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A New Composite Indicator of Household Risk Preparation

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Abstract:

In this paper, we conceive, define and propose a new manageable composite statistical indicator conceptualizing and measuring the cross-country preparedness of households - of a certain country - to face generic risk events, in particular adopted here for EU15 member states. We construct our original composite statistical variable by using the following basic empirically measurable statistical variables: Access to finance index (%), Wealth per adult ($US), Debt per adult ($US), Insurance (% of GDP), Unemployment rate (% of labor force), Mean years of schooling, GNI per capita (current $US), government gross debt (% of GDP), Physicians (n° per 10,000 persons). In order to build up our new index we use the principal component analysis of Stata and, secondly, a simple linear aggregate analysis after renormalization. We, finally, conduct the two analysis for the study case of EU15 countries, creating two ordered cardinal tables and confront the two series of results in order to verify the meaningfulness of our proposed new statistical index.

Keywords: principal component analysis; composite indicator; household risk preparation index

JEL Classification: C1; C3; C38; C8

Introduction

Recent years have seen growing interest in the conceptualization and measurement of household risk preparedness at the cross-country level.

The purpose of our study is the design of a simple index measuring the cross-country preparedness of households to face generic risk events, for EU15 member states.

More specifically, we propose our composite variable to measure the hypothesized capacity of the average household - of certain country – in order to respond to exogenous shocks, such as illness of family members, unemployment, natural disasters, and so on, in such a way that the shock events do not lead to significant loss of consumption or wellbeing of family members themselves.

1. Research background

As we already well-known, a composite indicator measures a multidimensional concept (*e.g.* cultural development of a population, environmental quality of a country, quality of life, happiness of citizens, corruption of political members of a parliament, perception of a general corruption of a country), multidimensional concept which cannot be directly measure and cannot be defined by a single mono-dimensional statistical indicator. Many scientists have dealt with the search for indices that can measure such multidimensional concepts.

As we can read in literature, a composite indicator requires a theoretical definition, which allows the selection, combination and weighting of individual mono-dimensional indicators.

For the definition of the concept, we refer in particular to Foa (2013); he was involved in the evaluation of a household risk preparedness index, but through a different definition, a different method of analysis (factor analysis) on different statistical units and using different selections of indicators for obtaining their algebraic combinations.

We have also studied other approaches to similar problems, for example the works of Islam and Maitra (2012) that considered the possible type of shocks for rural households.

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For what concerns future researches and applications, we are proposing new composite indicators and we are conducting analysis with the same methodology also for general and applicative works, following the lines of the papers Carfi and Donato (2018, 2017).

2. Methodology

In this section, we present the construction of our general model.

Identification of dimensions, sub-dimensions and variables

We can measure the preparedness capacity of the average household of a country, to respond to an exogenous shock, by identifying the mechanisms by which households can protect against such shocks. This appears the result of accumulated physical, human and social assets of households, their participation in insurance mechanisms their access to public goods.

Moreover, we consider the capacity of the country to respond to bad events through preventive health measures and disaster relief. This classification of risk preparedness leads to an identification of two big dimensions, and four sub-dimensions, that determine household ability to manage risk, as follows:

- Capacity of household:
  - Financial Resources: access to credit; household savings.
  - Social/Human Resources: insurance mechanism; possession of human assets (skills and knowledge)
- State capacity:
  - Aggragate Financial Resources: capacity to respond to large scale shocks (natural disaster or financial crisis); aggregate social resources; preventive health measures (mitigate common risk hazards, *i.e.* health and sanitation).

The variables we use in our study are:

Table 1. Summary of indicators and data sources

Indicator	Source
Access to finance index	Honohan (2007)
Wealth per adult, $US	Credit Suisse Global Wealth Databook (2017)
Debt per adult, $US	Credit Suisse Global Wealth Databook (2017)
insurance (% of GDP)	OECD Data (2017)
Unemployment rate (% of labor force)	OECD Data (2017)
Mean years of schooling	PERFA (2015)
GNI per capita (current $US)	World Bank (2016)
Government gross debt (% of GDP)	World Economic Outlook Database (2015)
Physicians (per 10000 people)	PERFA (2015)

Construction of a composite indicator

After the selection of indicators, we assign weights to indicators in order to produce the final index. Most composite indicators rely on equal weighting.

Our indicators will show different measurement units so, prior to data aggregation, normalization is required. We will use the min-max rescaling. We transform the indicators so that they move in the same direction and so that they can be compared with min-max rescaling.

3. Case studies

We consider the following nine indicators to obtain our composite indicator of household risk preparation in a country belonging to the EU15 country group, as we show in Table 2.

Table 2. Values of the indicators for the countries

	Unemploy	Acc_fin_serv	Gov_gross_debt	Wealth_adult	Ins_perc	Debt_adult	GNIpc	Physician	Meanyearsc
AUT	-5.5	96	-86.82	221,456	4.789	-29,636	45,870	48.3	10.8344
BEL	-7.1	97	-105.6	278,139	6.315	-35,763	41,860	29.9	11.2732
DNK	-5.4	99	-42.61	281,542	10.597	-94,592	57,020	34.2	12.7293
FIN	-8.7	99	-59.63	159,098	4.128	-42,419	45,050	29.1	10.2860
FRA	-8.9	96	-95.14	263,399	11.02	-29,945	38,720	31.8	11.1331
DEU	-3.8	97	-73.11	203,946	6.157	-28,735	43,940	38.1	13.0667

	Unemploy	Acc_fin_serv	Gov_gross_debt	Wealth_adult	Ins_perc	Debt_adult	GNIpc	Physician	Meanyearsc
GRC	-21	83	-177.18	111,684	2.007	-15,289	19,050	43.8	10.2600
IRL	-6.2	88	-109.46	248,466	17.373	-51,629	52,010	27.2	12.2000
ITA	-11.4	75	-132.11	223,572	7.973	-21,931	31,720	40.9	10.1018
LUX	-5.2	99	-24.61	313,687	34.462	-82,610	71,590	28.2	11.7139
NLD	-4.7	100	-68.3	204,045	4.850	-77,029	46,610	31.5	11.8893
PRT	-8	84	-130.18	89,437	5.592	-20,653	19,880	34.2	8.2451
ESP	-16.6	95	-97.67	129,578	5.464	-23,599	27,580	37.0	9.5819
SWE	-6.6	99	-41.5	260,667	7.375	-61,188	54,480	32.7	12.0951
GBR	-4.2	91	-89.54	278,038	9.214	-47,869	42,360	27.9	13.0544

3.1 Linear aggregation method with min-max scaling

We obtain, for every country, a composite indicator considering the weighted mean of nine values (from nine different indicators) belonging to the interval [0,1] (by min-max rescaling) and then multiplying by 100. We present the rank of the countries in Table 3.

Table 3. Rank of the countries

Luxembourg	75.543
Germany	66.886
Austria	65.271
Denmark	65.078
Sweden	64.091
United Kingdom	59.091
France	57.129
Belgium	56.281
Ireland	55.514
Netherlands	55.172
Finland	49.841
Italy	42.538
Spain	40.662
Portugal	31.289
Greece	29.15467

We remark that we could use also different weights for any indicator or for any sub-dimension.

The first country in the above Table 3 is Luxembourg, then four countries appear very close together in the ranking and they are Germany, Austria, Denmark and Sweden. Then we see United Kingdom with a score of 59.1 and then we see another four countries with very similar rank (France, Belgium, Ireland and Netherlands). In 10th position we see Finland, then Italy and Spain follow and finally Portugal and Greece close the ranking.

3.2 Principal component analysis multivariate method

Then, we propose the Principal Component Analysis for the construction of our composite indicator.

Using the software Stata, the command “pca” displays the principal components in unit normalization; the sum of squares of the principal loadings equals 1. In this normalization, the sum of the squared loadings equals the variance explained by that component (see Stata.com).

First of all, we write down here the commands and remarks taken from software Stata, regarding the principal component analysis.

```
. pca GNIpc wealth_adult gov_gross_debt acc_fin_serv unemploy Meanyearsc Physician debt_adult ins_perc

Principal components/correlation                  Number of obs    =         15
                                                  Number of comp.  =          9
                                                  Trace            =          9
    Rotation: (unrotated = principal)             Rho              =     1.0000
```

In Table 4a we show the eigenvalues of the components and the proportion of variance explained.

Table 4a. Principal component analysis with Stata: eigenvalues of the components.

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	5.54899	4.52752	0.6166	0.6166
Comp2	1.02146	.232897	0.1135	0.7300
Comp3	.788566	.16196	0.0876	0.8177
Comp4	.626606	.20554	0.0696	0.8873
Comp5	.421066	.122113	0.0468	0.9341
Comp6	.298953	.13527	0.0332	0.9673
Comp7	.163684	.0762759	0.0182	0.9855
Comp8	.0874081	.0441426	0.0097	0.9952
Comp9	.0432655	.	0.0048	1.0000

In Table 4b we show the eigenvectors of the components.

Table 4b. Principal component analysis with Stata: eigenvectors of the components

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9	Unexplained
GNIpc	0.4066	-0.0489	0.0419	0.2648	0.0429	0.0044	0.0414	0.1433	-0.8581	0
wealth_adult	0.3513	-0.2301	0.4232	-0.0057	-0.0832	0.3389	-0.7050	-0.0370	0.1560	0
gov_gross_~t	0.3754	0.2711	-0.2422	0.2311	0.1708	0.0013	-0.0287	0.7220	0.3496	0
acc_fin_serv	0.2973	0.5635	-0.3225	0.0985	-0.1707	0.4627	0.0464	-0.4833	0.0388	0
unemploy	0.3282	0.1368	0.1994	-0.3610	0.7814	-0.1424	0.1043	-0.2436	0.0487	0
Meanyearsc	0.3201	0.1195	0.5594	-0.2429	-0.4515	-0.0101	0.5269	0.1235	0.1206	0
Physician	-0.2542	0.3094	0.5104	0.7139	0.1846	-0.0890	0.0365	-0.1298	0.0960	0
debt_adult	-0.3662	-0.0086	0.1470	-0.1426	0.2667	0.7773	0.2069	0.2966	-0.1330	0
ins_perc	0.2703	-0.6518	-0.1472	0.3839	0.1151	0.1963	0.4070	-0.2092	0.2680	0

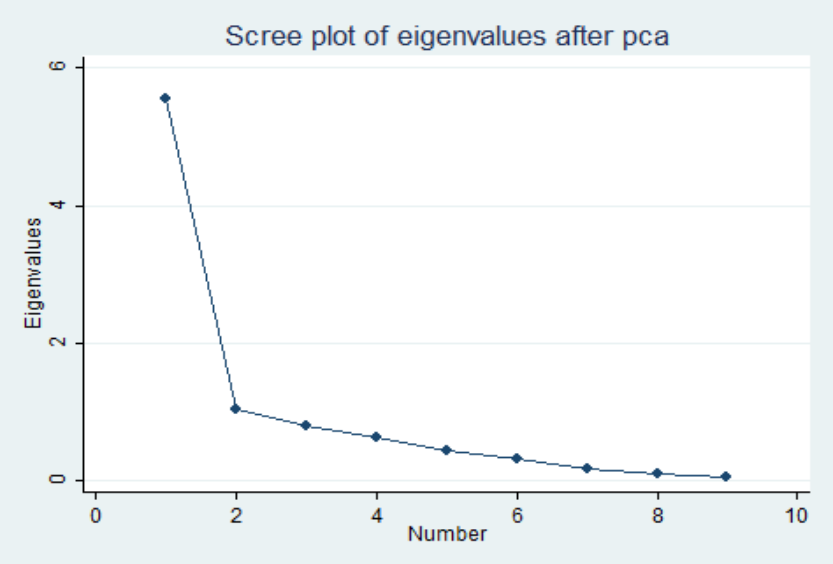
The proportion of variance in Table 4a indicates how much of total variance appears in the variance of a particular principal component. Hence, the first principal component variability explains 61.7% of total variance of the data. The first two principal components show eigenvalues greater than 1. These two components explain 73% of the variation in the data.

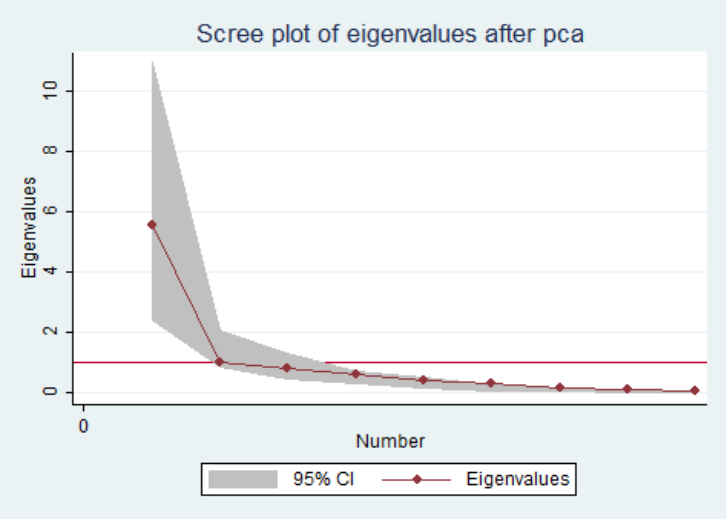
Remark. The principal components are the linear combinations of the original variables that account for the variance in the data. The maximum number of components extracted always equals the number of variables. The eigenvectors, which are comprised of coefficients corresponding to each variable, are used to calculate the principal component scores. The coefficients indicate the relative weight of each variable in the component.

The larger the absolute value of the coefficient of the original variables, the more important the corresponding variable is in calculating the component (see Stata.com).

With the "screeplot" command we visualize every eigenvalue relative to one another (with the related confidence interval), see Figure 1.

Figure 1. Scree plot of eigenvalues after "pca" command.





By the commands "loadingplot" and "scoreplot", we can look at the components from the perspective of the columns (variables) or the rows (Countries).

In particular, we use the loading plot to identify which variables have the largest effect on each component. Loadings can range from -1 to 1. Loadings close to -1 or 1 indicate that the variable strongly influences the component, while, loadings close to 0 indicate that the variable has a weak influence on the component.

Figure 2. Plot of component loadings.

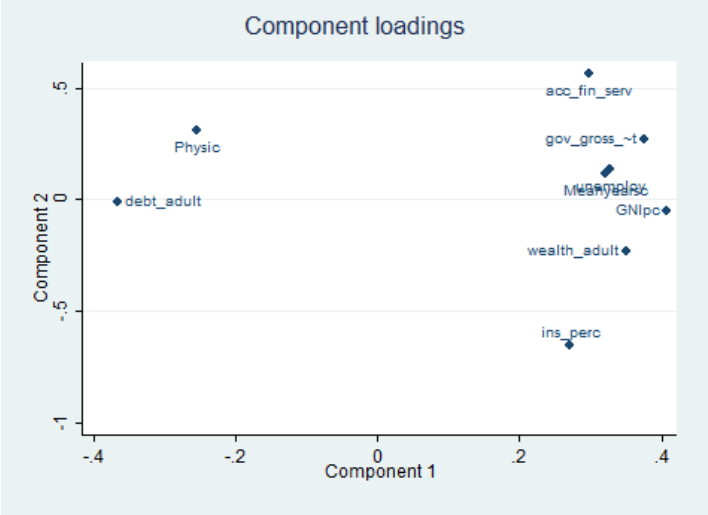
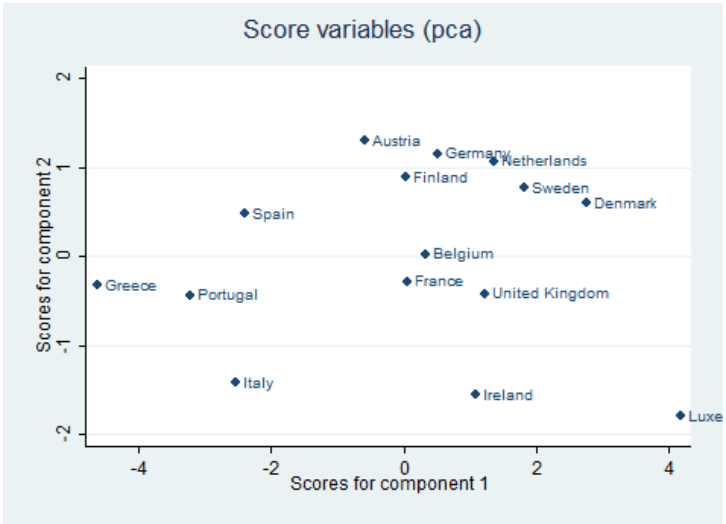


Figure 3. Plot of score variables after pca



We can use, in Stata, the "predict" command to obtain the components themselves and we obtain the first factors by typing, "predict pc1". The rank is shown in the following Table 5 (as in Figure 3).

Table 5. Rank of the countries ordered with increasing composite index.

Country	pc_1
Greece	-4.626
Portugal	-3.227
Italy	-2.537
Spain	-2.397
Austria	-0.596
Finland	0.040
France	0.063
Belgium	0.329
Germany	0.515
Ireland	1.080
United Kingdom	1.232
Netherlands	1.363
Sweden	1.819
Denmark	2.762
Luxembourg	4.179

3.3 A comparison of two methods

After comparison between the two methods, we can see that the ranking of the countries is different. In fact, Austria moves from the 3rd to the 10th place, Germany passes from the 2nd to the 7th place and Netherland from the 10th place to the 4th place, and so on. Only the country at the top of the ranking and the country at the bottom of the ranking do not move.

Table 6. Comparison of two methods.

Linear aggragation method (min-max rescaling)	PCA
Luxembourg	Luxembourg
Germany	Denmark
Austria	Sweden
Denmark	Netherlands
Sweden	United Kingdom
United Kingdom	Ireland
France	Germany
Belgium	Belgium
Ireland	France
Netherlands	Finland
Finland	Austria
Italy	Spain
Spain	Italy
Portugal	Portugal
Greece	Greece

We re-consider Table 4b of principal component eigenvectors. In Table 4b, the first principal component (that is the first column of the table), shows positive components for all variables (rows) except for the variables *debt_adult* and *Physician* (rows number 7 and 8). The score of the first principal component vector can be calculated from the standardized data using the coefficients listed in first column, that is its components, in Table 4b:

$$pc_1 = 0.4066\ GNIpc + 0.\ 3513\ wealth\_adult + 0.3754\ gov\_gross\_debt + 0.2973\ acc\_fin\_serv + 0.3282\ unemploy + 0.3201\ Meanyearsc - 0.2542\ Physician - 0.3662\ debt\_adult + 0.2703\ ins\_perc. \quad (1)$$

We note that two variables show negative loading factors. This is not what we expected, because we had already transformed the indicators taking into account variables negative for our purpose (*debt_adult*, *unemploy*,

gov_gross_debt), that is we had placed the negative sign on the indicators contributing negatively to the assessment of the composite indicator "household risk preparedness".

We interpret this absurd as the proof that those variables were not measuring what we had intended to measure. In other terms, those factors do not mean what we think they imply, or those factors are just picking up measurement errors or sampling error.

That suggests us we should delete those variables from the analysis, or drop the whole factors from the solution. So, we analyze again the two methods by eliminating the two variables. From the method of linear aggregation with equal weight and the min-max rescaling normalization we obtain the following Table 7.

Table 7. Rank of the countries with decreasing order of Household risk preparation index

Luxembourg	94.2577
Denmark	78.9006
Sweden	72.6901
United Kingdom	67.0766
Germany	66.7764
Netherlands	64.8619
Ireland	63.6358
Belgium	59.9099
France	58.686
Austria	57.9333
Finland	53.4244
Spain	32.8867
Italy	32.3107
Portugal	22.1447
Greece	11.9584

From the PCA multivariate method, we obtain, as before, the eigenvalues of the components (Table 8a), the eigenvectors of the components (Table 8b), the scree plot of eigenvalues (Figure 4), the plot of component loadings (Figure 5) and the plot of score variables (Figure 6):

```
. pca Meanyearsc GNIpc ins_perc wealth_adult gov_gross_debt acc_fin_serv unemploy

Principal components/correlation                  Number of obs    =         15
                                                  Number of comp.  =          7
                                                  Trace            =          7
    Rotation: (unrotated = principal)             Rho              =     1.0000
```

Table 8a. Principal component analysis with Stata: eigenvalues of the components

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.53957	3.55224	0.6485	0.6485
Comp2	.987325	.27739	0.1410	0.7896
Comp3	.709935	.289356	0.1014	0.8910
Comp4	.420579	.245865	0.0601	0.9511
Comp5	.174715	.0561121	0.0250	0.9760
Comp6	.118602	.0693273	0.0169	0.9930
Comp7	.0492751	.	0.0070	1.0000

Table 8b. Principal component analysis with Stata: Eigenvectors of the components

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Unexplained
Meanyearsc	0.3639	-0.0283	-0.6234	0.4115	0.5325	0.0250	0.1568	0
GNIpc	0.4517	0.1031	0.1515	0.0593	0.0804	-0.3261	-0.8038	0
ins_perc	0.2904	0.6638	0.4583	0.0046	0.2893	0.3676	0.2149	0
wealth_adult	0.3982	0.3184	-0.2928	0.1755	-0.7763	-0.0006	0.1450	0
gov_gross_~t	0.4151	-0.2718	0.3479	-0.0779	0.0480	-0.6049	0.5084	0
acc_fin_serv	0.3324	-0.5989	0.3053	0.2905	-0.1359	0.5757	-0.0582	0
unemploy	0.3713	-0.1184	-0.2800	-0.8402	0.0545	0.2462	-0.0157	0

Figure 4. Scree plot of eigenvalues after pca

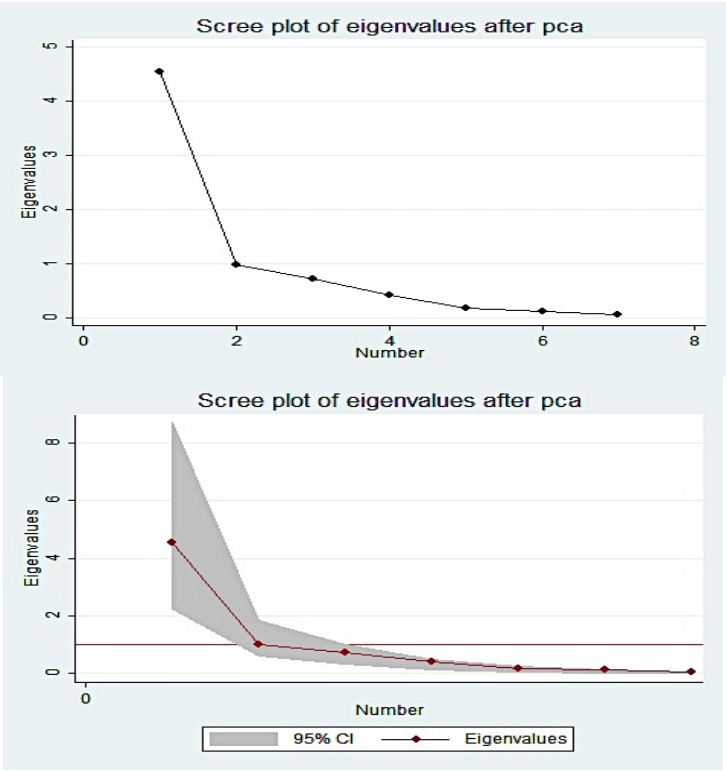


Figure 5. Plot of component loadings

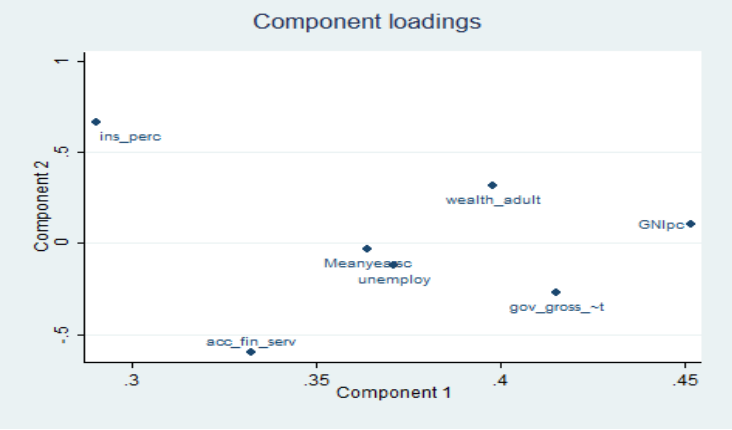
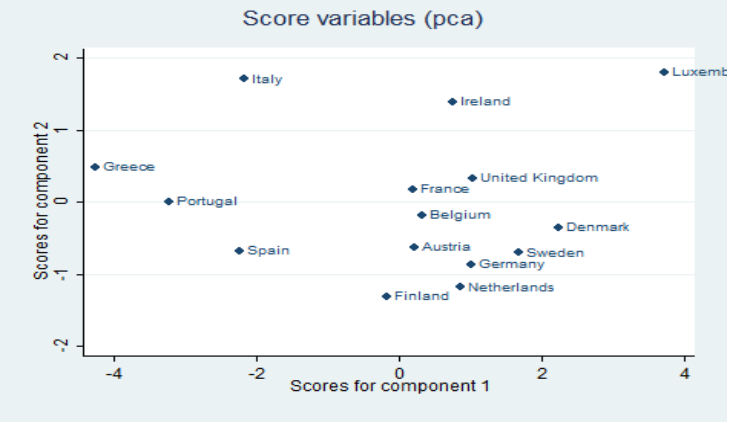


Figure 6. Plot of score variables after pca



In Table 9 we propose the rank of score variables for component 1.

Table 9. Rank of the countries ordered by increasing composite index.

Country	pc1
Greece	-4.257
Portugal	-3.229
Spain	-2.230
Italy	-2.163
Finland	-0.172
France	0.194
Austria	0.220
Belgium	0.321
Ireland	0.756
Netherlands	0.857
Germany	1.017
United Kingdom	1.040
Sweden	1.678
Denmark	2.250
Luxembourg	3.718

The comparison of the two methods gives the following result.

Linear aggragation method (min-max scaling)	PCA
Luxembourg	Luxembourg
Denmark	Denmark
Sweden	Sweden
United Kingdom	United Kingdom
Germany	Germany
Netherlands	Netherlands
Ireland	Ireland
Belgium	Belgium
France	Austria
Austria	France
Finland	Finland
Spain	Italy
Italy	Spain
Portugal	Portugal
Greece	Greece

The two methods lead practically to the same results.

Conclusion

In our work, we have conceived, defined and proposed a new manageable composite statistical indicator conceptualizing and measuring the cross-country preparedness of households - of a certain country - to face generic risk events, in particular adopted here for the EU15 member states.

We have constructed our original composite statistical variable by using the following basic empirically measurable statistical variables: Access to finance index (%), Wealth per adult ($US), Debt per adult ($US), Insurance (% of GDP), Unemployment rate (% of labor force), Mean years of schooling, GNI per capita (current $US), Government gross debt (% of GDP), Physicians (n° per 10000 persons).

In order to build up our new index, we have used the principal component analysis of Stata and, secondly, a simple linear aggregate analysis after renormalization.

We, finally, have conducted the two analysis for the study case of EU15 countries, creating two ordered cardinal tables and we have confronted the two series of results in order to verify the meaningfulness of our proposed new statistical index.

The result of the comparison is that the two methods lead practically to the same result, when we choose the variables showing positive loading factors according to the principal component analysis.

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A Bayesian Structural Time Series Approach to Forecast Mexico's Consumer Index

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Abstract:

A Bayesian structural time series model is used to forecast the current value of the consumption index in Mexico, where correlated searches in Google's search engine are used to determine the weekly value of the index. Mexico's Institute of Statistics and Geography releases the consumer index, along with other important macroeconomic variables, in a three-month span from their recollection. This can be improved by using information that is readily available just a few days from the end of each month to create an estimate with Bayesian methods. For this we set the time series model in state space mode, which allows us to use a big set of regressors as predictors of the current value of Mexico's consumer index. The main finding is that the use of the search queries improves significantly the accuracy of prediction.

Keywords: Bayesian structural time series; state space models; consumption index; forecasting

JEL Classification: C11; C55; D12; E27

Introduction

Every month, Mexico's Institute of Statistics and Geography (INEGI) publishes the Monthly Indicator of Private Consumption in the Domestic Market. This indicator is a valuable tool for researchers, local governments and firms to make informed decisions and build more knowledge from it. Although a period length between releases of the indicator of one month can be a reasonable time in periods of economic stability, a more responsive flow of data may be needed in periods of recession. Moreover, most indicators are often released with several months of delay. In the case of the Private Consumption Index, the most recent information available is three months old. In a context of macroeconomic volatility, the reduction of the window of uncertainty can prove to be a key factor for accurate policy decisions.

The existence of new sources of information means that there is room for improvement in the publication of indicators that can be used for macroeconomic policy decisions. This preview of the information to be published has come to be known as nowcasting (Banbura 2013), *i.e*., predictions about the present, the very near future or very recent past. For example, the GDP is released quarterly by INEGI, but it also releases a monthly indicator of economic activity, which is a rough estimation of the same elements that compose the Gross Domestic Product.

One possible source of data that can be useful to nowcast the consumption index can be found in Google search queries data, available in the Google Trends and Google Correlate (Mohebbi *et al*. 2011) tools. A reasonable case can be made that enough consumption items imply Internet search activity in a way such that it is possible to infer future or present consumption activity through peaks in searches.

This might be true even for a country like Mexico, with a relatively low broadband penetration. The reasoning is that some important product queries might be correlated to the intermediate demand. For example, we will further show that searches for transport services are frequently correlated with the consumption index. This might suggest that the transport of merchandise can be used as a predictor of consumption, and, if the Google searches for the services are a big part of the purchasing process, then the search trends can be helpful to predict consumption. Indeed, it is possible that the users search for the transport companies to get tracking numbers, which might be seen directly reflected in the correlation between the queries and the consumption index.

In this article, we develop a state space model to forecast the Mexican consumption index using Google search data as regressors. The private consumption is a major component of the Gross Domestic Product of a

nation and provides strategic information to governments, firms and researchers. It is assumed that some significant part of the consumption process of final or intermediate goods implies Internet searches and, thus, it is reasonable to believe that Google searches can be used as explanatory variables for consumption. Google searches have been used to predict several macroeconomic indicators, such as motor vehicles and parts demand, unemployment and traveling (Choi 2012). Nowcasting is becoming ever more important for central banks for policy decision.

The rest of the document is organized in the following way. Section 2 provides a brief description of the Private Consumption Index of Mexico, the methodology used for collecting it and its role in policy decision. Section 3 describes the state space model and the simulation techniques used to compute the regression coefficients. Section 4 describes the forecasting made under this model with and without the use of search queries as regressors. Section 5 discusses the empirical findings. Finally, section 6, concludes.

1. The data

In this section the data used in the model will be described. Our variable of interest is the Private Consumption Index, which we describe further in this section. The private consumption can be very descriptive and a useful indicator of an economy. Moreover, it might be reasonable to consider that the index can be benefited from the insight obtained from Google search data, which is described further in this section, along with its interpretation.

Mexico's information collection methodology is designed to match the methodologies of international organisms, such as the United Nations, EUROSTAT, the Organization for Economic Co-operation and Development (OECD) and the International Monetary Fund (IMF) (see INEGI, 2013). This means that the GDP and its components follow a standard theoretical framework that helps compare one series with another. This means that a consumption index can be compared within countries with a reasonable degree of confidence that both measurements mean the same, provided that the statistics source is reliable and follows the same methodology.

It would be only natural to keep a certain degree of skepticism about the comparability of indexes. After all, it would be an interesting coincidence that two countries share the same weight in the relevance of the demand of a certain industry. Nonetheless, the indexes and their components are clearly a reliable indicator of the state of the economy.

The theoretical framework of the National Accounts is consistent with that of standard macroeconomic models. Thus, the aggregate demand is:

$$Y = C + I + G + (X - M) + \epsilon \tag{1}$$

where: Y is the demand-side GDP which is composed by the Private Consumption C; gross Capital Formation is measured by Iwhich by convention stands for investment in the demand side of the economy; the Government spending is denoted by G; and $(X - M)$ stands for the net exports.

Official statistics include a term for variations in existence. That is, demand unaccounted for that can be explained by other terms that cannot be classified in the components in equation (1).

Some variables can be explained with more accuracy by Google searches than others. As we will see further in the document, the balance of trade variables tends to have less out-of-the-box prediction power than the local variables. This makes sense, since the export and import of goods should be subject to exogenous variables, independent of the search behavior of the country, *e.g.* the exchange rate.

The private consumption index is composed by consumption of national products and imports. Domestic consumption is divided in goods and services, whereas the imports index has only products. The information available starts in 1993, which is the year that the record starts in order to standardize measurements previous to the entry to NAFTA. However, in this article we will only use the information from 2004 to 201, which is the period available from Google search data.

The information from this index is gathered by INEGI with data from different surveys applied to firms in the manufacturing industry, services and registries from the trade balance and the National Price Index (INEGI 2013). This data is complemented with information from producers' associations and statistics derived from institutions such as state-owned petroleum company PEMEX, the Automotive Industry Mexican Association and the Bureau of Labor Statistics of the United States of America for the imports. Since the sources may differ in time releases, they use Denton's method (Denton 1971) to adjust the data into a monthly release.

Since the data release from INEGI for the monthly data has a three months' lag but the Google search data is available within a few days of difference, the creation of an early forecast of the indicator may prove to be valuable for decision takers. The main condition for this forecast to be useful is that a reasonably accurate model can be created from the data. It is possible to have an insight of the topics of interest of the public by observing Google

query data. People make queries on a daily basis on a broad variety of subjects and the search volume varies in time according to economic activity and changes in interest. It is possible to make inferences from these queries that reveal more than what surveys and other methods for collecting data may tell us. For example, Stephen-Davidowitz (2014) finds a proxy for racial animus using Google search data, and Stephen-Davidowitz (2013) using the same methodology argues that an economic downturn results in an increase in children maltreatment rates.

The users of the search engine type a certain query, *e.g.*, "credit card score" and the volume of queries is registered and can be observed as a time series of the normalized popularity of the query over time. The scale is such that the maximum of any give series is always 100, and the output from the Google Trends series can be restricted to a given period of time and for any of the countries in which the service is used. The data can also be filtered by category of search (for example, it might be relevant to distinguish if the word 'jaguar' means the animal or the car), and by Google service (images, news, YouTube videos or the Google shopping service). The results can be also filtered at state level or by city, when it is available.

The earliest date of the series is from January 2004 and it can be searched in monthly, weekly, daily, hourly, and by the minute frequencies. It is also possible to obtain the queries with highest correlation indexes from a particular time series using the Google Correlate tool, which uses Asymmetric Hashing to find the 100 nearest neighbors across millions of candidate time series in less than 200 milliseconds (Vanderkam *et al*., 2013). It uses a standard Pearson correlation to measure how close is one-time series to another and applies a k-means algorithm to compute approximate distance between vectors.

In this research, we took the Consumption Index of Mexico from 2004 to march of 2017 and found the most correlated searches for the period. Table 1 shows the search terms with more correlation and their respective Pearson correlation indexes given by:

$$r(x,y) = \frac{\text{cov}(x,y)}{\sigma_x \sigma_y} = \frac{\sum_{j=1}^{n}\left[\left(y_j-\mu(y)\right)\left(x_j-\mu(x)\right)\right]}{\sqrt{\sum_{j=1}^{n}(y_j-\mu(y))^2}\sqrt{\sum_{j=1}^{n}(x_j-\mu(x))^2}} \quad (2)$$

where: x in an element of regressors vector $\mathbf{x}$.

It is noticeable that this set of regressors, shown in Table 1, is composed of various consumption related terms. It is remarkable the proportion of consumption related searches found, considering that the search is not restricted to any kind of queries. The set of consumption related queries found include electronics, automotives, homeware, hobbies, food, clothes and footwear. It is also noticeable that several brands of transportation service show strong correlation with the consumption index. The companies that require goods from different cities to accommodate demand might search a transportation company in order to get a delivery tracking number. Another important service that is consistently correlated with the consumption index is credit cards and commercial credit companies. It is natural to think, then, that since some of the consumption can be explained by the use of credit cards, increases in their use should lead to an increase in issues (*e.g.*, a rejected operation or any other misunderstanding) that requires the user to search for means of communication with the company. Other consumption items that are allegedly searched for during the purchasing process are homeware, cars and accommodation, which are found in the set of queries. The information collected from the search engine is thus used as a predictor in a time series model described in the next section.

2. The forecasting model

In this section, we use a structural time series model that includes a trend, seasonality and a set of regressors. We use the structure and methodology described in Scott and Varian (2014) of Bayesian Structure Time Series, as well as the R package developed by the authors.

A structural time series model is divided into two equations, the observation equation and the state transition equation. In this type of model, a latent state is observed indirectly through another variable, therefore, in:

$$y_t = Z_t^T \alpha_t + \varepsilon_t; \qquad \varepsilon_t \sim \mathcal{N}(0, \sigma_\varepsilon^2). \quad (3)$$

Variable y_t is the observation of the latent state α_t. The observation is altered by a set of structural parameters contained in Z_t and an observation noise, captured by the normally distributed ε_t, where every observation is independent to the rest of the time series. The latent state α_t evolves over time according to:

$$\alpha_t = T_t \alpha_{t-1} + R_t \eta_t; \qquad \eta_t \sim \mathcal{N}(0, \sigma_\eta^2), \quad (4)$$

where: T_t and R_t are also structural parameters and η_t is independent to ε_t and to itself as well. It is not uncommon that Z_t, T_t and R_t contain mostly strategically placed zeros and ones, which are indicators of the relevance of the state variable to the model.

The simplest model is a local level model, where α_t=μ_t and Z_t, T_t, R_t are all an instance of the scalar 1.

$$y_t = \mu_t + \varepsilon_t; \qquad \varepsilon_t \sim \mathcal{N}(0, \sigma_\varepsilon^2) \tag{5}$$

$$\mu_{t+1} = \mu_t + \eta_t; \qquad \eta_t \sim \mathcal{N}(0, \sigma_\eta^2) \tag{6}$$

Note that if $\sigma_\eta = 0$, then μ is a constant and the observation equation shows different noisy instances of the same state. That means that the best estimator to any particular observation of y_t is the mean of the previous observations. However, a model in which $\sigma_\varepsilon = 0$ implies that the best estimator of y_t is y_{t-1}, since it is a random walk. Also note that the current state depends indirectly on the complete set of observations, even though it only depends directly on the previous state (*i.e.*, it is Markov).

One of the main reasons for using structural time series models over Box and Jenkins (2015) methodology is its flexibility and transparency. The shape of the parameters can be modified in a modular way to model trend, seasonality, regressions and other effects that may be needed with flexibility. This model is considerably transparent since it does not rely on differences, lags and moving averages. Instead, the regression and seasonality is included directly in the model and they can be visually inspected. Additionally, any ARIMA model can be expressed in state space mode.

Figure 1 shows the trend and seasonality of the consumption index of Mexico from 1993, when it was first recorded, to 2017. This information can be obtained from a state space model without regression components. A general model with trend μ_t, a seasonal pattern τ_t and a regression component $\beta^{\mathrm{T}}\mathbf{x}_t$ can be stated as:

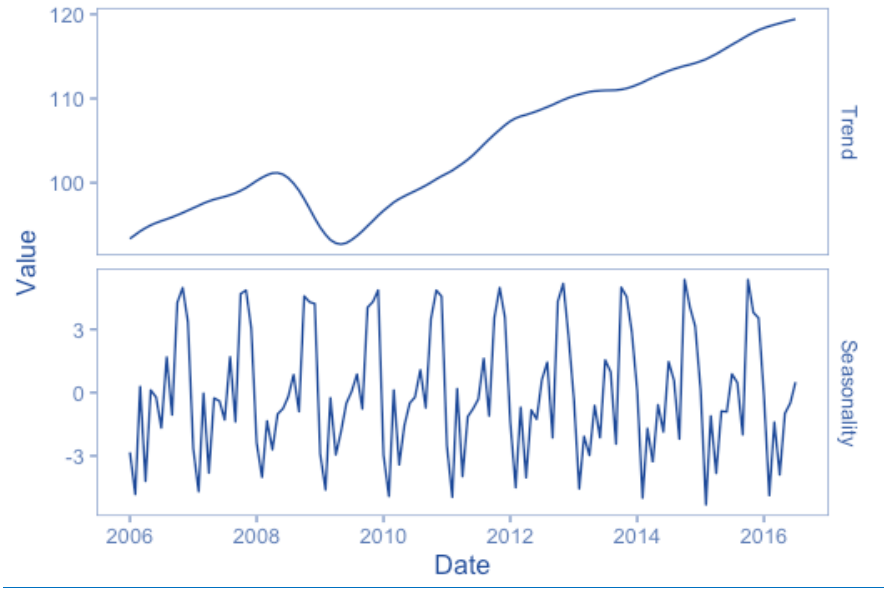
$$y_t = \mu_t + \tau_t + \beta^{\mathrm{T}}\mathbf{x}_t + \varepsilon_t, \tag{7}$$

$$\mu_t = \mu_{t-1} + \delta_{t-1} + u_t \tag{8}$$

$$\delta_t = \delta_{t-1} + v_t \tag{9}$$

$$\tau_t = -\sum_{s=1}^{S-1} \tau_{t-s} + w_t \tag{10}$$

Figure 1. Trend and seasonality of Consumption Index of Mexico



Source: Own estimations based on data from INEGI

In this model, the state variable error term is a vector $\eta_t = (u_t, v_t, w_t)$ that contains elements of Gaussian noise. The trend is similar to the local level model above, but a term δ_t is added as a slope of the local linear trend. This addition reflects the belief that the time series is drifting in a particular direction, such that a prediction of the next observation should reflect a continuous increase or decrease in the direction of the current

trend. Slopes regularly multiply some variable, but in this case the coefficient of δ_t is just $\Delta t = 1$. The state variable from (3) becomes a diagonal matrix with σ_u^2, σ_v^2 and σ_w^2 as its elements and $H_t = \sigma_\varepsilon^2$.

The seasonal component can be understood as a regression with S seasonal dummy variables. In Scott and Varian (2014), the analysis is made with weekly data, so the authors set $S = 52$. Since this paper works with monthly data, let: $S = 12$. The regression components vector $\mathbf{x}$ is made from the Google search data in Table 1 found in the Appendix, and the regression coefficients β is supposed to be known.

Once the model is in state space form, we can use the Kalman filter (Kalman 1960) which leads to the Kalman smoother and Bayesian Data Augmentation (*cf*. Hoeting 1999) for predictions. The Kalman filter is a recursive procedure to compute the optimal estimator of the state vector, given the available information.

Let $y_{1:t}$ be the set of observations of the time series up until time t. Given the assumption that the initial state is $\alpha_t \sim \mathcal{N}(a_0, P_0)$ with a_0 and P_0 known, it is possible to calculate recursively the predictive distribution $p(\alpha_{t+1}|y_{1:t})$ (see Harvey 1990 for the computational details of the Kalman filter and Kalman smoother). This is done by combining $p(\alpha_{t+1}|y_{1:t})$ and $p(\alpha_t|y_{1:n})$, where n is the length of the complete time series; it can be proven that the result is equivalent to a linear regression (Bode 1950). We use the Durbin and Koopman (2001) method for simulating random noise with the covariances drawn from $p(\alpha_{1:n}|y_{1:n})$.

The set of search queries with high correlation to the consumption index is used in the observation equation as $\beta^{\mathrm{T}}\mathbf{x}$ in equation (4). Although it might seem as it is a big set of regressors, a high degree of *sparcity* is expected, *i.e*., most predictors have a coefficient zero. A description of twenty-one different algorithms for selection of variables is made in Castle (2009), where they identify approaches as information criteria, selection of a "portfolio" of the best subset of models, general-to-specific algorithms, forward-stepwise regression approaches and Bayesian Model Averaging.

The spike-and-slab technique to select the regression variables from the available set was first proposed by George and McCulloch (1997) and Madigan and Raftery (1994). Let γ denote a dummy variable of the same size as β that is zero when a variable is not included in the regression and one when it is. Let therefore β_γ represent the set of regressors that are included in the regression, *i.e*., the subset for which $\gamma_i = 1$. The residual variance of the regression model is σ^2. A spike-and-slab prior for the joint distribution of $(\beta, \gamma, \sigma^{-2})$ can be computed by:

$$p(\beta, \gamma, \sigma^{-2}) = p(\beta_\gamma|\gamma, \sigma^{-2})p(\sigma^{-2}|\gamma)p(\gamma) \tag{11}$$

Each variable is assumed to have Bernoulli distribution, so the prior is the product

$$\gamma \sim \prod_i \pi_i^{\gamma_i} (1-\pi_i)^{1-\gamma_i}. \tag{12}$$

If there is no detailed information, it is common practice to set π_i to the same number for all regressors. In the case of prior knowledge of expected regressors, it is possible to set k out of K average nonzero predictors by setting $\pi = k/K$. In this application, some search queries are set to zero, and the rest are given a prior value of $\pi_i = 0.1$. This is the "spike" component of the selection method.

The "slab" part is a prior of the values for the nonzero coefficients. Let b be a prior guess of the coefficients of the regressors and Ω^{-1} a prior precision matrix. A conjugate "slab" prior is given by:

$$\beta_\gamma|\gamma, \sigma_\varepsilon^2 \sim \mathcal{N}\left(b_\gamma, \sigma_\varepsilon^2\left(\Omega_\gamma^{-1}\right)^{-1}\right), \quad \frac{1}{\sigma_\varepsilon^2} \sim \Gamma\left(\frac{\nu}{2}, \frac{ss}{2}\right) \tag{13}$$

where: Ω_γ^{-1} is the matrix with rows and columns of Ω^{-1} for which $\gamma_i = 1$.

Here, $\Gamma(r, s)$ denotes the gamma distribution with mean r/s and variance r/s^2 . We may choose the prior parameters to make the slab weakly informative, conditional to γ. It is a convention to set $b = 0$, except, perhaps, for the intercept term. The value ν is considered the prior sample size and ss the prior sum of squares. Both values can be set by asking the value of the expected R^2 from regression. Thus, we set $ss/\nu = (1-R^2)s_y^2$, where s_y^2 is the marginal standard deviation from the response.

Let $\mathbf{X}$ denote the design matrix composed by the predictors so that the likelihood for an ordinary regression model has Fisher information matrix $\mathbf{X}^{\mathrm{T}}\mathbf{X}/\sigma_\varepsilon^2$. This means that if we take $\Omega^{-1} = \kappa\, \mathbf{X}^{\mathrm{T}}\mathbf{X}/n$, we are placing a weight to the prior mean b equivalent of κ observations (Zellner 1986). In this application we use the default settings $\kappa = 1, R^2 = 0.5, \nu = 0.01$ and $\pi_k = 0.5$.

To compute the posterior distribution of the model parameters, we use Markov Chain Monte Carlo (MCMC) simulations. Our main objective is to compute the value of parameters β, σ_ε^2 and θ, which comprises all other

model parameters needed. Let ϕ denote the collection of parameters $(\beta, \sigma_\varepsilon^2, \theta)$. Then, the complete data posterior distribution is given by:

$$p(\phi, \alpha_{1:n}|y_{1:n}) \propto p(\phi)p(\alpha_0)\prod_{t=1}^{n} p(y_t|\alpha_t, \phi)p(\alpha_t|\alpha_{t-1}, \phi) \quad (14)$$

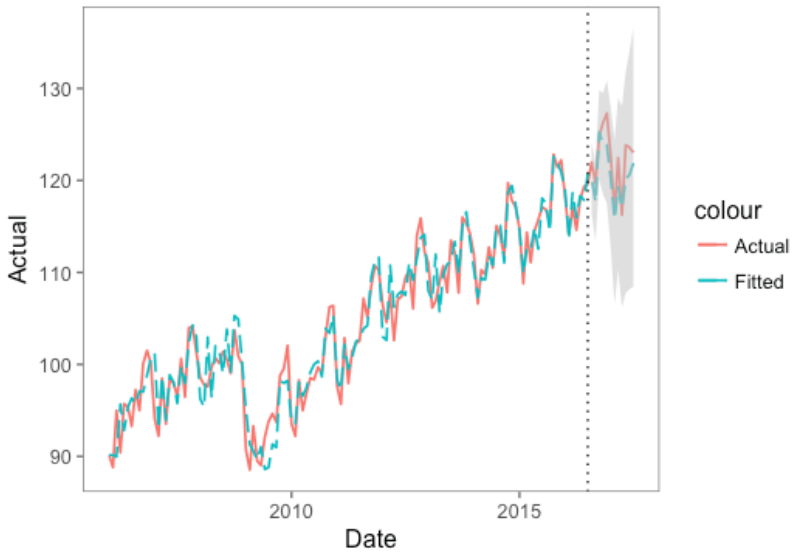
It is possible to draw a sample from the posterior distribution of the posterior parameters by using a Gibbs sampling algorithm, alternating between draws of $p(\alpha_{1:n}|\phi, y_{1:n})$ and $p(\phi|\alpha_{1:n}, y_{1:n})$. This will produce a sequence of pairs $(\phi, \alpha_{1:n})_0, (\phi, \alpha_{1:n})_1$, ... as a Markov chain for a given number of iterations. It is customary to *burn* a certain amount of the first iterations to ensure that the resultant distribution of ϕ reflects more accurately the posterior expected value of $p(\phi|\alpha_{1:n}, y_{1:n})$.

Durbin and Koopman (2001) describe a fast smoothing technique to compute $\mathbb{E}(\alpha_{1:n}|y_{1:n}, \theta)$ with Kalman filters. Thus, we use this algorithm to simulate the latent state from $p(\alpha_{1:n}|y_{1:n}, \theta, \beta, \sigma_\varepsilon^2)$. We then proceed to simulate $\theta \sim p(\theta|y_{1:n}, \alpha_{1:n}, \beta, \sigma_\varepsilon^2)$ and use this information to simulate the parameters β and σ_ε^2 from a Markov chain with stationary distribution $p(\beta, \sigma_\varepsilon^2|y_{1:n}, \alpha_{1:n}, \theta)$. The parameters distributions are the main result of the work and they are used for the prediction of the consumption index. In section 4, we make a prediction with $\beta = 0$ and with the complete set of search queries as predictors, estimating the parameters. The result of the MCMC algorithm is, naturally a set of random numbers distributed whose mean we will take as the values of the parameters.

3. Forecasting of Mexico's Consumer Index

In this section we describe the application of the forecasting model for obtaining the consumption index from Google search queries. We use Google correlate to get the 100 most correlated terms, described in Table 1 in the Appendix.

Figure 2. Fitted data on BSTS model without regression components



Source: Own estimations based on the Monthly Consumer Index by INEGI

The dataset is split in a training set from January of 2006 to July 2016, which leaves one-year worth of data from August 2016 to July 2017 for forecasting. Two years of data, from January 2004 to December 2005 are discarded for lack of information in the Google Trends data from Mexico. Then, the model specifications are set, with a seasonality of $S = 12$.

Figure 2 shows a forecast with a Bayesian Structural Time Series model without regressors. From the model stated above, we can see that the forecasting returns a distribution, rather than a number, and it is seen how the accuracy of the model diminishes as the moment of the forecasting is further from the last available data point. The main contribution of present research is to show that this model can be improved by including a regression component to the model in which the data is taken from related search queries. We can thus think that present values of the consumption index can be forecasted with a higher precision before the official release from statistics institute is out by using the search queries for certain consumption items.

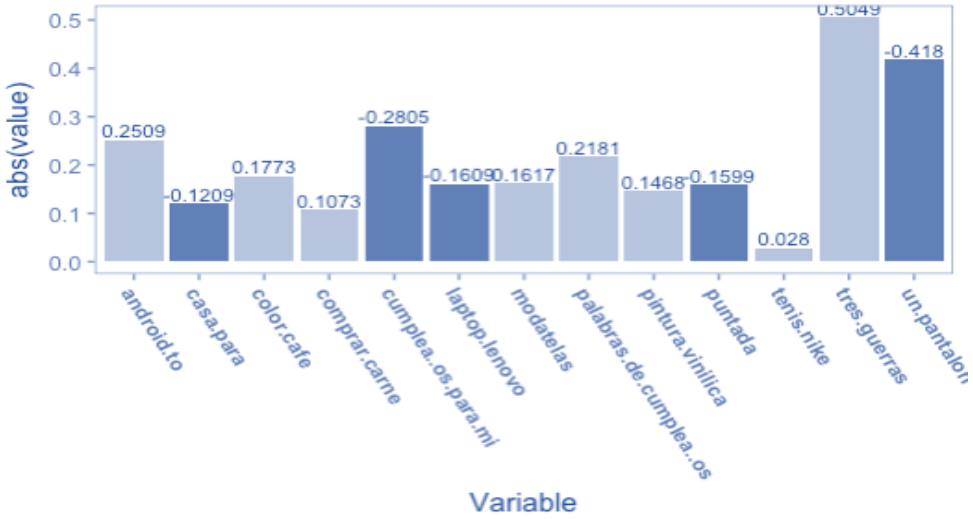
The MCMC model with regressors ran for 5000 iterations in a 1600 MHz Ddr3 Apple workstation in a runtime of 32.001s, using the R package from Scott and Varian (2011). We burnt the first 200 iterations and calculated the

posterior parameters from the rest. We set an expected size of $k = 20$, this is, we expect to see on average 20 variables with a positive probability of inclusion in the regression (see section 3).

Figure 3 shows the average mean of the coefficient of the regressors interpreted as a probability of inclusion. We include only those search terms with an absolute coefficient value above 0.05. As we can observe, the most positively correlated search queries is “tres.guerras”. This is a transport company in Mexico, which might suggest that general consumption can be traced by the activity of transport companies in the country. It is natural to assume that a significant proportion of users of transport services use search engines to find the companies' website, looking for the tracking number.

Several other consumption items are also included in the set, such as meat, smartphones, cars, personal computers, clothing and vinyl paint. Very few of the search terms that showed high correlation with the index have an unclear relation.

Figure 3. Average coefficient of the search terms obtained by MCMC simulations



Most of the brands searched for consumption items are popular brands in the country. The complete set of predictors includes consumption credit companies (*i.e.,* firms whose business model considers selling the good to the consumer in differed payments), banks, department stores, food, car accessories, furniture and shoes. Most correlated terms are so because they have been persistently correlated through the economic cycle. It might therefore be possible to find current brands that are more informative of present consumption, but with less predictive power over time.

As previously mentioned, one of the main advantages of state space models against other methodologies is its transparency. In Figure 4 we can see the model's trend, seasonality and regression components. Again, what this graphic is showing is the average value of the components across iterations in each month during the period under study. The elements in Figure 4 are shown up to March 2016, and are combined in the model to create a prediction from April 2016 to March 2017. The resulting prediction and its distribution are shown in Figure 5. Note that the distribution of the prediction shows an upper and inferior limit at 97.5% and 2.5%, respectively, closer to the mean than the one in the model without regressors. In Figure 6, the absolute cumulative one-step prediction errors in both models are compared, where the dotted line shows the errors in the model without the inclusion of search queries. It is possible to observe that the size of the errors is considerably diminished in the model with regressors, shown in the black line. The inclusion of search terms for nowcasting of the current level of the consumption index shows a significant improvement.

Figure 4. Model components with regressors

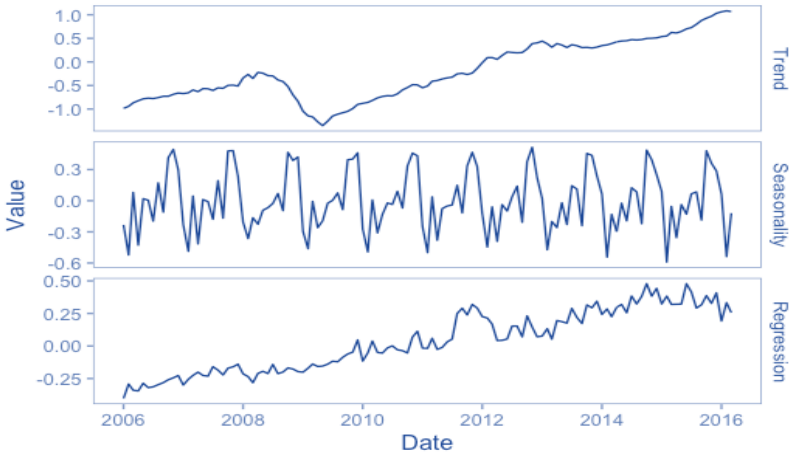


Figure 5. Fitted data on BSTS model with regression components

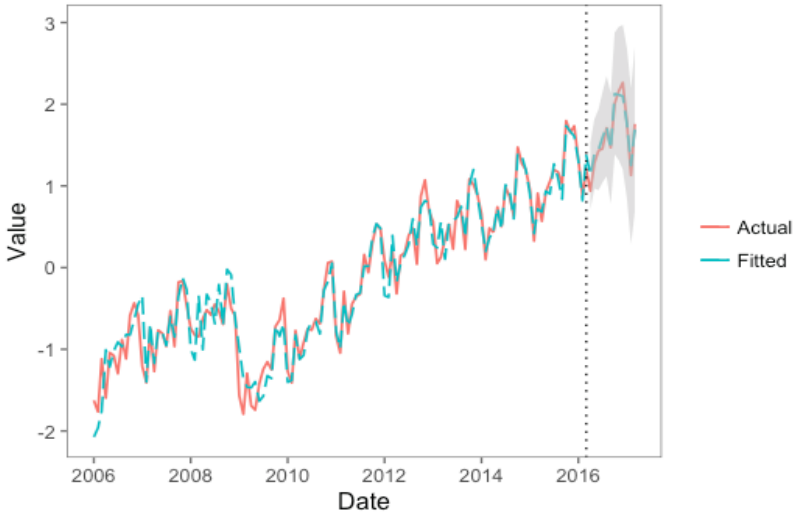
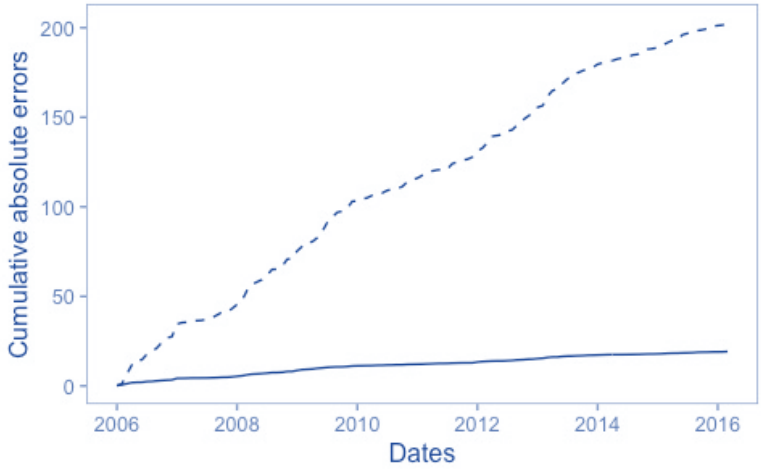


Figure 6. Prediction errors on BSTS model with and without regressors



4. Discussion of empirical results

A model for nowcasting the consumption index, an important component of Gross Domestic Product was developed in this article. From the components of the GDP, the private consumption appears to have a clearer relation with Google search queries as predictors.

Although correlated search terms can be searched for every component of the GDP, we assume that the private consumption is the only element where search terms are a significant predictor.

The information from Google data is, thus, used to make a regression model, modeling the time series behavior as a state space model, where the Google search information is observed and used to infer the consumption index that follows a Gaussian Markov process. This kind of model allowed us to include trend and seasonality as essential part of the time series behavior. Additionally, we use a Spike and Slab regression, to select from the set of search queries, those with higher probability of inclusion. This can be done by setting a prior in the Bayesian model about the size of the regressors set and the coefficients that it will show. Then the parameters are computed using a MCMC algorithm, which generates a distribution of results. The mean of the output is used as parameter.

Conclusions

The inclusion of search queries in the model showed a significant reduction in the prediction error. This might result in an advantage for forecasting present value of the consumption index whose official record is usually released with a three months delay. Such improvement in the availability of information might prove to be helpful in decision taking from businesses and governments. The set of search queries used span through the years before, during and after the great recession. Also, the rise and fall of different brands of products is covered in the information available. This means that some of the correlated terms in the period covered can cease to be significant in later contexts and the model would have to be readjusted to account for new consumption items and habits.

The proposed model permits to include in the set of predictors other variables different from the search queries to make better predictions. Which variables can be helpful to predict series such as imports and exports or even imported goods in the consumption index in a model that includes both search queries and official statistics remains an open question.

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APPENDIX

Number	Variable	Correlation	Class	Explanation
1	Feliz cumpleaños para mi novio	0.9337	Birthday	Boyfriend birthday
2	Tarjeta de liverpool	0.9326	Credit	Department store credit
3	Tarjeta de credito	0.9319	Credit	Bank credit
4	Color cafe	0.9298	Unclear	Brown color
5	Tarjeta bancomer	0.9288	Credit	Bank credit
6	Jetta sport	0.9271	Automotives	Automobile
7	Laptop lenovo	0.9269	Electronics	Computer brand
8	Catalogo de vianney	0.9269	Homeware	Catalog sales
9	Computadora lenovo	0.9263	Electronics	Computer brand
10	Led de	0.9263	Homeware	Led lightbulbs
11	Moño	0.9253	Unclear	Ribbon
12	Tenis nike	0.9250	Clothing and Shoes	Tennis shoes
13	Faly music	0.9238	Music shop	Music instruments
14	Convertidor de pesos a dólares	0.9237	Currency	Currency converter
15	Chevrolet toro	0.9234	Automotives	Automobile
16	Telefono de coppel	0.9224	Credit	Department store credit
17	Piscar	0.9223	Unclear	To pinch
18	Paredes exteriores	0.9223	Homeware	Outer walls
19	Zapatos cerrados	0.9222	Shoes	Closed shoes
20	Tarjeta sears	0.9221	Credit	Department store credit
21	Caja de tequila	0.9219	Alcohol	Tequila box
22	Zara kids	0.9219	Department store	Clothing brand
23	Hotel hotsson	0.9218	Accommodation	Hotels
24	Combinaciones de color	0.9218	Unclear	Color combination
25	Mulza	0.9218	Shoes	Footwear outlet
26	Dar gracias	0.9218	Unclear	Thanks giving
27	Hd para pc	0.9217	Electronics	Hardware
28	Descargar musica de youtube	0.9217	Music	Download music
29	Felicitar a una amiga	0.9216	Birthday	Congratulate a friend
30	Tarjeta de credito banamex	0.9215	Credit	Bank credit
31	Farolitos	0.9213	Restaurant	Common restaurant name
32	Y+	0.9213	Unclear	Unclear
33	Colores para combinar	0.9212	Unclear	Color combination
34	Latte	0.9211	Coffee	Coffee
35	Regulador de alternador	0.9211	Autoparts	Alternator regulator
36	Hotsson	0.9210	Accommodation	Hotel
37	Palabras de cumpleaños	0.9207	Birthday	Birthday congratulations
38	Spat mail	0.9206	Transport	Delivery company
39	Instalar facebook	0.9206	Software	Install facebook
40	Frijoles	0.9206	Food	Beans
41	Moñito	0.9206	Hobbies	Little ribbon
42	Bonn dorada	0.9205	Automotives	Car distributor
43	Para desear feliz cumpleaños	0.9205	Birthday	To wish happy birthday
44	Letras de feliz cumpleaños	0.9204	Birthday	Happy birthday banners
45	Tarjeta coppel	0.9203	Credit	Department store credit
46	Juego de sala	0.9201	Homeware	Living room
47	Tarjeta de debito banorte	0.9202	Credit	Debit card
48	Sillas de comedor	0.9202	Furniture	Diner chairs
49	64gb	0.9201	Electronics	Computer storage
50	Llanta tornel	0.9201	Autoparts	Car wheels
51	01800 banamex	0.9200	Credit	Bank number
52	Cafeses	0.9198	Gramatical	Brown color
53	Y café	0.9197	Coffee	Coffee
54	Tres guerras	0.9196	Transport	Delivery company
55	Pintura vinilica	0.9195	Homeware	Vinyl paint

Number	Variable	Correlation	Class	Explanation
56	Tele samsung	0.9194	Electronics	Television screen
57	Tarjeta famsa	0.9191	Credit	Department store credit
58	De gato	0.9191	Pets	Of a cat
59	Vs versa	0.9190	Automotives	Automobiles
60	Puntada	0.9189	Hobbies	Stitch
61	Carta cumpleaños novio	0.9188	Birthday	Birthday cards
62	A1278	0.9187	Electronics	Apple computer model
63	Sacar tarjeta de credito	0.9187	Credit	Credit card
64	Orillas	0.9186	Unclear	Borders
65	Mi llanta	0.9186	Automotives	Car wheels
66	Cumpleaños a una amiga	0.9185	Birthday	Friend's birthday
67	Zapateria moderna	0.9184	Shoes	Shoe store
68	Volkswagen torreon	0.9183	Automotives	Car distributor
69	Mensajes de cumpleaños	0.9183	Birthday	Birthday message
70	Cuello de camisa	0.9182	Clothes	Shirt collar
71	Tacos tarascos	0.9182	Restaurant	Taco parlor
72	Desear feliz cumpleaños	0.9181	Birthday	Wish happy birthday
73	Combina	0.9181	Color	To combine
74	Cafe juan valdez	0.9180	Coffee	Coffee
75	Modatelas	0.9180	Fabrics	Fabrics store
76	Una puerta	0.9180	Homeware	A door
77	Prueba rapida de vih	0.9180	Health	Hiv quick test
78	Android to	0.9180	Electronics	Smartphones
79	Llanta bridgestone	0.9179	Automotives	Car wheels
80	Comprar carne	0.9179	Food	To buy meat
81	Taladro bosch	0.9178	Hardware	Drill
82	Colores cafes	0.9178	Color	Brown color
83	Tarjeta costco	0.9177	Credit	Department store
84	Quick digital	0.9177	Advertising	Advertising
85	Cumpleaños para mi	0.9177	Birthday	Birthday for me
86	Pintura vinimex	0.9177	Homeware	Vinyl paint
87	Pintura verde	0.9176	Homeware	Green paint
88	Un pantalon	0.9174	Clothing	Pants
89	Casa para	0.9173	Unclear	House for
90	Traje cafe	0.9173	Clothing	Brown suit
91	Pantalon hombre	0.9172	Clothing	Man's pants
92	Ves o vez	0.9172	Gramatical	Gramatical query
93	Pintar zapatos	0.9172	Shoes	Paint shoes
94	Kurazai	0.9171	Automotives	Motorcycle brand
95	Banamex 01800	0.9171	Credit	Bank
96	Telefono soriana	0.9171	Department store	Department store
97	Mesa de comedor	0.9170	Homeware	Diner table
98	Catalogo de jafra	0.9170	Perfume	Catalog sales
99	Telefono de famsa	0.9170	Credit	Department store
100	Caldo de gallina	0.9170	Food	Chicken soup

The 2008-2009 Global Crisis: The Environmental Impacts on Developed versus Less Developed Countries

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Abstract:

In this study, we examine the impact of the 2008-2009 Global Crisis on developed and less developed countries' environmental scores. Our results for the developed countries show that, while the Global Crisis has affected both the EPI (*i.e.* Environmental Performance Index) and the Ecosystem Vitality scores significantly, there has been no significant impact on the Environmental Health scores. On the other hand, our results for the less developed countries indicate that the Global Crisis has affected all three general categories (*i.e.* the EPI, the Environmental Health, and the Ecosystem Vitality scores) negatively. In other words, when faced with a global economic crisis, less developed countries need to deal with both Environmental Health and Ecosystem Vitality issues while developed countries only need to deal with Ecosystem Vitality issues. In this study, we also show how developed versus less developed countries perform in each Environmental Health and Ecosystem Vitality subcategory (in total, 22 subcategories). Policymakers in developed versus less developed countries should concentrate their efforts in only the significantly affected areas.

Keywords: global crisis; environment; ecosystem vitality; Environmental Performance Index; sustainability

JEL Classification: Q50; Q53; Q54; Q56; Q57; Q58

Introduction

In this study, we examine the impact of the 2008-2009 Global Crisis on environmental sustainability. We compare how developed versus less developed countries' environmental indicators are affected due to the Global Crisis. As we know, the Global Crisis has affected both developed and less developed countries, therefore in this study, we expect to see significant impacts on both developed and less developed countries' environmental performance indicators.

The EPI (*i.e.* Environmental Performance Index) dataset produced by Yale University and Columbia University, in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission is very comprehensive. This dataset includes data on 132 countries' EPI data, as well as EPI's two main components (*i.e.* Environmental Health and Ecosystem Vitality). This dataset also includes data on the subcomponents of both Environmental Health and Ecosystem Vitality.

The dataset classifies the countries into three groups based on per capita income. These groups are "Upper", "Middle", and "Lower" income groups. Since we want to compare the developed countries to the less developed countries, in this study, we simplify this classification and assign countries into two groups: The "High GDP/capita" group which includes all of the countries classified in the dataset as "Upper", and "Low GDP/capita" group which includes all of the other countries classified in the dataset as "Middle" or "Lower".

After differentiating between the developed (*i.e*. High GDP/capita) countries and the less developed (*i.e.* Low GDP/capita) countries, we use nonparametric tests to see how each group is affected by the Global Crisis. We first examine how the 2008-2009 Global Crisis has affected the developed countries' environmental indicators. We test to see whether EPI, Environmental Health, Ecosystem Vitality, or any of their subcomponents are affected significantly due to the Global Crisis. Then, we do a similar analysis for the less developed countries.

In this study, we are hoping to show how the level of development in a country affects the relation between the macro-economy (in this case, the Global Crisis period) and the environmental indicators in that country. Does the development level affect the relation between the macro-economic environment and economic quality? The findings here should guide policymakers in both developed and less developed countries in devising strategies and policies that would mainly support certain areas of the environment.

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Our paper continues as follows: Section 1 goes over the previous literature. Section 2 explains our hypotheses. Section 3 explains our data and methodology. Section 4 presents our empirical results. Finally, Section 5 concludes.

1. Research background

The "Environmental Kuznets Curve hypothesis" (EKC hypothesis) argues that there is an inverted U-shaped relation between economic growth and environmental degradation. As economic growth (or per capita income) increases, environmental degradation increases (*i.e*. environmental quality declines). When a certain level of per capita income is reached in a country, environmental degradation starts to go down (*i.e*. environmental quality starts to improve).

There are several studies that support the EKC hypothesis of an inverted U-shaped relation between economic growth and environmental degradation. In an earlier study, Stern *et al.* (1996) suggest that there is an inverted U-shaped relation between environmental degradation and income per capita. In another paper, Selden and Song (1994) look into the relation between air pollution and economic development and show that per capita emissions of pollutants have inverted U-shaped relationships with per capita GDP.

Welsch (2004) also supports the EKC hypothesis. Welsch (2004) explains that the relationship between per capita income and a number of pollution indicators have an inverted U-shaped (or downward-sloping pattern). According to the author, the existence of corruption may affect the relation between per capita income and pollutants. Corruption may raise pollution at given income levels (direct effect) and reduce per capita income (indirect effect). Welsch (2004) argues that developing countries may possibly improve both their economic and environmental performance by reducing corruption.

Barrett and Graddy (2000) shows a U-shaped relation between pollution and per capita income. According to Barrett and Graddy (2000), this inverted U-shaped relation exists because as incomes rise, citizens demand improvements in environmental quality, and that these demands are delivered by the political system. The authors also explain that civil and political freedoms may improve this inverted U-shaped relation.

While these studies support the EKC hypothesis, there are a few other studies that does not support it. Ekins (1997) finds that there is a positive relation between income and environmental degradation. The author explains that, even in the highest income countries, overall environmental quality is still declining. In contrast to the studies that support the EKC hypothesis, Grossman (1995) finds that, for most indicators, economic growth brings an initial phase of deterioration followed by a subsequent phase of improvement.

Broad (1994) examines the relation between per capita income and environmental quality in the Philippines. The author shows that, under certain conditions, poor people can become "environmental activists" (rather than "environmental degraders"). Galeotti (2007) also does not support the EKC hypothesis. The author contends that, at least after certain levels of income, a de-coupling or de-linking between economic development and environmental degradation is possible.

Other studies go deeper and look into the relation between economic growth and environmental quality from different perspectives. Smulders (1995) explains the conditions under which unlimited economic growth with limited natural resources is feasible. The author describes how a country can achieve sustainable growth. Arrow *et al.* (1995) look from the opposite direction and examine how excessive environmental degradation may affect the economy. The authors explain that excessive environmental degradation may hurt economic activity in the end. Lopez (1994) contends that economic growth decreases the degradation of natural resources if producers internalize their stock feedback effects on production. John and Pecchenino (1994) develop a model and show the circumstances under which sustained growth of both capital and environmental quality may occur.

Lopez and Mitra (2000) examine the impact of corruption on this inverted U-shaped relation. They show that corruption is not likely to preclude the existence of an inverted U-shaped relation between economic growth and environmental degradation. Scruggs (1998) examines whether equality (*i.e*. economic and political) result in less environmental degradation. The author finds that equality does not necessarily minimize degradation. Under certain conditions, greater inequality may even reduce environmental degradation.

Panayotou (2003) explains that in order to improve the inverted U-shaped relation between economic growth and environmental quality, governments should integrate environmental and economic policies, and also phase out environmentally harmful subsidies.

Spangenberg *et al.* (2002) argue that it si possible for governments to devise strategies that can support both economic growth and environmental quality. According to the authors, salary increases proportional to labor productivity growth, a modern social security system, reduced work times, social and technical innovation, and

green taxes are essential parts of any such strategy. Spangenberg *et al*. (2002) show the effectiveness of such strategies regarding social, environmental, and economic sustainability.

Brock and Taylor (2005) explain that when papers focus on the current serious environmental problems, they tend to be more pessimistic. When they focus on the improvement in living standards, they tend to be more optimistic. According to Brock and Taylor (2005), these two views are not necessarily inconsistent. Copeland and Taylor (2004) develop a model where government policy and private sector behavior interact with each other. This model shows how the equilibrium level of pollution can be determined.

Zhang (2008) examines Asia and argues that having the right policy mix as well as having a better cooperation at national, local and regional levels will support both economic growth and environmental quality in the region. Dasgupta *et al.* (2006) suggest that poor countries can implement strong environmental governance policies. According to their findings, climate and terrain account for much of the observed variation in developing countries' air pollution levels. Bartz and Kelly (2008) show that there is a different threshold of per capita income for developed and less developed countries. When compared to developed countries, for less developed countries, pollution peaks at a lower level of income.

Antal and van den Bergh (2013) examine if decoupling (of environmental quality and economic growth) is possible. Antal and van den Bergh (2013) explain that decoupling is very risky, because even if it is successful, it may hurt economic growth. Van den Bergh (2011) recommends governments to follow the strategy of "a-growth" (*i.e*. being indifferent about growth) rather than following the strategy of "de-growth".

Janicke (2012) explains that governments should focus on two issues: Developing environmental and resource-saving technologies, and reducing or eliminating products and processes that undermine long-term living and production conditions. Perez (2013) explains that "green growth" may be the most effective way to saving the economy. Zenghelis (2012) supports the arguments of Janicke (2012) and Perez (2013). The author argues that green investments support economic growth, therefore governments should promote such investments. Rodrik (2014) supports these papers and explains that green technologies should be supported.

Costantini and Monni (2008) suggest governments to increase their investments in human capital accumulation which would also help increase the quality of their institutions. The authors recommend developing countries to get advice and support from developed countries and to promote environmental protection as soon as possible. Costantini and Monni (2008) explain that maintaining environmental quality and achieving a higher standard are not necessarily contradictory.

Urhammer and Røpke (2013) go over the previous papers that offer solution to the economic crisis as well as achieving a sustainable economy. Acharyya (2009) finds that FDI inflows in India has a positive impact on both GDP growth and CO2 emissions. Geels (2011) examines the relation between the macro-economy and environmental efforts in a country. The author explains that crises tend to weaken public, political and business attention for environmental problems.

The most recent papers on the topic offer additional suggestions. Witt (2013) explains that the public does not accept lower economic growth, therefore they ignore sustainability efforts. Witt (2013) suggests that society should be convinced to rethink growth expectations and political priorities. Foxon (2013) explains that behavioral, ecological, institutional and evolutionary economics could form the basis for a new "economics". Loorbach and Huffenreuter (2013) contend that the economic crisis is an opportunity for countries around the world to accelerate fundamental systemic change that will lead to environmental sustainability.

While all of these studies look into the issue from different perspectives, in this current study, we expand both the depth and the breadth of the research. First, we go deeper than the previous papers because we examine the impact of a crisis period on many subcomponents of environmental performance. Second, we have more breadth than most of the previous papers because we examine the impact of a crisis period on 132 countries' environmental quality.

The next section explains our hypotheses.

2. Hypotheses

Since a global economic crisis, like the 2008-2009 Global Crisis, affects all countries, we expect to see governments of both developed and less developed countries to ignore environmental issues for a while. This would result in a decline in the environmental component scores. Our first hypothesis deals with the overall score, which is the EPI:

Hypothesis 1: The EPI of both developed and less developed countries had declined due to the global crisis.

Similarly, we expect to see both developed countries and less developed countries to suffer in terms of both components of the EPI. These are Environmental Health and Ecosystem Vitality. We also expect to see more

deterioration in both groups of countries in terms of the subcomponents of Environmental Health and Ecosystem Vitality. Therefore, our second and third hypotheses are:

Hypothesis 2: For both developed and less developed countries, the Environmental Health and its subcomponents were negatively affected due to the global crisis.

Hypothesis 3: For both developed and less developed countries, the Ecosystem Vitality and its subcomponents were negatively affected due to the global crisis.

The next section explains our data and methodology.

3. Data

In collaboration with the World Economic Forum and the Joint Research Centre of the European Commission, Yale University and Columbia University developed the EPI Index which includes the EPI index itself, its two main components (*i.e.* Environmental Health and Ecosystem Vitality), and their subcomponents. It covers 132 countries. In this study, we use this dataset (available at http://epi/yale.edu and distributed by the NASA Socioeconomic Data and Applications Center at http://sedac.ciesin.columbia.edu/data/set/epi-environmental-performance-index-pilot-trend-2012).

The EPI Index has two main components. These are "Environmental Health (EH)" and "Ecosystem Vitality (EV)". The subcomponents of "Environmental Health" are "Environmental burden of disease trend", "Air pollution (effects on humans)", and "Water (effects on humans)". The subcomponents of "Ecosystem Vitality" are "Air pollution (effects of ecosystem)", "Water (effects on ecosystem)", "Biodiversity and habitat", "Agriculture", "Forestry", "Fisheries", and "Climate Change Trend".

In the dataset, the countries are classified into three income groups. These are "Upper", "Middle", and "Lower" income countries. Using these three classifications, we created our own income classifications. These are "High GDP/capita" which includes all of the countries classified in the dataset as "Upper", and "Low GDP/capita" which includes all of the other countries.

Table 1 shows the annual percentage change in EPI and its two components (*i.e.* EH and EV). When we look at EPI, we are seeing that in year 2001 (which is actually the difference in EPI across the globe between year 2000 and year 2001), the average percentage change in EPI across all countries was 0.7955%. There was a solid improvement in EPI across the globe. Next year, in year 2002, the improvement was 1.0374%. After that, the improvement in EPI slowed down, but it was still strong in 2007 (0.6429% year over year increase). After 2007, we are seeing a decline in the improvement rate. It dropped to only 0.0372% in 2010 and -0.0006% in 2012 (which is actually a drop in the index).

When we look at Environmental Health (EH), we are seeing that in year 2001, the average percentage change in EH across all countries was 0.9793%. There was a solid improvement in EH across the globe. EH improved strongly each year up to and including year 2007. After 2007, we are seeing a decline in the improvement rate. It dropped to only 0.0002% in 2012 (which means it was flat).

When we look at Ecosystem Vitality (EV), we are seeing that in year 2001, the average percentage change in EV across all countries was 0.6898%. There was a solid improvement in EV across the globe. Next year, in 2002, the improvement was even stronger (1.1001%). EV improved strongly each year up to and including year 2007. After 2007, we are seeing a decline in the improvement rate. It dropped to only -0.1318% in 2010. In 2002, it improved slightly, but the percentage change in EV was still negative (-0.0004 which means it was still deteriorating).

The last row in the table shows the average improvement rate in EPI, EH, and EV over the sample period. During the whole period, EH improved the most. The average annual improvement was 0.6759% in EH. EPI improved, on average, by 0.5194% annually, and EV improved, on average, by 0.4284% annually.

Table 1. EPI and its components over time

Year	EPI	EH	EV
2001	0.7955	0.9793	0.6898
2002	1.0374	0.9287	1.1001
2003	0.5790	0.8461	0.4252
2004	0.7163	0.9244	0.5960
2005	0.6589	0.8396	0.5541
2006	0.5882	0.7837	0.4744

Year	EPI	EH	EV
2007	0.6429	0.8946	0.4961
2008	0.3956	0.5258	0.3193
2009	0.2626	0.3879	0.1891
2010	0.0372	0.3243	-0.1318
2012	-0.0006	0.0002	-0.0004
Average	0.5194	0.6759	0.4284

Table 2 shows the actual values of the EPI Index and its two main components EH and EV for the High GDP/capita countries. EPI had gradually improved for these countries until 2007 or 2008. It started at 56 and climbed up to 59 in 2007. After that, it was flat. EH gradually improved until 2007. It started at 89 and climbed up to 91 in 2007. After that, it was flat. Similarly, EV gradually improved until 2007. It started at 42 and climbed up to 45 in 2007. After that, it was flat.

Table 2. EPI and its components for high GDP countries

Year	EPI	EH	EV
2000	56.6063	89.0163	42.7163
2001	57.0692	89.4865	43.1760
2002	57.4875	89.8811	43.6046
2003	57.8596	90.1112	44.0375
2004	58.1796	90.5644	44.3004
2005	58.5303	90.8420	44.6824
2006	58.7751	91.0737	44.9328
2007	59.2556	91.3659	45.4941
2008	59.5555	91.4162	45.9010
2009	59.6093	91.4559	45.9608
2010	59.5769	91.4820	45.9032
2012	59.5766	91.4821	45.9034

Table 3 shows the actual values of the EPI Index and its two main components EH and EV for the Low GDP/capita countries. EPI had gradually improved for these countries until 2009. It started at 46 and climbed up to 49 in 2009. After that, it was flat. EH gradually improved until 2010. It started at 45 and climbed up to 51 in 2010. After that, it was flat. Similarly, EV gradually improved until 2009. It started at 46 and climbed up to 48 in 2009. After that, it was flat.

Table 3. EPI and its components for Low GDP countries

Year	EPI	EH	EV
2000	46.5401	45.5359	46.9704
2001	46.9033	46.2039	47.2031
2002	47.4859	46.8743	47.7480
2003	47.7392	47.5642	47.8142
2004	48.1334	48.2138	48.0990
2005	48.4687	48.8856	48.2900
2006	48.8088	49.5343	48.4979
2007	49.0658	50.2663	48.5513
2008	49.2237	50.7685	48.5617
2009	49.4097	51.1396	48.6684
2010	49.4583	51.4550	48.6026
2012	49.4580	51.4552	48.6022

By looking at these tables, for High GDP/capita countries, we can see that the EPI measure and its two components improved until 2007, and then this improvement stopped. For Low GDP/capita countries, we can see that the EPI measure and its two components improved until 2009 or 2010, and then this improvement stopped.

These tables indicate that the 2008-2009 crisis had a significant impact on these measures. There was a positive trend until the crisis hit (or until its effects were felt). After the crisis, the improvement in these measures disappeared.

In the next section, we will look into the impact of the 2008-2009 crisis on EPI, EH, EV, and their subcomponents using nonparametric tests (*i.e.* the Mann-Whitney-Wilcoxon tests). In our tests, instead of comparing the actual values of these measures, we will compare the changes (*i.e.* percentage changes) in each measure pre- and post-crisis. For the pre-crisis period, we take the year 2007. For the post-crisis period, we take the years 2010 and 2011.

4. Results

Table 4 compares the percentage change in EPI for developed countries pre- and post-crisis. It also compares the percentage change in EH, EV, and their main subcomponents pre- and post-crisis. We are seeing that the 2008-2009 Global Crisis had a significant impact on the trend of EPI (*i.e.* Environmental Performance Index) and Ecosystem Vitality (EV) scores, but it did not affect the trend in Environmental Health (EH) component of EPI.

EPI was improving at 0.501% annual rate before the crisis. After the crisis, the improvement rate was -0.001% (actually a deterioration). The difference is significant at 1% level (p=0.0002). EV was improving at 0.910% annual rate before the crisis. After the crisis, the improvement rate was 0.000%. The difference is significant at 1% level (p<0.0001). On the other hand, EH was improving at 0.055% annual rate before the crisis. After the crisis, the improvement rate was 0.000%. This difference is not statistically significant (p=0.5531).

The crisis also affected four main subcomponents negatively. These are "Water (on humans)", "Biodiversity and habitat", "Fisheries", and "Climate change trend". "Water (on humans)" was improving at 0.276% annual rate before the crisis. After the crisis, the improvement rate was -0.001% (actually a deterioration). This drop is significant at 1% level (p=0.0006). "Biodiversity and habitat" was improving at 2.032% annual rate before the crisis. After the crisis, the improvement rate was 0.000%. This drop is significant at 1% level (p=0.0003).

"Fisheries" was flat before the crisis. The change was 0.000%. After the crisis, the change was -0.004%. This drop is significant at 1% level (p=0.0084). "Climate change trend" was improving at 2.993% annual rate before the crisis. After the crisis, the improvement rate was 0.026%. This drop is significant at 1% level (p<0.0001).

Table 4. Env. indicators for high GDP/Capita countries before and after the 2008-09 crisis

Variables	Before			After			Wilcoxon
	Mean	Median	Std.	Mean	Median	Std.	p-value
EPI	0.501	0.231	1.212	-0.001	-0.001	0.005	0.0002
Environmental Health	0.055	0.000	0.444	0.000	0.000	0.003	0.5531
Ecosystem Vitality	0.910	0.426	2.300	0.000	0.001	0.008	<0.0001
Env, Burden of Disease Trend	0.067	0.000	0.736	0.001	0.000	0.004	0.9110
Air Pollution (on humans)	-0.099	0.000	0.505	0.000	0.000	0.002	0.2232
Water (on humans)	0.276	0.000	0.808	-0.001	0.000	0.003	0.0006
Air Pollution (on ecosystem)	0.000	0.000	0.000	0.002	0.003	0.012	0.0137
Water (on ecosystem)	0.000	0.000	0.000	0.001	0.000	0.020	0.1849
Biodiversity and Habitat	2.032	0.000	8.667	0.000	0.000	0.010	0.0003
Agriculture	-0.431	0.000	8.312	-0.001	0.000	0.007	0.2012
Forestry	-0.994	0.000	5.018	0.000	0.000	0.004	0.1284
Fisheries	0.000	0.000	0.000	-0.004	-0.005	0.015	0.0084
Climate Change Trend	2.993	2.298	8.840	0.026	0.003	0.171	<0.0001

Interestingly, one of the subcomponents improved. "Air pollution (on ecosystem)" was flat before the crisis. The change was 0.000%. After the crisis, the rate was 0.002%. This increase is significant at 5% level (p=0.0137).

Table 5 goes into more detail and shows the results of the comparisons for the environmental components which are the subcomponents of the measures that we show in Table 4. The table shows that, for developed countries, the improvement rates for "Indoor air pollution", "Access to drinking water", "Biome protection", "Pesticide regulation", "CO2 per capita", "CO2 per GDP", "CO2 emissions per elec. gen.", and "Renewable electricity" fell down significantly.

Our findings indicate that not all measures deteriorated. A few measures actually improved. We find that "SO2 emissions per GDP", "Growing stock change", and "Forest cover change" improved after the crisis.

Table 5. Env. components for high GDP/Capita countries before and after the 2008-09 crisis

Variables	Before			After			Wilcoxon
	Mean	Median	Std.	Mean	Median	Std.	p-value
Child mortality	0.067	0.000	0.736	0.001	0.000	0.004	0.9110
Indoor air pollution	0.000	0.000	0.000	-0.001	0.000	0.003	**0.0432**
Particulate matter	-0.288	0.000	1.321	-0.001	0.000	0.002	0.6701
Access to drinking water	0.336	0.000	1.051	0.000	0.000	0.004	**0.0117**
Access to sanitation	0.244	0.000	1.111	0.000	0.000	0.003	0.1971
SO2 emissions per capita	0.000	0.000	0.000	0.003	0.002	0.015	0.6980
SO2 emissions per GDP	0.000	0.000	0.000	0.002	0.003	0.008	**0.0044**
Change in water quantity	0.000	0.000	0.000	0.001	0.000	0.020	0.1849
Biome protection	1.907	0.000	5.773	0.008	0.000	0.067	**0.0017**
Marine protection	0.297	0.000	0.839	0.001	0.000	0.005	0.1315
Critical habitat protection	416.401	0.000	1316.780	0.018	0.001	0.057	0.7815
Agricultural subsidies	20.799	0.000	153.289	0.004	0.000	0.023	0.4385
Pesticide regulation	0.000	0.000	0.000	-0.003	-0.004	0.003	**0.0051**
Growing stock change	-2.140	0.000	9.485	0.000	0.000	0.001	**0.0141**
Forest loss	0.851	0.000	5.380	-0.004	0.000	0.029	1.0000
Forest cover change	-0.385	0.000	3.509	0.001	0.000	0.004	**0.0152**
Fishing stocks overexploited	0.000	0.000	0.000	-0.004	-0.004	0.017	0.6845
Coastal shelf fishing pressure	0.000	0.000	0.000	0.000	0.001	0.028	0.6771
CO2 per capita	5.988	1.846	26.003	0.000	0.000	0.021	**0.0091**
CO2 per GDP	1.565	1.678	4.810	0.002	0.001	0.008	**<0.0001**
CO2 emissions per elec. gen.	4.601	4.338	18.994	-0.054	0.003	0.551	**0.0004**
Renewable electricity	18.722	5.269	58.849	0.000	0.000	0.000	**<0.0001**

Table 6 compares the percentage change in EPI for less developed countries pre- and post-crisis. It also compares the percentage change in EH, EV, and their main subcomponents pre- and post-crisis. We are seeing that the 2008-2009 Global Crisis had a significant impact on the trend of EPI (*i.e.* Environmental Performance Index), Environmental Health (EH) and Ecosystem Vitality (EV) scores.

EPI was improving at 0.326% annual rate before the crisis. After the crisis, the improvement rate was -0.001% (actually a deterioration). The difference is significant at 1% level (p<0.0001). EH was improving at 1.247% annual rate before the crisis. After the crisis, the improvement rate was 0.000%. The difference is significant at 1% level (p<0.0001). EV was improving at 0.017% annual rate before the crisis. After the crisis, the rate was -0.001%. This difference is significant at 5% level (p=0.0186).

The crisis also affected five main subcomponents negatively. These are “Env. Burden of Disease Trend”, “Water (on humans)”, “Agriculture”, “Forestry”, and “Fisheries” (only marginally) deteriorated after the crisis. On the other hand, “Climate Change Trend” was deteriorating before the crisis. After the crisis, it was flat. This change is significant at 10% level (p=0.0673).

Table 6. Env. indicators for low GDP/Capita countries before and after the 2008-09 crisis

Variables	Before			After			Wilcoxon
	Mean	Median	Std.	Mean	Median	Std.	p-value
EPI	0.326	0.390	0.919	-0.001	-0.001	0.006	**<0.0001**
Environmental Health	1.247	1.074	1.122	0.000	0.001	0.009	**<0.0001**
Ecosystem Vitality	0.017	0.206	1.384	-0.001	0.000	0.008	**0.0186**
Env. Burden of Disease Trend	1.819	1.256	1.897	-0.002	-0.001	0.011	**<0.0001**
Air Pollution (on humans)	0.029	0.000	2.845	-0.001	0.000	0.007	0.1288
Water (on humans)	1.897	1.865	1.930	0.002	0.001	0.018	**<0.0001**
Air Pollution (on ecosystem)	0.000	0.000	0.000	0.000	0.001	0.014	0.2496
Water (on ecosystem)	0.000	0.000	0.000	0.004	-0.001	0.030	0.3953
Biodiversity and Habitat	0.068	0.000	0.242	0.004	0.000	0.037	0.5063
Agriculture	0.225	0.000	1.344	0.002	0.001	0.013	**0.0277**
Forestry	0.061	0.000	5.210	0.001	0.000	0.007	**0.0053**
Fisheries	0.000	0.000	0.000	-0.002	-0.001	0.014	**0.1089**
Climate Change Trend	-0.034	0.253	4.348	0.000	0.000	0.009	**0.0673**

Table 7 goes into more detail for less developed countries. The table shows that, for less developed countries, the improvement rates for "Child mortality", "Access to drinking water", "Access to sanitation", "Biome protection", "CO2 per GDP", and "Renewable electricity" fell down significantly.

Our findings indicate that not all measures deteriorated for less developed countries. A few measures actually improved. The measures that actually improved for less developed countries are "SO2 emissions per capita", "Forest cover change", and "CO2 per capita".

Table 7. Env. components for low GDP/Capita countries before and after the 2008-09 crisis

Variables	Before			After			Wilcoxon
	Mean	Median	Std.	Mean	Median	Std.	p-value
Child mortality	1.819	1.256	1.897	-0.002	-0.001	0.011	**<0.0001**
Indoor air pollution	0.410	0.000	2.753	-0.024	0.000	0.108	0.5583
Particulate matter	-0.736	0.000	9.644	-1.191	0.000	10.911	0.1184
Access to drinking water	1.783	1.337	2.304	-0.002	-0.002	0.011	**<0.0001**
Access to sanitation	1.830	1.556	2.312	-0.005	0.000	0.030	**<0.0001**
SO2 emissions per capita	0.000	0.000	0.000	0.000	0.001	0.013	**0.0840**
SO2 emissions per GDP	0.000	0.000	0.000	0.001	-0.001	0.016	0.1450
Change in water quantity	0.000	0.000	0.000	0.004	-0.001	0.030	0.3953
Biome protection	0.849	0.000	6.948	0.000	0.000	0.052	**0.0222**
Marine protection	0.008	0.000	0.046	0.001	0.000	0.006	0.7587
Critical habitat protection	0.099	0.000	0.497	1.905	0.002	9.855	**0.1016**
Agricultural subsidies	0.691	0.000	4.019	0.001	0.000	0.006	0.7354
Pesticide regulation	0.000	0.000	0.000	0.004	0.001	0.020	0.2727
Growing stock change	-1.343	0.000	18.527	-0.002	0.000	0.016	**0.1063**
Forest loss	0.000	0.000	0.000	0.000	0.000	0.006	0.4122
Forest cover change	-0.542	0.000	7.036	-0.001	0.000	0.041	**0.0007**
Fishing stocks overexploited	0.000	0.000	0.000	0.002	0.001	0.020	0.4075
Coastal shelf fishing pressure	0.000	0.000	0.000	0.000	0.000	0.023	0.5094
CO2 per capita	-0.804	0.000	2.995	0.000	0.000	0.004	**0.0570**
CO2 per GDP	0.883	1.047	12.235	0.002	0.001	0.014	**<0.0001**
CO2 emissions per elec. gen.	0.007	0.387	26.054	-0.007	0.004	0.123	0.2586
Renewable electricity	3.358	1.067	26.483	0.000	0.000	0.000	**0.0396**

Conclusion

In this study, we examine the impact of the 2008-2009 Global Crisis on developed and less developed countries' environmental scores. First, we examine Environmental Indicators which are more general measures of environmental issues. Then, we go deeper and examine the subcomponents of these indicators, which are called Environmental Components.

We use the dataset developed by Yale University and Columbia University in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission. This dataset includes data on the EPI Index, its two components, Environmental Health and Ecosystem Vitality, and their subcomponents. The dataset covers 132 countries.

Our results for the developed countries show that, while the Global Crisis has affected both the EPI (*i.e.* Environmental Performance Index) and the Ecosystem Vitality scores significantly, there has been no significant impact on the Environmental Health scores. When we examine the subcomponents, interestingly we find that nearly half of them were affected including some subcomponents of Environmental Health.

For developed countries, Water (on humans), Biodiversity and Habitat, Fisheries, and Climate Change Trend deteriorated after the crisis. When we go deeper, we find that, for these countries, Indoor air pollution, Access to drinking water, Biome protection, Pesticide regulation, CO2 per capita, CO2 per GDP, CO2 emissions per elec. gen., and Renewable electricity scores fell down significantly.

Our findings indicate that not all measures deteriorated. A few measures actually improved. The measures that actually improved for Developed countries are Air Pollution (on ecosystem) and Forestry. In terms of the subcomponents, we find that SO2 emissions per GDP, growing stock change, and Forest cover change improved after the crisis.

Our results for the less developed countries indicate that the Global Crisis has affected all three general categories (i.*e*. the EPI, the Environmental Health, and the Ecosystem Vitality scores) negatively.

For less developed countries, Env. Burden of Disease Trend, Water (on humans), Agriculture and Forestry deteriorated after the crisis. When we go deeper, we find that, for these countries, Child mortality, Access to drinking water, Access to sanitation, Biome protection, CO2 per GDP, and Renewable electricity scores fell down significantly.

Our findings indicate that not all measures deteriorated for less developed countries. A few measures actually improved. The measures that actually improved for less developed countries are Climate Change Trend and subcomponents which include SO2 emissions per capita, Forest cover change, and CO2 per capita scores.

We contend that when faced with a global economic crisis, less developed countries need to deal with both Environmental Health and Ecosystem Vitality issues while developed countries should mainly focus on Ecosystem Vitality (although a few subcomponents of Environmental Health should also be addressed). In this study, in our results section, we show how developed versus less developed countries perform in each Environmental Health and Ecosystem Vitality subcategory (in total, 22 subcategories). Policymakers in developed versus less developed countries should concentrate their efforts in only these significantly affected areas.

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Implementation of Financial Potential Generation Strategy based on Unconventional Method of Assets and Liabilities Management in Business Corporations

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Abstract:

The study substantiates the need to develop and implement financial potential generation strategy for corporations applying unconventional method of integrated liabilities and assets management via coordinated process of claims, liabilities and capital regulation. Integrated management of liabilities and assets in the corporation assumes the following: funds are generated in corporations and are allocated there as sources; financial sources are differentiated according to their circulation pace; financial sources are relocated into active instruments based on the requirements to liquidity, profitability, risk, and innovative development. This allows implementation of a balanced strategy in strategic financial management system supporting long-term activity of corporations. Suggested method for implementing financial potential generation strategy for corporations at a new level was tested in strategic financial management system of PJSC "Interregional Distribution Net Company of the North Caucasus".

Keywords: financial potential; strategy; integrated management; liabilities and assets; risk; inaccurate flows

JEL Classification: G10; G19

Introduction

In order to achieve efficient performance of corporations it is reasonable to fuse financial potential management in corporations and integrated approach to assets and liabilities management, where assets, capital and liabilities in indissoluble unity aimed to reach strategic goals of corporations supporting their strong positions in uncertainty environment. At the same time, liability and asset management focuses on development and implementation of financial potential generation strategy and execution of such activities that align corporation's balance sheet with strategic plans that imply setting up long-term objectives, subsequent development scenarios for a modern corporation, and implementation steps. Accordingly, the need for continuous improvement of financial potential generation strategy of corporations implies application of alternative implementation methods in practice.

As a rule, financial potential generation strategy for corporations is implemented based on traditional assets and liabilities management, which assumes financial equilibrium. Some economists, such as: Balabanov (2008),

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Basovsky (2013), Hygson (2012), Kovalev (2015), Kolchina, Portugalova and Makeeva (2015), Sinky (2016) while considering financial equilibrium matters and integrated assets and liabilities management do not merge them with implementation of financial potential generation strategy in corporations.

At the same time, financial practice shows that most corporations do not conform to the conditions of financial equilibrium because of inefficient employment of financial potential sources.

Many academic economists point out the need to make effective use of the financial potential of corporations, those are: Gilyarovskaya and Endovitskaya (2012), Minayeva (2012), Tolstykh and Ulanova (2004), Sheshukova and Kolesen (2013), Sheremet'ev (2008).

Also the scientists Bocharov (2006), Gilyarovskaya and Endovitskaya (2012), Kolchina and Polyak (2012), Komaretskaya (2005) highlight the importance of evaluation for efficient employment of financial potential in corporations.

However, existing works do not contain scientifically substantiated recommendations for development of non-traditional methods for implementation of financial potential generation strategy in corporations.

The purpose of the current research is to propose a non-traditional integrated method for assets and liabilities management as a tool supporting implementation of financial potential generation strategy in corporations. The research tasks include the following: prove that conversion from traditional connection of financial potential sources and assets to non-traditional is required; and develop an unconventional method for assets and liabilities integrated management, which would include three stages.

The works of foreign and Russian scientists and experts, legislative and regulatory documents of the Government of the Russian Federation, the Stavropol Territory laid theoretical and methodological basis of this study, as well as publications in periodicals on creation of methods for implementation of financial potential generation strategy in corporations and their internal regulatory framework. Methodological basis of the research is represented with both logical and situational scientific approaches to the processes of financial potential generation strategy implementation in corporations.

General scientific and special methods such as inductive, deductive, analysis, synthesis, coefficient analysis, grouping, monographic, comparative, economics and statistics, economics and mathematics, methods of constructing structural and logical schemes are used to present and implement unconventional method for assets and liabilities integrated management as an instrument for financial potential generation strategy implementation in corporations.

Working hypothesis of this research is grounded in practical need to recommend method for development of financial potential generation strategy and its implementation applying unconventional method of assets and liabilities complex management.

Theoretical significance of the research lays in expanded and intensified scientific understanding of the proposed toolset for financial potential generation strategy implementation in corporations, based on a fundamentally different theoretical level of knowledge. Its results provide for theoretical and methodological ground to continue further research on the issues of financial potential generation strategy implementation in corporations applying alternative approaches. Some theoretical and methodological provisions of this research are used as educational and methodological materials with such disciplines as "Financial Management" and "Corporative Finances" as well as for the professional upgrade and training courses in financial management.

The research may be practically significant for development and employment of specific methods, approaches, tools, models, and useful recommendations that would form theoretical, methodological and practical basis for development of a toolset for financial potential generation strategy implementation in corporations; and which would also supported accomplishment of new alternative methods, approaches, techniques, tools and models ensuring efficient implementation of financial potential generation strategy in corporations.

1. Method

1.1. Theoretical and method-related aspects of financial potential assessment based on its efficient employment in corporations

As surplus financial potential is created by means of efficiently employed resources that generate revenues, it becomes clear that one of the conditions for building and increasing financial capacity sources of corporations is to ensure efficient employment of resources.

So, Tolstykh and Ulanova (2004) characterize financial potential of organizations identifying expedient location and efficient employment of financial resources that are necessary to ensure organizations' normal performance. Minaeva (2012) determines financial potential of organizations as their ability to effectively employ

and manage available own and borrowed financial resources. Sheshukova and Kolesen (2013) consider financial potential of organizations as optimally created and efficiently employed maximum possible amount of financial resources for generating revenues and achieving organizations' sustainable development. Sheremetyev (2008) characterizing financial potential of organizations links efficient employment of their financial potential sources with creation of sustainable financial ground. Gilyarovskaya and Endovitskaya (2012) consider that efficient employment of own and borrowed capital and asset management are the factors that affect financial potential of organizations.

On the assumption of the fact that organization's financial potential assessing methods should be lined up in strict accordance with theoretical concept, examination of the methods led to the following opinions: Komaretskaya (2005) tops up those assessing methods that evaluate efficiency of financial resources based on the intensity of the capital employment; Bocharov (2006) specifies that efficiency of resources is assessed by means of comparison between evaluation results of organization's financial capacity and its actual financial activity, which ultimately should contribute to development of a set of measures aimed at more efficient utilization of that financial potential; Gilyarovskaya and Endovitskaya (2012), Kolchina and Polyak (2012) admit feasibility of factor based on assessment of financial potential generation in organizations.

All of the foregoing makes it evident that there is a need in a specific toolset enabling valuable assessment of efficient employment of financial potential in corporations.

1.2. Assessment of financial potential efficient employment in corporations. Practices

Factor based evaluation identifies significant factors influencing final value for the indicator in top-down structure, dynamics of financial potential is estimated for a period by the assessment of factors and the magnitude of gain/fall obtained.

Efficiency of financial potential generation in organizations is assessed through internal factor based evaluation of its efficient employment by means of chain substitutions method:

$$EEFP = NP/LMS \times LMS/OFPS \times OFPS/FPS \quad (1)$$

where: NP/LMS – net profit / loss making sales; LMS/OFPS – own financial potential sources return; OFPS/FPS – financial independence.

Table 1 contains data for calculations of indicators, and Table 2 provides the results of internal factor based evaluation (official Internet site of PJSC "Interregional Distribution Net Company of the North Caucasus").

Table 1. Information data for PJSC "Interregional Distribution Net Company of the North Caucasus"

Indicators	2010	2016
1. Revenues in thousand rubles	10.460.795	15.701.228
2. Net profit / loss in thousand rubles	562.957	– 1.234.179
3. Overall sources of financial potential in thousand rubles	22.713.590	35.640.088
4. Own financial potential sources, in thousand rubles	15.685.790	15.680.735
5. Profitability / Loss making sales, units	0,0538	– 0,0786
6. Own financial potential sources turnover, in cycles	0,6669	1,0013
7. Financial sovereignty, units	0,6906	0,44
CALCULATIONS	$\Delta EEFP_{\Delta NP / LMS} = (-0,0786 - 0,0538) \times 0,6669 \times 0,6906 = - 0,0610$ $\Delta EEFP_{\Delta LMS / OFPS} = - 0,0786 \times (1,0013 - 0,6669) \times 0,6906 = - 0,0182$ $\Delta EEFP_{\Delta OFPS / FPS} = - 0,0786 \times 1,0013 \times (0,44 - 0,6906) = + 0,0197$ $\Delta EEFP = - 0,0595$	

Source: calculated by authors Manuylenko, V.V and Loktionova, M. A.

Table 2. Results of internal factor based evaluation of financial potential efficient employment in PJSC "Interregional Distribution Net Company of the North Caucasus"

Internal factors	Influence rate	
	Units	%
1. Variability of profitability / loss making sales	– 0,0610	– 102,5
2. Variability of own financial potential sources return	– 0,0182	– 30,6
3. Variability of financial independence	+ 0,0197	+ 33,1
4. General influence of internal factors	– 0,0595	– 100,0

Source: calculation provided by the authors Manuylenko, V.V. and Loktionova, M.A

In PJSC "Interregional Distribution Net Company of the North Caucasus" decrease of financial potential efficiency is explained with loss making sales and decline in financial independence, so turnover of own sources of financial potential which is a strategic indicator of the organization's development unfortunately was negatively influenced by two of the internal factors mentioned above.

Advantage of this method lays in identification of internal factors (represented as quantitative feature) that affect efficiency of financial potential employment in organizations, whereas among shortcomings there are elimination of external factors direct influence, as well as forecast of the future financial potential of organizations under influence of macro-, meso- and microenvironment factors. The need to improve efficiency of financial potential employment in organizations determines application of appropriate methods, techniques and instruments for assets and liabilities management. So Marshall and Bansal (1998) naming insurance and hedging as methods recognize assets and liabilities management as the method for risk management.

1.3. Traditional model of ensuring financial equilibrium as implementation of financial potential generation strategy in corporations

Effective assets and liabilities management in corporations should be aimed at bringing to a balance overall value of sources for financial potential generation and circulating assets. With financial equilibrium dynamically changing value is reached when long-term and current non-financial assets are backed up with own sources of financial potential and financial assets by means of borrowed and attracted funds. In financial management practice financial equilibrium is the point of reference which is the center of continuous fluctuations - it is important for comparison of corporations in periods and types of their economic activity. The situation when own financial potential sources exceed the value of non-monetary assets and accordingly when financial assets exceed borrowed sources of financial potential reflects either positive deviation from breakeven point of the corporation or vice versa.

Optimal model of assets and financial potential sources correlation in corporation should merge requirements for liquidity, solvency and financial stability. So, the idea of comparing assets with corresponding sources of financial potential generation in corporation is reflected in economic essence of liquidity, solvency and financial stability. Liquidity of balance sheet means level of corporation's liabilities reimbursed from its circulating assets; period of commodity – money conversion corresponds to obligations repayment period; namely, comparison of most liquid and quick-selling assets with more urgent obligations represents current liquidity in the nearest future, whereas comparison of slow-moving assets with long- and medium-term liabilities represents long-term liquidity. Financial solvency means sufficiency of liquid assets adequate to pay off short-term obligations to creditors at any moment in time. It is clear that the concepts of "liquidity" and "solvency" are very close, solvency of corporation determines liquidity of its balance sheet and liquidity of corporation itself, which reflects the picture of current and future settlements. Corporation can be financially reliable on a specific date, having negative balance in future, which also works the other way round. In general, liquidity and solvency of a corporation represent financial stability and are its manifestation.

Financial stability is reached when liquid assets exceed over corresponding liabilities, which characterizes appropriate and correct investment of financial sources into assets, their distribution and employment, ensuring continuous financial equilibrium of cash flows and corporation’s performance at an acceptable risk level, regardless of random market conditions and stakeholder behavior. The degree of financial assets liquidity directly depends on the level of solvency of the corporation and its financial potential.

Traditionally, under condition of breakeven point financial potential sources relate to assets of a corporation as expressed by the following interrelated ratios as it is shown in Figure 1 and Table 3 (Official site of the Federal State Statistics Service for the Stavropol Territory).

Figure 1. Traditional correlation between assets and financial potential sources in corporation

1. Evaluation of own financial potential sources employment in corporation (OFPE), partially these financial resources back up fixed assets (FA) and partially – current assets (CA):

FA<OFPE (2)

2. Under normal business environment own financial potential sources back up substantial part of current assets and working capital exceeds external financial potential sources (OFPE):

CA>OFPE (3)

Table 3. Evaluation of financial breakeven condition in corporations (based on Stavropol Territory case study)

Criteria	YY				
	2012	2013	2014	2015	2016
Joint Stock Companies (JSC)					
Fixed Assets, in thousand rubles	193.635.149	224.563.357	260.893.867	292.895.326	328.338.175
Own financial potential sources, in thousand rubles	183.233.892	225.457.644	222.983.418	231.055.407	258.908.435
Current Assets, in thousand rubles	18.0471.527	189.564.458	178.486.765	197.815.054	199.524.370
Attracted (external) financial potential source, in thousand rubles	190.872.784	188.670.171	216.397.214	259.654.973	268.954.110
FA < OFPE	Not applicable	Applicable	Not applicable	Not applicable	Not applicable
CA > OFPE	Not applicable	Applicable	Not applicable	Not applicable	Not applicable
Public (open) Joint Stock Companies (PJSC)					
Fixed Assets, in thousand rubles	170.226.652	193.178.383	227.150.277	208.181.753	222.909.777
Own financial potential sources, in thousand rubles	158.975.126	195.526.683	192.317.249	149.750.655	160.441.595
Current Assets, in thousand rubles	124.067.290	78.092.443	126.284.516	84.961.121	88.988.584
Attracted (external) financial potential sources, in thousand rubles	135.318.816	75.744.143	161.117.544	143.392.219	151.456.766
FA < OFPE	Not applicable	Applicable	Not applicable	Not applicable	Not applicable
CA > OFPE	Not applicable	Applicable	Not applicable	Not applicable	Not applicable
Corporations for production and distribution of electricity, gas and water					
Fixed Assets, in thousand rubles	121.451.489	139.480.056	169.909.970	196.918.998	207.216.163
Own financial potential sources, in thousand rubles	65.196.579	79.984.105	65.070.962	45.532.504	21.304.035
Current Assets, in thousand rubles	92.790.450	– 37.329.565	99.622.083	90.294.506	89.667.750
Attracted (external) financial potential sources, in thousand rubles	149.045.360	22.166.386	204.461.091	241.681.000	275.579.878
FA < OFPE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
CA > OFPE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
PJSC "Interregional Distribution Net Company of the North Caucasus"					
Fixed Assets, in thousand rubles	29.004.398	27.767.831	28.412.587	28.134.789	27.274.467
Own financial potential sources, in thousand rubles	20.324.240	20.060.440	18.288.559	15.270.155	15.680.735

Criteria	YY				
	2012	2013	2014	2015	2016
Current Assets, in thousand rubles	3.405.448	4.928.336	5.339.967	5.355.234	8.365.621
Attracted (external) financial potential sources, in thousand rubles	12.085.606	12.635.727	15.463.995	18.219.868	19.959.353
FA < OFPE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
CA > OFPE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Source: compiled by authors Manuylenko, V.V. and Loktionova, M.A

The best possible standard for financial potential generation sources in corporations is when own sources back up fixed assets; whereas 25% of long-term loans and 75% of short-term loans back up current assets. It is believed that turnover of the sources for acquirement of fixed assets is slower in comparison with turnover of the sources projected for current assets. That is why decisions to fund fixed assets are strategic and lay with the competencies of the top financial management of corporations, whereas funding for current assets are tactical financial decisions and are the responsibility of the lower management level.

PJSC "Interregional Distribution Net Company of the North Caucasus" narrowed the model implemented in corporations producing and distributing electricity, gas and water; still implementation of the model in PJSC "Interregional Distribution Net Company of the North Caucasus" is less efficient than in other public joint stock companies in general. Hence, irrational balance of assets and liabilities, volatility of provided financial sources in conditions of uncertainty violate the financial breakeven point and complicate fulfillment of traditional connection of financial potential sources and the assets of the corporations represented in the territory.

Thus, it becomes obvious that modern economic environment makes it difficult to stick exclusively to traditional method, and its limited efficiency justifies development of an alternative method.

1.4. Development and implementation of a non-traditional model for financial equilibrium, implementation of financial potential generation strategy in corporations

Unlike it is in traditional method, where assets and liabilities of organization are independent financial funds, in unconventional method assets and liabilities of organization are two interdependent qualities of one overall financial fund generated and capitalized by organization.

Unconventional financing method is implemented in stages:

- 1st stage: generation of the funds inside corporation that should be used for allocation of sources - conversion (distribution) of sources through funds. To ensure financial potential sufficiency of corporations it is fundamentally important to allocate separate own company's sources of funds, long-term bank loans and borrowings and other sources of permanent capital, short-term sources, accounts payable, potential upcoming sources (deferred revenues, reserves of future expenses). After financial potential sources of organization are distributed into various funds, provided that their liquidity, profitability and risks are considered, strategic financial managers apply their professional judgment and control the funds movement focusing at the issue of "liquidity-profitability-risk";
- 2nd stage: "Segregation of financial sources by the speed of their circulation," it is taken into account that peak generation of financial potential is achieved through acceleration of funds circulation, its dynamic magnitude depends on financial potential turnover speed that varies depending on how strategic advantages benefit development of the corporation. At the period of research, the value of financial potential of corporation is determined by circulation process momentum. From the ground of funds circulation, corporation's activity is a constant process of permanent flow of assets from one area to another. That proves the need to assess turnover of funds invested in certain types of assets. In unstable environment it is important to take into account such characteristic as temporary value, related to the need of rapid circulation of funds due to inflation, which is expressed in 2 aspects: 1) depreciation of cash over time; 2) circulation of capital. Unconventional method of assets and liabilities integrated management differentiates funding sources as per pace of their circulation. Two of the previous stages predetermine conditions, forms and areas for employment of financial potential sources in corporations. Considering composition of financial potential sources concentrated in funds and pace of their circulation corporations select categories of activities for investment;
- 3rd stage: "Investment of sources from funds into active instruments considering type of financial potential generation policy" top management should regularly monitor ratio of mobilized and non-mobilized assets as regular financial management procedures taking into account the relevant type of policy (Table 4).

Table 4. Mobilized / non-mobilized assets dynamics in PJSC "Interregional Distribution Net Company of the North Caucasus"

Indicators	YY							Deviation (+,–)
	2010	2011	2012	2013	2014	2015	2016	
Mobilized assets, in thousand rubles	18.335.426	24.403.757	29.004.398	27.767.831	28.412.587	28.134.789	27.274.467	+ 8.939.041
Non-mobilized assets, in thousand rubles	4.378.164	2.952.402	3.405.448	4.928.336	5.339.967	5.355.234	8.365.621	+ 3.987.457
Mobilized and non-mobilized assets ratio, %	4,2	8,3	8,5	5,6	5,3	5,3	3,3	– 0,9

Source: calculation by authors Manuylenko, V.V and Loktionova, M.A

Practical research confirms high mobilization of own financial sources in PJSC "Interregional Distribution Net Company of the North Caucasus", which is a proof of considered risk of liquidity loss. Investment of financial sources into the assets of corporations requires determination of acceptable asset risk taking into account type of financial potential generation policy and considering the issues listed below (Table 5):

- liquidity - investments into mobilized assets are covered by a permanent sources fund;
- profitability - fund of bank long-term loans covers the most profitable assets (profitable investments in tangible assets, long-term financial investments);
- risks - non-payable assets cover accounts payable;
- innovative development - permanent sources fund intangible assets, including explorations, research and development results.

Table 5. Critical risk areas for financial sources flow in corporations (the Stavropol Territory)

Indicators	JSC	Public JSC	Production and distribution of electricity, gas and water	PJSC "Interregional Distribution Net Company of North Caucasus"
1. Decline in circulation of (yes +, no -)				
Permanent sources	+	+		
Long-term bank loans and credits		+	+	+
2. Increase of accounts payable turnover	+	+		

Source: compiled by authors Manuylenko, V.V and Loktionova, M.A.

Calculations show that PJSCs operating in production and distribution of electricity, gas and water and PJSC "Interregional Distribution Net Company of the North Caucasus" should pay attention to building up portfolio of bank long-term loans, whereas JSC and PJSC to permanent sources. JSC and PJSC should be paying special attention to accounts payable. It should be noted that implementation of research, development and technological projects (R&D) in PJSC "Interregional Distribution Net Company of the North Caucasus" is one of the main focuses of Innovative Development Program.

So, unconventional method of integrated assets and liabilities management in corporations is based on the following principles: expedient diversification of assets and financial sources; optimization of financial activity risks and hedging, provisioning; reasonable assets funding (predominance of highly liquid / high-quality assets in unstable periods); funding – *i.e.* determination of available sources application for current and strategic activities. Final financial decision on the dilemma of "liquidity - profitability-risks" is determined based on professional judgment of financial managers. Top management of corporation is responsible for funds investment. Significance of the method is most valued in unstable economic environment.

3. Results

In theoretical block of the research:

- it is concluded that the idea of comparing assets with the corresponding sources of financial potential generation is reflected in liquidity, solvency and financial stability interrelation, where solvency of corporation determines liquidity of its balance sheet and liquidity of the corporation itself; it shows current and expected state of financial settlements, and in complex liquidity and solvency altogether come up as reflection of financial stability and its external manifestation; combination of requirements for liquidity, solvency and financial sustainability is focused at implementation of balanced strategy aimed at long-term activity;

- process of integrated assets and liabilities management is described, where assets and liabilities are viewed as unbreakable unity of two interdependent characteristics which form one and the same financial fund; expression of the fund qualitative characteristics aimed at achieving the strategic goal is provided.

In practical block of the research:

- in the top-down structure of factors significant internal factors influencing efficiency of financial potential are identified, they require special regulation and monitoring in financial management system of corporations, those are: sales profitability / unprofitability, turnover of financial potential own sources;
- when influence of the emergency (macro- or meso-) environment on the efficiency of financial potential generation in corporations is ignored financial strategies lack property of dynamics manifested in practice as the fact: only when the internal and external factors change one financial strategy transforms into another;
- transition from traditional method of ensuring financial breakeven point to non-traditional is proved necessary, it is built up on the following principles: expedient diversification of financial sources and assets; optimization of financial risks, their hedging, provisioning; reasonable assets financing; generation of funds;
- standard model of financial sources and assets interrelation was analyzed, it is grounded in financial breakeven point when long-term and current non-financial assets are backed up by own sources of financial potential, and financial assets with borrowed and attracted funds; the analysis eventually showed the need to switch from traditional model towards non-traditional one, which is focused on integrated management of assets and liabilities in contrast with traditional model.

In methodological block of the research:

- unconventional method of integrated assets and liabilities management was suggested; it includes the following stages:
  - generation of funds inside corporation for allocation of sources;
  - differentiation of financial sources according their circulation pace;
  - investment of sources into active instruments considering implemented policy for financial potential generation;
- risk of incorrect flow of own / permanent financial potential sources is identified and applied also for short-term / long-term loans and payables, regulated via unconventional method; the highest risk is conditioned with slow turnover of permanent capital, *i.e.* strategic source that includes long-term bank loans (Table 6).

Efficiency is ensured in the positive situation when circulation of own, borrowed and permanent financial sources is accelerated whereas accounts payable circulation is slowed down. Efficiency of selected financial potential generation strategy is estimated according to the values of relevant indicators reflecting financial turnover of corporations in dynamics.

Table 6. Turnover of main financial potential sources in corporations in dynamics (Stavropol Territory case)

Indicators	YY					Deviation (+,–)
	2012	2013	2014	2015	2016	
JSC						
1. Revenues, *in thousand rubles*	297.719.655	304.138.735	324.055.951	351.030.951	385.186.996	+ 87.467.341
2. Own financial potential sources, *in thousand rubles*	183.233.892	225.457.644	222.983.418	231.055.407	258.908.435	+75.674.543
3. Own financial potential sources turnover, *in cycles*	1,625	1,349	1,453	1,519	1,488	– 0,137
4. Long-term bank loans, *in thousand rubles*	52.780.293	79.491.575	93.390.347	86.666.033	64.445.798	+11.665.505
5. Long-term bank loans turnover, *in cycles*	5,641	3,826	3,470	4,050	5,977	+ 0,336
6. Permanent sources of financial potential, *in thousand rubles*	239.883.015	317.718.423	321.877.877	332.470.901	341.678.863	+101.795.848

Indicators	YY					Deviation (+,–)
	2012	2013	2014	2015	2016	
7. Permanent sources of financial potential turnover, *in cycles*	1,241	0,957	1,007	1,056	1,127	– 0,114
8. Accounts payable, *in thousand rubles*	75.651.435	4.192.122	46.561.802	66.409.529	81.460.593	+ 5.809.158
9. Accounts payable turnover, in cycles	3,935	72,550	6,960	5,286	4,729	+ 0,794
10. Short-term bank loans, *in thousand rubles*	28.142.345	7.759.777	64.282.813	83.795.634	92.380.237	+64.237.892
11. Short-term bank loans turnover, *in cycles*	10,579	39,194	5,041	4,189	4,170	– 6,409
Public Joint Stock Companies						
1. Revenues, *in thousand rubles*	241.181.877	247.256.758	260347023	196.028.914	224.429.296	– 16.752.581
2. Own financial potential sources, *in thousand rubles*	158.975.126	195.526.683	192317249	149.750.655	160.441.595	+1.466.469
3. Own financial potential sources turnover, *in cycles*	1,517	1,265	1,354	1,309	1,399	– 0,118
4. Long-term bank loans, *in thousand rubles*	40.302.164	57.868.785	70461393	61.335.628	42.187.377	+1.885.213
5. Long-term bank loans turnover, *in cycles*	5,984	4,273	3,695	3,196	5,320	– 0,664
6. Permanent sources of financial potential, *in thousand rubles*	202.458.220	257.701.128	267.269.001	216.890.465	215.467.875	+ 13.009.655
7. Permanent sources of financial potential turnover, *in cycles*	1,191	0,959	0,974	0,904	1,042	– 0,149
8. Accounts payable, *in thousand rubles*	61.128.288	3.315.376	35102321	35.078.561	41.955.371	– 19.172.917
9. Accounts payable turnover, *in cycles*	3,946	74,579	7,417	5,589	5,349	+ 1,403
10. Short-term bank loans, *in thousand rubles*	19.863.802	5.948.661	46.718.439	40.327.885	46.759.171	+26.895.369
11. Short-term bank loans turnover, in cycles	12,142	41,565	5,573	4,861	4,800	– 7,342
Corporations for production and distribution of electricity, gas and water						
1. Revenues, *in thousand rubles*	213.737.995	228.716.131	234.983.316	236.570.681	254.837.895	+ 41.099.900
2. Own financial potential sources, *in thousand rubles*	65.196.579	79.984.105	65.070.962	45.532.504	21.304.035	– 43.892.544
3. Own financial potential sources turnover, *in cycles*	3,278	2,860	3,611	5,196	11,962	+ 8,684
4. Long-term bank loans, *in thousand rubles*	25.998.900	8.670.896	54.821.619	49.464.688	36.458.821	+ 10.459.921
5. Long-term bank loans turnover, *in cycles*	8,221	26,377	4,286	4,783	6,990	– 1,231
6. Permanent sources of financial potential, *in thousand rubles*	91.195.479	88.655.001	119.892.581	94.997.192	57.762.856	– 33.432.623
7. Permanent sources of financial potential turnover, *in cycles*	2,344	2,580	1,960	2,490	4,412	+ 2,068

Indicators	YY					Deviation (+,–)
	2012	2013	2014	2015	2016	
8. Accounts payable, *in thousand rubles*	106.084.178	3.072.297	14.221.409	142.164.569	175.448.109	+69.363.931
9. Accounts payable turnover, *in cycles*	2,015	74,445	16,523	1,664	1,452	– 0,563
10. Short-term bank loans, *in thousand rubles*	9.595.218	881.452	124.672.244	34.041.359	41.992.179	+ 32.396.961
11. Short-term bank loans turnover, *in cycles*	22,275	259,477	1,885	6,950	6,069	– 16,206
PJSC "Interregional Distribution Net Company of North Caucasus"						
1. Revenues, *in thousand rubles*	11.251.703	13.076.018	13.494.767	14.548.592	15.701.228	+4.449.525
2. Own financial potential sources, *in thousand rubles*	20.324.240	20.060.440	18.288.559	15.270.155	15.680.735	– 4.643.505
3. Own financial potential sources turnover, *in cycles*	0,554	0,652	0,738	0,953	1,001	+ 0,447
4. Long-term bank loans, *in thousand rubles*	2.466.752	4.533.217	5.514.991	4.126.758	5.805.943	+ 3.339.191
5. Long-term bank loans turnover, *in cycles*	4,561	2,884	2,447	3,525	2,704	– 1,857
6. Permanent sources of financial potential, *in thousand rubles*	22.790.992	24.593.657	23.803.550	19.396.913	21.486.678	– 1.304.314
7. Permanent sources of financial potential turnover, *in cycles*	0,494	0,532	0,567	0,75	0,731	+ 0,237
8. Accounts payable, *in thousand rubles*	3.872.069	2.870.127	4.535.881	5.436.641	5.829.385	+ 1.957.316
9. Accounts payable turnover, *in cycles*	2,906	4,556	2,975	2,676	2,693	– 0,213
10. Short-term bank loans, *in thousand rubles*	2.925.998	2.041.089	2.048.802	5.250.967	4.900.486	+1.974.488
11. Short-term bank loans turnover, *in cycles*	3,845	6,406	6,587	2,771	3,204	– 0,641

Source: calculation by the authors Manuylenko, V. V and Loktionova, M. A.

In JSCs turnover of long-term bank loans and accounts payable increases, accordingly turnover of own/ permanent sources of financial potential and short-term bank loans decreases; in the public JSCs turnover of accounts payable increases and sharp reduction of short-term bank loans circulation draws attention, which drops from 12.142 cycles in 2012 to 4.8 cycles in 2016. PJSC "Interregional Distribution Net Company of the North Caucasus" shows similar value for financial potential sources turnover to those of corporations for production and distribution of electricity, gas and water, *i.e.* increase of own and permanent sources of financial potential turnover and reduction of long-term / short-term bank loans turnover. Still in corporations with similar economic activity steep increase of own financial potential sources turnover is noted (from 3.278 cycles in 2012 to 11.962 cycles in 2016) as well as sharp decrease of short-term bank loans turnover (from 22.275 cycles in 2012 to 6.069 cycles in 2016).

Conclusions

Accomplished research can be further developed on the ground of actual situation and potentials for various compositions of financial potential sources which may provide for new methods of financial potential generation strategy implementation in corporations. Suggested instrument for implementing financial potential generation strategy in corporations enables its implementation at a higher quality level, and allows identification of risks evidence for incorrect financial potential sources flow under unconventional method.

Non-traditional investments into corporations require alternative practical reactions that would contribute into implementation of financial potential generation strategy in corporations at a higher quality level.

Recommendations for merging development and implementation of financial potential generation strategy in corporations with integrated assets and liabilities management were trialed in strategic financial management system of PJSC "Interregional Distribution Net Company of the North Caucasus". Application of those ensures implementation of balanced strategy in the strategic financial management system; it is focused on long-term activity of corporations and optimally serves their liquidity, solvency and financial stability.

Consequently, it is reasonable to develop such methods for financial strategy implementation that corporate influence of emergent (macro-, meso-) environment based on simulation modeling applied in assessment of corporations' performance, Manuylenko, *et al.* (2017). It is also necessary to consider crediting risks in the process of provisioning borrowed financial sources, which directly affect efficiency of strategy implementation for financial potential generation in corporations. Methods of credit risks assessment were studied in details by G.K. Rybina, P.V. Rybina, Akinin, Rusetskaya, Rusetskiy (2017). It is also important to use various best practices for risk insurance methods presented in complex by Rusetskaya, Rusetskiy, G.K. Rybina, Y.V. Rybina, Sazhneva (2015).

Discussions

The authors believe that suggested toolset for implementing financial potential generation strategy in corporations can be differentiated depending on variety of details, provided that they conform to the type of financial capacity-building policy. Considering specific areas of application/sources of financial potential generation and efficient economic influence each corporation can develop its own toolset. It is necessary to consider influence of emergent (macro- and meso-) environment on efficiency of financial potential in corporations since it leads to development of implementation methods for financial potential strategy in corporations based on stochastic modeling.

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The Effect of Tax Service Quality in Promoting Online Tax System in Indonesia

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Abstract:

The ultimate objective of the current study is to investigate the impact of tax service quality on the performance of online tax system (OTS). In recent decade, online tax system (OTS) is growing rapidly in most of the developed countries. However, online tax system (OTS) success is very limited in developing countries, particularly in Indonesia. In Indonesia, online tax system facing various challenge related to tax service quality, that is the reason online tax system (OTS) is not much beneficial. This issue effects adversely on the tax collection system. To address this issue, qualitative research approach was selected, and cross-sectional research design was used. Three hundred (300) questionnaires were distributed among various taxpayers. Questionnaires were distributed by using 5-point Likert Scale. SPSS version 21 was used to analyze the data. It is found that informativeness, reliability and responsiveness have significant positive relationship with online tax system (OTS). Therefore, improvement in tax service quality could enhances the online tax system (OTS).

Keywords: tax service quality (TSQ); online tax system (OTS); informativeness; reliability; responsiveness

JEL Classification: H26

Introduction

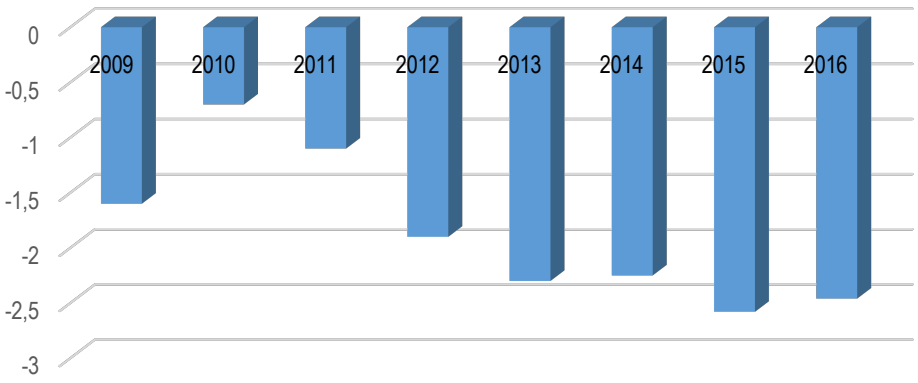
During recent decades the online tax system has emerged as a significant research area. During this era when information technology has revolutionized almost every aspect of human life, it also has significant impact on governance structure and economic development of countries around the globe. Information and communication technology has significant impact on tax policies. According to Dickson and Nwaobia (2012) the online tax system with the aid of information and communication technology is playing a vital role in creating awareness, and responsiveness among tax payers. Similarly, Egowan (2011) also found that information and communication technology has significant impact on the development and progress of tax system of any country.

The increasing role of information and communication technology is evident in develop countries such as UK, USA and Australia. However, developing and emerging economies such as Indonesia, Malaysia Thailand are still in process of installing this information and communication technology in their governance system. Meanwhile in developing and emerging economies tax revenue is a major source of revenue. Countries like Indonesia which from last several decades are in crisis and facing fiscal deficit. As evident from, the Figure 1 the budget deficit to GDP is increasing from last 10 years and in 2015 it is recorded as all-time high of -2.5.

Meanwhile the corrupt politician and least development has created an environment where citizen and corporate owners show responsiveness towards their tax obligation. Another issue is illiteracy which is a biggest hurdle in effective communication between government and tax payers. So, the online tax system is removing these barriers and creating a larger tax net for governments around the world.

The tax service quality (TSQ) is the organization wide effort by tax department to promote the culture which not only encourage tax payers but also facilitate them in paying their taxes and obtaining tax information's (Zeithaml, Parasuraman and Malhotra 2002). Whereas the online tax system is significantly linked with the tax service quality (TSQ) through an increasing advancement in information and communication technology (Haibara 2017). Parasuraman framework is among pioneering work in bringing the tax service quality on limelight. According to Mustapha and Obid (2015) tax administration of any country should install service quality system. Additionally, Indonesia is one of the country that is affected by the global financial crisis (Setyawati *et al.* 2017) that is the reason taxation system is not adequate.

Figure 1. Indonesian government budget deficit



Source: Economic survey of Indonesia 2016

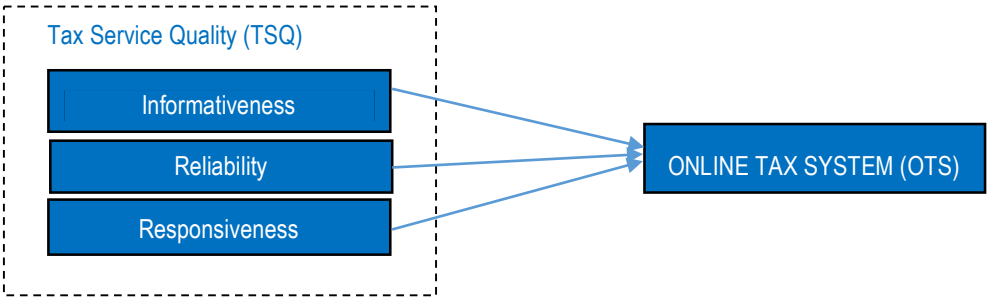
Online tax system (OTS) is system which with the aid of different information and digital communication technologies transmit tax information of tax payers to tax administration (Edwards-dowe 2008). According to Azmi (2012) the online tax system is playing a significant role in the development of tax administration. He further argued that online tax system provides inconvenience, reliability and information regarding tax systems and in turn provide tax payer information to tax administration. However, it needs good quality services. Good quality services include informativeness, reliability and responsiveness to encourage taxpayer to use online tax system (OTS). Additionally, trade has also influence on growth (Abidin, Bakar and Haseeb 2015, Amin *et al.* 2018) because it is facing various tax related issue such as collection of tax.

Therefore, the ultimate objective of current study is to investigate the impact of tax service quality on the performance of online tax system (OTS). The main research objective has following three sub-objectives:

- to investigate the impact of informativeness on online tax system (OTS).
- to investigate the impact of reliability on online tax system (OTS).
- to investigate the impact of responsiveness on online tax system (OTS).

The theoretical framework of the current study is given below.

Figure 2. Theoretical framework



1. Literature review and hypothesis development

Online tax system (OTS) is one of the process including tax related information and communication system between taxpayers and administration through the use of internet technology (Edwards-dowe-dowe 2008, Zafarullah 2018). This system provides to the taxpayers to file their returns without visiting the physical offices. Taxpayers can file their return through their laptops and mobile phones by using information technology.

Warrington *et al.* (2012) argued that the service quality should consider both perspective such as service provider and the service receiver. Meanwhile, Azmi (2012) online tax system is a revolutionary development in tax service quality. He further argued that the e-filing is appeared as an effective tool for increasing the tax net in developing and developed countries. Azmi (2012) continued and argued that a bulk of studies are carried out on the issue tax service quality and how it is affect the quality of online tax. However, limited or no intention has been given to explore the relationship between tax service quality and online tax system in developing counties and particularly in Indonesia

However, online tax system (OTS) needs good service quality system. Tax service quality (TSQ) based on three major elements such as informativeness, reliability and responsiveness. These three elements are key to

success for online tax system (OTS) by providing tax service quality (TSQ). As the good quality services enhance the satisfaction which enhance commitment to pay tax amount, moreover, commitment leads to the motivation (Hussain *et al.* 2013) of employees related to online tax system (OTS) and taxpayers. All these elements effect positively on smooth running of online tax system (OTS).

Service quality can be described as the degree to which the service is distributed to best address customer desires in terms of the support of the entity managing the system (DeLone and McLean 2003). According to Zeithaml, Parasuraman and Malhotra (2002), to build a good customer loyalty, firms requires to focus on the customers' perception as well as evaluation on the electronic-service quality.

Hughes and Moizer (2015) revealed that tax service quality is one of the function of brand name. Similarly, Mustapha and Obid (2014) found that tax service quality which comprises of reliability, responsiveness and informativeness are key determinants of usage online tax system. Therefore, these are the important elements to enhance tax service quality (TSQ). The following are some components of service quality

Informativeness

Informativeness is related to the good quality of information provided as well as accessible on the online tax system (OTS) website which generally presented by the tax authority to fill tax return (Barrios 2010). It could also be described as the quality of various information that is available on carriers and producer's websites and presented by producers when meeting with potential clients as well as explained by call center representatives (Parasuraman *et al.* 1988). Therefore, informativeness is based on the quality of information provided by the tax authorities to facilitate taxpayers. A good quality information enhances the quality of online tax system (OTS).

The timely information regarding incentives which a tax payer will receive on timely filing his or her tax return has significant impact on both the performance of tax administration and on the quality tax service. According to Nyarko (2016), the online tax system provides accurate and timely information to the tax payer which in turn affect their behaviour and stimulate them for timely payment of tax. Meanwhile they also argued that a well composed message with all information of tax payer interest significantly affect tax payer's intention. Therefore, it is hypothesized that

H_1: There is a significant relationship between informativeness and online tax system (OTS)

Reliability

After informativeness the second most important of tax sertce quality which significantly affect the online tax and subsequently tax payer tax paying behavior is reliability. According to Mustapha and Obid (2015) and Miazee and Rahman (2011) claimed that the reliability is one of the significant component or more broadly it can be said as a process which h not only enhance the capability of system to evaluate the timeliness and accuracy of tax administration function but also highlight flaws and bottleneck in the way to achieve an efficient tax administrative system. Meanwhile Miazee and Rahman (2011) argued that reliability is among the most important widely used measurement of tax service quality. Therefore, the reliability can be said as one of the important determent of online tax system.

Miazee and Rahman (2011), defined the reliability in service quality as the consistent ability of accessing and verifying the tax administration function. Mustapha and Obid (2015) also endorsed the view presented by Miazee and Rahman (2011) and of earlier view presented by Parasuraman *et al.* (1988). Parasuraman *et al.* (1988) claimed that the reliability is one of the most important dimensions of service quality. Tax service quality important because when evaluating an innovation, there is the need to know how reliable the system to meet the purpose of its adoption. Hence, reliability is an important variable to evaluate the quality of the online tax system. Finally, Reliability.

According to Bettua (1999), 23% of the websites do not respond to email at all, on the other hand, 15% generally take five days or more to respond. This is the issue which decreases the tax payer intention to pay tax through online tax system (OTS). Thus, reliability is significant element to evaluate the quality of the online tax system (OTS). Hence, from above discussion, it is hypothesized that:

H_2: There is a significant relationship between reliability and online tax system (OTS)

Responsiveness

Responsiveness is aimed on how fast are the tax administrators in responding to any inquiries made by the Taxpayers. It is referring to the preparedness of self-employed taxpayers to accomplish a goal in an accurate and timely manner (Mustapha and Obid 2015). Therefore, responsiveness is based on the response to the taxpayers by the tax authorities.

How friendly is the online tax system (OTS) in terms of format with the response to taxpayers when there is require updating the taxpayer's status regarding the payment, location as well as mode of payment of their tax. According to Liljander *et al.* (2006) feedback is one of the important element of responsiveness. As the factors like responsiveness justifies more attention with regards to tax service quality (Parasuraman *et al*. 1988). The accuracy as well as timeliness of the self-employed taxpayer means that they reply to the payment of tax return using the online tax system (OTS) to the tax administration.

Thus, the responsiveness attracts the taxpayers to pay tax by using online system which is more beneficial for taxpayers as well as tax authorities. Hence, responsiveness is one of the element of quality services which is more important to facilitate online tax system (OTS). Therefore, from prior studies, it is hypothesized that:

H3: There is a significant relationship between responsiveness and online tax system (OTS)

2. Research methodology

The current research study investigated the effect of in informativeness, reliability and responsiveness on the tax compliance level. Therefore, due to the nature of research study, quantitative research approach was selected, and cross-sectional research design was used.

Sample Size

Pearson and Mundform (2010) provide some guidance for the sample size in a series for inferential statistics. "Sample having less than 50 participants will observed to be a weaker sample; sample of 100 size will be weak; 200 will be adequate; sample of 300 will be considered as good; 500 very good whereas 1000 will be excellent." Therefore, by using Comrey and Lee (1992) series three hundred (300) sample size was selected.

Sampling

Data were collected by using 5-point Likert scale. Questionnaires were distributed among the among various taxpayers in Indonesia by using simple random sampling. Among three hundred (300) questionnaires, two hundred and seventy (270) were returned and ten (10) were uncompleted, therefore, excluded from the study. Thus, two hundred and ten (210) questionnaires were used to conduct the analysis. All the measures were adopted from prior studies.

Analysis Technique

To achieve the research objective multiple regression using statistical software SPSS version 21 is used to analyze the data. Meanwhile to check how the variables are correlated with each other the correlation was used to examine the strength of variable. Regression analysis was performed to test the hypothesis.

3. Research analysis, results and discussion

Reliability Test

Reliability test in statistics refers to any analysis in which we check the consistency of scale in producing same results over a repeated interval of time. This test is carried out by using the properties of systematic variation in measurement scale. To examine the reliability, Cronbach's Alpha was considered. According to Nunnally (1970), the value of Cronbach's alpha should be more than 0.5, however, according to Moss *et al.* (1998) Cronbach's alpha should be more than 0.6. In the context of the current study Table 1 shows the Cronbach's alpha for each variable.

Table 1. Reliability results

Constructs	Items	Cronbach's Alpha
Informativeness	07	0.732
Reliability	06	0.811
Responsiveness	04	0.801
Online Tax system (OTS)	08	0.851

Table 1 shows that all the variables have Cronbach's alpha more than 0.8 and the acceptable value is 0.6 as recommended by Moss *et al.* (1998). Therefore, it is evident from results that instrument is reliable to proceed the analysis.

Normality test

Normality test is among significant statistical analysis and is primary research test which we apply on data to check either it is normally distributed or not. Data normality was examined by considering skewness and kurtosis which fallowed the concept of Meyers *et al*. (2006).

According to him data is said to be normally distributed if the range of skewness as well as kurtosis lies between ± 1.0 and ± 3.00 respectively. In the current study, it is found that all the values exist between ± 1.0 and ± 3.00. Hence, data were normal and proceeded for further analysis.

Correlation analysis

Correlation analysis is used to measure the linear association between the two variables. The correlation value of 1 indicates that the variables are perfectly positively correlated whereas the value of -1 indicates that the variables are perfectly negatively correlated and the correlation value of 0 indicates that there is no correlation between the variables.

Examining the correlation value, it is found that all the variables have strong correlation. Informativeness, reliability and responsiveness have strong correlation value 0.6, and 0.55 and 0.53 respectively. Additionally, it is found that correlation is significant and positive.

Hypothesis testing

Regression analysis was used to test the hypothesis. For this purpose, p-value and β-value was considered. For a significant relationship p-value should be less than 0.05 ($p \leq 0.05$). Table 2 shows the results of regression analysis.

Table 2 shows that informativeness has significant relationship with online tax system (OTS) having p-value 0.04. Beta value 0.5 shows a positive relationship. Hence, H_1 is accepted. Similarly, relationship of reliability and responsiveness with online tax system (OTS) is also significant with p-value 0.03 and 0.05, beta value 0.27 and 0.24, respectively. Hence, H_2 and H_3 are also accepted. It indicates that informativeness, reliability and responsiveness enhance the online tax system (OTS).

Table 2. Regression results

Hypothesis	Model variables			Estimate	S.E.	C.R.	P	Results
H_1	OTS	←	INF	0.50	0.095	5.26	0.04	Supported
H_2	OTS	←	REL	0.27	0.060	4.50	0.03	Supported
H_3	OTS	←	RES	0.24	0.080	3.00	0.05	Supported

Note: INF = Informativeness, REL = Reliability, RES = Responsiveness, OTS = Online Tax System

Conclusion

The current study examined the effect of informativeness, reliability and responsiveness on online tax system (OTS). It is found that informativeness, reliability and responsiveness have a relationship with online tax system (OTS). Informativeness, reliability and responsiveness enhance online tax system (OTS). Increase in these three elements will automatically enhance the online tax system (OTS) success.

There is direct relationship between informativeness, reliability and responsiveness with online tax system (OTS). Increase in informativeness, reliability and responsiveness will lead online tax system (OTS), however, decrease in informativeness, reliability and responsiveness will mitigate the online tax system (OTS) success. Therefore, informativeness, reliability and responsiveness are the key element to enhance online tax system (OTS), particularly in Indonesia.

It is recommended to tax regulatory authorities to promote informativeness, reliability and responsiveness. Further research is required to introduce the mediating role of information and communication technology (ICT) in the framework of current study.

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Price and Discounts as Dominant Factors of a Marketing Mix Acting on the Purchasing Decision of a Slovak Consumer

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Abstract:

The price has an irreplaceable role not only in the domestic but also in the European market. Price is an important factor affecting the success of every business. The reduced price of the products and services must be chosen in a way that suits the seller as well as the buyer. The seller's goal is to cover the costs, create sufficient profits and, of course, serve as a means of competitiveness. Price is the most influential factor that can change the purchasing decisions of every consumer regardless of age and gender. It should be designed so that the buyer is willing to buy the product. Pricing is therefore very important for consumer perceptions. The aim of the research is the theoretical processing of the studied issue in the field of pricing policy, as well as the analysis of price impact, discounts and other selected factors affecting the purchasing behaviour of a Slovak consumer in retail shops. The survey sample consisted of consumers living in the region of Eastern Slovakia. The results of our research show that there is a statistically significant dependence between the group of consumers surveyed and the intensity of their buying. We cannot confirm the second examined hypothesis. It shows that there is no statistically significant dependence between the age of the respondents and the selected key factors affecting the choice of goods and services in the purchasing process of the consumers. The results of our research can be beneficial to several target groups, for both managers and regional managers of retail chains; not only in the Prešov region but also throughout Slovakia. They can serve as a source of information and as a basis for deciding and setting discounts and other selected factors influencing consumer decision-making and the academics in the form of backgrounds and ideas for further scientific research.

Keywords: consumer; price; buying decision; discount; quality.

JEL Classification: M20; M31; M39

Introduction

Consumption and buying behaviour is an important part of every consumer's life. The essence of marketing success is to understand the consumers' buying behaviour. Nowadays, it is no longer possible to focus solely on the production of products or the provision of services. It is necessary to know the behaviour of consumers, their needs and wishes, the reason for the purchase or the expected benefits. The “price” is the factor that can significantly affect purchasing behaviour and consumer decision-making. The price is the only element of the marketing mix that produces revenue, because other elements produce costs.

It is true that the price is, above all, an economic variable and that it has nothing in common with the cultures of the countries concerned. It is not so. The price is, in the first place, an amount that expresses the main and fundamental purpose of an exchange transaction on the market but is also an important part of the communication between the seller and the buyer. The relationship between buyers and sellers is not only about the manufacturer or service provider, but rather about the country in which it operates, what is the brand of its product. For the buyer, the price often expresses a means of evaluating a product or service, in terms of both social recognition and expression (Oláh *et al.* 2009). Companies do not usually provide a single price, but rather a price structure reflecting differences in the demand and cost of different regions, market segment requirements, purchase timing, order level, and other factors (Kotler and Keller 2013). Price is the most important attribute that a product must have if it is to

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create goods as one of the basic market stabilizers. It is not just about the price of an individual product, but also about its link to other prices for other business products (Jedlička 2003).

1. Literature review

The market economy price includes all the necessary information that an entrepreneur needs for the business. The market price arises on the market under the influence of demand and supply. It is created because of competitiveness between individual producers but also by consumers. Balance will arise with the amount and price of goods and services that the seller is willing to sell and the buyer will buy (Su, Liu 2017). Bačík *et al.* (2017) refers to the price of a key member of a merchant, which can be easily influenced. It expresses the value for which the products and services are offered on the market and at the same time represents the value for the consumer. Price is an essential factor that affects demand. It is a tool for attracting a customer to the store. Jain (2009) defines pricing policy as the area of pricing decisions. Pricing policy is in common market conditions. It sets rules and roles for creating and implementing a company's pricing strategy. Price policy is relatively stable and has a recurring character.

In classical understanding of marketing, the price is a very flexible element of the marketing mix. It fulfills the role of measurement of costs and volume of production (it is a direct determinant of profitability) and has a commercial and informative role. As a marketing category, it is the monetary amount charged for a product or service, or a sum of all the values that customers exchange for the benefit of ownership or use of the product or service, or the price is the value the customers give up in exchange for obtaining the product. The price may be paid in the form of money, goods, services, votes or anything else that has value for the other party (Giri, Roy 2016).

The key elements for price creation include costs, demand and competition. This trio together creates a so-called “magical triangle” of price creation. If the manufacturer wants to determine the correct price, all three factors must be taken into account (Lipianska 2002, Harvey 1991). Pricing uses a variety of approaches that have their basic clusters. The correct price determination must take into account all factors, although for different products, at a different stage in the life cycle and at a different level of demand or the position of the manufacturer on the market (Kienzler, Kowalkowski 2017). Kotler and Keller (2007) state that the price is the price between the price of the product costs (this price is too low to make a profit) and the price of competing products (this price is too high to prompt customers).

According to Lipianska (2002), the price of the different entities varies. From a macroeconomic point of view, the price represents the basic mechanism, which takes the price for the balance of demand and supply. At the same time, it operates on the resources of the whole company. For the seller (manufacturer), the price is one of the most important decisions, as it represents one of the tools generating profits. For the consumer, the price represents the sum of the funds he/she must surrender in order to obtain another benefit (the product the consumer needs). It is well known that most consumers perceive prices in a way, that it does not share anything with economics. According to Kita *et al.* (2010), the price is based on the value the product imparts to the customer. As a result, the goal of pricing policy is to create a value the customer will be interested about. This is an undeniably subjective factor. Therefore, the company must estimate how much the customer is willing to pay, how large the turnover will be at that price, what are the requirements for the given production capacity, etc. The question is why consumers are prepared to pay more and why is there more product, which are not cheap? Usually, it is due to the following reasons: customer inexperience, perceived risk and snobbism.

Price reduces take a fraction of the profits. Only 10 % of the gilding the company needs to sell 50 % more, so that the final sum of profits is the same. A risky “pricing game” raises costs, so companies can go as far as they can lose their position. Instead of reducing the prices, the question is whether there is any way to increase the value of a product or service. This “added value” proposal means we can “donate” something that does not come from profits. If we do this right, it can contribute to a positive customer experience, both on the transaction itself and on the image of our company. Good experience is the key to repeat the purchase, which is, on the other hand, a way for the company to profit very well (Kotler 2010).

An increasing number of businesses consider the perceived value of the product to be the decisive factor in determining the consumer price and not the cost per unit of production. The decisive precondition for price determination by consumers of perceived value is to correctly determine how the market perceives the offer. Sellers who value the consumer's perceived value would set higher prices. On the other hand, sellers who subordinate this value will set a lower price. The basis for correct price formation is to determine the value of the offer perceived by consumers in the relevant market through marketing research (Baran *et al.* 2014).

The status of non-price factors in the modern marketing process is constantly rising, despite the fact that the price remains one of the most important components of the marketing mix. Factors affecting the price levels of individual products affect prices at different times and vary in intensity. It is not possible to set the price at the beginning and not to deal with it more. This means that the factors influencing the price are dynamic. Intensity and a number of factors also depend on the nature of the business (production, business, service). Therefore, we divide the factors into internal factors that include the company's marketing goals, marketing mix strategy, cost, price policy organization, and external factors that include market, demand, competition and other environmental factors (Kita *et al.* 2010).

In the business strategy, the price plays a very important role. Prices vary according to goals, company priorities, and other situational factors such as the intensity of competition and economic conditions, and can therefore address different goals. Legal and ethical price issues play a very important role in choosing the pricing strategies (Cravens, Piercy 2009). The response of a company to changes in the price competition is also dependent on market demand. In markets, characterized by high production homogeneity, an enterprise must look for a way to highlight its product. If it fails to do so, it is forced to adapt to changing competing businesses. On the contrary, in the market for non-homogeneous products, the company has more opportunities to respond to changes in the prices of competing manufacturers. Customer response is reflected in the relationship between the price and the quantity demanded, which is indirectly proportional, *i.e.,* the higher the price, the lower the demand is and vice versa. Competition can react equally to all price changes, or a competitor will treat each change as a new challenge and respond to it in line with current interests (Kotler, Keller 2007).

The process of creating a price in international marketing is the same as when creating a price for the domestic market, it mainly affects costs, demand and competition. Apple, for example, sells its iPhone products on the US market at a different price than in Europe, adjusting prices to the value perceived by consumers. iPhone is perceived as a luxury product in Europe, and its price is adjusted. Another example is the Diesel Company, which sells good-quality jeans whose cost is tailored to the cost of production. However, the cost of other assortments such as T-shirts and accessories, which are produced in North Africa at minimal cost, is determined by the value perceived by consumers. From the reason that Diesel is a luxurious brand, the company can set a high price on this line and realize high profit margins.

According to Einav *et al.* (2018), Internet still has a major impact on pricing. It facilitates more dynamic real-time pricing, thanks to the increasing number of auctions, prompt markets, compensation transactions and the creation of group purchasing power. The prices of goods offered through e-commerce are usually lower than the prices of the same goods offered in the physical stores. E-commerce is a big competition for traditional business interfaces and gives them a dilemma - what price to set?

2. Methodology

The aim of the research was to analyze the impact of the price, price discounts and other selected factors affecting the purchasing behaviour of the Slovak consumer in the field of retail shops. The subject of the research were consumers living in the region of Eastern Slovakia. Primary information was obtained by own collection. For the data collection, the questionnaire method was selected in the electronic form. Questions in the questionnaire were in the form of semi-closed, closed and scaled questions. In the questionnaire, the Likert five-point scale was used, in which respondents could express their complete agreement, resp. disagreement. The questions were focused on consumer satisfaction with prices in retail shops operating in Slovakia, the price/quality ratio, the purchasing power, as well as the factors affecting the purchasing. The obtained primary data were processed in the Statistica statistical program. When confirming or rejecting hypotheses, Spearman's method of correlation coefficient and single-factor analysis of ANOVA scattering were used.

To achieve the research goal, we have set the following hypotheses:

H1: We assume that there is a statistically significant dependence between the gender and the intensity of purchasing.

H2: We assume that there is a statistically significant dependence between the age of the respondents and the key factor influencing the choice of goods.

3. Survey results

After the purchase, the consumer may be satisfied or dissatisfied, that if the product meets the expectation, the consumer is satisfied, if not, the consumer is dissatisfied. According to Jayaswal and Jawkes (2016), consumer expectations are based on the information they have received from sellers, friends and from other sources. If the

seller exaggerates the product performance, the consumer expectations are not met and there is a situation, which leads to dissatisfaction. Some sellers reduce performance levels to increase the consumer satisfaction with the product. For correct pricing, we need to get the most accurate data about the attitudes and opinions of the customer (Bačík *et al.* 2015). The pricing is based on respect for buyers' value system, resp. on psychological valuation. They are primarily about ideas about price, willingness to pay the price, price and quality relationship, price and image relationship, level of maturity and customer relationship to prices (Mallick, Marques 2016).

In the research, we surveyed the respondents as to whether retailers are motivating respondents' with the price reductions so much that they would opt for a purchase. Also on this issue, respondents had to choose from the five-step Likert scale. It is clear from the outcomes that respondents are affected by price reductions. 73 respondents (47.1%) chose the answer “rather yes” and 12 respondents (7.7%) opted for a positive answer. Whether the price reductions in the retail stores affect the purchase cannot be assessed by 30 respondents (19.4%). 32 respondents (20.6%) stand for an answer “rather not”. 8 respondents (5.2%) had a negative attitude and chose the option “definitely not”. Out of the 155 respondents, 102 women and 53 men participated in the survey.

The youngest survey respondents were at the age of 16 and the oldest ones at the age of 60. The average age of the respondents was 29 years. The most frequent group included respondents between the age category of 21 to 25, representing 76 respondents (49 %). The second group included the respondents from the age of 26 to 30, which means that 29 of the surveyed respondents (18.7%). The third considerable group included the respondents from the age category 31 – 35. They represented 18 respondents (11.6%). Other groups reached values below 10 %: 36-40 years, 9 respondents (5.8%), 16-20 years, 7 respondents (4.5%), 46-50 years, 6 respondents (3.9%). The smallest representation was for the group of people from 41 to 45 years and over 50 years 5 (3.2%).

In the first part of the questions, we asked respondents for their opinion, which of the factors influence them the most in the decision making process. Respondents had a choice of several options: quality, price, product composition, brand of the product, country of origin, and product design. It is precisely the identification of the factors that most influence consumers on their purchases, helping companies to choose an appropriate sales strategy. There are many factors to influence consumers. For the needs of our analysis, we have chosen these six factors. In the first two places are the quality and the price of the products. 67 respondents (43.2%) chose the price and 61 respondents (39.4%) chose the quality of the product. 12 respondents consider the ingredients as an important factor affecting their purchase (7.7%). Six respondents (3.9%) chose the brand of the product and the ingredients of the product. 3.2% of the respondents (5) are affected by the country of origin. The last place with a percentage of 2.6 %, four respondents chose the design of the product.

When questioning whether they use discounts when purchasing, the majority of the surveyed respondents had a positive answer on the five-step Likert scale. “Definitely yes” was chosen by 25.8% of the respondents (40). 68 respondents (43.9%) chose an option “rather yes”. The average option “I do not know” was used by 4 respondents (2.6%). The possibility of “rather no” was expressed 37 respondents (23.9%). 6 respondents (3.9%) out of 155 replied that they do not take advantage of price reductions.

Another follow-up question was that respondents were influenced by discounts, whether they would buy the goods just because they offered, although it was not necessary at that moment. As with other questions, we used the five-step Likert scale. The answer "rather no" got (40%), 60 respondents. The option “rather yes” got the second place, which attracted 56 respondents (36.1%). 13 respondents (8.4%), chose “definitely yes” and "definitely no". 7.1% of the respondents, (11) cannot judge whether the price reductions influenced them. The following question follows and complements the previous question. We wanted to find out how often respondents were affected by discounts. They had five choices from “always” to “never”. Most of the surveyed respondents was influenced by discounts, 47.7%, which is 74 respondents. Other responses are as follows: very often 38 respondents (24.5%), often 33 respondents (21.3%), always 8 respondents (5.2%) and two respondents (1.3%) chose “never“.

In the following part of the paper, we statistically analyzed the data, which were based on testing two hypotheses. The first hypothesis is analyzed in Tables 1 - 2 as follows:

H1: We assume that there is a statistically significant dependence between the gender and the intensity of purchasing.

The differences between the intensity of purchasing and the gender can be seen in Table 1. The context was identified with the help of the identification question about the gender of the respondents and the second question related to the intensity of purchasing. The obtained statistical values are presented in Table 2.

Table 1. Gender versus intensity of purchasing

How often do you purchase in retail shops?						
Intensity of purchasing	Male		Female		Total	
	N	%	n	%	n	%
Daily	13	24.5	46	45.1	59	38.1
Weekly	27	50.9	46	45.1	73	47.1
Monthly	12	22.6	6	5.9	18	11.6
As necessary	1	1.9	3	2.9	4	2.6
At all	0	0.0	1	1.0	1	0.6
TOTAL	53	100.0	102	100.0	155	100

Source: Own elaboration

The results outlined in Table 1 show that men and women buy at different intervals. The biggest difference can be seen when they are shopping daily. While 45.1% of women shop daily, in the case of men it is only 24.5%. 45.1% of women are purchasing weekly, monthly the percentage is 5.9%. Men dominated in the weekly shopping, accounting for 50.9% of respondents. Monthly only 22.6% of men were purchasing. In the case of others, 3 (2.9%) women and one (1.9%) men chose the option “as necessary”. One woman (1%) of 155 respondents said, that she did not purchase in a retail shop at all.

Table 2. Spearman's correlation coefficient focused on the intensity of purchasing

N	df	ro	p - value
155	10	0,269	0,0009

Source: Own elaboration

We used Spearman's correlation coefficient to determine the purchasing frequency for women and men. From the data in Table 2, we deduced the p value, *i.e.* the probability. The probability was 0.001. Since $p < 0.05$, *i.e.* $0.001 < 0.005$ between variables, there is a statistically significant dependence. The Spearman's correlation coefficient shows that this dependence is weak because its value of 0.269 is in the range 0.1 - 0.3. From these values, we found that dependence exists between the intensity of the purchasing and the gender of the respondents. Based on the above findings, we can accept the H1 hypothesis.

We live in a time of great, constant economic and as well as political changes that have a significant impact on the consumer and their decision-making. Every consumer is a person with his or her own opinion. There are many different factors, which influence the consumer behaviour. Each retailer should therefore be aware of what the target audience wants to reach and focus on that group and try to accommodate it in order to obtain and maintain the most satisfied consumers. The purchasing behaviour affects a large number of factors in the company in which the consumer is a part of (Gburová, Bačík 2016).

In the second hypothesis, we focused on assessing the dependence between the age of the respondents and the factor that most affected them when purchasing. The second hypothesis is the following:

H2: We assume that there is a statistically significant dependence between the age of the respondents and the key factor influencing the choice of goods.

In order to assess the dependence between the age of the respondents and the factor that most affected them, we used a one-factor analysis of ANOVA scattering. To verify this hypothesis, we used an age-related identification question in the questionnaire, and a second question that deals with the factors affecting the choice of goods in general in the retail shop.

Table 3. Factors affecting the purchase of goods considering the age of consumers

Which of the factors will affect you most when purchasing?														
Age	Quality		Price		Ingredients		Brand		Country of origin		Product design		TOTAL	
	n	%	n	%	N	%	n	%	n	%	n	%	n	%
16 -20	3	42.9	3	42.9	0	0	1	14.3	0	0	0	0	7	4.6
21 -25	29	38.2	34	44.7	5	6.6	2	2.6	2	2.6	4	5.3	76	49
26 - 30	14	48.3	8	27.6	3	10.3	2	6.9	2	6.9	0	0	29	18.7
31 - 40	11	40.7	12	44.4	2	7.4	1	3.7	1	3.7	0	0	27	17.4
> 40	10	62.5	4	25.0	2	12.5	0	0	0	0	0	0	16	10.3
TOTAL	67	43.2	61	39.4	12	7.7	6	3.9	5	3.2	4	2.6	155	100

Source: Own elaboration

Quality is one of the main tools for building a market position. Product quality means the ability of a product to perform its functions. From the point of view of marketing, quality should be measured according to the perception and acceptance of the consumer (Kotler, Armstrong 2004). According to Hui *et al.* (2012), in marketing, we distinguish internal and external quality. Internal quality is a summary of properties that meet technical standards. They allow the product to function properly. External quality is a summary of features that meet customer expectations. It is a summary of the features, which make the manufacturer perceived by the customer as a high quality or speed supplier with which he responds to external developments from a customer perspective (Fedorko, Kakalejčík 2015). Zerang *et al.* (2018) characterizes in the context of marketing the trend as a long-term change in attitudes and behaviour of the consumers. Product trends are a tool for estimating consumer behaviour and can help businesses learn in their markets at the time of change as they show the direction of a huge number of current changes.

Trends bring many opportunities and in companies where they correctly identify, analyze and use consumer trends, revenue, market share and profit increase, and gain a significant competitive advantage.

Table 4. Factors affecting the purchase of goods directly in the shop considering the age of consumers

Which of the factors will affect you most when purchasing directly in the retail shop?										
Age	Discount, Special Offer		Exposure Of Goods		Competition		Gift Wrapping		TOTAL	
	N	%	N	%	N	%	N	%	N	%
16 -20	3	42.9	1	14.3	3	42.9	0	0	7	4.6
21 -25	42	55.3	22	28.9	7	9.2	5	6.6	76	49
26 - 30	12	41.4	13	44.8	3	10.3	1	3.4	29	18.7
31 -40	17	63	7	25.9	3	11.1	0	0	27	17.4
> 40	10	62.5	6	37.5	0	0	0	0	16	10.3
TOTAL	84	54.2	49	31.6	16	10.3	6	3.9	155	100

Source: Own elaboration

From the above question, which we put to the surveyed respondents, we found out that the main factor influencing the purchase of goods is the quality (43.2%) and the price (39.4%) of the products. They are followed by the ingredients (7.7%), brand (3.9%), country of origin (3.2%), and at last the design of the product (2.6%). The key factor affecting the purchase of respondents in the retail shop is also associated with the price and it is a discount, with the share of (54.2%). 31.6% of the respondents consider the issue of goods as the key, the competition is 10.3% and the gift packages are chosen by 3.9% of the respondents. In the tables, we can notice that the differences in the representation of the different age categories are not very different. Almost all age categories consider the most important factors that affect their purchasing to be the quality and the price of the product.

Table 5. ANOVA analysis focusing on factors affecting the purchasing process

	SS	Df	MS	F	p	F
Between the groups	387.578	5	77.516	1.021	0.407	2.567
In the group	11,306.810	149	75.885			
TOTAL	11,694.390	154				

Source: Own elaboration

Table 6. ANOVA analysis, focusing on factors affecting the purchasing process in the retail shop

	SS	Df	MS	F	p	F
Between the groups	414.878	3	138.293	1.851	0.140	3.116
In the group	11,279.509	151	74,699			
TOTAL	11,694.390	154				

Source: Own elaboration

The output of the single-factor scattering analysis is given in Table 5 and Table 6. The tables contain the squares of deviations (SS), the number of degrees of freedom (df), the value of the mean square, the values of the test criteria (F), the P value and the critical F value (F crit.). The F value is calculated as the share of the mean square values between the groups and in the group. The critical F value was determined based on the F0.975 Fisher - Snedecor divisions ($\alpha = 0.05$). If the value F is higher than the F criterion, we have confirmed the hypothesis if F <F we rejected the hypothesis. In our case, both F - values are lower than F crit., *i.e.* 1.021 <2.567 and 1.851 <3.116. This finding was confirmed by p-values of 0.407 and 0.140. Because these values are greater than 0.05, they are statistically insignificant.

Based on these facts, we can assert that the different age of the respondents does not cause any influence on the purchase by other factors. Based on the above findings, we can reject the H2 hypothesis.

Conclusion

Slovak consumers, especially in the shops, are mainly deciding on a price basis. This is evidenced by the fact that there are almost no shops that offer better-quality food. All business chains are therefore focusing on offering the cheapest goods to the customer.

Price is a very often used and very effective marketing tool when the customer's purchasing power is low (Oláh *et al.* 2009). A consumer who cannot afford expensive products is also willing to accept lower quality in this case. Fighting with low prices can also be harmful for both the company and the consumer (Mudrík, Fedorko 2010). Companies can get rid of their competitors. The company that is strong on the market is able to keep low prices for several years. Its weaker competitors will not be able to afford long-term losses, and they are gradually going bankrupt. If a strong player in the market succeeds in a price war to destroy competitors, he will most likely raise his prices, as they were before the price war. At the end, the consumer will be the one, who pays for the price war.

For a marketing analyst (Bačík *et al.* 2014) is not enough to know only the influences that affect the consumer, he needs to understand how the consumer makes purchasing decisions. However, it is necessary to have information about what types of buying decisions exist, what steps involves the buying process and it is also necessary to identify individual purchasing roles in the purchasing process. As we have seen from the questionnaire survey conducted, the main factors influencing consumer behaviour are the price and the quality of products. Consumers often contact these two factors, so if the price is low, the quality of the product is obviously low and vice versa. Most of the respondents think that the price/quality ratio in retail outlets operating in Slovakia is adequate.

Nowadays, various discounts are offered at each step; almost every product is sold at an advantageous price. Everyone is interested in buying products at the lowest price, so it is no longer rare to witness long queues at a cash register. In our survey, we also found a positive perception of price reductions and adjustments. More than 69% of the respondents expressed a positive feeling about the use of price reductions. 44.5% of the respondents buy goods that are sold at a discount even if they do not need it at that moment. In many cases, they buy the goods because they think they will use it in the future. We can therefore claim that price reductions and overall price changes are largely affecting customers.

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Regional Disparities and Unemployment Rate: Role of Education in Regional Development

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Abstract:

When it comes to unemployment, graduates and youth become to the most sensitive group of all active population. They lack experiences, soft skills and intercultural understanding. When the economic crisis showed up, the unemployment of the youth rose in the European Union and in Slovakia as a part of it. In Slovakia, various disparities between regions occurred, measured by the NEET indicator. While in the west part of the country only slight changes in the youth unemployment showed up, the very eastern part suffers by extremely high rate, some regions up to the 70%. Using the spatial autocorrelation, we have proved the impact of the education on the youth unemployment rate in 79 districts. However, the relationship between the unemployment rate and education is not the same in all districts and here the spatial paradox occurs; the quantile regression has showed, that in districts with the low unemployment rate the role of the education is much stronger than in districts with the high unemployment rate. This impact of the education is changeable and influenced by period, current economic cycle, internal political situation and the policy of EU bodies and institution.

Keywords: youth; unemployment; higher education; graduates; quality

JEL Classification: H75; I280; I230; I250

Introduction

In the life of every young person, the transition from school to the first job means a significant milestone. Graduates face several life decisions; where to focus the career and how to develop it. Some graduates enter the labor market with high expectations regarding their first salary, the content of their job position and career growth, responsibility and competencies. Many of them do not realize the absence of any competitive advantage compared to other graduates ending in a similar study field with a similar focus, uncertain future and unclear career profile.

The current labor market is expecting from today's youth the traditional range of educational equipment, but also assumes an adult and experienced individual. Employers on the labor market are aware of the fact, that university graduates do not bring the desired range of experiences, especially soft skills. Graduates also lack a more detailed training for confronting the European social and cultural phenomenon, which is a growing need to be ready to work and exchange knowhow in an intercultural and internationally diverse work environment.

1. Literature review

The financial and economic crisis in 2008 affected most of the developed economies, the European Union (and thus Slovakia) too. It has been occurred in several phases, at varying degrees of intensity and has hit every field of the economy. Each developed market economy is flexible and able to adapt to changes at markets, although they are vulnerable at the same time. Due to this reason close attention is paid to them by national governments and by the EU as well (Mura, Kljucnikov, Tvaronavičiene, Androniceanu 2017, Machová 2014). With a certain delay the crises influenced youth unemployment. Slovakia was also showing signs of a slowdown in the economy growth related to the slowdown of the Eurozone. Its consequences were mainly mirrored in the reduction of foreign sales and the overall increase of the risks on the labor market, which was particularly negative for the group which is most sensitive for labor market changes and unemployment. This includes not only women or parents after maternity leave, but also graduates and young people who are vulnerable group on the market because of their lack of skills, experiences, work habits. Potential employers often involve too much time investment with their inclusion and incorporation; in the case of layoff they are absolutely their first choice (Spirkova, Stehlikova, Zubkova 2016a). Even though Slovakia has been stricken by the crisis in many ways, unemployment rate did not manifest that significantly as for instance in the countries of southern Europe, especially in Greece, where the impact of the crisis has been reflected in all fields of the life; the unemployment rose to 24%. The overall lack of funding in this

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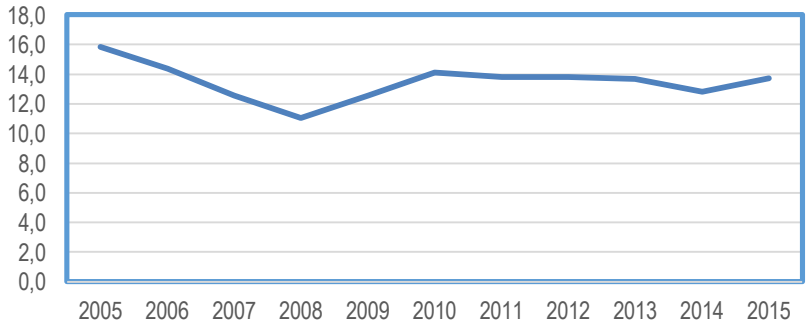
country has contributed negatively to this. In order to get the country out of the crisis-induced problems, it has received three rescue packages from the European Union (Spišáková, Mura, Gontkovičová, Hajduová 2017).

Several factors influence the success and duration of the transition from school to the labor market (Spirkova, Stehlikova, Zubkova 2016b). Besides the effectivity and intensity of the economy is one of the most important factor education - the general education system of the country and the institutions which provide and cover it (Brzinsky-Fay 2011). Although higher education is the highest level of education that a person can achieve, the transition to the labor market is also associated with the risks and difficulties associated with the education system in the country, the structure of the study programs and the government itself, which acts as a market player in higher education environment (Fussel 2012). The motivation to study is affected by many reasons. Most likely is a wider succeed on the market and better financial evaluation. In many case universities are tackling the problem of inadequate student interest in the faculty which they study in. In Slovakia, there is a very frequent phenomenon following a certain trend and popularity of social sciences, which often have worse practical use and do not reflect the needs of the market. Then there is overproduction of graduates who are not able to enter the labor market neither in their home country nor abroad. Not only in Slovakia, but also in the European Union, there is an increasing demand for higher education; the number of enrolled students increases and new study programs, interdisciplinary fields are being created, the number of higher education institutions (also private) is increasing and the international cooperation of universities is getting deeper (Knight 2014). Despite the existence of historically significant universities, Slovak universities are often underestimated regarding their quality and in comparison, with institutions in neighboring Czech Republic or other countries in a Europe are misjudged. The “brain drain” effect has a significant impact on many aspects of the Slovak economy; the changing demographic structure of districts, the share of the economically active (working) population and, finally, the country's attractiveness regarding their foreign investment (loss of qualified labor force), which is reflected in wage developments. Regionally, Slovakia is divided into 79 districts; each of them is specific itself. Bratislava, the capital, is the leading part when it comes to the innovation potential and economic strength, followed by Košice, Nitra, Trenčín. It is obvious, that the innovation potential is closely linked to the economic performance of regions (Hudáková, Fiľa and Maroš, 2017 or Havierniková, Lemańska-Majdzik and Mura 2017).

The education system in Slovakia has influenced mainly by the education systems of Austria and Germany. After the Second World War, when Czechoslovakia was affiliated to the communist bloc, Soviet influence began to dominate in education. The government has created a monopoly. The elements of real socialism also influenced by the system of higher education (Europe 2017). The role of the universities in the field of research was diminished, the government had a significant power on universities and controlled their activities. Because of these changes, the development of the Slovak university environment as well as the whole society have been isolated from the developed countries. The government centralized and politicized the higher education system, both from the perspective of access to the university education as well as from the perspective of university staff. Planning the number of students in all fields of study was based on five-year economic development plans and should provide the economy's needs in terms of the qualifications structure of workers (Bornhorst, Commander 2006). The criteria for application to the university was often the party´s loyalty of the parents or the family. On the other hand, we can also find certain advantages in this system. After the Second World War, in Slovakia was almost eliminated illiteracy and the average educational level of the population could be compared with developed countries. The advantage of this system is often also the assurance of the free access to the all levels of education. Despite of the persistent monopoly role of the state, significant changes have taken place since 1990 in terms of transformation and restructuring (Agnew 2015). A new law regulation in higher education has been adopted which abolished the ideology of political control in this area. Fundamental rights and freedoms have been established, political parties have been forbidden on the university soil, authorities have renewed their autonomy, and their overall power has been strengthened. Academic senates were formed to express the views of several groups that exist at universities (Talebian 2014). The goal of the transformation that took place in this area in the 1990s was also to bring Slovakia closer to the level of developed countries and to prepare education system for integration to the European Union. In many developed countries, private universities already existed now - in USA at this time nearly a quarter of all students’ study in private universities, there are almost 2,600 small private universities in Japan and about one fifth in Italy (Matsumoto, Elder 2010). We consider important to note that currently the share of university educated people in Slovakia exceeds the European average. After the integration of Slovakia to the European Union in 2004, several private universities arose in each region. Obtaining a minimum Bachelor's degree has become a form of prestige and necessity in our country. For this reason, the effect of the "over-educated" population occurred, especially in the non-attractive fields.

Slovakia belongs among the EU countries to the bottom of the ranks of graduation and youth unemployment. In recent years, indicators of unemployment have been increasing and after 2007, the number of jobs offers has fallen sharply in the year-on-year comparison. This trend reached its first minimum in 2010. Nowadays, the current numbers of unemployed youths are in the range of 30-35% of total unemployment and the same high share also shows long-term unemployment. Starting in 2013, we can see a slight improvement in the trend, and the overall number of job seekers and unemployed young people have fallen. Despite the consolidation effect, the youth unemployment rate in Slovakia shows high numbers and despite many European and national initiatives this rate seems to be hard to decrease permanently (Eurofound 2014). In addition, Slovakia faces the demographic issue of the decline of young people due to low birth rates and the brain drain effect. Although Slovakia showed a positive trend in GDP growth and high economic activity in the pre-crisis period (up to 2008), 2011 is considered as a recovery in economic activity, which also led to an increase in jobs offers in regions and we can note the re-established stability in the labor market. However, the unemployment rate for young people is higher than 33% and is ranked as a country with the higher youth unemployment rate. On the Figure 1 we can observe the youth unemployment rate per NEET (Not in Education, Employment or Training) indicator developing in years 2005-2015.

Figure 1. Youth unemployment rate in Slovakia (NEET indicator)



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2. Objectives, data collection and methodology

2.1. Objectives

The main objective of the research is to identify the intensity and extent of the education impact on the unemployment rate of young people in Slovakia. For the purpose of this paper, we have selected the year-range 2005-2015 to measure pre-crisis, crisis and post-crisis situation as the immediate situation. Therefore, our measures are explained in 3 different time periods:

- 2005-2007 (pre-crises);
- 2007-2012 (crisis);
- 2012-2015 (consolidation period).

Research hypothesis: Different levels of long-term unemployment rate influence the dependence on the percentage of university graduate unemployment. Youth and graduate's unemployment is related to education and gains different values of dependence and significance in regards of the region/district.

In chapter 1, we have approached the current situation of this problem in Slovakia. In the empirical research, based on the hypothesis and research goals, we will test its reliability and interpret the results.

2.2. Methodology

In the research, we will use statistical quantitative methods in order to verify the hypothesis. From the objective of this paper and the hypotheses, we have selected the following statistical methods to verify and achieve the goal which we will verify the hypothesis by:

- spatial autocorrelation;
- quantitative regression;
- regression analysis.

Spatial autocorrelation belongs to spatial statistics and spatial econometrics. This is a specific type of correlation where we evaluate the relationship of one variable in the space. From a geographical point of view, it is

evaluated as the relationship between phenomena or events separated by certain spatial or temporal segments. We can talk about positive autocorrelation if similar attributes are closer to another. For negative autocorrelation, we are talking about geographic values that are different from each other. If none of the previous cases occur, it is a random distribution of the phenomenon in space - then we are talking about statistically insignificant.

Griffith (2008) defines positive spatial autocorrelation as a case where geographically close values aggregate with similar values. High values with high, medium to medium and low to low. There are several measurements for spatial autocorrelation measurement, *e.g.* Moran's, Geary's, Gettis's rate. In our research, we will use Moran´s coefficient, which is given by the relation:

$$I = \frac{N}{\sum_i \sum_j w_{ij}} \frac{\sum_i \sum_j w_{ij}(X_i - \bar{X})(X_j - \bar{X})}{\sum_i (X_i - \bar{X})^2} \quad (1)$$

where: N is the number of spatial units (in our research districts of Slovakia, N = 79); X_i is the value of the variable; *e.g.* X_i = unemployment rate of young and graduates; X is the arithmetic mean of that variable; w_{ij} is the element of the Neighborhood Matrix.

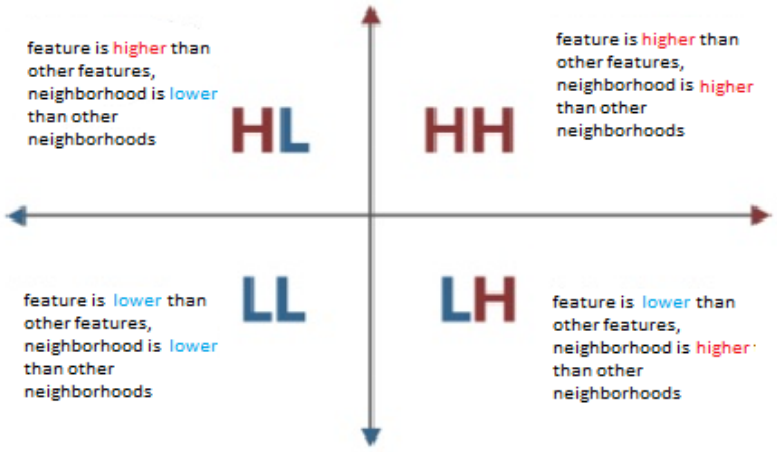
In the case of positive autocorrelation, the districts in Slovakia with similar unemployment rates will be grouped close to each other and in the case of negative autocorrelation, the values will be spread in the form of a checkerboard. Neighborhood matrices represent the power of potential interaction between individual places (Anselin 1999).

Moran´s coefficient gets values from interval <-1; 1>. The more the Moran coefficient is closer to the value -1, the stronger the phenomenon is negatively autocorrelated. If the values of the Moran´s coefficient are closer to +1, the values of the phenomenon are positively autocorrelated. When the Moran´s coefficient value is 1/N-1, the phenomenon is randomized. For large N values, it is about 0. The significance of the Moran´s coefficient value can be tested by using Monte Carlo simulations. If Moran's coefficient is significant, it is logic to ask, which values the spatial autocorrelation causes. This is facilitated by LISA (Local Indicators of Spatial Association) tests. According to Anselin, one of the following scenarios may occur:

- positive spatial autocorrelation can occur in locations with high values and similar neighbors (high-high);
- positive spatial autocorrelation also occurs in low value and similar neighborhoods (low-low);
- negative spatial autocorrelation occurs at locations with high values, but neighbors will have low values (high-low);
- negative spatial autocorrelation for locations with low values but with neighboring high values (low-high);
- locations without significant spatial autocorrelation.

Such an analysis can be depicted on the diagram (Figure 2) with four quadrants; each of these quadrants represents a different type of relationship. The right top and left quadrants represent positive spatial autocorrelations, and the left upper and right lower represent negative autocorrelations (Griffth 2008).

Figure 2. Moran´s diagram example



Source: Griffith 2008

Classical linear regression and other regression models used do not give us a comprehensive picture of the relationship between variables X and the dependent variable Y. Regression analysis is a method showing the

relationship of the dependent variable Y to the independent variable Xi, i = 1, ..., k. In a classical linear regression model, we write this relationship as:

$$Y = \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k + \varepsilon \quad (2)$$

Assuming that the disturbance component ε has for all observations a distribution with zero mean and constant scattering.

In the practical part, we will also use quantitative regression, which gives us a more complete view of relations between variable X and Y in individual points - quantiles. (Koenker and Hallock 2001). Regression coefficients of quantitative regression estimate the change in the given quantified variable.

If F(y) P (Yy) is the distribution function of a given distribution of the random variable Y and (0,1). Then the function:

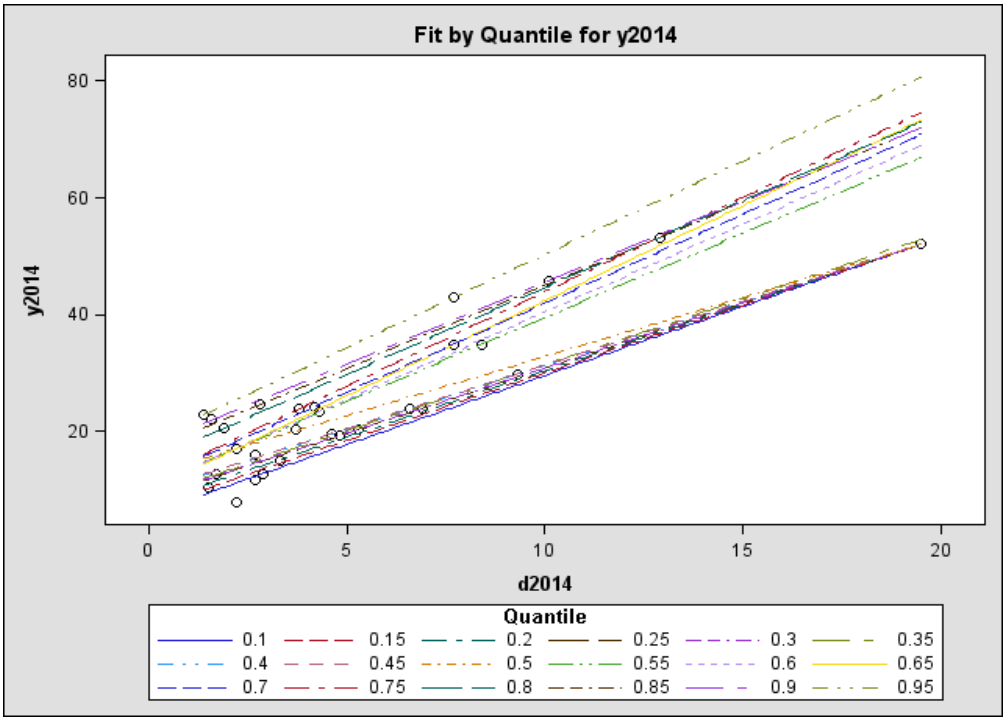
Q F1(y) infyR: F(y) (3)

Is called a quantile function and a number yα= Q(α) is called the α-quantile distribution with the distribution function F(y). α-quantile divides the definition of the random variable Y into two parts so it applies:

P (Yy) P (Yyy) (4)

If we want to draw several quantiles and not only a medium value on the graph, we can draw the so-called Quantiles curves (Figure 3) to obtain an overview of the behavior of the individual quantiles of the distribution of the random variable Y.

Figure 3. Quantile curves example



Source: own

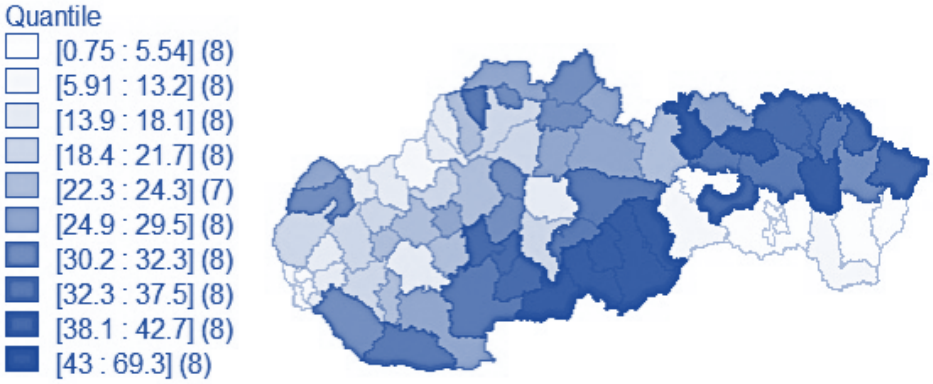
Except quantitative methods, qualitative methods were used in this paper, namely deduction, analysis, synthesis and descriptive method. The GEODA program was used for spatial data processing. The SAS program was used for quantitative data processing.

3. Research results

Currently, Slovakia is divided into 79 districts. The creation of new districts following the change of law in 1996 changed the spatial concentration of total unemployment, but we cannot talk about qualitative change. The districts most affected by unemployment are in eastern and southern Slovakia, such as Rimavská Sobota, Spišská Nová Ves, Michalovce, Lučenec, Komárno or Bardejov. Bratislava district represents approximately 9% of the total population.

Even though in the monitored years 2005-2015, youth unemployment, long-term unemployment and total unemployment have risen (from around 2% in 2005 to 4.8% in 2015), this rate is several times lower than in Košice. It is remarkable that while in economically strong districts such as Bratislava, Žilina or Nitra, the unemployment rate has risen or stagnated in certain periods, smaller and economically less efficient districts, Dolný Kubín, Šaľa and Stará Ľubovňa managed to reduce their rates (although slightly) during the consolidation years after the economic crisis (2012-2015). However, we consider it necessary to mention that in the mentioned years there was a general increase of illegal work in Slovakia and the outflow of young generation and fresh graduates abroad.

Figure 4. Spatial profile of Slovakia: the youth unemployment rate (average values of 2005-2015)



Source: own by Geoda Programme

As we can see on the Figure 4, inequalities in individual districts must also be justified by social and demographic developments; the share of minorities, the birth rate and productivity of the active population, the size and efficiency of the labor market, and, finally, their educational structure. Universities are concentrated in Slovakia in the districts of Bratislava, Košice, Trnava, Banská Bystrica, Žilina, Zvolen and Prešov. At the same time, the regional distribution of universities causes the outflow of the younger generation to larger regions, which also causes a change in the educational structure of the population in the regions. Consequently, the economic attractiveness (regarding investment too) of certain parts is significantly lower. Such concentration also leads to the lack of experts.

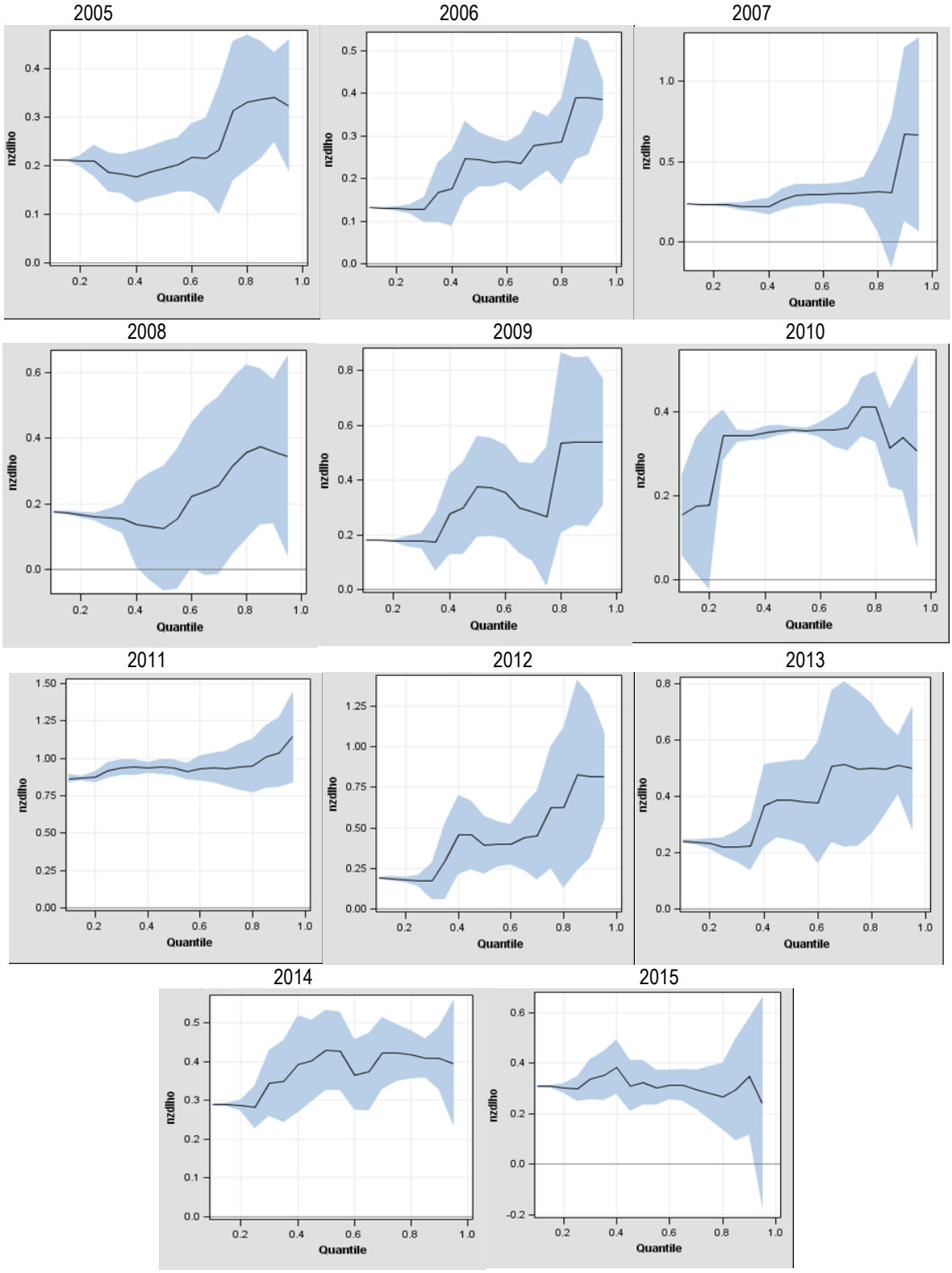
The economic and social performance of the districts of Slovakia should be considered in regard to educational opportunities and unemployment. On the spatial profile, we can see developments in the districts of Medzilaborce, Revúca, Snina, Žarnovica - these are the districts with the unemployment rate of the young and the long-term unemployment above the average of Slovakia. Factors that could theoretically influence this situation include for example the stagnation of construction and the low adaptability of the economy to market conditions and globalization. These districts also show a high proportion of the population in post-productive age, a high proportion of the Roma minority and a low level of education. Other districts with youth unemployment over the average of Slovakia include districts such as Svidnik, Lučenec, Banská Štiavnica or Michalovce - unlike the previous group, this group of districts and their economic base was only slightly diversified and narrowly specialized and in fact suffered the failure of one of the strategic enterprises so that the unemployment rate has risen rapidly.

For verification of the hypothesis we chose the quantile regression obtained by the statistical program SAS Software and the data from the individual districts of Slovakia (unemployment rate of the age group 15-24 years and long-term unemployment) available in the Eurostat. By analyzing the quantile regression in the districts of Slovakia we can see the similarities. We can divide them into three different time periods:

- pre-crisis: 2005-2007;
- crisis: 2008-2011;
- post- crisis: 2012-2015.

Differences between those three times periods are remarkable on following graphs (Figure 5). Considering total unemployment, in the pre-crisis period in 2005, 2006, 2007 we see a similar evolution of the quantitative curve (QR). The QR curve increases considerably at the beginning, and at about 0.3 quantile, the increase slows down and continues to develop relatively in a constant level and about 0.85quantile starting to decrease slightly.

Figure 5. Quantile regression for youth unemployment rate and education (2005-2015)



Source: own by SAS Software

Moreover, when analyzing the confidence interval (especially around climbing and falling), the area in the range of 0.3 quantile and above the 0.85 quantile we observe that the confidence interval crosses the zero axis, which means that the influence of education on total unemployment is not significant. In these districts, the impact of education on unemployment is too small or too low. The explanation is that in districts with a too low unemployment rate, up to 0.3 quantile (representing about 6% of the unemployment rate), the demand for labor is

generally higher than the supply. On the other hand, in districts with a high unemployment rate (approximately from 0.85 quantile, which is higher than 25%), young people are overqualified and there are generally fewer job offers in the area. In both crisis and post-crisis years, we see that the QR curve has also had considerable growth, then stabilized and the trend is then constant or moderately rising. Unlike the graphs in the pre-crisis years, the analysis of the confidence interval in the crisis and crisis graphs suggests that from 0.3 quantile, the dependence of education and overall unemployment is significant. When the crises showed up, labor market subjects (enterprises) are trying to make working capacity more efficient and, therefore, place suitable candidates with adequate education.

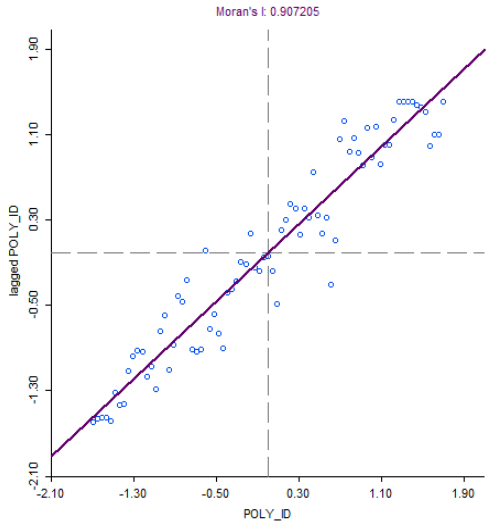
Considering the long-term unemployment, the QR curve is predominantly increasing. Moreover, the confidence interval confirms that the dependency between education and unemployment is significant across the quantitative spectrum. As the dependence increases with the increasing value of the quantiles, it means that the higher unemployment rate we will note in those districts, the stronger influence of the education factor is on this indicator. From the long-term perspective, the crisis has a modest impact on the relationship between education and unemployment.

Youth unemployment figures vary considerably from one district to another; ranging from 2% in the Bratislava district to 30% in the least economically developed districts in the east of Slovakia. In the case of the analysis of the influence of variables by linear regression, the result could be significantly distorted. As an example, we can state the total unemployment rate in 2005, where the values in the 0.2 quantile are underestimated and the values from the 0.25 quantile are overestimated. Quantile regression gives us a more complete picture, and its results are more accurate.

The greatest increase in youth and graduate unemployment was observed in the years when the economic crisis began to show up (2008-2009). By 2007, the employment rate of graduates slightly improved. This situation is directly proportional to the market situation and the overall changes in unemployment rates. Impacts on university graduates tend to show a slight lag even though it is the most sensitive group of all unemployed.

Using the spatial autocorrelation method, we determine whether there are certain relations between the districts of the SR which created certain clusters or concentration (Figure 6).

Figure 6. Moran´s diagram of the youth unemployment in Slovakia (average values 2005-2015)



Source: own by Geoda Programme

The Moran´s coefficient reached the value of 0.907 (P-value = 0.0000), which means that it is a highly positive spatial autocorrelation. On Figure 4 we can observe the location attractiveness of the districts, especially in the western Slovakia, where are many smaller (and economically less powerful) districts, but they benefit from their location close to the strong districts (Malacky, Senec, Dunajska Streda). These districts show high labor migration (day-to-day work outside their home). The disturbances of districts with similar youth unemployment rates occur predominantly in the spatial outliers' quadrant and in the quadrant high-high. High-value districts create so-called hot spots with neighbors with similar values, and cold spots with neighbors with similar values. Based on the results, we can say that the macro-regional attractiveness of the territory of the Slovak Republic is evident, where we see districts with a lower level of the youth unemployment rate and in the eastern and southern districts with a high level - except Kosice (I. - IV) as this area is considered as an economically efficient district.

4. Discussion

At the end of 2013, the accelerated growth of the economy and the improvement in the labor market are reported. According to many experts, 2013 is the first year of recovery and the first consolidation year. Annual GDP growth was reported as 0.9%, which is half of the previous year. In 2010 it was at the lowest level.

The consolidation trend was also reflected in the labor market. In some Slovak districts, especially those economically stronger, the nominal monthly wage was increased. Despite a certain economic recovery, however, the inability of individual districts to integrate workers into the labor market, particularly among young people, was also manifested. Moreover, except the limited job creation Slovakia also suffers from the problem of employers' demand and of study programs offers, especially the lack of technical directions and the orientation of schools to practical skills.

Based on the unemployment situation and this analysis, we can summarize recommendations that could lead to a consolidation of the current situation, for instance greater efficiency and activity of regions, development of programs for regional development, greater support for small and medium-sized enterprises, increased flexibility of higher education institutions and flexibility of universities regarding the market needs, development of infrastructure, greater universality of education, creation of new projects to increase the employment and information of young people and graduates and, last but not least, to restructure the Slovak economy.

In this section, quantile regression shows more accurate results because it does not assume the homogeneity of a given group. While spatial autocorrelation gives us the profile of the monitored area on the basis of clusters of similar values, it does not show us the dependence of unemployment and education. For this reason, we consider it as a complementary method that allows spatial differentiation of the area.

Conclusion

In the spatial analysis of the youth unemployment rate in the districts in Slovakia, we found significant disparities and in the monitored period (2005-2015) the development of this indicator was considerably different. The unemployment rate ranged from 0.1%, and in some districts, it climbed up to nearly 70% in the crisis years. We realized an interesting paradox here; in districts with low unemployment rate the job offer exceeds demand for it, and in the region with the highest rates we meet graduate overqualification, but the job offer is very limited. The "brain drain" effect is concentrated in the east of Slovakia, where greatly affects the demographic structure of these areas. The hypothesis has been confirmed and we have found different levels of long-term unemployment rates causes different form of dependence on the percentage of youth unemployment. The youth unemployment rate is related to the graduate´s education and is achieving different values in the respect to the region.

Unemployment among young people has become an all-society phenomenon. It has an undeniable impact on labor productivity because young people are demotivated, lost knowledge, become apathetic and skeptical, which lower the chance to get a new job. It is also a form of signal for potential employers who consider this group to be less diligent, efficient and productive. Because of the macroeconomic nature of unemployment, temporary unemployment may also cause the lower chance to get mortgage and other loans. In such a situation and uncertain future, the "willingness" of young people to start a family is diminished, what is negatively influencing the demographic development of the country. On the one hand, the increase in mortality, on the other, the decline in natality. The willingness and motivation of such young people to start their own business becomes a question. Since they do not have any credit history in banks, they have worse access to getting credits for possible startups. From a macroeconomic point of view, the social system is heavily burdened, fiscal expenditure is rising, and the tax system is less efficient.

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The Influence of Organization's Culture and Internal Control to Corporate Governance and Its Impact on State-Owned Enterprises Corporate

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Abstract:

This study measured four variables, namely, organizational culture, and internal control as exogenous variables as well as corporate governance and corporate performance as an endogenous variable. To collect data using survey techniques on state-owned companies in Indonesia. Respondents of this research is the manager of state-owned enterprises in Indonesia as many as 270 respondents. Validity and reliabilities made to the questionnaire that has been collected. The data were analyzed using Structural Equation Modelling with LISREL application. The results showed that there is significant influence of organizational culture on corporate governance, internal control of corporate governance, organizational culture on corporate performance, corporate governance influence on corporate performance. From the test direct effect has no significant effect of internal control to corporate performance. Corporate governance is an intervening variable relation between the internal control and corporate performance.

Keywords: organizational culture; internal control; corporate governance; corporate performance

JEL Classification: D23; G32; G38; L25; P47

Introduction

State-owned Enterprises (BUMN) is a business entity partially or wholly owned by the Republic of Indonesia. Currently there are 119 State Owned Enterprises (SOEs) under the control of Ministry of SOEs (As of December 31, 2014). Indonesia is a country where the state role in the economy is relatively large. One of them, showed by the large number of SOEs, although until 2014, the number of SOEs has been decreasing or decrease to 20 SOEs compared to the end of 2013. The excessive role of state in the economic system, often considered led to various kinds of distortions that lead to inefficiencies (Sirojuzilam *et al*. 2016, Tarmizi *et al*. 2016 and Tarmizi *et al*. 2017). Therefore, there is a belief that one important step to enhance the competitiveness of enterprises is reducing state intervention in the economy, which in the context of ownership of the SOEs indicated by privatization. Therefore,

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what is more urgent to be addressed is actually the implementation of the governance of SOEs, which in turn will affect the performance of the company (Corporate performance).

Cash and Fischer (1987) stated that many factors affect the performance of the company which is the development of the organizations, the compensation plan, the communication system, managerial style, organizational structure, policy and procedures. Maswig, (2008) revealed that there are seven factors that affect the performance of the company which are the government's policy, legal and political strength, technology, resources, competitors, customer tastes and management of the company (Nurzaimah *et al*. 2016). Wheelen and Hunger (2002) mentions that the factors affecting the performance of the company is the business environment factors, namely the external environment and internal environment. The results of the management of state-owned enterprises continue to grow from 2010 to 2014, thus reflecting the good financial performance of SOEs. But this is not reflected in the number of SOEs that suffered losses or did not achieve profit. From the 119 state-owned enterprises, there are some state-owned enterprises that have not been able to achieve a net profit. Noted, there are 26 state-owned companies that are still loss. The total loss from the 26 SOEs is RP.11.7 trillion. Although there are still state-owned company that is loss, but the number of state-owned enterprises and a nominal loss in 2014 turned out to be decreased when compared to 2013. In 2013, there were 30 state-owned enterprises suffered from loss up to Rp 34.68 trillion, so there is a decline of 65.77%. When examined in the literature, one of the causes of SOEs that have not been able to achieve a net profit, causing non-optimal financial performance of SOEs is due to a lack of attention to the application of the principles of good corporate governance (Sukardi 2005).

Valuation of the performance of SOEs aimed to determine the effectiveness of the company's operations. One of the measurements of company performance can be seen from the financial perspective which is to look at the financial position of the company. According to Davis (1996), measuring the performance of companies grouped into two categories, namely non-financial performance measurement and financial performance measurement. Merging both of the performance measurement which are the measurement of financial performance and non-financial performance known as the Balanced Scorecard (BSC) introduced by Kaplan and Norton (1996). According to Kaplan and Norton (1996), Balance Score Card measures the performance of companies in the four perspectives: financial perspective, customer perspective, internal business process and learning and growth perspective. According to Syakhroza (2009), the problems faced by SOEs is the professionalism of human resources, organizational systems, organizational culture, good corporate governance, behavioral, organizational strategy, and payroll systems. Steps that has to be taken by the state is doing repairs concerning structure, culture, and the organization's internal systems. Empowering the management of SOEs has to be a priority in order to be more responsive to changes in market environment. While at the macro level, concerning the existence of ministries of SOE as SOE policy body, Daniri (2013). Cultural organization grows easily in the organization. Despite strong to change, organizational culture can be made to further improve the performance of companies (Kotter and Heskett 1998). According to Robbins, (2008), organizational culture can affect performance. Internal control (internal control) that is good can enables management ready to dynamic economic changes situation, increasingly fierce competition, shifting customer demands and their priorities, and also restructuring for future progress (Lubis *et al*. 2016). According to COSO (1992), that the difference in Internal Control of COSO version and Internal Control of previous version (version of Government Accountability Office/GAO) is the emphasis on Soft Control (Performer), which is the core of the internal control compared to its Hard Control (mechanisms, forms, etc.). COSO concept in internal control that emphasizes the soft control, suitable to be applied in the corporate / state-owned enterprise today. Weaknesses exist in the state-owned enterprise in general lies in the soft control. No matter how good a control system when there is collusion between the perpetrators, the system will be damaged as well. Therefore, the State Owned Enterprises (SOE) is required to organize internal control (internal control) based on COSO framework (internal control COSO) as set out in Article 22 of the Decree of the Minister of State-Owned Enterprises No.117/MMBU/2002 on the Implementation of Good Corporate Governance of State-Owned Enterprises, The provision states that it is a must to establish an effective internal control system to secure the investment and state-owned assets that include things like: Control Environment, Risk Assessment, Control Activities, Information and Communication, and Monitoring. The application of the principles of internal control (internal control) role in maintaining good governance in SOEs.

Furthermore, according to the provisions of Article 1 of Law No.19 of 2003 on State-Owned Enterprises (SOEs) the provisions of Article 22 Paragraph (1) The decision of the Minister of BUMN 117 of 2002 on Good Corporate Governance states that "The Board of Directors shall establish an internal control system that is effective for securing investments and assets of state-owned enterprises. Various of research with corporate governance in Indonesia are more focused on the Stock Exchange and in the interests of the capital markets and investors only.

1. Literature review

Corporate performance

Performance (performance) is an achievement of the work in accordance with the rules and standards that apply to each organization's work. Hawkins (1979), states that: "Performance is: 1. the process or manner of performing; 2. a notable action or achievement; 3. the performing of a play or other entertainment".

Corporate governance

Good corporate governance is related on how investors believe that managers will benefit investors, convinced that the manager will not steal and embezzle or invest in projects that do not benefit associated with the fund or the capital that has been invested by the investor and is related with how investors control managers (El Gammal and Showeiry 2012, Lutfie *et al*. 2016, Muda *et al*. 2016, Muda *et al*. 2017). Corporate governance is a system that directs and controls the company with the aim to achieve a balance between the power of authority required by the company to ensure the continued existence and accountability to shareholders.

Organizational culture

Corporate consists of various elements and shaped by the larger culture. The corporate culture is built to address the challenges in the past. Policies, procedures, corporate philosophy, customs and others are response to the situation and challenges in the past. When conditions change faster than the speed of cultural adjustment, organization's success and even survival of the enterprise may be in danger (Zwell 2000, Muda and Dharsuky *et al*. 2015, Yahya *et al*. 2017 and Muda *et al*. 2018). The corporate culture (corporate culture) is the application of the culture of organization (organizational culture) to an enterprise or company.

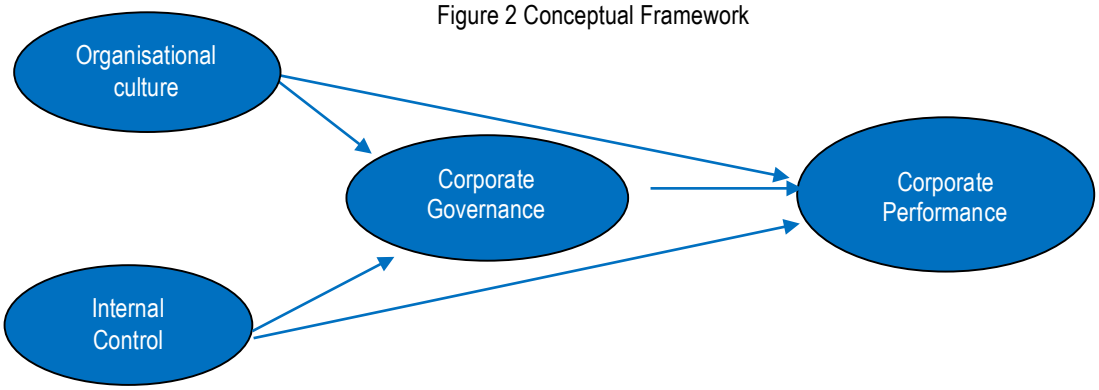
Internal control

In Indonesia, State Owned Enterprises (SOE) required to organize internal control (internal control) based on framework of COSO (internal control COSO) as set out in Article 22 of the Decree of the Minister of State-Owned Enterprises NO. 117/MMBU/2002 on the Implementation of Good Governance in state owned enterprise. Article 5 Paragraph (3) of Law No.19 of 2003 on State-Owned Enterprises (SOEs) stated that "In exercising their duties, members of the Board of Directors must comply with the statutes of SOEs and legislation and is obliged to implement the principles of professionalism, efficiency, transparency, independence, accountability, responsibility, and fairness.

Conceptual framework

From the study of the theory and empirical studies can be noted a relationship between the variables of organizational culture, internal controls, and corporate governance on corporate performance within a framework (conceptual framework) below.

Figure 2 Conceptual Framework



2. Influence of organizational culture against corporate governance

With a good organizational culture, it can support the creation of good corporate governance. The roots of good corporate governance lie in the attitude and behavior of the leadership of the company's internal factors that can also be driving the successful implementation of GCG originating from within the company which is the presence of an organizational culture that supports the implementation of GCG in the mechanism of labor management system in the company.

Thereby the organization's culture will affect corporate governance. This is evidenced by the findings of the thistle, and Paramita (2008) which states that the organizational culture influence on corporate governance. This finding is supported by Chandrasasmita, (2010) and Rashidpur (2011) are also has the same opinion that the organizational culture influence on corporate governance.

Effect on internal control against corporate governance

Each country definitely need a good government or so-called good corporate governance. Good governance is a form of success in carrying out the task of building the state in accordance with the objectives that have been planned (Muda *et al*. 2017).

For this to be accomplished, the company's management requires internal control (internal control) that is powerful, simple, easy to operate, and safe for the enterprise. Thus the internal control will affect the formation of good corporate governance. And this is supported by research findings of Leng, and Ding (2011), which revealed that the internal control has significant effect on corporate governance.

Influence on organizational culture against corporate performance

The study that evaluated the effects of organizational culture variables on the performance of companies (corporate performance) has been done by Thoyib (2005), Brahmasari and Suprayetno (2008), Muda *et al*. (2016), Dalimunthe *et al*. (2016), Hutagalung *et al*. (2017) and Situmorang *et al* (2017).

The study's findings are supported by the findings of research conducted by Rahmati, Darouian, Ahmadinia (2012) on the effect of cultural variables on the performance of the company. Results of research of Lee and Yu (2004) found that cultures influence the performance of the company (corporate performance). Eccles, Ioannou, and Serafeim (2002) and M. Shakil Ahmad (2012) proves that the culture affects the performance of the company (corporate performance). Tseng (2009) and Xiaoming (2012) provide evidence that the cultural influence on the performance of the company (corporate performance). Aluko (2003) and Lee and Yu (2004) found a significant effect on the performance organization culture towards companies' performance (corporate performance).

Effect of internal control against corporate performance

The mechanism of internal control is designed to bring the interests of managers and shareholders in congruence. Required by law, that the board of directors in publicly owned corporation are responsible for developing and implementing mechanisms of internal control (internal control). As noted by Fama (1980), the most important role of the board of directors is to scrutinize the highest decision-making within the company. Managers make decisions and implement them, while members of the board of directors ratified them and in general to monitor the implementation of the company's top managers job (Fama and Jansen 1983).

Influence on corporate governance against corporate performance

According to the Organization of Economic Cooperation and Development (OECD: 2004), Corporate governance is the structure of the relationship and its relation to the responsibilities of the related parties consisting of shareholders, board members, commissioners, managers, designed to encourage the creation of a performance competitive required to reach the main goal of the company.

Khan, Rehman, Dost, and Mumtaz (2011) and Anum and Ghazali (2010) in his study mentions that the corporate governance affects the corporate performance, furthermore Sheikh (2013) and Muktiyanto (2005) states that corporate performance is influenced by corporate governance. Likewise, research results Murwaningsari (2009), Hadrat (2007), Wulandari (2006) and supported by research of Switzera, and Mingjun (2009), Aljifri, and Moustafa, (2007) and Bonifasius (2009), that the corporate governance affects the corporate performance.

3. Research method

This research uses explanatory research method and the type of research is causality (Gusnardi *et al*. 2016). This study measured four (4) variables, namely, organizational culture, and internal control as exogenous variables as well as corporate governance and corporate performance as an endogenous variable. To collect data using survey techniques on state-owned companies in Indonesia. Respondents of this research is SOE enterprises managers in Indonesia.

State-owned companies in Indonesia consists of 13 sectors and totaled 119 SOEs either state-owned, opened state-owned, and Housing. In this study is only done on SOE state-owned and opened state-owned and on the other hand Housing (perum) is not used in this study. The number of state-owned enterprises and opened state-owned enterprise is 105 companies in 12 sectors of 85 state-owned SOEs and 20 SOEs owned open. The

population of this research is all company managers of SOEs in Indonesia's state-owned enterprises and state-owned company in Indonesia. The minimum number of samples was 270 respondents, while the data processing requirements by SEM analysis tool between 100-200 samples (Hair *et al.* 1998, Muda 2017, Pohan *et al*. 2018, Kesuma *et al*. 2018, Muda and Hutapea 2018, Muda and Nurlina *et al.* 2018 and Muda and Naibaho 2018). The samples in studies used random sampling for members of the population considered to be homogeneous and sampling of members of the population was randomly without regard to strata that exist in this population (Sugiyono 2006, Muda *et al.* 2018). The samples are all managers in state-owned enterprises and state-owned opened company in Indonesia, by taking four managers from each of the state-owned company, so the opportunity for all managers in answering questionnaires distributed is the same. Validity and reliabilities made to the questionnaire that has been collected. The data were analyzed using Structural Equation Modelling with LISREL application.

4. Result and discussion

Influence of organizational culture and internal control against corporate governance

Based on test result the culture of the organization, corporate strategy, and internal control, respectively - each has significant positive effect on corporate governance in state-owned companies in Indonesia. Can be seen in the following Table:

Table 1. The result of the influence of organizational culture and internal control of corporate governance

Line	Standardized Value	t – Value	Critical value	Hypothesis
BO – CG	0,51	7,84	1,96	Accepted
PI – CG	0,38	6,32	1,96	Accepted

Source: Data processing results (2015).

So based on the test results it can be concluded that the culture of the organization and internal control, respectively each has significant positive effect on corporate governance in state-owned companies in Indonesia.

Influence on organizational culture against corporate governance

With their good organizational culture can support to create a good corporate governance. The roots of good corporate governance lie in the attitude and behavior of the leadership of the company's internal factors that can also be the driver on the successful implementation of GCG originating from within the company which is the presence of an organizational culture that supports the implementation of GCG in the mechanism of labor management system in the company.

Thereby the organization's culture will affect corporate governance. This is evidenced by the findings of the thistle, and Paramita (2003) which states that the organizational culture influence on corporate governance. This finding is supported by Chandrasasmita, (2010) and Rashidpur (2011) are also have the same opinion that the organizational culture influence on corporate governance. Based on the results of data processing of the structural model, it is known that variable of organizational culture has positive influence on corporate governance significantly. Thus, it can be concluded that the better the organizational culture of state-owned companies throughout Indonesia, then the corporate governance will also be better. Strong organizational culture gives managers a clear understanding of the tasks given by the organization, have a major influence on corporate governance Vendor.

Effect of internal control against corporate governance

Based on the results of data processing of the structural model, it is known that the internal control variable has positive influence on corporate governance significantly. Thus, it can be concluded that the better the internal control in state-owned companies throughout Indonesia, the corporate governance will also be better. Internal Controls affect the Application of the Principles of GCG. This is consistent with the research of Suripto (1996) and Hiro Tugiman (2001). This suggests that in order to implement the principles of good corporate governance should be encouraged by the Internal Control.

Influence on organizational culture, internal control against corporate performance

Based on test results, organizational culture, corporate strategy, each has significant positive effect on corporate performance in the state-owned company in Indonesia, and internal control did not significantly affect corporate performance in state-owned companies in Indonesia. Can be seen in the following Table 2:

Table 2. The test results influence on organizational culture, internal control towards corporate performance

Line	Standardized Value	t – Value	Critical Value	Hypothesis
BO – CP	0,27	3,45	1,96	Accepted
PI – CP	-0,07	-1,06	1,96	Denied

Source: Data processing results (2015).

So based on the test results it can be concluded that the culture of the organization, corporate strategy, each has significant positive effect on corporate governance in state-owned companies in Indonesia, On the other hand internal control did not significantly affect corporate performance in state-owned companies in Indonesia.

Influence of organizational culture against corporate performance

Company consists of various elements and shaped by the larger culture. The corporate culture is built to address the challenges in the past. Policies, procedures, corporate philosophy, customs and others are response to the situation and challenges in the past. Cultural organizations can influence individual and corporate performance, especially in a competitive environment.

The study that evaluated the effects of organizational culture variables on the performance of companies (corporate performance) has been done by Thoyib (2005), Brahmasari and Suprayetno (2008). The study's findings are supported by the findings of research conducted by Rahmati, Darouian, Ahmadinia (2012) on the effect of cultural variables on the performance of the company. Results of the research of Lee and Yu (2004) found that cultures influence the performance of the company (corporate performance). Eccles, Ioannou, and Serafeim (2002) and Shakil Ahmad (2012) proves that the culture affects the performance of the company (corporate performance). Tseng (2009) and Xiaoming (2012) provide evidence that the cultural influences on the performance of the company (corporate performance). Aluko (2003) and Lee and Yu (2004) found a significant effect on the organizational culture towards companies' performance (corporate performance). Based on the results of data processing of the structural model, it is known that that variable of organizational culture has positive effect on corporate performance significantly.

Effect on internal control against corporate performance

The mechanism on internal control (internal control) are designed to bring the interests of managers and shareholders in congruence. Required by law, the board of directors (board of directors) in publicly owned corporation are responsible for developing and implementing mechanisms of internal control (internal control).

As noted by Fama (1980), the most important role of the board of directors is to scrutinize the highest decision-making within the company. Managers make decisions and implement them, while members of the board of directors ratified them and in general to monitor the implementation of the company's top managers job (Fama and Jansen 1983). Based on the results of data processing of the structural model, it is known that that the internal control variable is not a positive influence on corporate performance significantly. Thus, it can be concluded that the better the internal control in state-owned companies throughout Indonesia, does not affect the corporate performance.

Influence on organizational culture, internal control through corporate governance against corporate performance

Based on test results, culture of the organization, corporate strategy, and internal control over corporate governance each has significant positive effect on corporate performance on state-owned enterprises in Indonesia, can be seen in the following Table:

Table 3. The test results of influence on organizational culture, internal controls over corporate governance towards corporate performance

Line	Direct Effect		Non direct Effect		Hypothesis	Description
	S-Value	t – Value	S -Value	t – Value		
BO – CG – CP	0,27	3,45	0,29	4,76	Accepted	CG Intervening
PI – CG – CP	-0,07	-1,06	0,22	4,31	Accepted	CG Intervening

Source: Data processing results (2015).

So based on the test results it can be concluded that the culture of the organization and internal control, through corporate governance each has significant positive effect on corporate performance in state-owned companies in Indonesia. And Compared to the construct of the direct influence of the corporate governance then is an intervening variable on each relationship between organizational culture and corporate performance. As well

as corporate governance is an intervening variable in the relationship between the internal control and corporate performance.

Influence on corporate governance against corporate performance

Based on test results corporate governance has significant positive effect on corporate performance on state-owned enterprises in Indonesia, can be seen in the following table:

Table 4. The test results of corporate governance against corporate performance

Line	Standardized Value	t – Value	Critical Value	Hypothesis
CG – CP	0,56	5,36	1,96	Accepted

Source: Data processing results (2015).

So based on the test results it can be concluded that corporate governance has significant positive effect on corporate performance in state-owned companies in Indonesia.

5. Discussion

According to the Organization of Economic Cooperation and Development (OECD 2004), Corporate governance is the structure of the relationship and its relation to the responsibilities of the related parties consisting of shareholders, board members, commissioners, managers, designed to encourage the creation of a competitive performance that required to have to reach the main goal of the company.

Khan, Rehman, Dost, and Mumtaz (2011) and Anum and Ghazali (2010) in their study mentions that the corporate governance affects the corporate performance, furthermore Sheikh (2013) and Muktiyanto (2005) states that corporate performance is influenced by corporate governance. Likewise, research results of Murwaningsari (2009), Hadrat (2007), Wulandari (2006) and supported by research Switzera, and Mingjun (2009), Aljifri, and Moustafa, (2007) and Bonifasius (2009), that the corporate governance affect the corporate performance. Based on the results of data processing of the structural model, it is known that the corporate governance's variables have positive effect on corporate performance significantly. Thus, it can be concluded that the better corporate governance in state-owned companies throughout Indonesia, will better also the corporate performance.

Conclusions and suggestions

Conclusions

- The organizational culture, internal controls, each has significant positive effect on corporate governance.
- An organizational culture influences on corporate performance and internal control has no significant effect on corporate performance.
- Culture organization, internal controls, corporate governance each has significant positive effect on corporate performance. Corporate governance is an intervening variable in the relationship between organizational culture and corporate performance, and corporate governance is an intervening variable in the relationship between the internal control and corporate performance.
- Corporate governance has significant positive effect on corporate performance.

Results contributions

The results of this study contribute to the development of accounting knowledge, especially in the areas of corporate governance, next the results of this study can be used as a basis for further research that are interested in doing research in the field of corporate governance by using research methods similar to the unit of analysis and samples that were different from the expectations to obtained similar results (replicability) that will increase confidence in the research that has been done and the usefulness of the research can be widely accepted by many organizations, but it uses other variables apart from this research.

Recommendation

- To use this research model as the basis for the development of the next model of research in hopes to help developing subsequent research model that can make the model more complete and incorporate new variables which is a causative factor corporate governance and corporate performance.
- There needs to be further research on organizational culture and internal control is associated with a variety of variables in addition to corporate governance, and corporate performance.

- Need to improve the intensity of research on internal control and the implementation of good corporate governance in state-owned companies in Indonesia. This is important because the issue of internal control and corporate governance is a fundamental issue in improving corporate performance on state-owned companies in Indonesia.

Implications of research results

- Theoretically, the results of this study have implications for the importance of development on theories about broader corporate performance. Corporate performance is not always immediately seen from the aspect of culture, and internal control, it turns out corporate performance can be seen on the various dimensions of corporate governance.
- In terms of practical results of this study provide an overview to the state-owned companies in Indonesia about the importance of organizational culture, internal controls, corporate governance and corporate performance in order to progress in the Indonesian state-owned enterprises.

Limitations on the research results

This study has limitations, which in this study the internal control variables that are used, which only use soft control of internal control used by COSO and also by state-owned companies, while controlling the hard control is not performed in this study. Advised on further research to assess internal control in state-owned companies can use a soft control and hard control. Later on in this study corporate governance measurement does not use Key Performance Indicator (KPI) state-owned companies, suggested the researchers can then use the KPI of state-owned enterprises.

Suggestion

- To the state-owned company in Indonesia: SOEs need to improve the implementation of internal control in accordance with the guidelines of internal control that are state-owned companies, so it will be able to improve corporate performance state-owned companies in Indonesia. In the implementation of the internal control state enterprises need to pay attention to the hard control and soft control.
- To the other researchers:
  - Further research can deliver straight to respondents to fill out a questionnaire given that respondents are more honest and more serious to fill out a questionnaire;
  - Subsequent research suggested that could add other variables, so thatwill obtain a more complete model of the factors that influence the corporate governance and corporate performance.

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Pension Reform in Slovakia and its Influence on the Future Income of the Population in the Post Productive Age

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Abstract:

In 2004, a new pension system has been introduced in Slovakia; this system with small adjustments is valid till nowadays. However, this system is not long term sustainable. The government tries to place the responsibility of the future income of old-age pensions on workers themselves. Even the last modification of the pension system attests the unpopular and superficial solution of this important topic. The endeavor of the population in the productive age is to mind about securing their income in the post productive age. There are several options to secure a dignified income in the old-age, via not only mandatory levy to the social system and savings but also in the form of suitable financial investments. The point of this article is to reconsider not only changing position of population to their future old-age pension but also to reconsider the government approach to the improvement of redistribution of old-age pensions mainly equity-wise. This article uses data mainly from the Statistical Office of the Slovak Republic and also material from the valid Slovak legislation.

Keywords: social system; social insurance; pension reform; old-age pension; average income; population income

JEL Classification: H55; D31; J21

Introduction

The living standard of the population, in addition to income earned during productive life, also depends on the income flowing after the productive age, i.e. the old-age pension. At present, retirement benefits are based on social security income from the working population. The main part of social security is social insurance based on the payment of income taxes and serves to protect against sick leave or other situations during which the population is unable to work. Social insurance consists of sickness, pension, accident, guarantee and unemployment insurance. In Slovakia social insurance is regulated by the Social Insurance Act no. 461/2003 Coll. approved on January 1, 2004 and is based on a voluntary or an obligation basis.

Many domestic and foreign scientific authors have dealt with the standard of living and its individual aspects, as proven by a number of interesting scientific studies Buyse *et al*. (2017), Ruland *et al.* (2016), Suhányiová *et al.*

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(2016), Sorsa (2016), Adamišin and Vavrek (2015), Bohátová *et al.* (2015), Huttmanová and Synčáková (2009), Kotulič and Adamišin (2012), Sloboda (2006), Ungureanu and Matei (2007), Bogdan (2011), Bogdanoiu (2008), Văcărescu Hobeanu (2016), Gallo *et al.* (2016), Štefko and Nowak (2014), Nedomlelova *et al*. (2017), Širá *et al.* (2016), Valentiny *et al.* (2017), Potančoková (2005).

1. Literature review

Pension insurance belongs among the most important areas of social security (Beňová 2007). The philosophy of social security system law is based primarily on the combination of the merit principle, the principle of individual responsibility and the principle of the person's participation in the creation of resources and a reasonable degree of solidarity (The Ministry of Labour, Social Affairs and Family of the Slovak Republic 2017).

Prior to 1989, pensions were paid out from selected taxes, based on redistribution and solidarity. The length of the employment was taken into account for the calculation of the pensions and the average wage from the top five in the last ten years worked was used. The pension scheme was later regulated by Act No. 100/1988 Coll. on social security. In 1994 pension insurance was regulated by Act no. 274/1994 Coll. In the 1990s, Slovakia was marked by rising prices and wages, but the pension payment system was still based on low wages. While the pension system in Slovakia prior to 1988 represented stability for the population, after 1998, such a system is slowly becoming unsustainable. The pension system has begun to be influence by inflation, saving and investing the population, GDP, low wages, etc. In 2003, these facts resulted in the passing of Act No. 461/2003 Coll. about social insurance, according to which the tax reform was carried out. Under this Act, the amount of the pension is determined as follows:

$$\text{Amount of pension} = \text{APSP} \times \text{PIP} \times \text{CPV} \quad (1)$$

where: APSP = the average personal salary point, the value of which is directly proportional to gross wages in the decisive period; *PIP* = pension insurance period; *CPV* = the current pension value, which changes annually with the Ministry of Labor measure.

The pension system has changed to a system built on three separate pillars:

- 1st pillar - compulsory pension insurance administered by the Social Insurance Company. This type of pension insurance is compulsory or voluntary, and its participation is provided by the Social Insurance Act. 1st pillar is regulated by Act no. 461/2003 Coll;
- 2nd pillar - old-age pension savings managed by pension fund management companies (PFMC). This type of saving represents the so-called capitalization type and is made in the form of contributions*, i.e.* the amount of the pension will depend on paid and evaluated contributions of the savings managed by the pension fund management companies. A pensioner's pension in the retirement age will be provided from two sources, from a fairly reduced 1st pillar and from the assessed part of the paid-up capital contributions of 2nd pillar. The 2nd pillar is regulated by Act no. 43/2004 Coll. The resulting amount of 2nd pillar will be calculated as follows:

$$\text{Amount of pension} = (\text{APSP} \times \text{PIP} \times \text{CPV}) - ((\text{APSP} \times \text{PIP} \times \text{CPV})/2) + 2^{nd}\text{ pillar pension} \quad (2)$$

- 3rd pillar - voluntary supplementary pension savings managed by pension management companies. This pillar is intended to enable savers to obtain supplementary old-age pension income and supplementary retirement income in the event of the termination of the high risk work. For others, this pillar is based on voluntary basis. Savings from 3rd pillar are furthermore tax-advantageous for savers. 3rd pillar is regulated by Act no. 650/2004 Coll.

According to the most recent regulation since January 1, 2017, the method of determining the retirement age is altered by the number of days that the Ministry of Labor, Social Affairs and Family of the Slovak Republic determines annually and which depends on the dynamics of the average life expectancy common to men and women as determined by the Statistical Office of the Slovak Republic. Till present date, 41 amendments to Act No. 461/2003 Coll. were passed, however, no amendment brought about the correct and especially fair adjustment of the payment of pensions. According to Urbaníková and Papcunová (2016) the social security system is an actual topic, and its settings are often changed. Social policy has the unique feature that it affects every citizen. Without the modernization of the pension system, the ongoing pension system in the Slovak Republic, at an estimated demographic change, would reach an unsustainable deficit by 2050, estimated at around 5 billion EUR.

Similarly, to the situation in the world, in Slovakia, the situation for the development of pensions is unfavorable, especially due to the demographic problem. In the world the liberalization of pension legislation in the

activities of private pension funds, along with the state support is very popular. PPF assets can be a relatively cheap source of long-term investments in the economy for infrastructure and high-tech projects. Income derived from such investment will enable emerging hedge short- and medium-term risks in the financial markets and ensuring stable rates of return funds. This model of financing pension schemes is applied in many OECD countries, including the United States (Aksenov and Lebedeva 2016).

2. Methodology

The issue of the pension system and its reform in the countries of the European Union is very timely and urgent. The cause for concern in this area is the current demographic trend. The population of retirement age is growing, few children are born and the expected life expectancy of the population in the countries of the European Union is prolonged.

Forecasts for the future are worrying and countries need to realize that sooner or later they will be forced to link their pension systems to demographic developments in society. The ongoing financing of the pension system will be seen as unsustainable, which will require further reforms.

At present, the problems of pension systems are also accompanied by problems with the state budget of many countries. Both the European Union and the World Bank recommend for countries the introduction of a system with three (or several) pillars to achieve the sustainability of pension systems and the diversification of pension resources.

The aim of the paper is to evaluate the pension system in Slovakia and its reforms after joining the European Union by comparing and analyzing the benefits and risks. The underlying data was drawn from the Statistical Office of the Slovak Republic, scientific articles and professional books. The theoretical knowledge of the paper is based mainly on professional domestic and foreign literature; the introduction of the Slovak pension system itself is based on valid laws. The standard mathematical relations and numerical calculations were used in the evaluation process.

The researched issue is indicating a clearly perceived ambivalent relationship of economic subjects to processes that restore the balance in the pension system of the Slovak Republic. Because of the unavailability and discrepancies of some information sources, some analyzes and comparisons have been omitted. Therefore, some results, in particular, may only have partial validity for the evaluation analysis.

3. Results and discussion

According to the Statistical Office of the Slovak Republic, the number of old-age pensioners was 1029.1 thousand in 2004. In the following year, the number of pensioners decreased by 3.60 thousand to 1025.5 thousand. In 2006, with growth of 8.70 thousand, the number of pensioners increased to 1034.2 thousand.

With a growth of 4.60 thousand in 2007, the number of pensioners increased to 1038.8 thousand. In 2008, the number of pensioners decreased by 3.50 thousand to 1035.3 thousand. With growth of 8.70 thousand the number of the population receiving the pension increased to 1044.0 thousand in 2009. In the following year of 2010 the number of pensioners increased by 8.10 thousand to 1052.1 thousand. Their number increased sharply by 20 thousand in 2011 to 1072.1 thousand. Also in 2012, the number of pensioners has increased to 1091.0 thousand by 18.80 thousand. The trend of growth of non-economically active people also increased in the coming years. In 2013, the number increased by 12.1 thousand to 1103.1 thousand, in 2014 it rose by 13.60 thousand to 1116.7 thousand, and in 2015 the number of pensioners increased to 1128.3 thousand by 11.60 thousand. With a smaller increase, the number of pensioners also increased in the last year, by 8.40 thousand to 1136.7 thousand. The increase in the number of old-age pensioners over the last six years has been marked by the certainty of income security for the population.

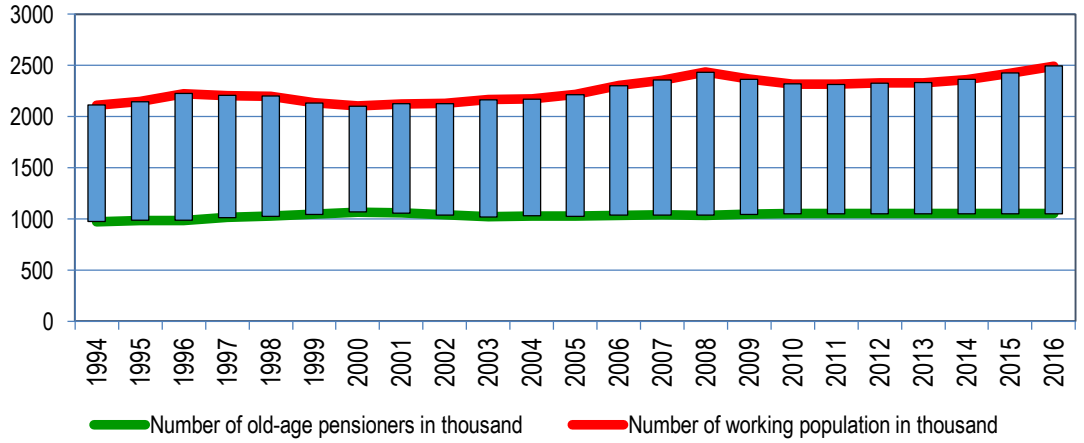
According to the calculations in Table 1, it is evident that during the period under review the ratio of working people to old-age pensioners is 2: 1, that is, one pensioner to two workers. Graphically, it is also depicted on Graph 1. Data are based on available records according to the Statistical Office of the Slovak Republic and it is observable that the pension system has not changed to a significant degree, before the pension reform as well as after the 2004 pension reform.

Table 1. The ratio of the economically active population to retirees for the period of 2004 - 2016

Number	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Working population	2170.4	2216.2	2301.4	2357.3	2433.8	2365.8	2317.5	2315.3	2329.0	2329.3	2363.0	2424.0	2492.1
Old-age pensioners	1029.1	1025.5	1034.2	1038.8	1035.3	1044.0	1052.1	1072.1	1091.0	1103.1	1116.7	1128.3	1136.7
Ratio of working population to pensioners	2(2.11)	2(2.16)	2(2.23)	2(2.27)	2(2.35)	2(2.27)	2(2.20)	2(2.16)	2(2.13)	2(2.11)	2(2.12)	2(2.15)	2(2.19)

Source: Statistical Office of Slovak Republic (2016), *in thousand*

Figure 1. Overview of working population and old age pensioners for 1994 - 2016 *in thousand*



Source: Statistical Office of Slovak Republic (2016)

According to the graphical representation of the survey of the number of workers to the old-age pensioner, it is clear that imaginary scissors have been opening since 1994 and the number of working people per old-age pensioner has the tendency to decline.

The average monthly wage in Slovakia, similarly to the average old-age pension, has a significantly lower amount than wages or pensions in countries outside of Slovakia. The amounts of retirement pensions, monthly wages and the ratio of old-age pension to wages in Slovakia are outlined in Table 2.

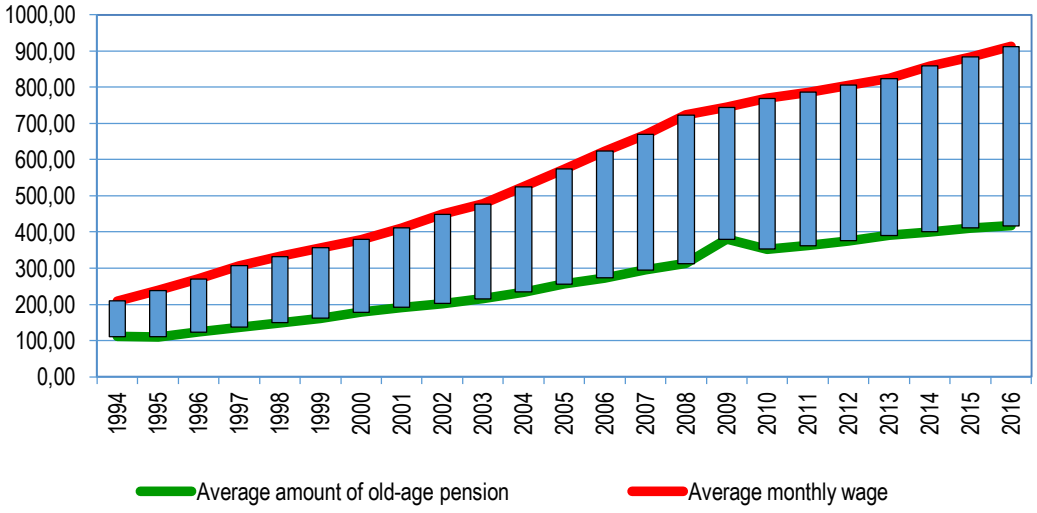
Table 2. Overview of wages, retirement pensions and the ratio of old-age pensions to the monthly wage in Slovakia (2004 – 2016)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Averge old-age pension (OAP) in EUR	233.88	256.02	273.05	294.93	313.05	379.73	352.54	362.08	375.89	390.51	400.18	411.06	417.46
Average monthly wage (MW) in EUR	525.35	573.45	622.81	668.79	723.10	744.5	769	786	805	824	858	883	912
Ratio of OAP to MW	0.45	0.45	0.44	0.44	0.43	0.51	0.46	0.46	0.46	0.47	0.47	0.47	0.46

Source: Statistical Office of Slovak Republic (2016)

In 2004, the amount of the old-age pension in Slovakia was paid in the amount of 233.88 EUR. The amount of the pension in 2005 increased to 256.02 EUR. In 2006, the retirement pension was paid in the amount of 273.05 EUR. In 2007, the amount of the pension increased to the amount of 294.93 EUR. In 2008, the pensioners were paid an amount of 313.05 EUR. The pension in 2009 was quantified at 379.73 EUR. In 2010, its value rose to 352.24 EUR. In 2011, the old-age pension increased to 362.08 EUR. In 2012, the old-age pension increased to 375.89 EUR. In 2013, the old-age pension was paid out in the amount of 390.51 EUR. In the following year, its value rose to 400.18 EUR. In 2015, the pension was quantified at 411.06 EUR, and in 2016 the old-age pension was paid on average at 417.46 EUR. The old-age pensioner will therefore fall to half their income when starting a retirement pension, which grows only by year-on-year increase, on average by one percent.

Figure 2. Overview of the average monthly wage and average paid old-age pension in Slovakia for 1994-2016 in EUR



Source: Social Insurance Agency in Slovakia (2016)

According to the graphical representation from 1994 until 2016, the difference between real monthly wage and old-age pension income is increasing every year.

To calculate the level of pensions, it is essential to determine the minimum subsistence living wage and its individual levels (Lisý 2007). This factor and other factors, *e.g.* inflation, uncertainty, reluctance to pay social insurance, etc., are not taken into account in future pension provision forecasts. As a result of demographic events the population of Slovakia is aging, the long-term decline in childbirth is reflected in the decrease of the child population.

Unemployment, which many economists consider to be the second macroeconomic evil next to inflation, brings with it a range of impacts, both economic and social (Jurečka 2013). Not every working-age resident is economically active. The fact that a large part of the population is unemployed is also an important factor in the payment of their future pensions. In addition to unemployment, education also has an impact on the payment of future pension. It is evident that the rate of economic activity in low-skilled population is low and at the same time has a decreasing trend.

On the other hand, the rate of economic activity is high in people with university education, but in Slovakia there is a decreasing trend (Workie Tiruneh 2012). Another factor affecting retirement benefits is the payload and wages. Wages and full labor costs are low in Slovakia (Vincúr 2007). After the adoption of the amendment to the law, which determines the limit of payment of social contributions after exceeding the income limit without expenses, a group of traders has been created, who deliberately avoid the payment of levies.

At present, this income limit is set to 6181 EUR. Similarly, a group of employers was created, employing shorter-term employees or agreements with a minimum workforce. Both groups lack motivation to reimburse social insurance; as one of the factors to pay levy is the amount of the future old-age pension. Another factor is the introduction of a levy reduction. Employers under specified conditions for are only paying the guarantee and injury insurance for this type of employees. This means that the income for such a period is not counted towards the period for calculating the pension. For this period, the future old-age pensioner will be able to pay additional pension insurance, which not everyone will be able to afford financially.

Conclusion and recommendations

The system before the pension reform was characterized by a great deal of solidarity. Pensioners who earn more in their lifetime have pensions at the same level as retirees who have earned less during their productive lives. Also, in the past, more people have been involved in the pension system than at present. Depending on the number of productive populations, the employment rate is more accurate, because the reduction in unemployment does not guarantee the real levy to the welfare system.

From monitoring the number of newborns and the aging generation, there is a realistic assumption that the current weak productive generation will take care of the numerous post-productive generation. Consideration must also be given to the individualism and selfishness of the worker who will refuse or already refuses to participate in the financial support of old-age pensioners. The basic model of the ongoing old-age pension system is based on

the fact that the compulsory insurance payments of citizens of working age are distributed in the form of retirement benefits and paid to citizens of retirement age "immediately", which means without the possibility of their evaluation on the financial markets (Beňová 2007). Also, the indifference of current workers and their so-called reconciliation with the fact that the current pension system will soon disintegrate must also be taken into account.

The Government's attempt to solve the problem of pension adjustment lies predominantly in increasing the tax and tax burden and, last but not least, by shifting the retirement age of the old age pension. In addition to the mandatory contribution to the social insurance company, it is also appropriate to invest funds so that the future old-age pensioner can contribute more to their future income. However, the overwhelming majority of the population in Slovakia is unable to invest and has no knowledge or great confidence in management companies yet.

Most Slovaks do not realize that the amount of their income will really depend on their decision as to whether or not to invest at all. For the state, this situation is satisfactory, because it will save significantly on the payment of future pensions. It is easier for the state to recalculate household income and compare it to the minimum living wage. Under such circumstances, there will be two situations, either the state will pay the difference in the amount of the living wage to the pensioner or nothing will be paid since the pensioner will be bordering on poverty but at the same time within the living wage.

For calculation of future pensions, besides mandatory levies, savings and investments, the influence should also be placed on merit, that is, the benefit of the employee for the state during the productive age. The decisive share of income in the social system should preferably be a private business sphere, both in terms of service provision and production. A special chapter is the public administration, which is currently "over-employed". Revenue for public servants comes from the state budget, and levies go back to the state budget. This sphere often has the highest pensions, although the share in growth of the economy in terms of performance and education is very low. According to merit and obligatory contributions, the manufacturing sector should have the highest old-age pensions, while the public sphere should have the lowest. Considering the ratio of the reallocation of old-age pension process, it would be most appropriate to use the form of performance indexing during the productive life of the population.

Pension reform has been underway in Slovakia since 2003, and is, with minor modifications, still in force. In addition to trying to transfer responsibility for their future income to the population, the government is trying to put in place a system that after meeting certain conditions "decides" automatically. The problem of social insurance, especially pension, is very topical, moreover, if the value of paid pensions is about half of the real monthly salary of a working citizen. While a solidarity-based system was sufficient for retirement in the past, today's best solution for the population is to increase their interest in securing it even during productive age. This means actively participating in the labor market, during productive life, making mandatory contributions to the social system, saving and investing financially. Over the last period the government has taken very little action. The last decision thus far, to shift retirement age is not the best solution. The government is supposed to be actively supporting the labor market, raising the living wage, which also affects the other factors necessary for the calculation of pensions. At the same time, it would be appropriate to introduce the so-called indexing of the population over the productive age by performance and benefit for society.

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Corporate Governance and Audit Quality: A Comparison of ASEAN Countries

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Abstract:

The issues of corporate scandal have negative affect in accounting manipulations, regulators, practitioners, researchers and organizations in the world. Due to the fact of this, there is need to review the code of corporate that governed the corporations of many countries. As such the new regulations and practices in developed countries, The audit committee and accounting firms which play a significant role in ascertaining the validity, acceptability, and reliability of high quality. Similarly, corporate governance plays a significant role in improving the auditing function and its effectiveness. The study is carry out on the sample of 120 non-financial firms listed on the Indonesian stock exchange, Busra Malaysia and Thai stock exchange is collected through the channel of annual reports of the year 2012, 2013, 2014, 2015 and 2016. We have used Logit regression to analyses the impact of corporate governance on audit quality of three ASEAN countries. The findings of the study have shown that in non-financial firms listed in Philippines audit committee and board characteristics has significant. This study will be helpful for the students, auditors, policymakers, and researchers in understanding the impact of corporate governance and audit fee.

Keywords: corporate governance; audit quality; ASEAN; non-financial firm.

JEL Classification: G34; H83

Introduction

Audit quality is a reliable evidence amongst the most basic issues in audit practice today. A couple individuals and social affairs; both inside and outside, have an excitement for the way of audited business information International Auditing and Assurance Standard Board. Audit quality assumes a vital part of keeping up an effective business sector environment, a free quality audit supports trust in the validity and honesty of financial articulations which is key for well-working markets and upgraded financial performance. External audits performed as per excellent evaluating measures can advance the use of accounting principles by reporting elements and guarantee that their financial proclamations are dependable, straightforward and helpful.

Sound audits can fortify strong risk management, internal control at firms and corporate governance, along these lines adding to financial performance. High quality outside auditing is a focal part of well-working capital markets. The accounting literature concentrates on two principal strengths that rouse auditors to convey quality a suit/protection motivating force and a reputation incentive. Under the main thought process, if auditors are legitimately obligated for audit disappointments, then they have a motivator to deliver high quality to avoid the costs of litigation. The insurance part emerges on the grounds that investors consider larger audit firms as these organizations can better meet investors 'lawful cases, in this manner giving financial resources plan of action against poor audit quality. Additionally, the reputational incentives motivate, accounting firms have to avoid audit disappointments since audit quality is profitable to customers. Customers imperfection to different auditors when an audit company reputation for quality turns out to be more awful (Skinner and Srinivasan 2012, Suryanto 2014).

Though, the Big Four firms as characterized in Business Week (Gerdes 2009, Hadi *et al*. 2016, Kachouri and Jarboui 2017) are Deloitte and Touche, Ernst and Young, PricewaterhouseCoopers (PwC), and KPMG which are positioned top among 50 open and legislative organizations. By and large, dependable and fair appraisal of information about public recorded organizations' financial position gave by the auditor is essential to speculators to settle on investment choice and improves the effectiveness of financial markets.

They are under statutory commitment to answer to the Securities Commission (SC) or Stock Exchange any action or undertaking of the organization that as they would see it constitutes an anomaly or rebelliousness with any posting prerequisites or securities law.

Additionally, the cordial association among the management, shareholders and the board were addressed in order to guarantee the investors and compete with the standard of developed countries who are already successful in theory and practice of the code of Corporate Governance (CAMA 2004). The events had a genuine

obliterating impact on stakeholders as far as misfortunes in their ventures. On the procedure to restore the certainty to the investors, diverse laws were put set up, for instance, Sarbanes Oxley Act Code 2000 in the United States (US) and launching of CG Code (2000) in Malaysia is required to relieve corporate outrages and other related issues. Hence, corporate disappointment and outrages are still there, for instance, the issue

This study assesses, how organizations give an ideal setting to considering the impact of auditor choice on their loan fees. This shows connecting with a Big Four auditor, which has a brand name reputation for supplying a higher-quality audit could upgrade the believability of financial proclamations, empowers young firms to decrease their acquiring costs.

1. Literature review

Higher audit quality is pro-actively providing assurance to the investors, deliver a service that goes beyond the simple audit and creates an avenue to consulting (Behn, Carcello, Hermanson and Hermanson 1997). Hai (2018) argued that achieving higher audit quality should be balanced among the relationships of personal, professional an independence and competence of accounting firms. Lee *et al.* (1995) suggested that accounting firms cannot choose to independent unless it is competent. Clients observed that larger accounting firms are independent and competent in international markets and smaller accounting firms have low and incompetence experiences in local markets. The competence of Big Accounting Firms has made them involve and contribute in standard setting such as Anglo-Saxo. Nobes and Parker (2008) claim that an accounting system in Ministry of Finance, China was developed by Deloitte one of the Big Accounting Firms due to their independence and competence in international accounting standards board (IASB). Adequate training and competence in auditing are evidenced of high-quality auditing to the investors because the result is prepared by professional accounting firms (Gul, Ferid, Hai, Teoh, Beer and Schelluch 1994).

In addition, independence of an auditor is indicated as a factor that determined the accounting firms size (Abu Bakar, Rahman, and Rashid 2005). Mautz and Sharaf (1961) revealed that large accounting firms can be perceived through research facilities, independence, financial resources, qualified experience, and training staffs. However, small accounting firms with single client resulted in the risk of dependence due to the small portfolio of the client compared to those of Big accounting firms (Mautz *et al.* 1961, Azam *et al.* 2016, Zou *et al.* 2017). Large accounting firms protect their independence and reputation because of large client portfolio the firm's audit. Incompetence and low-experiences staff or any elements that can hinder the quality of independent auditors may less the standard of quality of audit

Palmrose (1988) reveals audit quality as far as levels of affirmations. More elevated amounts of affirmations (*i.e*. the probability of financial statements should comprise zero misstatements or fewer mistakes) have relationships with the standard audit quality at the way around. Audit failures have been created as the basis of this definition (in a situation where the issue of misstatement appears, or auditor failed to recognize inconsistent materials) which need to be found in the legal process. As indicated by Francis (2004) described low quality as an audit failure which may bring about a few results, for example, regulatory authorizations, litigation rates, and business disappointment.

According to Institute of Chartered Accountants in England and Wales (ICAEW) in (2002) as a regulator, defined ‘‘audit quality as the best expectations that contain evidence, reliability, and appropriate expertise opinion, free and fair judgments have the quality of the audit.’’ However, regulator agrees that independent auditors that provide adequate audit evidence have a higher quality service and can be relied upon.

Francis (2004) audit quality is contrarily identified with non-fulfillment audit: the lower the nature of auditing, the higher the non-fulfillment rate. Regardless of the way that specialized qualities, for instance, an auditors' ability to distinguish and report mistakes, have been claimed as the characterizing parts of a quality audit. Duff (2004) suggests that audit quality is contained both specific quality and service term of quality (the desires and client's satisfaction). Specialized quality contains ability, experience, skill, integrity and independence scales. However, advantage quality is depicted by responsiveness, feeling and the procurement of client services and Non-Audit Service (NAS).

Audit quality is chosen by auditor's capacity to get ruptures of accounting norms and in this manner the auditors motivating forces to report such breaks *i.e*., audit quality could be a result of auditor capacity and freedom. DeAngelo (1981) contends that huge enterprises are identified with higher audit quality as a result of they are extra autonomous. For large auditors like Big Four firms, no individual or customer is monetarily fundamental with respect to the estimation of an identified audit disappointment. Besides, Big Four industry has set up brand-name position and in this manner, have motivators to shield their prestige by providing desire quality audit (Simunic and Stein 1987).

Clients ascribe audit quality upheld the name of the auditor. All in all, the vast audits firms have needed to separate themselves from option auditors by using their money to partner with character capital (Beatty 1989, Bokhari and Khan 2013) and observed as giving higher quality audits upheld their apparent (1) capacity(by ethicalness of their genuine dispensing on auditor instructing offices and projects) and (2) autonomy (by the excellence of their size and tremendous arrangement of clients, that presumptively offers them the financial quality square up to, or go stroll from, a clients if fundamental).

Expected by these contentions, early studies utilize the experience, information asymmetry, and service between the Big Four and Non- Big Four firms and demonstrate that Big Four industry performs audits of upper quality and are more extra moderate. Firms prefer toward name-brand (Big Four) auditors on the off chance that they are liable to extra agency clashes. Coopers (2002) contends that audit quality relies upon a few elements together with auditors "information and knowledge of the organization being examined and the business in which it works". Teoh and Wong (1993) place that to the degree that investors see Big Four auditors as giving higher quality audit, *i.e*., as recording a great deal of believable income for his or her auditees, the stock worth response to amazing reported profit for vast four auditees should be greater than that of option auditees.

These arguments, therefore, recommend that auditors with industry experience area unit a lot of doubtless to observe misrepresentations and irregularities than auditors while not. DeAngelo (1981) contends that firm size might be an intermediary for quality (auditor independence) since there is no single client is vital to a Big Four auditor and this make auditor protect their reputation (their whole clientele) for not misreporting. Against this, firm with just single client may consistently infer that they require a lot of to realize by going in conjunction with their client and misreporting than.

The work expertise in massive Big Four companies is so doubtless to “mold” auditors that end up being totally different from auditors in non-Big Four companies. As an alternative, those recruited by large four firms might have comparatively additional conservative personalities that additionally results in conservative audit outcomes. Evidence indicates that client of massive four audited firms has lower irregular collections which means less forceful profit management conduct thus higher income quality (Becker, DeFond, Jiambalvo and Subramanyam 1998). Gottschalk (2011) that the perspective of audit quality may be categorized into twofold.

The lawful perspective of auditing offers a basic classification of either "audit disappointment" or "non-audit disappointment." An audit disappointment happens if the auditor is not free truth be told, or if an autonomous auditor mistakenly problems a spic audit report due to the lack to collect adequate equipped proof by auditing due process. Conversely, a "decent audit" or a non-disappointment is one within which the auditor agrees to examine gauges. and problems the proper feeling with regard to the client's financial explanations at an acceptable level of audit risk.

From at opportune time, audit quality has been characterized as a result restrictive on the neighborhood of specific characteristics of auditors. The widely utilized definition by Alduwaila *et al*. (2018) characterizes the issue of audit quality as "the sector evaluated mutual chance which independent auditor can each notice an opening in an exceedingly customer’s accounting, and report the rupture what is more contends that business firm size is a mediator for audit quality, as no single client is imperative to greater accounting firms and, then, larger accounting firms are additional inconceivable than smaller accounting firms.

The Sarbanes Oxley (SOX) Act (2002) allocated particular obligations to the audit committee, it is the responsibility of the committee to oversight auditors work, compensate and resolve financial reporting. Audit committee likewise has right to select or appoint independent advice and consultants (Klein 2003).

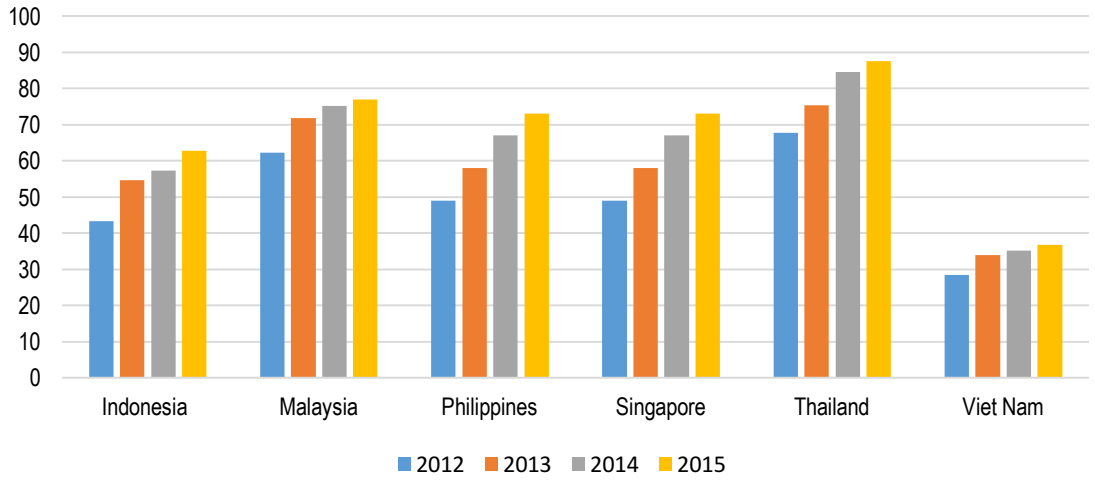
According to ASEAN corporate governance Scorecard Country report and assessment (2015). The mean score of all the member's counties has increased during the period of four years from 2012 to 2015.The Thailand in leading, Malaysia is second and Vietnam is at last.

The adequacy of audit committee relies upon the degree to which the group can resolve issues and issues confronted by the organization and to enhance their checking elements of the organization (Abbott, Park and Parker 2000). A more dynamic audit committee is relied upon to give a viable observing component. In addition, Akgun and Tektufekci (2017) require that all individuals from an audit committee should be autonomous of the company’s management as well as those who oversee the financial reporting processes and accounting procedures. This idea is in line with Malaysia Corporate Governance.

Table 1. Mean corporate governance score of ASEAN countries

	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
2012	43.29	62.29	48.9	48.9	67.66	28.42
2013	54.55	71.69	57.99	57.99	75.39	33.87
2014	57.27	75.22	67.07	67.02	84.53	35.14
2015	62.68	76.91	73.09	73.09	87.5	36.75

Figure 1. Mean corporate governance score of ASEAN countries



Source: ACMF Working Group D Secretariat 2015.

In Malaysia corporate governance, on the Section 344A (2) of the Bursa Malaysia Listing Requirement requires audit advisory group to comprise at least three individuals, a greater part of which must be non-executive directors. The code (Part 2, AA III) expresses that the group of audit advisory must have no less than 33% (*i.e* 1/3) independent non-executive directors. A study by Zandi and Elwahi (2016) found that the Malaysian audit board independent sees that the board assumes a successful part in checking financial capacities and audit roles. As indicated by McMullen (1996) estimated that an independent non-executive audit board is more viable. They concentrate on 128 organizations which disclose financial reporting issues. They found that organizations with financial reporting issues are less inclined to have audit advisory groups made just out of independent executive's board. Audit group independent upgrade the viability of checking limits. It serves as a sustaining administrator to the free of inside and outside auditors. It is set that the more independent of the audit counseling gather, the higher the level of oversight and the more likely that people exhibit impartially in evaluating the propensity of the association inside reporting control and accounting. This demonstrates a self- governing audit board can help companies deal with the intelligence of business. Through the way when they are gone up against with financial difficulties, they are required to propose certain movement plans to direct the issue.

The absence of freedom from the management may incidentally transform the individuals from the audit group into an expansion of the management group itself and this will crush the goal of having the audit advisory group in any case. There ought to be an expansive majority of independent or non-executive's directors, audit group individuals that serve on the audit advisory group to improve firm value. A financial master is any part who has the training or experience of a public accountant, principal accounting officer of an issuer, principal financial officer, auditor or has been in a position requiring the comprehension of sound accounting guidelines and financial articulation involvement in the arrangement and auditing of financial proclamations of practically identical issuers, involvement in the use of such standards regarding the representing appraisals, understanding of audit committee functions, accruals and reserves, and experience with internal accounting" (Dalley 2003).

Financial knowledge decreased extortion in corporate financial reporting. A formal acknowledgment of this necessity was recently made in the US with the passing of the SOX (2002) which requires every public recorded organization to uncover regardless of whether it has a financial master in the audit group. Coopers (1999) and SEC (2003) regulators contended that financial mastery is fundamental to guarantee that the audit committee satisfies their essential obligations of regulating the financial reporting prepare and upgrading financial reporting quality.

Schmidt and Wilkins (2012) claim that financial master of audit board is essential since it audit advisory group is in charge of the financial reporting process and audit quality. He focused on that audit boards with financial

ability can offer huge worth to the stakeholders and client, since their financial information is the favorable position of distinguishing any control. DeFond and Francis (2005) find that market contestants respond decidedly to the arrangement of an audit advisory group with a financial master in accounting, however, no response is noted for audit advisory group with non-accounting financial capability. This is because of the way that the arrangement of council individuals with accounting financial knowledge enhances the oversight capacity of the advisory group and therefore gives a tenable sign to the investors that the organizations seek to a higher audit quality and financial reporting.

Fama and Jensen (1983) referred managerial discretion as an effect of the instructive asymmetry that prompts to agency costs and agency issues. The partition of the exercises of management, informational asymmetry and the ownership which may result in misunderstanding or trust. The manager's self-premium could prompt the mismanagement of firm assets, for the case, through putting resources into risk and impulsive activities to the detriment of the stakeholders who give capital. In this way, to control irreconcilable situations and diminish agency costs, different inside and outside components (known as a corporate mechanism) have been recommended. For instance, the team of board director is built up as an alternative solution for such clashes. The activity of company's board is important due to the fact that they are outside directors and differentiate from management, this will allow the board to provide high-quality monitoring and serve stakeholders with due process (Fama and Jensen 1983).

2. Data and methodology

Data source

The collection of secondary data of 120 firms listed on the Indonesian stock exchange, Bursa Malaysia and Thai stock exchange is collected through the channel of annual reports of the year 2012, 2013, 2014, 2015 and 2016 and the annual reports were used to collect the data concerning the audit committee and big Four/Non-big Four. 40 firms from each stock market are selected to for a balanced panel of 120 firms.

The independent and dependent variables are measured, classified, and quantified into a numerical type. Therefore, the association between the audit committee and audit quality is examined and assessed in a very applied statistical means from the data collected. The study is predicated on a panel data study.

Logit regression

We are using logit regression in our study, the purpose we are using this technique is that it breaks down the relationship between dependent and independent variable. As our dependent variable is a dummy variable so this technique is recommended by Al-Ghamdi (2001). Who argued that the logit regression techniques can be connected when the dependent variable is categorical. As a result, the remainder of this study discussion will focus on independent variables in this regression analysis.

Model specification

To measure the impact of corporate governance on quality we have used the models, which are given below:

$$AUDITQ_{it} = \alpha_0 + \alpha_1 NED_{it} + \alpha_2 FENED + \alpha_3 ACM_{it} + \alpha_4 BS_{it} + \alpha_5 SIZE_{it} + \alpha_6 LEV_{it} + \alpha_7 PROF_{it} + \varepsilon_{it} \quad (1)$$

where: for each company (i) and each year (t), AUDIT is a dummy variable which gives value 1 if it is engaged with big four auditing firm; NEDAC is the ratio of non executive director member of the audit committee to a total member of audit committee; FENEDAC is a dummy variable which gives one if the non-executive director of the audit committee is accounting qualified and zero otherwise; ACM audit committee meeting which represents the frequency of audit committee meetings.

3. Correlation analysis

In Table 2 we have discoed the result of correlation test. The results show that there is a bivariate statistical correlation among all the relevant variables. The correlation table shows that audit quality is positively related to a ratio of non-executive directors to total directors. And financial expertise of Non-executive. Whereas it is negatively related to Audit committee meeting. The correlation among other independent is moderately okay.

Table 2. Correlation analysis

	AUDITQ	NED	FENED	ACM	SIZE	PROF	LEV
AUDITQ	1						
NED	0.5079*	1					
FENED	0.4764**	0.5354*	1				
ACM	-0.2327	-0.2127	0..2906	1			
SIZE	-0.2037**	0.2056**	-0.3148*	-0.3328*	1		
PROF	-0.4 433**	0.3313*	-0.3711*	-0.4492*	0.1982	1	
LEV	0.4391***	0.2452**	-0.5741*	-0.2101*	0.2101	-0.1205	1

3.1 Results and discussion

Based on hypothesis stated the relationship between corporate governance and AUDIT QUALITY is explored using logit regression techniques. As our sample comprises of three different countries so the results of each country are presented in Table 3. Below we have discussed the results of each country.

Malaysia

Malaysia is among top economies of South East Asia and during last two decades and especially after the Asian Financial crisis it has shown tremendous progress in codes of Corporate governance. In term of score among Asian countries, it stood second.

The result if the study is highlighting that the board independence which is measured as the ratio of non-executive directors to the total director. The result of the study is revealing some interesting facts Board independence and board size are in negative relation with audit quality which is indicating that the Malaysian firms with more directors on the board and majority of them are independent that firms duffer in audit quality Whereas the financial expertise of board members and frequency of audit committee meeting is positively related with audit quality. This shows that if a board has members with accounting and finance degrees then this will affect the audit quality. Overall the impact of corporate governance on audit quality is significant is significant.

Thailand

Among ASEAN countries the Thailand is among the country which is leading the corporate governance code. The average growth in a score of Thailand is highest among region countries.

The result if the study is highlighting that the board independence which is measured as the ratio of non-executive directors to the total director. The result of the study are revealing some interesting facts Board independence, board size, board expertise and frequency of meeting by audit committee has a significant positive impact on audit quality and are in negative relation with audit quality which is indicating that the Malaysian firms with more directors on the board and majority of them are independent that firms duffer in audit quality. Similarly, frequency of meeting of the audit committee will enhance the quality of audit of any firm in Thailand.

Indonesia

Indonesia is among most important countries of this region. During recent times the Indonesia has shown a tremendous growth and is among emerging economies of the world.

The result if the study is highlighting that the board independence which is measured as the ratio of non-executive directors to total director. The result of the study are revealing some interesting facts Board independence and board size are in negative relation with audit quality which is indicating that the Indonesian firms with more directors on the board and majority of them are independent that firms duffer in audit quality Whereas the financial expertise of board members and frequency of audit committee meeting is positively related with audit quality. This shows that if a board has members with accounting and finance degrees then this will affect the audit quality. Overall the impact of corporate governance on audit quality is significant.

Table 3. Logit regression

Dependent Variable AuditQ	Malaysia			Thailand			Indonesia		
	Coef	Robust Std. Error	Z	Coef	Robust Std. Error	Z	Coef	Robust Std. Error	Z
NED	-0.7860	0.195	-2.75*	0.8860	0.245	2.15*	-0.5860	0.245	-1.75*
$FENED$	0.4320	0.146	1.87**	0.3240	0.146	2.07**	0.3240	0.146	0.87**
ACM	0.2650	0.548	1.56	0.2220	0.447	2.31	0.2220	0.447	0.31
$logBS$	-1.3250	0.543	-2.71**	-1.8750	0.648	-2.71**	-1.8750	0.648	-0.77**

Dependent Variable AuditQ	Malaysia			Thailand			Indonesia		
	Coef	Robust Std. Error	Z	Coef	Robust Std. Error	Z	Coef	Robust Std. Error	Z
$logSIZE$	1.3230	0.421	3.38***	1.1230	0.321	2.56***	1.123	0.321	4.56***
$PROF$	0.4324	0.342	1.12	0.2340	0.342	2.17	0.234	0.342	1.36
LEV	-0.1029	0.108	2.45*	-0.0129	0.008	1.95*	-0.029	0.008	1.72*
$Cons$	-0.7690	-0.786	-0.769	-0.7860	-0.734	-1.573	-0.786	-0.534	-0.432
No of obs	200			200			200		
Prob>Chi2	0.000			0.000			0.000		
Pseudo R2	0.3452			0.4321			0.5342		
Mean Vf	126			1.30			1.30		

Note: *,**,*** denote statistical significance the 0.10, 0.05 and 0.01 level respectively

Conclusion

The Asian financial crisis has brought about many significant changes in the corporate sector and capital market regulations. One of the major issues which leads ASEAN counties to Asian financial crisis is poor performance of audit mechanism. So, addressing this issue the code of corporate introduces in the start of the twentieth century and subsequent amendments have highlighted the significance of the issue of audit quality.

Audit quality assumes a vital part of keeping up an effective business sector environment, a free quality audit supports trust in the validity and honesty of financial articulations which is key for well-working markets and upgraded financial performance. External audits performed as per excellent evaluating measures can advance the use of accounting principles by reporting elements and guarantee that their financial proclamations are dependable, straightforward and helpful. This study is a comparative analysis of three ASEAN countries. The result of the study highlight that Thailand is leading in corporate governance implementation which consequently improving the quality of the audit. Whereas Malaysia and Indonesia are not as efficient as Thailand and Indonesia is at last among these countries.

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How Do International Fund Flows Move the Stock Markets in Asia?

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Abstract:

This study investigates the impact of international fund flows on four Pacific Rim stock markets in Asian countries including Indonesia, South Korea, Taiwan, and Thailand since 2007 when the Federal Reserve and other major central banks have issued the quantitative easing (QE) or the similar policies which have created huge and unexpected fund flows to the global economy. These fund flows have had a significant effect on the global equity market, especially the emerging markets in Asia. Multiple regressions are applied to examine the effect of both foreign and domestic investors' fund inflows represented by their net buy on the stock market returns, volume, and volatility. The empirical results show that foreign fund inflows are positively correlated with market returns while the domestic fund inflows are not. Foreign fund inflows have significantly positive effect on market volume, while domestic fund inflows have significantly negative effect. In addition, foreign fund inflows significantly lessen market volatility while domestic fund inflows increase volatility in the stock market. The results can potentially be explained by the asymmetric information content of foreign investors' trading.

Keywords: Pacific Rim stock markets; quantitative easing; emerging markets; fund flows; market volatility; asymmetric information

JEL Classification: G1; F3

Introduction

International or foreign fund flows receive great attention from domestic investors as stock market movers (Boyer and Zheng 2002) and foreign investors are viewed as momentum investors whose trading triggers price changes in local markets (Richards 2005).

The cross-border equity investment plays a significant role in the emerging markets, especially, when quantitative easing (QE) policy have been used by the Federal Reserve and many central banks to inject massive capital to fight the great recession from subprime crisis. The study on the stock returns in 14 emerging markets during sub-prime crisis confirms that the real economic events from the US economy play a great role in the emerging markets and uniformly move the markets (Dooley and Hutchison 2009). Though the movement of these funds is to seek for investment opportunity in financial markets around the world, different traders have different information and trading behaviour (Auronen 2003). Accordingly, it is interesting to find out whether foreign or local investors have better information for trading, especially in Asia where there are many important emerging markets. This study, therefore; explores the role of international fund flows on four stock exchanges including Indonesia Stock Exchange, Korea Stock Exchange, the Taiwan Stock Exchange, and the Stock Exchange of Thailand. Foreigners' trading in the stock markets is investigated whether it has relationship with stock market returns, overall trading volume, and stock market volatility, and, in addition, whether foreign investors' superior performance is due to their superior information or just their trading volume.

1. Literature review

The pushing demand caused by foreigners' trading would be evidenced as to the massive trading volume that pushes the markets. Therefore, massive volume from any sources; *i.e.,* mutual funds, would gain the same result. The effect of market fund flows has been observed by many researchers as the stock market mover.

The buying demand drives up the overall market, and leads other market participants to follow. The selling of the funds signals oversupply in the market and depresses the market prices. Besides, the demand in stock markets not only increases the price level, but also leads the overall trading volume. As a result, the research question such as whether fund flows have any effect on stock market volatility has been explored, for example, the studies involving the market fund flows from particular groups of investors, and their trading effect on market returns, volume, and volatility (Chotivetthamrong and Nittayagasetwat 2014).

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The impact of fund flows from different types of investors is also discussed. Institutional trading may reduce stock price volatility rather than promotes it (Reilly 1979) and retailed investors usually observe fund managers' behavior and believe in their managerial ability and past performance in order to make investment decisions (Huang *et al.* 2007). These informed investors reduce market volatility, consequently, fund flows have negative relationship with volatility. The mutual fund managers' ability and the negative relationship between stock returns and volatility are also reported (Pastor and Veronesi 2010). Additionally, there are claims that fund inflows make positive returns and increase trading volume, and fund outflows do otherwise (Berk and Green 2004).

There are other suggestions such that fund flows would result market returns and reflect trading volume such as the relation between unexpected flows and returns at monthly frequency is very strong (Warther 1995). The supported evidences are obviously shown in the result of the study later on the correlation among returns, volatility, and trading volume (Brooks 1998) and the finding of the positive relation between volatility and volume for the Nikkei 225 stock index futures traded on the Osaka Securities Exchange (Watanabe 2001).

There is also the discovery that the rare extreme volatility is often followed by the market crash (Schwert 1989, 1990). That is the stock market is exceptionally unstable and it would encounter the crash after that. Also, increase of investors' risk aversion and concerns on capital investment, consumption, business cycles, and other microstructure factors are related to the volatility. Hence, investors may use market flows and the information of local and global market volatility to make investment decisions (Haugen and Baker 1991).

Mutual fund flows is also examined to unveil the relationship among return, volatility and trading volume (Chang and Wang 2002). The study adopt three estimators; the daily volatility estimator as high-frequency volatility (Andersen, Bollerslev, Diebold, and Labys 2001), the extreme value estimator (Parkinson 1980), and the volatility of an option on a market index to avoid the sensitivity of particular volatility estimator. The result shows that aggregate fund flows have positive relationship with stock returns, but negative relationship with volatility. The study also reveals that the volume of fund inflows is negatively related to market volatility while that of fund outflows is positively related to market volatility. In other words, fund inflows decrease the volatility while fund outflows increase the volatility. Moreover, the results of GARCH (1,1) model are compared with those of EGARCH (1.1) (Engle and Victor 1993) and find that both methods give the same results showing that there are positive relationship between returns and volume and negative relationship between volatility and volume.

Several researches also examine the asymmetric information among each investor and its impact to stock market flows, returns and volatility. The price volatility may reflect the flow of information to the market (Ross 1989). From the test on the correlation among returns, volume and volatility dynamics of the Sensitive Index (SENSEX) during the period from October 1996 to March 2006, the evidence shows that trading volume is an important factor conveying information that affects stock prices and the further analysis on the relationship of returns, volume, and volatility according to investor types reveals that each investor type's trading volume or the market flows affect the returns and volatility (Mahajan and Singh 2009). For the Stock Exchange of Thailand, GARCH model analysis shows that retailed traders' behavior significantly affects price volatility while the others' has very minimal effect and there exists a strong relationship between trading volume and volatility for both continuous and jump components for all traders when using 5-minute time intervals for the examination (Tanthanongsakkun *et al.* 2011). However the foreign traders are excluded from the sample in the study.

Furthermore, several studies report that international investors who mostly are institutional investors possess superior information over domestic retail investors. In other words, international investors could make a better decision than could local investors; *i.e*., foreign investors' net buy signals that the stocks are undervalued and their net sell signals that the stocks are overvalued. The study on the linkage between foreign fund flows and the performance of stock markets discloses that with a considerable amount of foreigners' investment capital, it creates demand for stocks and pulls the stock prices up. A considerable amount of foreigners' investment capital creates demand for stocks and pulls the stock prices up. On the other hand, increase in supply when foreigners sell their shares decreases the stock prices (Nittayagasetwat and Buranasiri 2017).

The verification is from several studies to support this claim. For example, the investigation on fund flows in Mexico during the economic crisis also finds that the surge of supply from investors' panic lowers the stock prices significantly (Frankel and Schmukler 2000). Foreign investors' trade, hence, provides valuable information for predicting the stock market's return and there might be asymmetric information held by these investors (Seasholes 2000). Many studies also report that foreign investors could sell their stocks at high price by using their superior information (Razin *et al.* 1999, Ciner and Karagozoglu 2008).

In particular, there is evidence supporting foreign investors' superior information for equity trading in Finland (Grinblatt and Keloharju 2000). For the Stock Exchange of Thailand, there is evidence showing that the unpredictable shock of foreign fund flows strongly impacts stocks' returns (Pavabutr and Yan 2007) and foreign

trade has a positive impact on stock market returns but a negative impact on volatility (Chotivetthamrong and Nittayagasetwat 2014). The retailed investors seem to trade in the opposite direction with the market and their trading demand increases the market volatility. The majority of literature supports the asymmetric information hypothesis and evidences that foreign investors have superior information over domestic investors.

2. Methodology

This study uses foreign trading in stock markets as a proxy of international fund flows since part of foreigners' fund inflows aim to buy stocks and when foreigners sell stocks, the fund moves out of the stock markets. Hence, the foreigners' net buy signifies international fund inflows, and their net sell signifies international fund outflows. In this paper, investors' trading is represented by the logarithm of investors' buying volume (B) over their selling volume (S).

$$ln\left(\frac{\mathrm{B}}{\mathrm{S}}\right) \quad (1)$$

If it is positive, it means investors' net buy and its negative sign indicates investors' net sell. Following the study on fund flows effect on Pacific Rim Emerging Market (Nittayagasetwat and Buranasiri 2017), this paper collects the data of daily foreign trading, daily domestic trading, market daily returns, market daily trading volume, and market daily volatility from January 2007 to December 2016 of 4 Pacific Rim stock markets in Asian countries including Indonesia, South Korea, Taiwan, and Thailand from Reuter Database. The Philippine Stock Exchange has been dropped from the sample because the data of foreign investors' buy and sell orders are not provided

Table 1 shows the descriptive statistics of the movements of foreign trading (natural logarithm of foreign buy/foreign sell) compared to those of domestic investors' trading of all stock markets in the sample. When there is a huge fund in the global economy, this fund is allocated to several capital markets, either to bond markets or to stock markets. In addition, when there is a retrieval of fund, it moves out from the capital markets at the same time causing plunges of the stock markets and currency depreciation.

From 2007 to 2016, foreign investors who have invested in the Indonesia and Taiwan stock markets have had a daily average trading as net buy (when the buying transactions exceed the selling transactions), while foreign investors who have invested in the South Korea and Thailand stock markets have had a daily average trading as net sell (when the selling transactions exceed the buying transactions). On the other hand, domestic investors in the stock markets of Indonesia and Taiwan have had net sell, and domestic investors in the stock markets of South Korea and Thailand have had net buy.

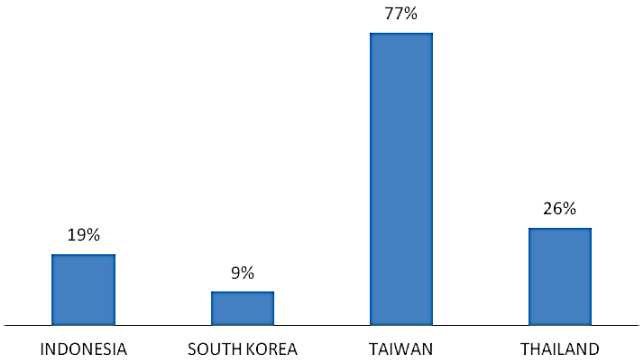
Table 1. Descriptive Data of the Daily Foreign and Domestic Investors' Net Buy, $ln\left(\frac{B}{S}\right)_{i,t}$, of 4 Pacific Rim Markets in Asian countries during December 2007 to December 2016.

Tranche	Indonesia	South Korea	Taiwan	Thailand
Mean	4.2889%	-0.4542%	5.7261%	-2.3213%
Median	2.7149%	-0.53%	4.3479%	-1.1225%
Maximum	256.7857%	86.4296%	419.899%	135.2457%
Minimum	-136.796%	-115.1797%	-142.4158%	-148.9773%
Std. Dev.	31.2785%	25.8735%	41.3618%	27.8558%
Skewness	1.042109	-0.242105	2.134563	-0.317245
Kurtosis	9.327122	3.870401	18.09138	5.173604

Source: Reuter Database

Figure 1 shows the percentage proportion of foreign trading compared to the overall trading of the stock markets in the sample. Except for Taiwan Stock Exchange in which Chinese investors from the mainland China play a great role in the Taiwan stock market and are considered as foreign investors, the proportion of foreign trading in Indonesia, South Korea, and Thailand stock markets reflects small fraction in those markets. The foreign trading in the Taiwan market is weighed 77.44% compared to 22.56% of the domestic investors. The foreign trading in the South Korea market is weighed only 8.85% compared to 91.15% of the domestic investors. The foreign trading in the Indonesia market is weighed only 18.80% compared to 81.20% of the domestic investors. Finally, the foreign trading in the Thailand stock market is weighed only 25.76% compared to 74.24% of the domestic investors. The small fraction of foreign trading in the domestic market indicates that foreign trading does not push demand or supply for overall market. Domestic investors which include retailed and institutional investors still play a greater role in domestic stock markets in Asia.

Figure 1. The percentage proportion of foreign trading compared to the overall trading of the stock markets in the sample



Source: Reuter Database

In addition, there are some characteristics according to international fund flows and foreign trading. First, the fund inflows create demand for local currency and its appreciation and the outflows would depreciate the local currency. The second point is that the international investors' investment is usually widespread and aiming to emerging stock markets on particular. The enormous cash flows are allocated to several emerging stock markets. When foreign investors invest money in the stock markets, foreign trading in those markets would be net buy and the markets trend to move up simultaneously. Foreign fund also trends to move out of the stock markets at the same time and those markets would have foreign net sell and have negative returns. Therefore, foreign trading is correlated among the emerging markets, so are their returns.

The period of study starts during the global financial crisis of 2007 and, then, the Federal Reserve's quantitative easing (QE) was launched in order to stimulate the US economy. As a side effect, the quantitative easing policy injects a lot of capital to global economy, and part of this capital is invested in stock markets around the world. The scope of the data should be large and long enough to draw general conclusion on the existence of the linkage between foreign fund flows and the stock returns. This paper uses daily data of foreign investors' trading volume on both buying and selling sides to study the overall market relation between foreigners' trading and stock returns, trading volume, and volatility. The continuous daily stock returns are log return (Chotivetthamrong and Nittayagasetwat 2014) and could be calculated as following:

$$R_t = ln\left(\frac{P_t}{P_{t-1}}\right) \quad (2)$$

where: R_t refers to actual daily stock return on day *t;* P_t and P_{t-1} refer to the final closing prices of the market index on day t and on the previous day, respectively.

The descriptive data of daily stock returns of the 4 Pacific Rim Markets in Asian countries are shown in Table 2. Based on the stock indices' daily return data from the beginning of January 2007 to the end of December 2016, the average daily returns of stock indices are in the range of 0.0064% to 0.0412%. The stock market in Indonesia has the highest average daily returns and standard deviation, while that in South Korea has the daily return at the top rank for its maximum value, minimum value, and the kurtosis. Interestingly, the stock exchange in Taiwan has the daily return at the lowest rank in most categories; *i.e.*, mean, maximum, minimum, standard deviation, skewness, and kurtosis, and is the most stable (has lowest risk) and the most normal (the kurtosis is close to 3) in the sample. In addition, all of the indices' daily return data are skewed to the left. It is noticeable that although the foreign trading in the stock markets in South Korea and Thailand is net sell, both markets have generated the positive return on average during the studying period.

Table 2. Descriptive Data of the Daily Returns, $R_{i,t}$, of 4 Pacific Rim Markets in Asian Countries during Jan 2007 to Dec 2016

Tranche	Indonesia	South Korea	Taiwan	Thailand
Mean	0.0412%	0.0132%	0.0064%	0.0314%
Median	0.0547%	0.0000%	0.0115%	0.0106%
Maximum	7.6231%	11.2844%	6.5246%	7.5487%
Minimum	-10.9540%	-11.1720%	-6.7351%	-11.0902%
Std. Dev.	1.3657%	1.2894%	1.2097%	1.2452%
Skewness	-0.6399	-0.5901	-0.3875	-0.6425
Kurtosis	8.0858	10.0447	3.9310	7.7462

Source: Reuter Database

This study also attempts to find whether foreign investors' trading would affect the overall market volume. In other words, foreign trading would increase or decrease the overall market trading. The change in market volume can be considered as:

$$\ln\left(\frac{v_t}{v_{t-1}}\right) \quad (3)$$

where: $v_{i,t}$ refers to the daily volume of the stock market *i* at time *t*.

Table 3. Descriptive Data of the Changes of Daily Volume, $ln\left(\frac{v_{i,t}}{v_{i,t-1}}\right)$, of 4 Pacific Rim Emerging Markets in Asia Countries during December 2007 to December 2016.

Tranche	Indonesia	South Korea	Taiwan	Thailand
Mean	0.050%	0.018%	-0.554%	0.042%
Median	0.000%	0.000%	-0.981%	0.000%
Maximum	272.695%	81.166%	129.956%	114.624%
Minimum	-235.529%	-63.795%	-99.186%	-111.182%
Std. Dev.	33.336%	12.405%	27.818%	24.504%
Skewness	0.075003	0.030824	0.103781	0.231976
Kurtosis	9.955188	5.080995	3.744196	4.292121

Source: Reuter Database

Table 3 shows that, on average, the daily changes of overall trading volume in the stock markets in Indonesia, South Korea, and Thailand are positive, while the daily changes of overall trading volume in the stock market in Taiwan are negative. During the studying period which is after the QE was launched, the daily trading volume has been increasing for most stock markets in the sample, so some part of the QE money would flow into the stock markets in Asia.

For stock return volatility, method to prevent the error in volatility calculation was suggested (Chang and Wang 2002). The volatility of returns for a random walks use the high and low in any particular period for the estimation (Parkinson 1980). The Pakinson volatility, also called "extreme volatility" of the stock returns for the period n can be calculated as the following:

$$\boldsymbol{\sigma}_{\mathrm{n}} = \frac{\sqrt{\sum_{t=1}^{n} \frac{1}{4ln2}\left(\ln\frac{P_{Ht}}{P_{Lt}}\right)^2}}{n} \quad (4)$$

where: P_{Ht} and P_{Lt} denote respectively the highest and lowest index prices on day t.

Table 4. Descriptive data of the daily volatility, $\sigma_{i,t}$, of 4 Pacific Rim emerging markets in Asian countries during Jan 2007 - Dec 2016

Tranche	Indonesia	South Korea	Taiwan	Thailand
Mean	0.0133%	0.0102%	0.00891%	0.00897%
Median	0.00513%	0.00370%	0.00412%	0.00347%
Maximum	0.4949%	0.9051%	0.3142%	0.1977%
Minimum	0.000184%	0.000332%	0.000262%	0.000266%
Std. Dev.	0.0303%	0.0335%	0.0189%	0.0172%
Skewness	7.50185	15.25386	9.188713	5.084508
Kurtosis	83.75701	321.2108	118.4836	36.55368

Source: Reuter Database.

Table 4 describes the daily volatility of stock markets in the sample. On average, the stock markets in Indonesia and South Korea have had approximately the same level of daily volatility, while the stock markets in Taiwan and Thailand have been the other level which is lower than those in Indonesia and South Korea.

To explore the information contained in foreign fund flows, the relationship between the daily returns and the net foreign fund flows is presented under the regression model (Nittayagasetwat and Buranasiri 2017) as follows:

$$R_{i,t} = \alpha + \beta_{i,t} ln\left(\frac{B}{S}\right)_{i,t} + \beta_{i,t-1} ln\left(\frac{B}{S}\right)_{i,t-1} + \ldots + \beta_{i,t-n} ln\left(\frac{B}{S}\right)_{i,t-n} + \varepsilon_{i,t} \quad (5)$$

where: $R_{i,t}$ refers to the daily continuous return of the stock index *i* on day *t*.

The regression analysis from their study indicates the statistically significant relationship of foreign fund flows and the market return. The lags of daily foreign fund flows are introduced into correlation and regression analysis. The correlation analysis shows that the influence of foreign fund flows quickly disappears. This evidence implies the high level of market efficiency in these markets. The research results suggest that the past information on foreign fund flows might not be useful in forming good investment strategies. However, the information on the expected foreign fund flows is the valuable information for investors would like to earn abnormal return.

However, this paper examines the foreigners' trading effect on the return-volume-volatility of stock markets. The lagged returns, volume, and volatility are included into the model as controlled variables to prevent the positive bias in the regression (Chang and Wang 2002, Durbin 1970, Chotivetthamrong 2014). Therefore, the following models are tested:

$$R_{i,t} = \mathrm{a}_i' + b_i' \ln\left(\frac{B}{S}\right)_{i,t} + \sum_{j=1}^{k} \gamma_{i,j}' R_{i,t-j} + e_{i,t}' \quad (6)$$

$$ln\left(\frac{v_{i,t}}{v_{i,t-1}}\right) = \mathrm{a}_i'' + b_i'' \ln\left(\frac{B}{S}\right)_{i,t} + \sum_{j=1}^{k} \gamma_{i,j}'' ln\left(\frac{v_{i,t-j}}{v_{i,t-j-1}}\right) + e_{i,t}'' \quad (7)$$

$$\sigma_{i,t} = \mathrm{a}_i''' + b_i''' \ln\left(\frac{B}{S}\right)_{i,t} + \sum_{i=1}^{k} \gamma_{i,j}''' \sigma_{i,t-j} + e_{i,t}''' \quad (8)$$

where: $\sigma_{i,t}$ refers to the Parkinson volatility of the stock index *i* at time *t*.

This paper uses Parkinson (1980)'s volatility by calculating the extreme value as highest and lowest price in the fix period of time. By this approach, the daily volatility can be calculated and explore whether volatility is affected by foreign trading. Volatility can be an indicator of information asymmetry (Ross 1989, Mahajan and Singh 2009). Therefore, this paper will compare the impact of foreign investors' trading and the rest of investors' trading on volatility.

The model set tries to find whether foreign trading affects the stock market returns, volume changes, and volatility of four stock markets in Asia. Finally, this research attempts to cope with the market efficiency pursuit or the asymmetric information possibility due to foreigners' trading. In other words, this study tries to find out whether foreign investors trade on superior information over the rest of investors or just simply they create demand/supply shocks. The case that stock indices increase when foreign investors have a net buy (and have a profit) is because foreigners know more or they just create the volume. Therefore, this study will repeat the overall methodology on the aggregate market and will explore whether there exists the asymmetric information due to foreign investors' trading.

3. Result

The data analysis of this study shows the effect of both foreign and domestic investors' trading on the stock indices' daily returns, volume, and volatility. The first set of regression analyses are conducted focusing on the effect of both foreign and domestic investors' net buy on the daily stock indices' return. It tests whether foreign investors' net buy commences demand for stock and produces positive returns, compared to the other groups' net buy. In other words, the null hypothesis is designed so that the stock demand has either no or negative effect on stock returns (H_0: $b_j' \leq o$)

Table 5 shows that foreign trading in every market has a significant effect on the stock return while the rest has no effect on the return. In other words, there is a positive relationship between the stock return and the stock demand created by foreign investors in all four markets. Therefore, foreign investors' net buy boosts the domestic stock return, while their net sell lessen the return. Since the foreign sector is considered a minimal portion in the markets as seen in Figure 1, the return would not be affected by the broad volume. Therefore, the positive relationship between the foreign investors' net buy and the stock return could be explained by foreign investors' superior information over the information possessed by the remaining groups of investors. The hypotheses such that there is a positive relation between stock returns and international fund inflows and there is a negative relation between stock returns and international fund outflows have been supported by evidences from many researchers, for example, the positive contemporaneous relation between the US stock market returns and fund flows from foreign Investors (Boyer and Zheng 2009), the positive feedback between trading and herding by foreign investors on stock returns in Korea from November 30, 1996 to the end of 1997 using order and trade data (Choe *et al.* 1999), and the discovery of positive feedback trading with respect to global, as well as domestic, equity returns in several markets (Richards 2005). The nature of this trading suggested that it is due to behavioural factors or foreigners extracting information from recent returns, rather than portfolio rebalancing effects.

$$R_{i,t} = a_i' + b_i' \ln\left(\frac{B}{S}\right)_{i,t} + \sum_{j=1}^{k} \gamma_{i,j}' R_{i,t-j} + e_{i,t}' \quad (9)$$

Table 5. Multiple Regression Models of the Daily Market Return from each 4 Pacific Rim Markets in Asian countries against both foreign and domestic investors' net buy and the lags of the Daily Market Returns during Dec 2007 to Dec 2016 under the Null Hypothesis that the Investors' Demand on Stock Has Either No or Negative Effect on Market Returns (H_0: $b_t' \leq o$)

	Indonesia		South Korea		Taiwan		Thailand	
	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic
C	-0.00022	7.92E-05	0.00019	0.000146	-0.00071***	0.00216***	0.00070***	0.00049**
ln_B/S	0.01471***	-0.02524	0.01250***	-0.09643	0.01583***	-0.00421	0.01548***	-0.01646
ln_r(-1)		0.07164***			-0.08840***	-0.06470***	-0.08716***	
ln_r(-2)					-0.05267***	-0.05821***		
ln_r(-3)					-0.06715***	-0.05663***		
ln_r(-4)					-0.07361***	-0.09108***		
ln_r(-5)					-0.07133***	-0.05992***		
ln_r(-6)					-0.08510***	-0.09982***		

Note: * Significant at 0.10 ** Significant at 0.05 *** Significant at 0.01

The evidence of the return-volume relationship of foreign trading could support the asymmetric information hypothesis since the other groups of investors; *i.e.,* domestic retailed and institutional investors which are the major portion in the market do not significantly direct the stock index. In addition, this study investigates how foreign trading would lead the overall market trading volume. Therefore, the hypotheses whether foreign investors' net buy would have positive relationship with the overall market volume, compared to the rest of investors' net buy, are tested as shown in Table 6.

$$ln\left(\frac{v_{i,t}}{v_{i,t-1}}\right) = a_i'' + b_i'' \ln\left(\frac{B}{S}\right)_{i,t} + \sum_{j=1}^{k} \gamma_{i,j}'' ln\left(\frac{v_{i,t-j}}{v_{i,t-j-1}}\right) + e_{i,t}'' \quad (10)$$

Table 6. Multiple regression models of the change in daily market volume from each 4 Pacific Rim markets in Asian countries against both foreign and domestic investors' net buy and the lags of the changes in daily market volume during Dec 2007 - Dec 2016 under the Null Hypothesis that the Investors' Demand on Stock Has No Effect on Market Volume (H_0: $b_i'' = 0$).

	Indonesia		South Korea		Taiwan		Thailand	
	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic
C	1.37347***	1.06220***	1.45771***	1.70534***	2.32527***	2.21431***	1.73340***	1.71947***
ln_B/S	0.06890**	-0.05757	0.01529*	-0.25055***	0.19856***	-0.09976***	0.08938***	-0.13724***
ln_Vn/Vo(-1)	-0.21128***		-0.31566***	-0.33347***	-0.42209***	-0.41723***	-0.29861***	-0.29731***
ln_Vn/Vo(-2)	-0.08397***		-0.13046***	-0.17336***	-0.27959***	-0.28104***	-0.17049***	-0.16699***
ln_Vn/Vo(-3)				-0.12458***	-0.26561***	-0.25668***	-0.14964***	-0.14545***
ln_Vn/Vo(-4)				-0.10353***	-0.19332***	-0.17159***	-0.05950***	-0.05551***
ln_Vn/Vo(-5)				0.04307**	-0.04073*			
ln_Vn/Vo(-6)					-0.04631**			

Note: * Significant at 0.10 ** Significant at 0.05 *** Significant at 0.01

For the hypotheses whether foreign investors' trading leads the liquidity of overall market, the second set of models is tested. This study finds the positive relationships between foreign investors' net buy and the overall market volume for all markets in the sample and the negative relationships between domestic investors' net buy and the overall market volume for almost all markets, except the market in Indonesia. The findings mean that foreign investors' demand would lead the overall market liquidity and push up the stock prices. Since the domestic investors trade against the foreign investors, they sell stocks in the bullish market and buy stocks in the bearish market. Except the stock market in Taiwan, foreign trading volume is considered a small fraction in the stock markets, but they surprisingly have a greater market power than the domestic investors.

The third set of models is to explore the relation of volatility-volume for foreign investors' trading, compared to the domestic investors' trading. The hypotheses are such that since foreign investors' trading contains information, there should be a negative relationship between international fund inflows and the stock market volatility (Lensink and Morrissey 2006, Chang and Wang 2002). Table 7 reports the relationship between volatility and fund inflows for foreign investors' trading, compared to the domestic investors' trading. The result shows the

negative volatility impact for foreign investors' net buy and the positive volatility impact for domestic investors' net buy.

Therefore, during the bullish market, foreign investors would have a net buy, stock prices go up, market volume also increases, but market volatility goes down. While domestic investors trade against foreign investors, they have a net buy in the bearish market. The higher the domestic investors' net buy, the lower the stock prices, the lower the market volume, but the higher the market volatility.

$$\sigma_{i,t} = \mathrm{a}_i''' + b_i''' \ln\left(\frac{B}{S}\right)_{i,t} + \sum_{i=1}^{k} \gamma_{i,j}''' \sigma_{i,t-j} + e_{i,t}''' \quad (11)$$

Table 7. Multiple regression models of the parkinson volatility from each 4 Pacific Rim markets in Asian countries against both foreign and domestic investors' net buy and the lags of the parkinson volatility during Dec 2007 - Dec 2016 under the Null Hypothesis that the Investors' Demand on Stock Has No Effect on Market Volatility (H_0: $b_i''' = 0$).

	Indonesia		South Korea		Taiwan		Thailand	
	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign	Domestic
C	3.3E-05***	3.4E-05***	2.23E-05***	2.25E-05***	2.30E-05***	7.23E-05***	3.5E-05***	3.5E-05***
ln_B/S	-6.6E-05***	0.00013***	-6.1E-05***	0.00052**	-4.7E-05***	1.13E-05***	-6.3E-05***	9.6E-05***
SD(-1)	0.41277***	0.41293***	0.40092***	0.40101***	0.24207***		0.29475***	0.29884***
SD(-2)	0.08550***	0.08989***	0.29467***	0.29382***	0.15245***		0.12685***	0.12888***
SD(-3)	0.09162***	0.08979***	0.10188***	0.10291***	0.05985**		0.06978***	0.06997***
SD(-4)	0.06466***	0.06087**	-0.13566***	-0.13534***	0.07266***		0.05568***	0.05428***
SD(-5)	0.09106***	0.07407***	0.11881***	0.11988***	0.11992***			
SD(-6)					0.03938*			
SD(-7)					0.08393***			

Note: * Significant at 0.10 ** Significant at 0.05 *** Significant at 0.01

The regression results imply that foreign investors have superior information over the domestic investors, similar to the study on Mexican and Asian stock markets (Frankel and Schmukler 2000)

Conclusion

To resolve the economic downturn, the Federal Reserve and other central banks of developed countries have issued the quantitative easing (QE) or the similar policies and have injected an enormous capital to the global economy. Therefore, there have been international fund flows to the global capital market and these fund flows have had a significant effect on the global equity market, especially the markets in Asia. This study investigates the effect of international fund flows on the returns, volume, and volatility of the stock markets in 4 Pacific Rim Asian countries including Indonesia, South Korea, Taiwan, and Thailand. The stock market data since 2007 when there is an outbreak of the global financial crisis are investigated.

The descriptive statistics of this study shows evidences that the daily trading volume has increased in most stock markets in the sample and the daily market returns have increase in all markets. In addition, the evidence indicates that foreign investors in the stock markets in Indonesia and Taiwan have represented the buyers on daily average while those in the stock markets in South Korea and Thailand have represented the sellers.

To study the impact of international fund flows on the stock markets in Asian countries, this research runs several sets of regressions on market returns, volume, and volatility. For stock markets in Asia, the relationship between foreign investors' net buy and stock market returns is positive. It means that foreign investors trend to be the buyers in the rising of stock prices while domestic investors would be the sellers. Since foreign trading is considered a small fraction of the market volume in most stock markets in the sample, the increases of stock prices are not driven by the foreign investors' demand for stock. In addition, this research provides the evidence that international fund inflows lead the overall trading volume of every stock market in the sample, so that foreign investors' demand for stock creates liquidity in the stock markets. Finally, this study finds that the foreign investors' fund inflows reduce the overall market volatility. There exists asymmetric information between international and domestic investors.

Getting along with several studies, the empirical results confirm the role of international fund flows as the market movers. International investors are buyers and support positive returns in the stock markets (Richards 2004). Not only making positive returns, fund inflows also increase stock market liquidity (Bark and Green 2004). Finally, informed investors' trading reduces stock market volatility (Reilly 1979). Therefore, this study supports asymmetric information proposition that international investors possess superior information over domestic investors and apply their knowledge to move the stock markets.

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Russian Practice of Identifying and Assessing Budget Risks

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Abstract:

The paper examines different approaches to the assessment of budget risks existing in the Russian legal framework. The main attention is paid to the imperfections of government regulation in this field. Separate sections are devoted to the definition and procedure of budget risks management in the regions of the Russian Federation. The article examines methods of quantifying the budget risks proposed by Russian economists and researchers, their positive aspects and gaps are identified. The absence of a unified legal and methodological basis for a comprehensive analysis of budget risks taking into account external and internal threats is stated and explained. The main objective of the study is to clarify the legal regulation of assessment and identification of budget risks, including the risk of non-compliance with budgetary legislation and anti-corruption legislation; risk of non-compliance with the principle of the budgetary funds effectiveness and failure to meet the target values of financial management indicators. In particular, specific recommendations have been developed to introduce amendments to legal normative documents of the Russian Federation, mandatory for adoption in all Russian regions. The practical use of the formulated proposals, including recommendations on clarifying legal standards and documents on the organization of internal financial control, involves the elimination of contradictions revealed in the work and allows making informed decisions in the field of risk management and use of budget funds in the current economic environment.

Keywords: budge risks; identification; normative and legal regulation; assessment.

JEL Classification: H60; H63; G32

Introduction

A list of budget risks was presented in the official documents of the Russian Ministry of Finance (Order of the Ministry of Finance of Russian Federation No. 383 “On the Procedure for the Operational Monitoring of the Quality of Financial Management in the Ministry of Finance of the Russian Federation” (2011) and Order of the Ministry of Finance of the Russian Federation No. 356 “On Approval of the Methodological Recommendations for the Implementation of the Internal Financial control” (2016), which guide toward the formation of a new risks management system, but do not specify a methodological basis for risks identification and assessment.

The information on budgetary risks provided by the constituent entities of the Russian Federation is not sufficient to assess their level. Theoretical studies of Russian researchers as Gamukin (2016), Zhelnova (2014), Cherkasova, Makarova and Gordeeva (2015), *etc*. remain scattered and offer different modes of budgetary risks assessment.

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According to the current practice, the article proposes the specification and clarification of certain evaluation criteria, formulated on the basis of identifying contradictions in the estimates used by different constituent entities of the Russian Federation.

1. Methods used and results obtained

The research methodology is based on the generalization of national practice of identification and assessment of budgetary risks and is aimed at their unification in order to improve the quality of internal financial control. The proposals set out in the article are based on the normative regulations of the Ministry of Finance of the Russian Federation, which are specified taking into account the contradictions established in the assessment of budgetary risks by the constituent entities of the Russian Federation.

Results

The methods of assessing budgetary risks are also outlined in the order of the Ministry of Finance of the Russian Federation "On the procedure for the operational monitoring of the quality of financial management in the Ministry of Finance of the Russian Federation", which provides calculation formulas and criteria for g budgetary risks assessment.

Streamlined proposals for assessing budgetary risks are presented in the Order of the Ministry of Education and Science of the Russian Federation "On documents of internal financial control in the Federal Service for Supervision in Education and Science" (2015). The main provisions of the Order No.499, which ceased to be valid, have been incorporated in Order No. 356 of the Ministry of Finance of the Russian Federation "On Approval of the Methodological Recommendations for the Implementation of Internal Financial Control". However, this document is of an advisory nature and is applied with a varying degree of detail in the constituent entities of the Russian Federation, which does not allow for an objective comparison of budgetary risks in different regions and an appropriate risk-management action. In this regard, the analysis of the experience of identification and assessment of the budgetary risks set forth in the normative legal documents of the Russian Federation and the works of Russian researchers-economists is a necessary condition for the further improvement of the budgetary risk management system.

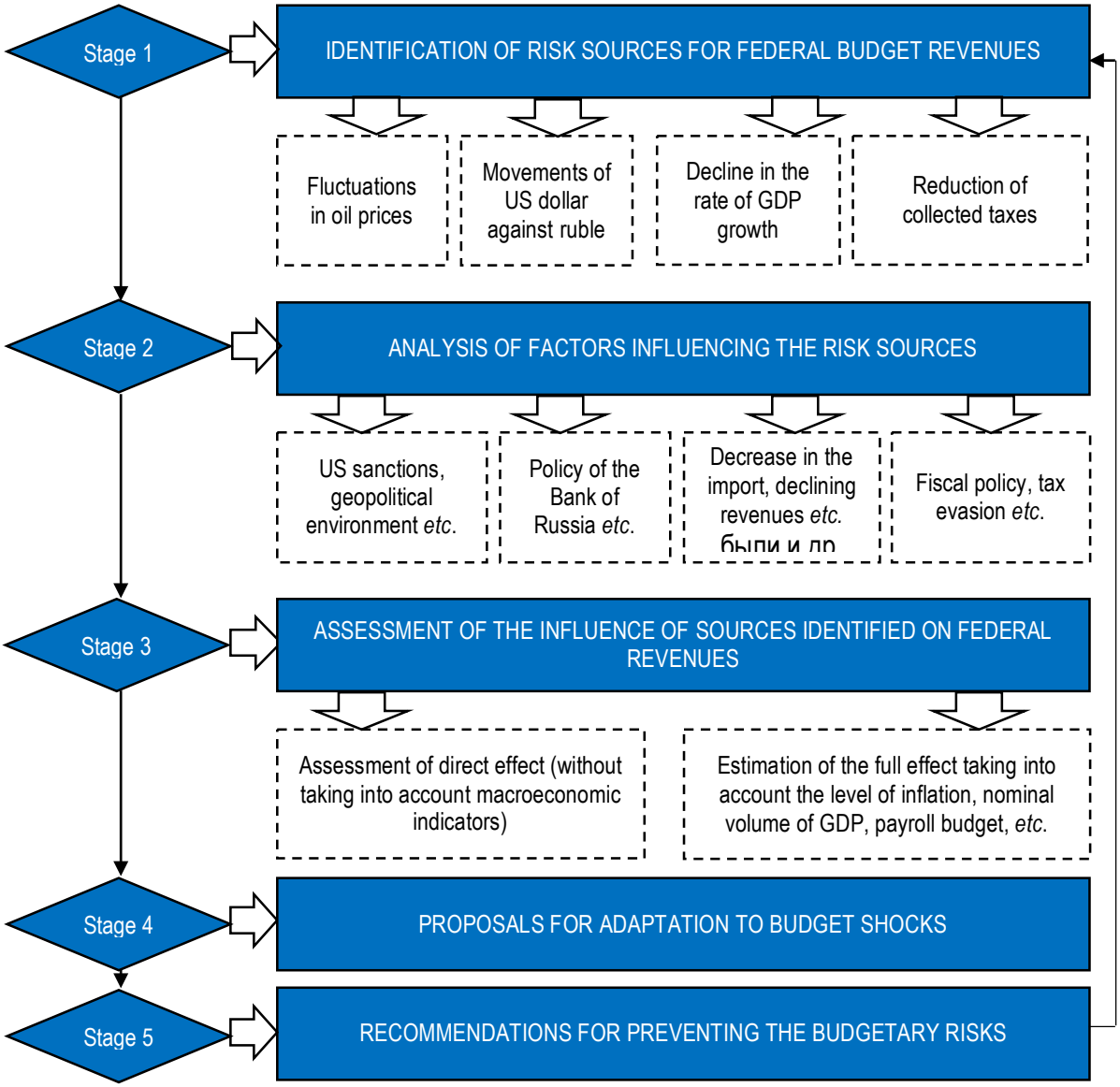
Risk identification without reference to the object of the study, is considered in detail in the All-Union State Standard GOST R 51897-2011/ISO Guide 73: 2009 "Risk Management. Terms and Definitions". Here, the risk identification is referred to as "the process of identifying, describing and establishing the list of risk elements" (2009). Therefore, in relation to budgetary risks, identification should be viewed as a process of determining budgetary risks, establishing their list and describing each element. And in accordance with the same document, sources of risk, events, their causes and possible consequences can be considered as the elements of risk.

Some references to the identification of budgetary risks are contained in Order of the Ministry of Finance of Russia No. 356, where it is considered as the basis for assessing budget risks and determining their level. In order to identify budgetary risks in accordance with the above-mentioned document, we analyzed the information provided under the instructions of the state (municipal) financial control authorities and recommendations (proposals) of the internal financial audit in the first place, was made. The analyzed information gives an idea of the occurrence of harmful events that can affect the results of the internal budgetary procedure.

In addition, clause 31 of document (Order of the Ministry of Finance of the Russian Federation of September 7, 2016 No. 356) contains a list of risk sources, which are subject to a detailed study. Since identification involves the description of all risk elements, including their causes, it can be argued that the above-mentioned Order of the Ministry of Finance of Russia contains not only a generalized methodology for assessing fiscal risks (discussed below), but also recommendations for their identification.

The national experience in identifying budget risks can also be clearly seen in the Report of the Working Group on the Assessment of Budget Risks (2015). The authors identify the risks of loss of budget revenues, additional costs, financing and budget planning risks by analyzing the sources of their occurrence, predicting the consequences and analyzing other elements of risk. The process of identifying an individual risk, used in the Report, can be presented in the form of an algorithm (Figure 1).

Figure 1. Algorithm for identifying the risk for federal budget revenues

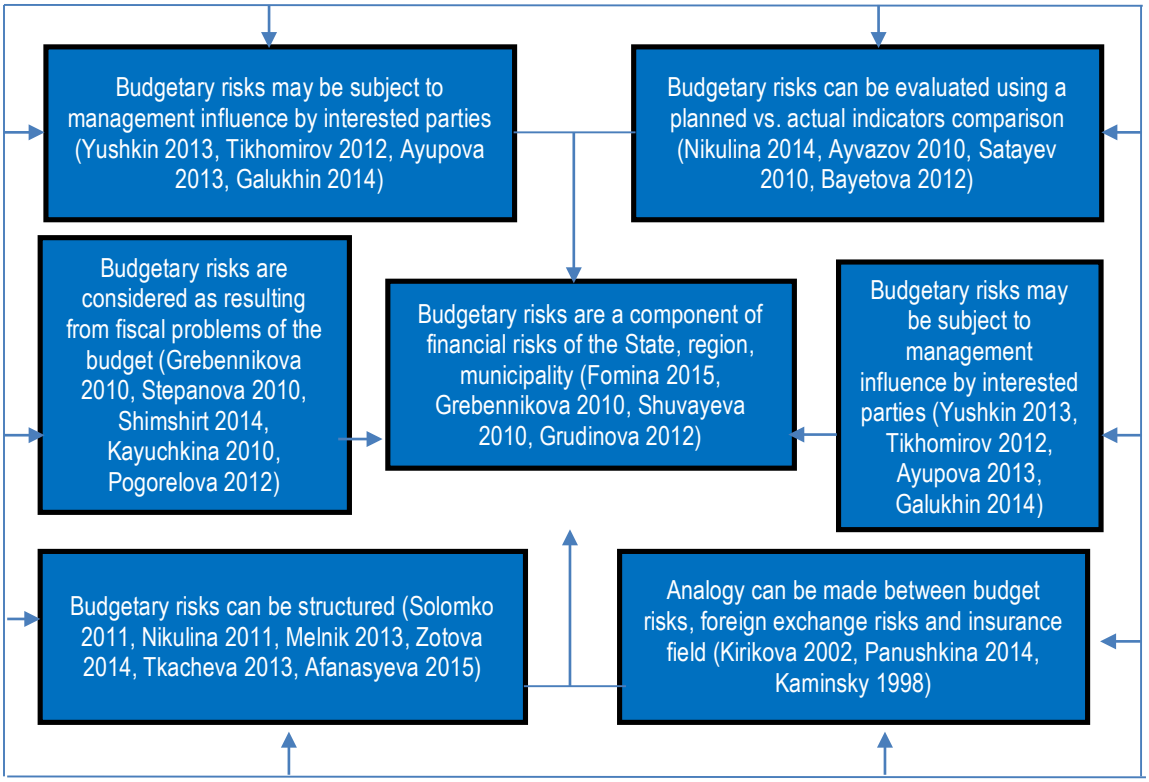


A timely identification of budgetary risks is indispensable, inter alia, because it gives to the subjects of economic relations (legislative and executive authorities) the possibility to find the most acceptable methods for risk assessment and management.

The establishment of a list of budgetary risks with an analysis of the current state of the budget system external environment is not the subject of this study. In this respect we will look closely at the assessment of budgetary risks, the issues of methodology of which remain relevant. As a probabilistic category, risk can be quantified by means of probability theory and mathematical statistics. In the theoretical works of Russian researchers, various methods for estimating budgetary risks are proposed, including statistical, mathematical methods, methods of peer review, and others.

In his thesis, Gamukin V.V. provides a detailed review of the features of budget risks specified by Russian researchers (Figure 2), allowing to determine the principal approaches to risk assessment.

Figure 2. Matching of Russian authors' views on the nature and features of budgetary risks (Gamukin 2015, 88)



Thus, Russian authors disagree as to the assessment of budgetary risks and suggest the following options (Gamukin 2015, 81-92)

- comparing the planned and actual indicators (budget revenues and expenditures, budget deficit, *etc.*), which allows to perform calculations in dynamics and to provide forecasts of budget risk for the future;
- calculation of the probability of an adverse event considering it as a measure or a number that shows the ratio of favorable outcomes to the total set of adverse outcomes
- grouping of factors of integrated budgetary risk taking into account “unaddressed and unknown factors” (Fomina and Kovalskaya 2015, 50);
- building a factor model for the emergence of budgetary risks under the influence of environmental factors and the risks of the budget process;
- use of indicators of forecasting foreign exchange risks and application of insurance system in the context of budget risks study;
- assesment of the quality of the financial management, *etc*.

In addition to the proposed options for assessing the budget risks recommended by Russian researchers, a special attention should be paid to the assessment toolkit. For instance, to calculate budgetary risks mathematical and statistical tools can be used, including: regression equation; standard deviation equation; approximation of time series; normative method; mean mathematical expectation; dispersion; coefficient of variation, *etc*., as well as qualitative assessment.

The budget risks assessment with the use of regression equation (Ayupova 2010, 82) is based on the assumption of a difference existing between the actual budget revenues and the planned ones. Herewith, various internal and external factors, influencing the sources of income, are identified. The main parts of regression equation are sources of budget revenues, except uncompensated receipts (they were excluded for easier application and clearer presentation of calculations).

The regression model of budgetary risks assessment, according to Ayupova (2010, 84), allows to identify the degree to which “the dynamics of budget revenues formation and the risk increase / reduction for certain types of income are linked” (Table 1).

The standard deviation equation used in the research of Zhelnova (2014, 95) is based on data concerning the execution of consolidated budget of the region under consideration. On the basis of the standard deviation model, the variability of characteristics (revenue source or objects of expenditure) is determined, and their

deviations from the arithmetic average are measured. The results of the calculations allow to assess the rate of budgetary execution, improve budget planning and strengthen control over the expenditure of budget funds.

Along with the standard error, the coefficient of variation is calculated, which permits to find the extent to which the actual results deviate from the mean values. The value and frequency of deviations in the execution of the budget allows to predict possible risks in the future.

The use of the method of approximation (smoothing the curve) of the time series as applied to the estimation of budgetary risks is studied in the research of Cherkasova, Makarova and Gordeeva (2014).

Table 1. Models of budgetary risks assessment

Author/s	Model	Calculation formula	
Ayupova (2015)	Regression equation	$Y(R) = a_0 + a_1R_1 + a_2R_2 + a_3R_3 + \epsilon$	Y - budget revenues; R_1 - collection of individual income tax allowing for risk; R_2 - collection of corporate income tax allowing for risk; R_3 - collection of corporate property tax allowing for risk; ε - element of chance; η - the volume of studied population.
Zhelnova (2014)	Standard deviation	$\sigma = \sqrt{\sum (x_i - \bar{x})^2 \star p_i}$	x_i - indicator of collection of i-th budget income source/object of expenditure; p_i - share of i-*th* source of income/object of expenditure; $\bar{x}$ – average indicator of tax collection/ expenditures.
Cherkassova, Makarova, Gordeyeva (2014)	Standard approximation error	$\varepsilon = 100 * \sqrt{1 - R^2}$ $R^2 = 1 - \frac{V(\frac{y}{x})}{V(y)}$	R^2 - coefficient of determination; $\frac{V(\frac{y}{x})}{V(y)} = \sigma^2$ - conditional variance.
Galukhin, Uskova (2016)	Particular risk values	$R_1 = \frac{\sigma}{\bar{B}}$*100%	R_1 - risk of non-fulfillment of budget; σ - standard deviation of budget incomes; $\bar{B}$ – average of budget execution % in last three years.
		$R_2 = \left\lvert \frac{P_f / P_p}{D_f / D_p} \right\rvert * 100\%$	R_2 - budget imbalance risk; P_f / P_p - actual/planned volume of budget revenues in the reporting year; D_f / D_p - actual / planned volume of budget expenditures in the reporting year.
		$R_3 = \frac{P_j}{D_j + D_{jz}}$*100%	R_3 - default risk; p_j - the volume of expenses for servicing debt in *j* – *M* year; D_j - budget revenues in *j* – *M* year; D_{jz} - amount of borrowed funds in *j*–*M* year.
	The integral value of risk	$R = \sqrt[3]{R_1 + R_2 + R_3}$	R_1 - default risk; R_2 - budget imbalance risk; R_3 - risk associated with non-repayment of the debt.

The authors propose to use smoothing of actual and planned values of budget revenues and expenditures. Considered as an indicator of budget risk assessment, the magnitude of approximation error is calculated based on the data obtained.

As it is easy to see, the methods of assessing budgetary risks given above emphasize revenues and expenditures of the budget, but this is by no means enough. Therefore, it seems interesting to study the works of Russian researchers Galukhin and Uskova (2016), who propose to analyze particular and integral values of budgetary risks (Table 1). The authors' view on the assessment of budget risks seems to be justified, since the indicators of budget risk related to debt repayment, risk of non-fulfillment of the budget and the risk of budget imbalance allow for a more detailed assessment of budgetary risks and complex characterization of individual values, including sufficiency/insufficiency of budgetary funds for the execution of expenditure obligations, *etc*.

Thus, even a brief description of only a part of the toolkit used by Russian economists for budgetary risk assessment suggests that Russian researchers take different approaches to the assessment of budgetary risks and provide compelling evidence to justify their application. However, there is no consensus on the methodology for assessing budgetary risks and their identification in Russian practice.

For further research, let us turn to the official documents of the executive authorities. In accordance with the Order of the Ministry of Finance of the Russian Federation of October 19, 2011, No. 383 “On the Procedure for the Operational Monitoring of the Quality of Financial Management in the Ministry of Finance of the Russian Federation”, budget risk is “the potential for certain budget parameters (characteristics) to be unavailable for implementation (in whole or in part), resulting from ineffective management solutions for the accounts of federal budget funds, as well as an inefficient use of federal budget funds in the current financial year, provided that the level of financial management achieved in the reporting period has been preserved” (2011)

In our view and in accordance with the above-mentioned document, the assessment of budget risks should be conducted by groups of indicators, including: inefficiency of fiscal spending, weak revenue management; ineffective accounting of federal budget funds and liquidity management.

The methods for assessing fiscal risks, as set out in Order no. 383 of the Ministry of Finance of Russia, are summarized in the Table 2.

Table 2. Assessment of budget risk in accordance with the order no.383 of the Ministry of Finance of the Russian Federation

EVENT	Formula for calculating budget risk	LEVEL OF RISK: - High - Medium - Low
1. Inefficiency of fiscal spending		
1.1. Incomplete or untimely fulfillment of budgetary obligations		
1.2. Poor medium-term financial planning		
1.3. Low level of implementation of sectoral (departmental) outlines of efficiency gains in budgetary expenditure		
2. Inefficient revenue management		
2.1. Poor planning of tax revenues and customs duties		
2.2. Poor planning of other budget revenues		
2.3. Revenue shortfalls in the federal budget		

The next document, containing recommendations on the assessment of budget risks, is the Order of the Ministry of Finance of Russia no. 356 (2016). The order does not contain an explicit definition of budgetary risk, but at the same time, according to paragraph 3, it suggests to consider as risk any event affecting the implementation of internal budgetary procedures. In addition, clause 4 of the Order provides their detailed list. Risk assessment, according to the same document, should be conducted based on two criteria: the probability of their occurrence and the possible consequences of the damage caused by the sanctions imposed for violation of the Russian legislation; changes in the efficiency of budget funds caused by the budgetary risk.

For the "probability" criterion recommended for assessing the risks, the Ministry of Finance of the Russian Federation proposes to form scoring scales where the risk level ranges from 0 to 1. In turn, the "consequences" criterion assumes the assignment of a low, moderate, high or very high level to a risk.

Based on the methodology for budgetary risks assessment recommended by the Ministry of Finance of Russia, it is the constituent entity of the Russian Federation that identifies and assesses budgetary risks. The key difference between the methods used by different entities is the name of the scales for "probability" criterion (Table 3) and the different number of risk factors (in the Table 4 they are denoted as P_1 … P_2.

Table 3. Comparison of methods used for assessing budgetary risks by "probability" criterion

Document	"Probability" criterion			"Consequences" criterion
	0-20% 20-40% 40-60% 60-80% 80-100%	Low Medium High Very high	Improbable Hardly probable Medium probability Probable Expected	Low Medium High Very High
The order of Russian Ministry of Finance no.356	+			+
The decision of Rostov region government no.889		+		+
The order of Ministry of Labor and Social Development of Adygeya republic no.41	+		+	+
Order of the State Financial Control Committee of Leningrad region No.10	+		+	+
The order of Ministry of Finance of Ryazan region no.269	+			+

Different designations of budget risk level cause inconsistency in their interpretation. Moreover, in the decision of the Rostov region government, four risk levels correspond to five evaluation scales, which seems to be incorrect.

Table 4. Comparison of approaches to budget risks assessment applied in the Russian Federation

Structure of methodology of budget risk assessment	Order of Russian Ministry of Finance no. 356	Order of Russian Ministry of Finance no. 383	Rostov region (Decree of the Government of Rostov region, Dec 31, 2013 No. 889)	Adygeya Republic (Order of Ministry of Labor and Social Development of Republic of Adygea, Feb 29, 2016 no. 41)	Leningrad Region (Order of State Financial Control Committee of Leningrad Region, June 16, 2015, no. 10)	Ryazan Region (Order of Finance Ministry of Finance of Ryazan Region, Dec 9, 2014 no. 269)
Budgetary procedure			+	+	+	+
Event		+		+	+	+
Operation			+	+	+	+
Types of budget risks		+				+
Risk factors:						
P_1	+			+	+	+
P_2	+			+	+	+
P_3	+			+	+	
P_4	+		factors	+	+	+
P_5	+			+	+	+
P_6	+			+	+	+
P_7	+			+	+	+
P_8	+			+	+	
Formula for calculating the risk exposure		+				
Level of the risk		+				
"Probability" criterion	+		+	+	+	+
"Consequences" criterion	+		+	+	+	+

2. Discussion

In order to reconsiliate the discrepancies indicated in Table 3, we consider it useful to clarify the provisions of the Order of Russian Ministry of Finance No. 356 regarding the specification of budgetary risks level by "probability" criterion. In particular, we presented the clause 30 of the Order in tabular form (Table 5).

Table 5. Proposals for clarification of paragraph 30 of Order of the Ministry of Finance of Russian Federation No. 356 "On Approval of the Methodological Recommendations for the Implementation of Internal Financial Control"

Current version	Proposed changes
Every budgetary risk… Level by "probability" criterion - between 0 and 20%, between 20 and 40%, between 40 and 60%, between 60 to 80%, between 80 to 100%.	Every budgetary risk… Level by "probability" criterion - between 0 and 20% - improbable, between 20 and 40% - hardly probable, between 40 and 60% - medium probability, between 60 and 80% - probable, between 80 and 100% - expected.

Besides, the clause 30 should be supplemented with a scale of assessment by "Consequences" criterion. It is also necessary to modify the Clause 32 accordingly. The Order of the Russian Ministry of Finance No. 356 "Matrix of budgetary risk assessment".

There is no substantial difference between elements of risk assessment methodologies approved in the Rostov region, the Republic of Adygeya, Ryazan and Leningrad regions and those contained in the Order of the Russian Ministry of Finance no. 356 (The constituent entities of the Russian Federation were chosen arbitrarily without any selection criteria).

However, when reviewing the reports on the budgetary risks assessment of the above-mentioned regions, it was found that the constituent entities of the Russian Federation do not submit calculations by the "probability" and "consequences" criteria, but only determine a certain level of risk (Frumina 2016). For example, the report on the budgetary risks assessment in the Rostov region contains only a table with marked columns, without an appropriate confirmation. In the report on assessing the budgetary risks of the Leningrad Region, the following arguments are presented as a justification for the risk level definition: "We consider that the level of risk is low. By criterion "Probability" it is unlikely, by the criterion "Consequences" it is Moderate ..." It seems that these arguments are insufficient to justify the level of budgetary risk and need a clarification, in particular, with regard to each risk

measuring and analyzing its causes. As an example, we propose to analyze the report on the assessment of budgetary risks as follows (Table 6).

Table 6. The recommended form of report on the assessment of budget risks by constituent entity of the Russian Federation

Budgetary procedure 1	Risk 1	The cause of risk 1	Formula for calculation of risk probability	Risk extent by "Probability" criterion	Risk level by "Probability" criterion	Formula for calculation of risk consequences	Risk extent by "consequences" criterion	Risk level by "consequences" criterion
	…	…						
	Risk n	The cause of risk n						
Budgetary procedure *n*	Risk 1	The cause of risk 1	Formula for calculation of risk probability	Risk extent by "Probability" criterion	Risk level by "Probability" criterion	Formula for calculation of risk consequences	Risk extent by "consequences" criterion	Risk level by "consequences" criterion
	…	…						
	Risk *n*	The cause of risk *n*						

Conclusion

Our proposals on the assessment of budgetary risks are of an advisory nature and can be used by the constituent entities of the Russian Federation in the field of financial control. At the same time, the proposed methodology refers only to budgetary risks (non-compliance with budget legislation and anti-corruption legislation, failure to comply with the principle of the efficiency of budget funds and to meet target financial management quality indicators) assessed as a result of internal financial control by the entities listed in Clause 1 of the Order of the Russian Ministry of Finance No. 356 and cannot be used to analyze the budgetary risks associated with losses of budget revenues caused by the changing geopolitical situation, the world economic environment, a decrease in oil prices, *etc*.

Our study revealed that there is no common approach to budget risks assessment in our national practice; in other words, their uniform classification and definition have not been worked out; the methods used to assess the budgetary risks are not ordered, they are not fixed in normative legal documents and, accordingly, cannot be used in the practice of the constituent entities of the Russian Federation. Thus, the application of a scientifically grounded methodology for assessing and identifying budgetary risks, taking into account the prevailing domestic and foreign practices, will allow to avoid timely identified and prevented threats, as well as reduce the unexpected budgetary expenses over the long-term.

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Ministry of Education and Science of the Russian Federation, Federal Service for Supervision in Education and Science of 10 April 2015 No. 499 Order of the Ministry of Education and Science of the Russian Federation, Federal Service for Supervision in Education and Science of 10 April 2015 No. 499 "On Documents for the Implementation of Internal Financial Control in the Federal Service for Supervision in Education and Science" (no longer valid).

*** Order of the Ministry of Finance of the Russian Federation of October 19, 2011 No. 383 "On the procedure for the implementation of operational monitoring of financial management in the Ministry of Finance of the Russian Federation".

***Order of the Ministry of Finance of the Russian Federation of September 7, 2016 No. 356 "On Approval of Methodological Recommendations for the Implementation of Internal Financial Control".

*** Order of the Ministry of Finance of the Ryazan Region of December 9, 2014 No. 269 "On approval of the procedure for the implementation of internal financial control by the Ministry of Finance of the Ryazan Region".

*** Order of the State Financial Control Committee of the Leningrad Region of June 16, 2015, No. 10 "On Approving Methodological Recommendations for Calculating the Level of Budgetary Risks of Internal Budget Procedures at the Implementation of Internal Financial Control".

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Ownership Structure and Corporate Social Responsibility: A Case of Mining Firms Listed on Indonesian Stock Exchange

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Abstract:

Today, corporate social responsibility (CSR) goes far past the old altruism of the past giving cash to great purposes at the end of the budgetary year. Organizations acknowledge environment around them by participating in their nearby communities. Not only they concern on the quality and uniqueness of their brand names but also on how well they connect to the world. There are many factors which are being studied to the detriment of the corproate social responsibility in current study using panel data we are studying the impact of corporate governance. On corporate social responsibility. However, from the prior findings, the most important determinant of audit fee is corporate governance. So, the prime objective of the current study is to explore the link between Corporate governance mechanism (board size, board composition, board meeting) and corporate social responsibility. Data of 6 years (2011-2016) is collected from the firm's audited account. The findings of the study have shown a strong link between corporate governance and audit fee. This study will be helpful for the students, auditors, policymakers, and researchers in understanding the impact of corporate governance and audit fee.

Keywords: corporate governance; corporate social responsibility; Indonesia; non-financial firm

JEL Classification: G30

Introduction

Until the late twentieth century, businesses were considered as socially responsible where they obeyed the regulations or laws of the land and met the basic needs of their employees and the host community. Everything began in the United States of America in the twentieth century as it became a global phenomenon when corporate organizations in developed countries adopted it as a marketing tool to win customers. How socially responsible corporation is, solely depends on the way and manner the principal actors go about its governance. Excellent corporate governance is the glue that holds an intelligent business practice and guarantees positive working environment management, natural stewardship, community engagements and strong financial performance, which help in restoring certainty and promoting economic growth (Oelze, Hoejmose, Habisch 2016).

Today, corporate social responsibility (CSR) goes far past the old altruism of the past giving cash to great purposes at the end of the budgetary year. Organizations acknowledge environment around them by participating in their nearby communities. Not only they concern about the quality and uniqueness of their brand names but also on how well they connect to the world (Clarke 1998). Earlier Bowen (1953) and recently Low (2016) and Onuoha, *et al.* (2017) note that the objective of corporate social responsibility is to get knowledge regarding the organization's activity to stakeholders and support a positive effect through its activities, which push open interest, by empowering group development and improvement. There is great attention on the mining industry effects on the communities in Indonesia because petroleum-marketing companies are causing hazards emission and influence earth's climate, thereby causing global warming. Thus, many researchers and the general public are interested in knowing the exact contribution of petroleum marketing companies to host communities in the form of corporate social responsibility.

Understandably, investors in the company want clear governance rules around the sustainability of its projects. Numerous organizations have looked for the capacity to react to open responsibility requests exterior a coupling legal framework. A fundamental reshaping of company's core value and the ways in which they conduct business especially in areas outside the reach of the United States and European regulations have begun to transform political and social relationships among major international companies. The people whose resources they extract, the individuals whose area they work on and the civil society frequently remark on the exercises of these marketing organizations such as selling such product at an unreasonable price. Since 1990's, many companies have engaged in corporate social responsibility, internalizing, externalities and social issues. This conduct appears to clash with the meaning of corporate governance (CG) as "the courses in which the suppliers of money to companies guarantee themselves of getting profit for their investment" (Shleifer and Vishny 1997, Hsu and Wen 2015, Azam *et al.* 2016).

Consequently, the field of business system and practice is changing into a standout amongst the most dynamic and testing corporate pioneers are confronting conceivably a standout amongst the most paramount elements for forming the face of reality. Corporate governance covers all aspect of corporate social responsibility and is about the way business conducts itself in an ethical way. It also includes their consciousness of all stakeholders. The extent of this study is constrained to how powerful corporate governance mechanisms are on corporate social responsibility disclosure in the Indonesian mining companies, coating a time of five (5) years from 2011 to 2016. The period under study was utilized with an aspect of evaluating the level at which these organizations as of previous years discharge their commitment disclosure (*i.e*. corporate social responsibility) to their host groups.

1. Literature review

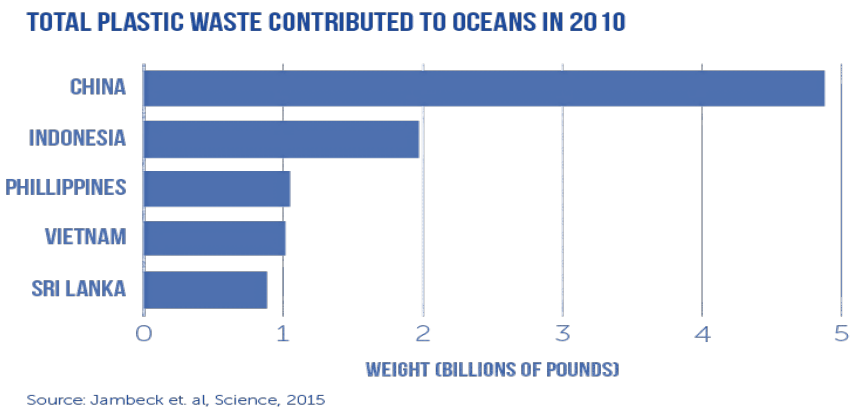
Corporate social responsibility is an interesting topic within the context of academic literature (Batool, Butt and Niazi 2016, Razak 2018). Even though there is no single accepted definition of CSR, the notion of corporate social responsibility is related to such complex issues as environmental protection, health, and safety at work, production of qualitative and safe products, corporate philanthropic activities, and relationships with suppliers

In view of this, corporate social responsibility has been variously defined. Koirala (2016) sees from the present day dominant conception of corporate social responsibility to imply that companies voluntarily integrate social and environmental concern in their relations and interactions with stakeholders. In addition, businesses should act morally and help financial advancement as part of their work processes. Businesses are expected to enhance the personal satisfaction of the workforce, their families and neighborhood group and people on the loose.

As discussed earlier, the idea of social responsibility or social responsiveness is for business to respect host community and to attend various stakeholders needs (Batool, Butt and Niazi 2016, Haseeb and Azam 2015, Kashif *et al.* 2018). The idea has been in the present since the start of humankind (Anderson 1989). A comprehensive approach to contemporary society responsibility came in 1953 with the publication of Bowen (1953), in which he described the social the responsibility of a businessman as “the responsibility of businessman to pursue policies make decisions, or follow the same line action that is desirable in terms of objectives and the value in the society”. Moreover, CSR is practiced by business down to the 21st century where corporate managers deemed it is not only necessary to donate generously to the society but also to produce a safe product to the customers.

The reasons for companies undertaking corporate social responsibility have been considered from a number of viewpoints. Pantamee (2014) categorized company’s activities as: Action with a direct bearing on the nature of the business undertaking, that includes investment in the reduction of toxic emission by a heavy industrial equipment; magnanimous gifts and sponsorship which bear no immediate connection to the organization's business, and the apparent profits to the beneficiaries. However, adopting a different perspective leads to alternative reason. Yaftin *et al.* (2014) examined corporate social responsibility from the viewpoint of social and political studies. This viewpoint also leads to the possibility to examine corporate social responsibility, as earlier on an attempt to legitimize corporate activity or as part of the corporate sector’s continuity the exercise of power. In reality, various works have considered authenticity as a key the explanation behind undertaking corporate social conduct, and likewise then utilizing that action as the manifestation of undertaking corporate social conduct or effect (Boyd, McGarry and Clarke 2016). An opposite view to this is situated out by Pantamee (2014) about general public gift authenticity and force of business. In the long run, the individuals who do not utilize control as part of the way that public opinion consider dependable will have a tendency to lose it. From a reasonable perspective, prior studies which observed that there is probably in some example, corporate social responsibility is simply publicizing toward oneself. The CSR issues in Indonesia are severed and it's on the second number in region as shown in Figure 1.

Figure 1. Total plastic waste contributed to oceans in 2010



Source: Kambeck *et al*. Science, 2015

From a corporate perspective, Kengatharan (2018) finds that the main reasons for companies undertaking contribution activities were: corporate citizenship, business environment security and enhance environment's field in which they live and work together, representative profit or acknowledge profit for organization businesses, clearly shows that commitment and involvement of directors or the interest in supporting and enhancing corporate social responsibility help in deriving business benefits, customer loyalty, improve and boost staff morale, help in gaining the approval and support of stakeholders and to obtain social legitimacy and exercise power in such society.

Previous studies utilized Kinder, Lindenberg, and Domini (KLD) now called Environmental Social Governance (ESG) index, self-administered questionnaires, donations, dummy *i.e*. whether the company is in the list of ethical or responsible companies, number of sentences disclosing CSR in the firm financial statement, number of words disclosing CSR in the firm financial statement, reputation index of Fortune and the announcement of CSR (Montecchia *et al.* 2016, Hadi *et al.* 2016). The most common measurement approaches are ESG (formerly KLD) and fortune index. The ESG record incorporates CSR data about group relations, worker, nature's domain, item, and training ladies and minorities, military contracts, atomic force involvement (Hackston and Milne 1996, Simmons 2016). Stanwick and Stanwick considered this record as the best one accessible thinking of it as a separated approach, despite the fact that they perceive few limitations.

The Fortune list measures the ten more prominent organizations in every movement part as per eight properties associated with notoriety, management quality, index quality, advancement, responsibilities with company environment's domain (Suryanto 2014) Wood (1991) prosperity record is sketchy because it is focused on assumptions of senior executives, directors, and money related investigators, being management class the most valorized trait rather than qualities more associated with social performance.

In this research, to develop a CSR list, the study adopts Haniffa and Cooke (2005) measure of corporate social responsibility disclosure using content analysis. Content analysis is a measurement of CSRD by codifying the content (or text) of a bit of writing into various categories depending on the criteria selected (Wood 1991). An important component of content analysis is the determination and development of programs into which content units might be arranged. The items and categories were drawn from previous studies in the field (Haniffa and Cooke 2005, Haniffa and Cooke 2002, Dias, Rodrigues and Craig 2017) and applied to Indonesian petroleum industry.

Company size is an essential determinant of CSR practice. Company influence is discovered to be a primary indicator of the relationship between higher commitments and esteem degree of CSR disclosure (Melo and Morgado 2011, Chatzoglou *et al.* 2017). Hackston and Milne (1996) broke down 50 yearly reports for 1992 in New Zealand and revealed a positive relationship exist in the focus of size and industry. To this end, benefit and state of reporting had no effect on the level of CSR disclosure.

Corporate governance is concerned with routes in which all groups interested in the the wellbeing of the firm (the stakeholders) endeavor to guarantee that directors and different insiders take measures or embrace mechanisms that can protect the enthusiasm of the stakeholders. Such measures are required by the partition of proprietorship from management. Corporate governance is characterized by Ford, Austin, and Ramsay (1999) as being about the management of business endeavors composed in corporate structure, and the mechanisms by which directors are regulated. In the same vein, Larcker, Richardson, and Tuna (2007) and Cho and Chun (2016) view it as the set of tools that affect the choices made by supervisors when there is a partition of proprietorship and control. A typical subject in these definitions is that they concentrate on the activities of directors. A more extensive

explanation is that corporate governance manages routes in which suppliers of the fund to enterprises guarantee themselves of getting profit for their speculation.

Melo and Morgado (2011) saw corporate governance as the set of structures, procedures, societies, and frameworks through which targets are situated, accomplishing these goals, observing execution are resolved, and companies are guided and controlled. The sort of corporate governance set up and polished by an association will focus the level to which such business will discharge its corporate social responsibility to the host group adequately. Since the board of directors is in charge of making a key arrangement of the business as well as saddled with the responsibility, it is expected to see the development and advancement of the business**.**

In the modern, globalized, interconnected and competitive world, the way social, environment and corporate governance issues are overseen is part of organizations' general administration quality which is required to be effective from a societal point of view. The duties and responsibilities placed on the Indonesian mining -marketing companies have increased drastically in the last couple of years.

The more these companies become economic forces prominently the more society expects the companies to be socially responsible. In essence, a responsible corporate entity, which is properly governed, takes into consideration all direct and indirect external effects of its operations. Companies that perform better have the better choice of increasing shareholder value by overseeing risks, suspecting administrative activity or getting to new markets while in the meantime helping the reasonable improvement of the social orders in which they work. "Which regards wins" which takes a glance at the environment social and governance issue that can have a material effect on corporate monetary performance is one of the numerous reports examining the relationship between social, natural and governance practice.

Corporate Governance as a code of best practice by organizations may come up short where the stakeholders in the general public assault it along two lines. There is discrimination that the straightforward benefits augmentation may be awful for people, in view of some negative by-item on environment's grass, human rights, specialists' condition and different components. There is also acknowledgment that some of a piece of the corporate mechanisms have not been after essential controls and illicitly removed assets from stakeholders. This assault emerges because of the disappointment of both corporate governance and corporate social responsibility. A powerful corporate governance the framework would reduce unlawful actions against stakeholders. A viable socially the dependable corporate code would anticipate movements that are lawful however unseemly, due to their results on a percentage of the shareholders. Both corporate governance and corporate social responsibility fortifies one another.

The number of directors is a vital element in deciding the viability of the board. There are conflicting plans regarding the proper or ideal size of the board of directors in an organization. At the point when the board is too enormous, singular directors may feel obliged about heartily partaking in board decisions with little feeling of particular responsibility. At the point when the board is excessively small, the directors will be unable to settle on compelling choices and may confront some level of troubles in working during a crisis. Lincka, Nettera, and Yang (2008) find that the usual board size is eight persons. They recommend that the cutoff of board size be around eight directors as having more directors is difficult to make decisions in meeting and restrain the board execution. Most analysts find that bigger firms have a tendency to have more directors. It could be clarified by the need for these bigger companies to keep up more contacts with the business environment. A bigger board would bring in more prominent directors and access to assets as board monitoring increases, the nature of management decisions will be upgraded (Villiers, Naiker and Staden 2011, Cahan *et al*. 2016).

In an alternative measurement, Alsaeed (2006) focus on the stockholder theory. The stakeholders' theory emerged in presumptions of CSR. The legitimacy theory assumes that the use of CSR is more extensive because it will lessen the stream of profits to firm stakeholders. Jensen and Meckling (1976) pushed the accommodate clash in these two perspectives; they expressed that in the long run, no organization can expand the estimation of the organization. Therefore, firms overlook the interests of stakeholders. As per the perspectives of stakeholder theory, Imam and Malik (2007) find the organization's relationship with internal and external stakeholders, in the long run, will dictate the estimation of the organization.

The bigger company is more differentiated and more equipped to expand their money stream than smaller organizations (Michelon and Parbonetti 2010, Roy and Ghosh 2017, Razake 2018). Therefore, organizations have the proficiency to manage their advances and in this way face lower risks. Cheng (2008) and give confirm that the expensive company is more prone to have better organization CSR. Bigger organizations can without much of stretch access investments (Bear *et al.* 2010). Likewise, bigger organizations can expand entrepreneurs' certainty in protecting speculators' diversions (Villiers *et al.* 2011) and secure various enhancements good to go. Besides,

those organizations can pull in great hopefuls to sit on their board and keep up steady money stream. In addition, the vast companies are less inclined to be influenced by progressions in the business environment's field.

The firm age which is measured in this study by a number of years the firm has since listed in the Indonesian stock exchange, the previous empirical result shows that company age has a positive and strong effect on the corporate social responsibility disclosure. This affirms that as a control variable, the older the company as listed in NSE, the more prominent the corporate social responsibility disclosure, development, and survival. This may bring about greater support for shares of such organizations, which finally improves the earnings quality. Moreover, the older organizations sometime during their development embark on corporate social responsibility at less cost compared to younger organizations quoted in NSE. As a result, older organizations are able to upgrade their compliance capability and financial report quality than younger organizations. This is because the older

2. Data and methodology

Data source

To investigate the link between corporate governance and audit fee the day of variables is punched from the annual reports of companies. Data of four fiscal years (2013-2016) is collected from annual reports of the company. We targeted the entire population of listed firms. However, because of unavailability of data and resource issue, the final sample comprised of 90 firms.

Methodology

We are using the panel data methodology. This means a multi-dimensional data frequency involving measurements over the period. Panel data involves observations on given variables over multiple periods of time for different/common firms or entities. It is mostly seen as an efficient method of analysis that handles econometrics data. According to Asteriou and Hall (2007) panel data analysis becomes widespread among researchers due to its ability to include a set of data for *N* number of a cross-section of firms and *T* time period.

In panel analysis, when cross-sectional data are pooled into time series, it may result in differences among the different cross-sectional observation, which is captured using dummy variables. The use of dummy to account for the variations leads to estimation of either fixed or random effect models. So we are using pooled OLS in our study.

Model specification

To measure the impact of corporate governance on audit pricing we have used the models, which are given below:

$$CSR_{it} = \alpha_0 + \alpha_1 BS_{it} + \alpha_2 BC_{it} + \alpha_3 CEO_{it} + \alpha_4 AGE_{it} + \alpha_5 SIZE_{it} + \alpha_6 LEV_{it} + \alpha_7 PROF_{it} + \varepsilon_{it} \quad (1)$$

$$CSR_{it} = \alpha_0 + \alpha_1 BS_{it} + \alpha_2 BC_{it} + \alpha_3 CEO_{it} + \alpha_4 BM_{it} + \alpha_5 AGE_{it} + \alpha_6 SIZE_{it} + \alpha_7 LEV_{it} + \alpha_8 PROF_{it} + \varepsilon_{it} \quad (2)$$

where: for each company (*i*) and each year (*t*), CSR represents THE Corporate social responsibility disclosure length for every entity over the time period BS is board size which is measured by the total number of directors in a board; BC is the ratio of total number of non-executive directors to total directors; CEO Duality is a dummy variable which gives zero if CEO and chairman are a same individual 0 otherwise and BM is the frequency of board meeting in the single accounting year.

3. Results and Discussion

Pre-test specifications

The research analysis carried out Breusch and Pegan Lagrangian multiplier (LM) test for the purpose of selecting the most fitting model between random effect and pooled OLS. The results of the test var (u) = 0, Chaibar 2(01) = 0.00 and Probability> Chaibar2=1.00. The results of *Breusch and Pagan Lagrangian multiplier (LM) test* shows that, the probability value of Breusch and Pagan lagrangian multiplier test (1.0000) is not significant. This leads to non-rejection of the null hypothesis, which means that there is no entity effect in the model. Thus, the test perfectly suggests that pooled OLS is the most efficient and appropriate.

Correlation analysis

Table 1 shows result on the bivariate statistical correlation among all the relevant variables. The correlation table shows that corporate social responsibility is NEGATIVELY correlated with CEO at (p< 0.010) and also with the board meeting. Whereas it is positively correlated with BSIZE at (p< 0.010), and board independence at (p<0.005). The correlation among other independent is moderately okay.

Table1. Correlation Analysis

	CSR	BS	BI	CEOD	BM	AGE	SIZE	PROF	LEV
CSR	1								
BS	0.5079*	1							
BI	0.2766**	0.2354*	1						
CEOD	-0.3027	-0.1127	0.186	1					
BM	-0.0037**	0.1059**	-0.0117*	-0.2914*	1				
AGE	-0.0033**	0.2043*	-0.0711*	-0.1492*	1	1			
SIZE	0.2454***	0.1442**	-0.2745*	-0.001*	0.0100	-0.1200	1		
PROF	-0.2343**	0.1342*	-0.2341*	0.0213**	0.1120*	-0.3110	0.3451*	1	
LEV	0.3132*	0.1432*	0.1234*	0.0312**	0.3110*	0.1120	0.1345*	0.2311	1

4. Results and discussion

To achieve the research objectives, we have used a widely used statistical technique known as the ordinary least square. The findings of the study indicate that board independence, board size, institutional ownership, size and earnings before interest and tax are in positive whereas the CEO duality, managerial ownership, ownership concentration and leverage is in negative relation with dividend payout ratio.

Table 2 shows that board size, board composition, board meeting, risk management committee size, risk management committee composition, risk management committee meeting, directors' ownership, blockholders' ownership, profitability, leverage, firm size and firm age jointly explain 81% variations in corporate social responsibility disclosure length. The model used in this study is adequate and significance at 1% level of significance. In addition, the independent variable in relation to corporate social responsibility disclosure shows that, board size is negative and not significantly related to corporate social responsibility disclosure. The board composition has a significant positive relationship with corporate social responsibility disclosure at 1% level of significance. Therefore, 1 unit increases in the independent director on the board lead to an increase in corporate social responsibility disclosure by 210 words. While board meeting reveals a non-significant negative relationship with corporate social responsibility disclosure.

From the control variables aspect, firm age is statistically significant though negatively related to corporate social responsibility disclosure at 1% level of significance. The result implies that 1 unit increase in age of the companies will lead to decrease in CSRD length by 2.6689% while leverage, profitability and firm age are positively related to corporate social responsibility disclosure though statistically not significant.

Table 2. OLS Regression

Dependent Variable:CSR	(1)	(2)
BS	-0.923***	031***
	(0.029)	(0.029)
BC	0.258***	0.299***
	(0.018)	(0.020)
$CEOD$	0.277**	0.182**
	(0.003)	(0.003)
BM		-0.600***
		(0.062)
AGE	-1.148**	-0.882**
	(0.226)	(0.229)
$SIZE$	0.676*	0.624*
	(0.177)	(0.170)
$PROF$	0.784	0.684
	(0.026)	(0.026)
$LEVERGAE$	0.222	0.222
	(0.006)	(0.006)
R^2	0.659	0.661
Adjusted R^2	0.747	0.746
F-statistic	21.553	19.334
Prob.(*F* – Statistics)	0.000	0.000
S.E of Regression.	0.089	0.090
Number of firms	25	25

Note: *,**,*** denote statistical significance the 0.10, 0.05 and 0.01 level respectively

Conclusion

Corporate governance mechanism (board size, board composition, board meeting,) and control variables including profitability, leverage, firm size and firm age have a very strong explanatory power of 80.8% on the variations in corporate social responsibility disclosure.

While other variables not captured in this study explain about 19.2% of the variability in corporate social responsibility disclosure. It can also be concluded that board size and board meeting, have a negative but not significant effect on corporate social responsibility disclosure. However, the director's ownership, leverage, firm size, and profitability are found with a positive but not significant relationship with corporate social responsibility disclosure. Whereas firm age is in negative relation.

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Influence Analysis of Corporate Social Responsibility, Default Risk and Conservatisme on Earning Response Coefficient through Earning Management in Stockholding Manufacturing Company Joined in Indonesia Sharia Stock Index

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Abstract:

This study aims to examine and analyze the influence of direct and indirect influence of Corporate Social Responsibility, Default Risk, Conservatism through Earnings Management on Earnings Response Coefficient. The sample used is a manufacturing company whose shares are incorporated in ISSI in BEI (Indonesia Stock Exchange) during the period 2011-2015, it takes 170 samples in total. The sampling technique is saturated sample method where the sample research covers entire population. The analytical model used in this study is Structural Equation Modeling. This study found that Corporate Social Responsibility measured by economic and environmental factors have a negative and significant effect on Earnings Response Coefficient while CSR measured by social factor have positive and significant influence to ERC. Default risk as measured by debt to equity ratio and debt to asset ratio have negative and significant effect to Earnings Response Coefficient. Conservatism measured by earning/stock return relation and accrual has a positive and significant effect on Earnings Response Coefficient. Corporate Social Responsibility as measured by economic, environmental and social impact on Earning Response Coefficient through Earning Management at a manufacturing company listed in ISSI on the Indonesia Stock Exchange. Default Risk as measured by DER and DAR have influence on Earning Response Coefficient through Earning Management at a manufacturing company listed in ISSI on the Indonesia Stock Exchange. Conservatism measured by ESRR and accrual has influence on Earning Response Coefficient through Earning Management at a manufacturing company listed in ISSI on the Indonesia Stock Exchange.

Keywords: corporate social responsibility; default risk; conservatism; earning management; earning response coefficient.

JEL Clasiffication: D81 ; F34 ; G32 ; M14

Introduction

The assessment of the reported earnings quality can be seen from the level of profitability measured by using Earning Response Coefficient which is a measurement of information content in the profit. Profits which are reported in the financial statements will influence investors' reactions differently. The change of stock return of company will indicate market reaction where there is significant difference between actual return with expected return at the time of announcement (Suwardjono 2005, Lutfi *et al*. 2017). ERC can show the information content of earnings, which explains and identifies differences in market response to market announcements (Scott 2009). The amount of relationship between earnings and stock return is called earnings response coefficient.

In terms of market response to accounting earnings there are differences of opinion. Easton and Zmijewski, Khotari (1989) stated that the market response to accounting earnings for each company can vary and not constant depending on the type of company and the time span. While on the other hand, it is stated that the coefficient of response of accounting profit is relatively unchanged and constant (in constant), in other words, earnings response coefficient (ERC) is relatively stable (Beaver *et al*. 1980, Lipe 1990, Kormedi and Lipe 1987). Conservative accounting to date still has an important role in accounting practice because this principle will affect the valuation in accounting (Lasdi 2008 and Sadalia *et al*. 2017). Althrough in reality there are pros and cons around its application. Critics of conservative accounting argue that this principle causes the financial statements to be biased so that it can not serve as a tool by users of financial statements to evaluate corporate risk (Sari 2004).

The low information content of profits at companies in Indonesia raises the need for competitor information financial statements that is information outside the financial statements (Muda and Dharsuky 2015, Lubis *et al*. 2016 and Nurzaimah *et al*. 2016). The research used information about corporate social responsibility. It is also driven by the number of environmental cases, the existence of regulations that require limited liability companies to carry out corporate social responsibility activities, the issuance of ISO 26000 which makes corporate social

responsibility as one of the important things that is considered by all parties and has been widely applied as part of the company's activities. There are many previous studies that conduct research on corporate social responsibility but the results are still inconsistent, including Kartadjumena (2010) who examined the influence of voluntary disclosure of financial information and corporate social responsibility to earnings response coefficient. The result shows that corporate social responsibility has no significant effect on earnings response coefficient, but partially voluntary disclosure of financial information has positive effect on earnings response coefficient, otherwise corporate social responsibility negatively affects earning response coefficient.

Disclosure of CSR reports conducted by companies is expected to gain social legitimacy from the public. It is with this social legitimacy that will enhance the company's reputation so as to raise profitability (Dewi *et al*. 2014 and Muda *et al*. 2018). With the increase in profitability it will attract the attention of investors, because basically the attention of investors focused on profits and stock prices which is the implication of the company's performance. Information on CSR is one of the information that serve as input in making investment decisions (Sayekti and Wondabio 2007, Dwijayanti 2013, Hidayanti and Murni 2009, Pradibta and Purwaningsih 2012, Muda 2017, Muda 2018, Kesuma *et al*. 2018a and 2018b). In fulfilling as well as expanding the company's operational needs, virtually no company can run on its own capital, thus a company seeks additional funds either through credit loans by banks, financial institutions, and various international creditors (Surya and Yustiavanda 2008, Syahyunan *et al*. 2017, Ferine *et al*. 2017 and Muda *et al*. 2017). By obtaining external financing, a corporation may be able to grow faster than simply relying on their own capital. However, too much debt can also hinder the development of the company which in turn can create a shareholder's unwillingness to keep investing (Brigham and Houston 2006). Credit risk is related to the probability of a company experiencing a default, the ability to fulfill its obligations, and losses incurred if conditions of default occur (Muharam 2012). According to research conducted Muharam (2012), Some of the determinants of credit risk is the fundamental performance of debtors consisting of cash flow, profitability, leverage level and firm size. Macroeconomic performance and industrial performance, as well as past performance (lag) also greatly affect credit risk (Tarmizi *et al*. 2016, Sirojuzilam *et al*. 2016, Muda and Nurlina 2018a and 2018b, Muda 2018 and Muda *et al*. 2018). This research is conducted on companies which belong to sharia and listed in Indonesia Stock Exchange, the reason is because of the increasingly promising sharia stocks and several criteria that must be fulfilled by a company's stock. Islam has the same value for other religions in the principles and norms that underlie all aspects of human life including in business activities (Ebrahim and Joo 2001 and Pohan *et al*. 2018). The Islamic principles emphasize the need for socio-economic justice and the balance between the material and spiritual needs of all human beings.

1. Literature review

Theory of legitimacy

Legitimacy is a condition in which the value system is an entity equal to the value system of the social system of society in which an entity becomes part of society (Lang and Lundholm 1993). The birth of theory of legitimation is based on social contract between society and company in using economic source. The realization of legitimacy in the business world can be the reporting of social activities in the form of corporate social responsibility. One of the company's expectations in the implementation of corporate social responsibility is to gain social legitimacy and maximize its financial strength in the long run.

Corporate social responsibility

CSR is defined as the responsibility of an organization for the impacts of decisions and activities undertaken in society and the environment, through transparency and ethical behavior in the form of:

- contributions to sustainable development, including health and welfare;
- meeting stakeholder expectations;
- in accordance with applicable law and in line with internationally accepted norms of behavior;
- integrated with the whole organization and its implementation with the parties concerned.

The definition of CSR by the World Bank in Public Policy for Corporate Social Responsibility 2003 is "the commitment of business to contribute to sustainable economic development, working with employees, theirfamilies, the local community and society at large to improve quality of life, inways that are both good for business and good for development".

Based on the definitions above, CSR is done by the company to fulfill its responsibilities to shareholders, government, social environment, community and society. The fulfillment of this social responsibility can be done in various forms in accordance with the interests of the shareholders (Muda *et al*. 2017, Achmad *et al*. 2017,

Sihombing *et al*. 2017, Badaruddin *et al*. 2017, Lubis *et al*. 2017, Muda *et al*. 2018, Muda and Hasibuan 2018 and Muda and Windari 2018). With the implementation of CSR, the company not only strives to meet the needs of shareholders, but also to meet the needs of business continuity in the future. Implementation of CSR activities according to Kotler (2005) can be divided into six categories, namely: cause promotions, cause related marketing, corporate social marketing, corporate philanthropy, community volunteering and socially responsible Business Practice.

Default risk

The research of Vassalou and Xing (2003) using the bond rating as a proxy of debt default risk indicates that if stock returns are adjusted to the variation of risk of debt default around the date of the downgraded bond rating, the short term abnormal return will be lost. Risk of debt failure is a specific risk for each company so it has the possibility of affecting the amount of profit and return relationships company stock. According to Palupi (2006), investors as owners of the company will react to any information they receive related to the company. Increased earnings in companies with high debt levels will benefit debt holders. The better the conditions the profit of the company is the more negative the response of shareholders, because the shareholders assume that the profit only benefits the creditor (Etty 2008).

2. Research method

Type of research

This is a qualitative research and according to the characteristics of the problems examined, the study can be classified into causal comparative research.

Type and source of data

The type of data used in this study is secondary data and has been published by the Indonesia Stock Exchange through ICMD from 2011-2015. The required data are financial statements in accordance with the research variables, namely the activities of *corporate social responsibility, default risk, conservatism, earning management, earning response coefficient.*

Population and Sample

Population is a collection of individuals or research objects that have the quality and characteristics which have been selected (Gusnardi *et al*. 2016, Hutagalung *et al*. 2018, Muda *et al*. 2018 and Situmorang *et al*. 2018). Based on the qualities and characteristics that have at least one characteristic equation. The population used in this study are all manufacturing companies that go publicly syariah in ISSI listed on the Indonesia Stock Exchange from 2011 to 2015 which has complete financial statements and published in Indonesia Capital Market Directory (ICMD).

Definition of Operational and Variable Measurement

Table 1. Measurement of Research Variable

Variable	Definition	Parameters	Scala
Corporate Social Responsibility (X_1)	CSR in this definition covers social, environment, and governance		
Economy ($X_{1.1}$)	CSR activities related to the environment	$CSR_E = \frac{\Sigma X_{ij}}{n_j}$	Ratio
Environment ($X_{1.2}$)	CSR activities related to social elements	$CSR_L = \frac{\Sigma X_{ij}}{n_j}$	Ratio
Social ($X_{1.3}$)	CSR activities related to governance	$CSR_S = \frac{\Sigma X_{ij}}{n_j}$	Ratio
Default Risk (X_2)	Default risk is the risk faced by investors or bondholders because the bonds fail to pay. Default Risk in this study is calculated by using Debt to equity ratio and Debt to Asset Ratio. (Cashmere 2010, Sofyan Syafri Harahap 2010, Lukman 2009)		
Debt to Equity Ratio ($X_{2.1}$)	Debt to Equity is the ratio used to assess debt and equity	DER = $\frac{\text{Total debt}}{\text{Total equity}}$	Ratio
Debt to Assets Ratio ($X_{2.2.}$)	Debt to Asset Ratiois the ratio of debt used to measure the ratio of total debt to total assets	DAR = $\frac{\text{Total debt}}{\text{Total assets}}$	Ratio
Conservatism of Accounting (X_3)	Conservatism is measured by earnings/stock return relation measure, earning/accrual measures, net asset measures		

Variable	Definition	Parameters	Scala
Earning/Stock return relation ($X_{3.1}$)	Changes in asset value at the time the occurrence of changes, either changes in the loss or fixed profit is reported in accordance with the time	$\Delta NI = \alpha 0 + \alpha 1\ \Delta NIt\text{-}1 + \alpha 2\ \Delta NIt\text{-}1 + \alpha 3\ D\Delta NIt\text{-}1\ x;\ \Delta NIt\text{-}1 + \varepsilon t$	Ratio
Accrual ($X_{3.2}$)	Measures conservatism by subtracting income before extraordinary item with operating cash flow and with even depreciation expense	$CONACC_{it} = NI_{it} - CFO_{it}$	Ratio
Net Assets ($X_{3.3}$)	The level of conservatism within the financial statement is the value of the asset understatement and its obligations overstatement	Book to market ratio, companies that implement conservatism report net assets and book to market ratio is lower	Ratio
Earning Management	Earning management is the actions of managers to increase / reduce current reported earnings where managers are responsible without resulting in an increase / decrease in long-term economic profitability		Rasio
Abnormal cash flow operations	Profit manipulation through a cash flow operation that will have a cash flow lower than its normal level	$CFO_t/A_{t-1} = \alpha_0 + \alpha_1(1/\log A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \varepsilon_t$	Ratio
Abnormal production cost	Earnings management through the manipulation of production costs, where the company has higher production costs than normal.	$Prod_t/A_{t-1} = \alpha_0 + \alpha_1(1/\log A_{t-1}) + \beta_1(S_t/A_{t-1}) + \beta_2(\Delta S_t/A_{t-1}) + \beta_3(\Delta S_{t-1}/A_{t-1}) + \varepsilon_t$	Ratio
Abnormal discretionary expenses	Profit manipulation through research and development costs, advertising costs, sales costs, administration and general costs	$Disc_t/A_{t-1} = \alpha_0 + \alpha_1(1/\log A_{t-1}) + \beta(S_{t-1}/A_{t-1}) + \varepsilon_t$	Ratio
Dependent Variable			
Earnings Response Coefficient	A reaction that comes from the company's earnings announcement. This reaction is indicated by the change of stock. The stock return describes investor behavior because of valuable information it gains. earnings response coefficient is measured by slopa coefficients in regression of abnormal returns of shares and unexpected earnings	*Steps*: *a*. Abnormal return: $AR_{it} = R_{it} - RM_{it}$; *b*. Stock return: $R_{it} = \frac{P_{it} - P_{it-1})}{P_{it-1}}$; *c*. Market return; $R_{it} = \frac{(IHSG_{it} - IHSG_{it-1})}{IHSG_{it-1}}$; *d*. Cumulative abnormal Return: $CAR_{it} = \varepsilon AR_{it}$; *e*. Unexpected earnings; $UE_{it} = \frac{(EPS_{it} - EPS_{it-1}}{EPS_{it-1}}$, Earnings response coefficients (ERC); $CAR = \beta_0 + \beta_1\ UE_{it} + e$	Ratio

2.5. Data analysis technique

The partial least square (PLS) approach is distribution free, *i.e.* it does not assume certain distributed data (Yahya *et al*. 2017). With many advantages in the partial least square (PLS), assessing with small samples, not necessarily assuming a certain scale and also for theoretical confirmation (Marhayanie *et al*. 2017, Muda 2017, Sihombing *et al*. 2017 and Erlina *et al*. 2017). The partial least squaremethod (PLS) is a powerful method and considered an alternative model of covariance based SEM.

3. Result and discussion

Measurement model of Corporate Social Responsibility Variable

Table 2. Weight of indicator factor of CSR variable

Indicator	Loading factor	R^2	T statistics
Economy	0.756	0.738	2.255
Environment	0.839	0.468	2.303
Social	0.734	0.365	1.978

Indicator	Loading factor	R^2	T statistics
Composite reliability (CR) = 0.821			
Average Variance Extracted (AVE) = 0.605			

Source: Output Result of SmartPLS (2017).

Based on Table 2 above it can be seen that all the value of factor weight for each indicator is greater than 0.5. The testing was done by examining the t_{count} value compared to the critical value which was 1.96, which resulted that the t_{count} value was greater than the critical value (Lubis *et al*. 2016, Muda *et al*. 2016, Nurlina *et al*. 2017, Hasan *et al*. 2017 and Dalimunthe *et al*. 2017). These data indicate that all three indicators are significant in reflecting Corporate Social Responsibility.

Measurement model of Default Risk Variable

Table 3. Weight of indicator factor of Default Risk Variable

Indicator	Loading factor	R^2	T statistics
Debt to equity ratio	0.985	0.646	3.540
Debt to assets ratio	0.972	0.514	2.075
Composite reliability (CR)= 0.978			
Average Variance Extracted (AVE) = 0.957			

Source: Output Result of SmartPLS (2017).

Based on Table 3 above it can be seen that all the value of factor weight for each indicator is greater than 0.5 (Muda *et al*. 2016, Handoko *et al*. 2017 and Nasir *et al*. 2017). The testing was done by examining the t_{count} value compared to the critical value which was 1.96, which resulted that the t_{count} value was greater than the critical value. These data indicate that both indicators are significant in reflecting the Default Risk variable.

Measurement model of Conservatism Variable

Table 4. Weight of indicator factor of Conservatism Variable

Indicator	Loading factor	R^2	T statistics
Earnings Stock Return Relation	1.000	0.505	127.964
Accrual	1.000	0.596	132.091
Composite reliability (CR)= 1.000			
Average Variance Extracted (AVE) = 0.999			

Source: Output Result of SmartPLS (2017)

Based on Table 4 above it can be seen that all the value of factor weight for each indicator is greater than 0.5 (Muda *et al*. 2018). The testing was done by examining the t_{count} value compared to the critical value which was 1.96, which resulted that the t_{count} value was greater than the critical value. These data indicate that both indicators are significant in reflecting the Conservatism variables.

Measurement model of Earning Management Variable

Table 5. Weight of Indicator Factor of Earning Management Variable

Indicator	Loading factor	R^2	T statistics
Abnormal Cash Flow Operation	0.954	0.510	11.404
Abnormal Production Cost	0.957	0.537	11.350
Composite reliability (CR) = 0.954			
Average Variance Extracted (AVE) = 0.912			

Source: Output Result of SmartPLS (2017)

Based on Table 5 above it can be seen that all the value of factor weight for each indicator is greater than 0.5. The testing was done by examining the t_{count} value compared to the critical value which was 1.96, which resulted that the t_{count} value was greater than the critical value. These data indicate that both indicators are significant in reflecting the Earning Management variables.

Measurement model of Earning Response Coefficient Variable

Table 6. Weight of indicator factor of earning response coefficient variable

Indicator	Loading Factor	Composite Reliability	Variance Extracted
Cumulative Abnormal Return (CAR)	1.000	1.000	1.000

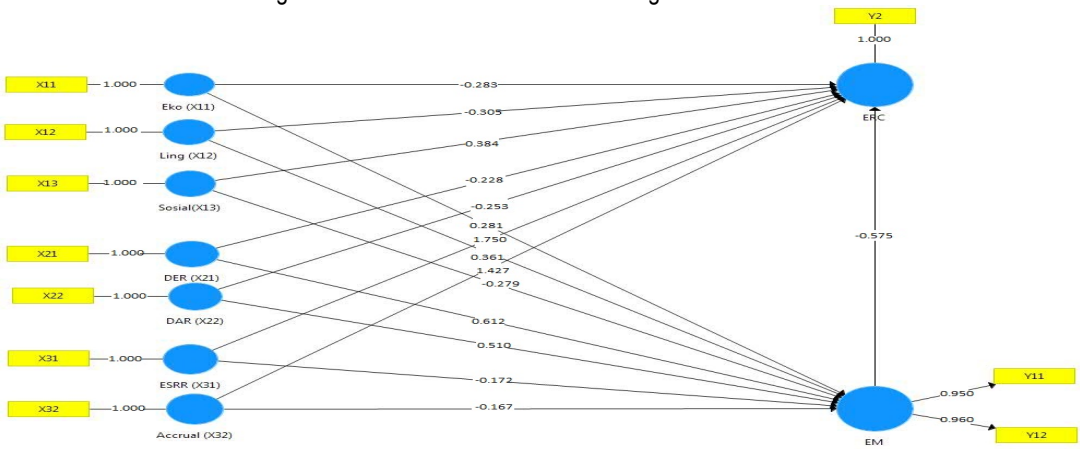
Source: Output Result of SmartPLS (2017)

According to Table 6, the value of factor weight, Composite Reliability (CR) and Average Variance Extracted (AVE) were 1.000 because the variable Earning Response Coefficient was described by one indicator.

Hypothesis testing

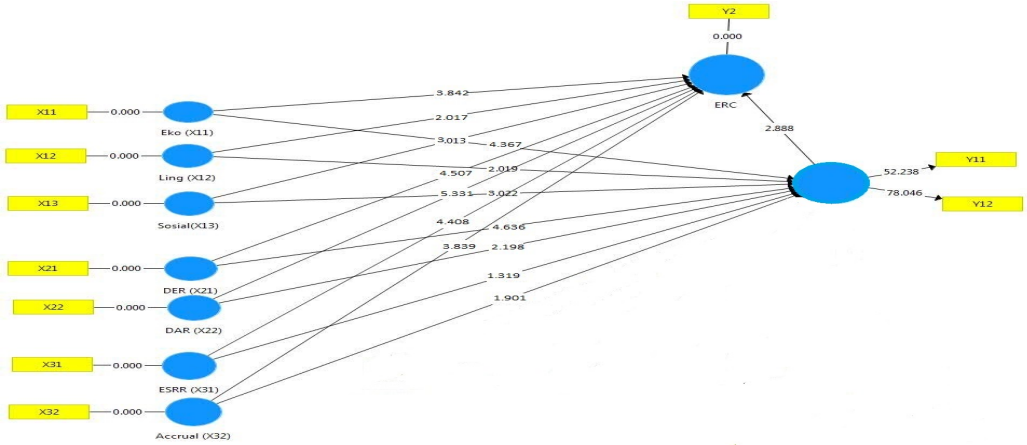
Here are the results of data processing with SmartPLS model PLS Algorithm and t-value model (Bootstrapping).

Figure 1. Line chart of Run SmartPLS Algorithm results



Source: Output Result of SmartPLS (2017)

Figure 2. Line chart of Run SmartPLS Bootstrapping results



Source: Output Result of SmartPLS (2017)

Influence of corporate social responsibility as measured by economic, environmental and social factors on earning response coefficient

Table 7 presents the t_{count} value of Corporate Social Responsibility path as measured by the economic variable on Earning Response Coefficient of 3.842 with Probability value of 0.040. Since the value of t_{count} (3.842) was greater than the $t_{critical}$ (1.96) which was at 5% error rate, when the Corporate Social Responsibility as measured by the economic variable affected the Earning Response Coefficient on companies listed in Indonesia Stock Exchange ISSI with coefficient of -0.283 which has negative sign, then it can be concluded that Corporate Social Responsibiliy as measured by the economy has a negative effect on Earning Response Coefficient. Therefore, the higher the Corporate Social Responsibility which is measured by the economic variable is, the lower the Earning Response Coefficient.

Table 7. Test result of influence of corporate social responsibility as measured by economic, environmental and social factors on earning response coefficient

Path	Coeffecient	t_{count}	p-value	H_1
Eco (X11) -> ERC (Y2)	-0.283	3.842	0.040	Accepted
Env (X12) -> ERC (Y2)	-0.305	2.017	0.044	Accepted
Soc (X13) -> ERC (Y2)	0.384	3.013	0.040	Accepted

Source: Output Result of SmartPLS 3.0 (2017).

Influence of default risk as measured by debt to equity ratio and debt to asset ratio variables on earning response coefficient

Table 8 presents the t_{count} value of Default Risk path as measured by DER on Earning Response Coefficient of 4.507 with Probability value of 0.029. Since the value of t_{count} (4.507) was greater than the $t_{critical}$ (1.96) which was at a 5% error rate, when the Default Risk as measured by DER had an effect on Earning Response Coefficient in manufacturing companies listed in ISSI on the Indonesia Stock Exchange with a coefficient of -0.222 which the path was negative, thus, it could be concluded that the Default Risk as measured by DER has a negative effect on Earning Response Coefficient. Therefore, the higher the Default Risk as measured by DER is, the lower the Earning Response Coefficient will be.

Table 8. Test result of Influence of Default Risk as measured by Debt to Equity Ratio and Debt to Asset Ratio variables on Earning Response Coefficient

Path	Coeffecient	t_{count}	p-value	H_1
DER (X51) -> ERC (Y2)	-0.228	4.507	0.029	Accepted
DAR (X52) -> ERC (Y2)	-0.253	5.331	0.018	Accepted

Source: Output Result of SmartPLS 3.0 (2017).

3.9. Influence of Conservatism as measured by Earning/Stock Return Relation and Accrual Variables on Earning Response Coefficient

The results of data processing using SmartPLS program as follows:

Table 9. Test Result of Influence of Conservatism as measured by ESRR and Accrual Variables on Earning Response Coefficient

Path	Coeffecient	t_{count}	*p-value*	H_1
ESRR (X31) -> ERC (Y2)	1.750	4.408	0.030	Accepted
Accrual (X32) -> ERC (Y2)	1.427	3.839	0.020	Accepted

Source: Output Result of SmartPLS 3.0 (2017).

Table 9 presents the t_{count} value of Conservatism path measured by ESRR on Earning Response Coefficient by 4.408 with a probability value of 0.030. Since the value of t_{count} (4.408) was greater than the $t_{critical}$ (1.96) at 5% error rate, when the Conservatism as measured by ESRR had an effect on Earning Response Coefficient in manufacturing companies listed in ISSI on the Indonesia Stock Exchange with a coefficient of 1.750 which was positive, it could be concluded that Conservatism as measured by ESRR had a positive influence on Earning Response Coefficient. Therefore, the higher Conservatism measured by ESRR is, the higher the Earning Response Coefficient will be.

Intervening variable testing

Influence of Corporate Sosial Responsibility as measured by Economic, Environmental and Social Factors on Earning Response Coefficient through Earning Management

Table 10. Test Result of Influence of Corporate Sosial Responsibility as measured by Economic, Environmental and Social Factors on Earning Response Coefficient through Earning Management

Path	Coeffecient	t_{count}	*p-value*	H_0	H_1
Eco (X11) -> EM -> ERC	-0.162	12.611	0.018		Accepted
Env (X12) -> EM -> ERC	-0.207	5.830	0.045		Accepted
Soc (X13) -> EM -> ERC	0.161	8.727	0.041		Accepted

Source: Output Result of SmartPLS 3.0 (2017).

Table 10 above presents the value of t_{count} of Corporate Social Responsibility path as measured by the economic effect on Earning Response Coefficient through Earning Management 12.611 with a probability value of 0.018. Since the value of t_{count} (12,611) was greater than the $t_{critical}$ (1.96) at a 5% error rate, so it could be decided to accept $H_{1.1}$ of Corporate Social Responsibility as measured by the economic effect on Earning Response Coefficient through Earning Management on companies listed in Indonesia Stock Exchange ISSI with coefficient of -0.1 62 which had negative sign, so that it could be concluded that the Corporate Social Responsibility as measured by the economic factor negatively affect Earning Response Coefficient through Earning Management. Therefore, the higher the Earning Management is, the lower the influence of Corporate Social Responsibility which was measured by the economic factor on Earning Response Coefficient will be.

Influence of default risk as measured by debt to equity ratio and debt to asset ratio variables on earning response coefficient through earning management

The results of data processing using SmartPLS program as follows:

Table 11. Test Result of Influence of *Default Risk* as measured by Debt to Equity Ratio and Debt to Asset Ratio Variables on Earning Response Coefficient through Earning Management

Path	Coeffecient	t_{count}	p-value	H_0	H_1
DER (X21) -> EM -> ERC	-0.357	13.389	0.014		Accepted
DAR (X22) -> EM -> ERC	-0.293	6.348	0.025		Accepted

Source: Output Result of SmartPLS 3.0 (2017).

Table 11 presents the t_{count} value of Default Risk path as measured by DER influence on the Earning Response Coefficient through Earning Management amounted to 13.389 with probability value of 0.014. Since the value of t_{count} (13.389) is greater than the $t_{critical}$ (1.96) at 5% error rate, so it could be decided to accept $H_{2.1}$ which could be concluded that the Default Risk as measured by DER had an effect on Earning Response Coefficient through Earning Management at manufacturing companies listed in ISSI at Indonesia Stock Exchange with the coefficient of -0.357 which had negative sign, thus, it could be concluded that Default Risk as measured by DER had a negative effect on Earning Response Coefficient through Earning Management. Therefore, the higher Earning Management is, the lower the influence of Default Risk as measured by DER on Earning Response Coefficient will be.

Influence of conservatism as measured by earning stock return relation and accrual variables on earning response coefficient through earning management

The results of data processing using SmartPLS program as follows:

Table 12. Test Result Influence of Conservatism as measured by Earning Stock Return Relation and Accrual Variables on Earning Response Coefficient trough Earning Management

Path	Coeffecient	t_{count}	p-value	H_0	H_1
ESRR (X21) -> EM -> ERC	0.0989	1.809	0.071	Accepted	
Accrual (X22) -> EM -> ERC	0.0960	1.490	0.090	Accepted	

Source: Output Result of SmartPLS 3.0 (2017).

Table 12 presents the value of t_{count} Conservatism path measured by ESRR has an effect on Earning Response Coefficientthrough Earning Management of 1.809 with probability value of 0.71. Since the value of t_{count} (1.809) was smaller than the $t_{critical}$ value (1.96) at a 5% error rate, so it could be decided to reject $H_{3.1}$ where Conservatism as measured by ESRR had no effect on Earnings Response Coefficient through Earning Management on companies listed in Indonesia Stock Exchange ISSI with path coefficient of 0.0989 which was positive, so that it could be concluded that conservatism as measured by ESRR had the positive effect on Earning Response Coefficient through Earning Management. Therefore, the higher the Earning Management is, the higher the influence of conservatism on Earning Response Coefficient will be.

3.2. Discussion

Corporate Social Responsibility as measured by Economic, Environmental and Social factors which influences Earnings Response Coefficient through Earnings Management.

Directly Corporate Social Responsibility as measured by economic factor had an effect of 5.48%, CSR as measured with the environmental factor was at 6.23% and social factor as measured by CSR was at 7.74% on Earnings Response Coefficient. The amount of direct influence of Corporate Social Responsibility to Earning Response Coefficient was 19.45%. In making investment decisions, investors no longer rely solely on profit information alone but must considered corporate CSR activities as well. This indicates that investors appreciate the CSR information disclosed in the company's annual report (Sayekti and Wondabio 2007). These consideration of investors will affect the market response to corporate profits because investors do not only give attention to the profit information alone in making investment decisions but also use the information contained in the CSR report. This means that the information contained in the CSR will reduce or negatively affect the level of usage of profit information by investors.

The theory of agency explains that the practice of earning management is influenced by the conflict between the interests of management with the owners of the company that arises because each party seeks to achieve or consider the level of prosperity they want (Salno *et.al*. 2000). These findings are in line with Kim, Park and Wier

(2012), I Gusti Bagus *et al*. (2013), Yip Van (2011), Palguna (2013) who examined the effect of corporate social responsibility on earnings management and found that corporate social responsibility negatively and significantly impacted earnings management through discretionary accrual, real activity manipulation and accounting and auditing enforcement releases. Companies that disclose more information regarding the activities of the company will be more restricted in earning management practices, on the contrary, companies which disclose less company's activities information tend to perform various forms of earnings management practices for both personal gain and profit for the company.

Default risk as measured by debt to equity ratio and debt to asset ratio which influences earnings response coefficient through earnings management

Directly Default risk as measured by debt to equity ratio and debt to asset ratio had negative effect on Earnings Response Coefficient. The magnitude of the direct impact of default risk as measured by debt to equity ratio was at -3.39% and as measured by debt to asset ratio was at -4.34%. A company's default risk affected investors' desire to invest. Although high risk firms can promise high returns but on the other hand the level of uncertainty is also high (Scott 2006). This causes investors to be cautious in making decisions with respect to high-risk firms. This caution will cause investors to react slower on corporate earnings information. This result is in line with the research of Judge *et al.* (2005) who states that the positive coefficient indicates high level of corporate debt thus managers will increasingly make earnings management to avoid breach of debt contract. Companies that have high ratio leverage due to the large amount of debt compared to the assets owned by the company, allegedly earn earnings management because the company threatened by its default if it can not meet the debt obligations in time. Companies will try to avoid it by making policies that can increase earning and profit.

Conservatism as measured by earnings/stock return relation and accrual which influences earnings response coefficient through earnings management

Directly Conservatism as measured by earnings/stock return relation and accrual have influence on Earnings Response Coefficient. The magnitude of the direct influence of conservatism as measured by earnings/stock return relation is 16.85% and measured by accrual of 14.4%. The existence of positive and significant influence of conservatism on Earnings Response Coefficient in this research is not in line with research of Dewi (2004), Zhang and Peman (2002), Suaryana (2007) stating that companies which apply conservative accounting, tends to generate profit which is fluctified so as to have low profit prediction power. Low profit prediction causes the information of current year profit in predicting future earnings becomes less interesting thus the resulting profit response coefficient will be low.

Conclusion

1. Directly Corporate Social Responsibility measured by economy and environment have negative and significant effect on Earnings Response Coefficient while CSR as measured by social factor have positive and significant influence on ERC
2. Directly Default risk as measured by debt to equity ratio and debt to asset ratio have negative and significant effect on Earnings Response Coefficient
3. Directly Conservatism as measured by earning/stock return relation and accrual have positive and significant effect on Earnings Response Coefficient
4. Corporate Social Responsibility as measured by economic, environmental and social factors have influence on Earning Response Coefficient through Earning Management at manufacturing companies listed in ISSI at Indonesia Stock Exchange
5. Default Risk as measured by DER and DAR affects Earning Response Coefficient through Earning Management on manufacturing companies listed in ISSI at Indonesia Stock Exchange
6. Conservatism as measured by ESRR and accrual does not affect EarningResponse Coefficient through Earning Management on manufacturing companies listed in ISSI at Indonesia Stock Exchange.

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Education of Individuals in the System of Further Corporate Education

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Abstract:

Changes in the work conditions as well as the process of an increase in intellectual character of work result in rising need for further education, the aim of which is to permanently adjust to professional readiness for employers' requirements placed on human resources. Theoretical part of the paper contains the literature review based on domestic and foreign scientific and professional sources. We deal with needs of further professional education and importance of individual methods in education and training of individuals. The focus is on temporal aspects of providing education and training to individuals in enterprises in terms of enterprise size (number of employees). The aim of the paper is to present results of our research and identify the dependency of education and work results of employees. Our analyses are based on the size of an enterprise linked to the scope of education and training, *i.e*. the time devoted to further education and training of employees as individuals. Employee work performances are analysed employee work performances in dependency to the number of hours of training of individuals in a month. Data accumulated are processed by means of two methods, namely the bar method (used for some types of questions) and an automated processing, when the data collected were analysed in MS Excel and in the statistical program of PSPP Statistical Analysis Software.

Keywords: coaching; guidance; methods of education; corporate education; work performance

JEL Classification: A2

Introduction

We live in a society where ongoing, all-encompassing and fast changes are part of our everyday life. The role of education should be based not only on the acceptance of the change; it should lead to the change and prepare employees for the change, thus ensuring the enterprise's competitiveness. Under the research project KEGA No. 014EU-4/2016 on "Preparation of the content and structure of subject disciplines focused on the business knowledge and skills in graduates from selected Medical Services fields of study", we analyse the process of further professional education also in other industries in terms of their contribution to and needs for achieving business objectives and ensuring employees' knowledge and skills. The focus of the paper is on the time aspects of education and training of individual in enterprises in terms of the size of an enterprise, which involves the criterion of the number of employees. The aim of the paper is to present results of research in this area. Our intention is to analyse the triangle of relationships and dependencies: enterprise size – time of education and training of individuals – employee work performances.

1. Deliberate preparation of individuals for work performance

Job position and its description have always been decisive for the evaluation of the intensity of work performance in a particular job position. The evaluation of the intensity of work activities in a particular job is closely related to qualification requirements, further demands on professional knowledge, skills and abilities. The importance of knowledge was emphasized by Friedrich von Hayek and the American philosopher Kenneth Arrow as early as in the 1960-ies. Kenneth Arrow introduced the concept of learning by doing – as the way in which the entity generates knowledge and the learning curve as the means of measuring costs for enhancing knowledge and skills (Tuma 2002).

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Job description describes work, tasks and responsibilities, rather than the results that are achieved on the site. To describe needs and results at workplace, the concept of competence is used. Competence is a set of manners of behaviour and action of an employee, to be fulfilled in a given position, so that they were able to master the tasks in a particular position (Veteška and Tureckiová 2008). The modelling of competence enables enterprises to move from job descriptions and job requirements to descriptions of competences. Competence models are derived from desirable results, they monitor and characterise the types of behaviour, which lead to desirable results (Hroník 2007, Hroník *et al.* 2008).

Educational needs are not human primary needs; they arise in the course of one's life and are influenced by various factors (Palán 2002). They are most frequently connected with the implementation of working activities and they are accompanied with:

- the claims placed on an individual in employment, while these requirements evolve in connection with increasing work requirements;
- the variable requirements of the job and the tasks to be performed;
- the implementation of organizational changes;
- job creation;
- various factors that influence the job performance;
- the implementation of new job positions related to career growth;
- various forms of job performance, *etc*.

These factors affect the need for education of individuals, who should be able to adjust to changing conditions of their job positions and demands placed on the job performance and outcomes of this work. Formal education is viewed nowadays as the preparation for further professional education which is either arranged by an individual themselves according to their ideas and career interests or it is organized and provided by the organization in which the employee works. Further professional education is conducted by means of traditional monologic methods of education, where an important role is played by the lecture. It is applied in the kind of education, where it is possible to systematically mediate new information about particular problems. A widespread use in further professional corporate education and training is typical for methods that are connected with work performance and are based on the dialogue between the educated/trainee and the trainer. These methods include mentoring, assisting, consulting, coaching, and counselling.

A mentor, owing to a personal approach and elaborated longer-term programme advices, supports, stimulates and regulates the mentee and helps him or her in dealing with current work problems and those in career building. Mentors provide their protégées with:

- advice on how to work out the programme of education and training in itself;
- advice on how to master all the administrative, professional or interpersonal problems;
- way of achieving necessary knowledge, skills needed for the work performance;
- information about an enterprise and corporate culture;
- professional assistance;
- drawing up career development plans.

In the case of assisting a trained employee, an experienced employee is assigned to as a help, assists him or her in the fulfilment of tasks and understanding the working process. Gradually, the trained employee takes more responsibility, until finally the trainee attains the kind of knowledge and abilities, which enable him/her to perform the task completely independently. The method is used not only in education for manual occupations but also in the training of management and specialists.

Guidance and assistance in the case of one-time incidence of the problem will be provided via counselling, *i.e.* the method linked to a concrete work performance and its character is short-term.

Coaching aims at the coacher's acceptance of responsibility or its increase and achieving their own objectives. It helps the coached not only to clearly define their objectives but also achieve them faster and as efficiently as possible. Coaching is viewed as a combination of individual guidance, personal feedback and practice-oriented training for a particular professional orientation. Guidance, *i.e.* advising in the true sense of the word, in contrast to coaching and mentoring puts the provider/instructor of guidance and the employee in equal positions of mutual consultations. Guidance can assume the form of psychological guidance. We provide an outline of methods used in organizations which are viewed by respondents as the methods used in organisations for developing knowledge and skills of individuals. The focus is on the methods that are analysed in the empirical part of the research.

2. Research design and basic methodology starting-points

In the empirical part, we deal with the needs of further corporate education and the importance of individual methods in educating/training individuals in enterprises. Having studied available sources, we have concluded there are few analyses that deal with the size of enterprise and the number of hours devoted to further education of individuals.

The aim of further professional education is to increase knowledge and skills so that tasks may be fulfilled in the best possible way and the objectives required were met. The analysis of existing sources revealed a theoretical as well as empirical niche for the implementation and the time under the research project KEGA No. 014EU-4/2016.

The aim of research was to analyse the relations between the enterprise size and the time (in hours/month) at disposal for the education and training of individual employees and to identify the influence of education on the fulfilment of objectives set forth and on the employee work performances.

Based on these reflections, research hypotheses were determined. Each hypothesis testing is focused on the basic hypothesis, *i.e.* zero hypothesis – H_0. Zero hypotheses were matched with alternative hypotheses H_1, which were determined, as follows:

H_0 = zero dependency between variables;

H_1 = dependency between variables.

If, based on hypothesis testing, we refuse the zero hypothesis, we accept the alternative one. The alternative hypothesis states what is valid if the zero hypothesis does not apply (Pacáková *et al*. 2009). Research hypotheses are determined as follows:

- Hypothesis no. 1:

H_0 = Small, medium-sized and large enterprises (VP) do not differ in the time dedicated to education/training of individuals (ETI);

H_1 = Small, medium-sized and large enterprises (VP) differ in the time dedicated to education/training of individuals (ETI).

- Hypothesis no. 2:

H_0 = Employee work performances (EWP) are not dependent from the enterprise size;

H_1 = Employee work performances (EWP) are dependent from the enterprise size.

- Hypothesis no. 3:

H_0 = Employee work performances (EWP) are not dependent from the time of training of individuals (TI);

H_1 = Employee work performances (EWP) are dependent from the time of training of individuals (TI).

The research was conducted by means of interview and questionnaire methods. The interview was used in order to obtain better information about respondents' opinions and experience. Interview was used in the course of pre-research in drafting up the questionnaire. The questionnaire method was applied for practical reasons: the research required to secure a representative sample of respondents. The application of the questionnaire method enables to collect information in an acceptable period of time and under adequate costs of information from a higher number of respondents. Primary data were collected based on basic questions in the questionnaire. Questionnaires were distributed either in person or online. The questionnaire consisted from two parts: information about a respondent and specific part on opinions of respondents of the implementation of training in their enterprises and results observed after the training taken. During the research, some respondents withdrew from the research and some questionnaires could not be considered as they were not fully completed.

Opinions of 287 respondents were considered in the research, out of the originally addressed 360 respondents, *i.e*. a 79.72% return, which is successful, in our opinion. Our intention was that the number of respondents enabled us to generalise information acquired and provide proposals for the improvement of education and training in enterprises.

In terms of size, enterprises were represented in the research as follows:

- respondents from large enterprises – 112 respondents;
- respondents from medium-sized enterprises – 88 respondents;
- respondents from small enterprises – 87 respondents.

In each group of enterprise, there were addressed 120 respondents. Large enterprises showed the greatest interest in participating in the research, while small and medium-sized enterprises were found to fear to participate in the research. Respondents addressed were personnel managers and line managers, or owners, manly in small enterprises. Respondents were managers working in various managerial levels, *i.e.* line management, medium and top management levels. Respondents of small enterprises are their owners. Respondents represented a sample of selected divisions of section C – Industrial Production, according to the Statistical Classification of Economic Activities SK NACE Revision 2 pursuant to Decree 306/2007.

The research was focused on knowledge employees (in view of the aim of research) was USD for the first time by Peter Drucker as early as in the sixties (Drucker 1992) and operators' employees with secondary education (including graduates from apprenticeship) and university education, who participate in educational activities focused on the development of knowledge and skills of individuals.

Individual respondents from enterprises create statistical units and their opinions are the basis for the application of selected statistical methods, which will enable to assess the problems studied. Apart from basic statistical Instruments, while applying the rate of central trend, *i.e*. modus and median, we investigated into mutual linear dependencies. Median is a value which divides a file into two parts of the same size, and modus is the most frequent value in the file examined.

Two types of methods were used for the statistical processing: manual processing, bar code method was applied for some types of questions and automated processing, data collected were analyzed in MS Excel (Chajdiak 2009) and in the statistical program PSPP Statistical Analysis Software. Results of statistical processing are presented in statistical surveys in tables and interpreted verbally. Hypotheses determined are tested by means of correlation and regression analysis.

3. Results of research

The formulation of starting-points of the research was based on the assumption that the practice of successful enterprises confirms that qualified and professionally trained employees are a source of competitive advantage. We were aware of the fact that the achievement of desirable results in the financial area has to be accompanied with highly-qualified human resources rather than just progressive technologies focussing on customer care. In our research we focus on exploring the scope of education and training of individual employees, *i.e*. the number of hours/month, during which employees received training. Although we analysed enterprises also in terms of their size; in Table 1 respondents are not classified in terms of enterprise size. The focus here is on finding the total number of hours spent on the training of employees.

In Table 1 we consider opinions of selected managers (mentioned in section 2) of the scope of employee education, while the employees were divided into six groups, and the number of hours in interval was determined.

Table 1. Scope of hours dedicated to education of individuals

Code for the purpose of statistical processing	Meaning of the codeEducation and training of individuals in hours (within the interval given)	Number of respondents in absolute figures
1	1 – 4 hrs.	105
2	5 – 8 hrs.	94
3	9 – 17 hrs.	46
4	18 – 26 hrs.	36
5	27 – 35 hrs.	6
6	36 – 60 hrs.	0

Source: results of empirical research

Education of individuals is conducted by means of a combination of educational methods. The most frequently applied methods (from those listed in the theoretical part of this paper) are assistance, consulting and lectures. In each organisation there are applied several methods, depending on the employee category and the content of education, which is to guarantee the development of knowledge and skills of individuals.

Table 2 contains an overview of methods, applied in enterprises; enterprises listed all the methods they used in the training of the analysed group of employees.

Table 2. Application of methods in developing knowledge and skills of individuals

Method applied	% of respondents
Lecture	93.72%
Mentoring	85.71%
Assistance	95.56%
Consulting	94.77%
Coaching	57.14%
Counselling	18.81%

Source: results of empirical research

We can state that all the methods are widely applied in education. The least applied is coaching and counselling. Even despite a high preference for coaching in the literature, its application in enterprises is substantially lower. The aim of each training, regardless the time and the method used, is to achieve required work results, in connection with the fulfilment of targets set forth. The fulfilment of the objectives and achieving the performances required should be proportionate to the extent of education, *i.e.* also to the approaches to education and educational policy applied in an enterprise. Table 3 contains respondents' opinions of the assessment of objectives set forth and employee work results.

Table 3. Assessment of the fulfilment of objectives set forth and achievement of required performances

Code for the purpose of statistical processing	Meaning of designation: Results of employee work (PVZ)	Number of respondents
5	Excellent assessment	51
4	Above-the-average assessment	106
3	Average assessment	115
2	Below-the-average assessment	15
1	Poor assessment	0

Source: results of empirical research

Employee results were assessed in the case of achievement of targets, expectations of quality or quantity, customer service, adherence to deadlines set forth and the like. The modus in the assessment of employee work performances the assessment was average (115 respondents). 36.93% of respondents assessed employees' performance as above-the-average and 17.77% of them rated them as being excellent. In order to provide a better survey, the statistical set is characterized via selected tools of the descriptive statistics (modus a median) in Table 4. In view of the kind of statistical investigation, we have chosen these two statistical functions, *i.e.* modus and median.

Table.4. Selected instruments of descriptive statistics

Analysed variables	Statistical tools			
	MODUS		MEDIAN	
	Code for purpose of statistical processing	Meaning of code	Code for purpose of statistical processing	Meaning of code
Education and training of individuals (ETI)	1	1 – 4 hrs.	2	5 – 8 hrs.
Employee work performances (EWP)	3	Average	4	Above -average

Source: results of empirical research

As may be stated based on the results of descriptive statistics, most frequently, *i.e.* modus (mode) of education/training of individuals is the education secured in the scope from one to four hours monthly. The median that divides the set into two equal parts is the scope of education of individuals from five to eight hours monthly.

When processing results and analysis of research results, the focus was also on testing of hypotheses listed in Sector 2. One of our intentions was to establish if the size of an enterprise determines the time needed to education of individuals as well as whether the relationship between the enterprise size and employee work performances are affected by the time available for their education.

Table 5. Analysis of correlation dependencies – to establish the existence of enterprise size and selected dependent variables (Spearman correlation coefficient)

Variables	Size of enterprise (VP)	
	Spearman's Corr. Coeff.	Sig. (2-tailed)
Education and training of individuals (ETI)	- 0.372	0.000
Employee work performances (EWP)	0.034	0.563

Source: results of empirical research (VP – independent variable, other variables – dependent).

It can be stated, based on the calculation of correlation coefficient, that education of individuals (ETI) depends on the size of an enterprise. Employee work performances are not dependent on the enterprise size (does not correlate with the enterprise size), in view of the value achieved Sig. (2-tailed). The correlation coefficient calculated is evaluated in our paper according to the following rule: The values achieved ranging from (0,8 do 1) or (-0,8 do -1) were considered for strong dependency, from (0,3 to 0,8) or (-0,3 to -0,8) as the medium strong dependency and those in the interval (0 to 0,3) or (-0,3 to 0) are considered as the weak dependency. On the basis of values, we can state that in the education of individuals the correlation dependency can be considered to be medium strong. With regard to the level of correlation coefficient achieved and a high level of δ in employee work performances (PVZ) $\delta = 0.563$, we consider the relation to be statistically insignificant.

Further, we will only deal with statistically significant relations. *i.e.* those in which based on the calculation of the correlation coefficient there is dependency and at the same time $\delta < 0,05$. When testing the hypotheses, we shall use the Leven test as the starting point, where:

- significance> 0,05 parametric test – ANOVA will be applied and in the case of;
- significance<0,05, nonparametric text KRUSKAL – WALLIS will be applied.

Table 6. Differences in time dedicated of individuals training while considering enterprise size

Test of Homogeneity of Variances

Training of individals	Levene Statistic	df1	df2	Significance
	1.42	2	284	0.24
The Leven test corroborated the significance > 0.05; we will test the hypothesis by means of parametric test ANOVA				

ANOVA		Sum of Squares	df	Mean Square	F	Significance
Training of individuals	Between Groups	35.55	2	17.77	16.28	0.00
	Within Groups	310.10	284	1.09		
	TOTAL	345.65	286			

Based on ANOVA test under significance of 0.00can corroborate an alternative hypothesis:

H_1 = Small, medium-sized and large enterprises (ES) differ in the time dedicated to training of individuals (TI)

The Spearman coefficient in the assessment of employee work performances (EWP) (EWP) linked to the enterprise size (Table 5 ($\delta = 0,563$; $r = 0,034$)) indicates a weak correlation dependence; we continued in the testing of hypothesis no. 2 by means of the Leven test.

Table 7. Differences in opinions of the assessment of employee work performances while considering enterprise size

Test of Homogeneity of Variances	Levene Statistic	df1	df2	Significance
Employee work performances	9.45	2	284	0.00

In the significance we have to apply the nonparametric test, namely the Kruskal – Wallis for testing the given hypothesis.

Table 8. Kruskal-Wallis Test

Ranks			
	Size of enterprise (VP)	N	Mean Rank
EWP	1	112	142.53
	2	88	140.28
	3	87	149.66
	TOTAL	287	
Test Statistics[a,b]			

	EWP
Chi-Square	700
Df	2
Asymp. Sig.	0.705
a. Kruskal Wallis Test	
b. Grouping Variable: VP	

The Kruskal Wallis test corroborated that enterprises in terms of size did not differ in the assessment of employee work performances (EWP). In the case of hypothesis no. 2 we accept the zero hypothesis: H_0 =Small and Medium-sized enterprises (ES) do not differ in the assessment of employee work performances (EWP).

Table 8. Dependence of employee work performances on training of individuals

Education and training of individuals (ETI)	Employee work performances	
	Spearman'sCorr. Coeff.	Sig. (2-tailed)
	0.345	0.000

Source: results of employee research

The relationship between the work results of employees and education of individuals is a statistically significant relation. Employee work performances are in medium strong correlation dependency with education of individuals (r = 0.345; δ = 0,000).

Table 9. Regression analysis of the influence of individual education and training on employee results

MODEL		Coefficients[a]				
		Unstandardised Coefficients		Standardised Coefficients	T	Sig.
		B	Std. Error	Beta		
1	Constant	3.064	0.098		31.260	0.000
	Education and Training of individuals (ETI)	0.339	0.055	0.451	6.139	0.000
a. Dependent Variable: PVZ						

In the course of research, we were interested in how the fulfilment of employee work performances (EWP) (*e.g.* meeting work targets, increase in quality, *etc.*) is dependent on the education of individuals.

The result of the regression analysis is the equation:

PVZ = 3,064 + 0,339 x VJ

Individual training of persons significantly determines work results of employees according to the equation:

EWP = 3,064 + 0,339 x ETI

If the time dedicated to education and training of individuals is increased by one unit, work results increase 0.339-times, also the calculated constant 3.064. Employee work performances are dependent of education and training of individuals. Based on the analysis, we adopt an alternative hypothesis: H_1 = Employee work performances (EWP) depend on the time dedicated to education and training of individuals (ETI).

Regardless the methods and forms of education of individuals, their influence on enterprise economic results is always favourable. For education to be beneficial, it has to be based on the educational aim to be achieved in the process of education, while the content, methods and organisation of education have to be adjusted to the aim.

Conclusion

Employers' attitudes to education has been changing, a qualified human resources are moving to the centre of attention and the need for success in competition exerts pressure on life-long education. Education has been traditionally understood as a human cultural value and its socialisation and cultural values are greatly appreciated. The economic function of education is increasingly rising. It is based on ideas and benefits and the return on investments in education of individuals. Investments in education have to be manifested in a better fulfilment of work results. In the research, we analysed enterprises in terms of size (small, medium, and large enterprises) and the research confirmed that enterprises by size differ in the time invested in individual education of employees.

Work performance of employees, achievement of results at work are influenced by employee education. Management of employee work performance should lead to development plans and educational plans linked to

contemporary and future activities of an employee in the organization. Education needs to be relevant and effective in satisfying the identified, corresponding and adequate needs, with respect to the implementation of work activities. The area of education has to be determined by the negative problem in the form of a specific shortcoming, which needs to be overcome, or the negative problem, which concerns the way of satisfying the need for the development of new knowledge, skills and capacities so that it corresponded to the requirements of the work performance.

Education and training provided to employees, should be flexible, factual and timely. It is important to choose the right method of education, which stands for a particular procedure in education, one that increases the dynamics of the entire education. Motivation of individuals for education is the basis of an overall success in education.

At present, we are witnessing of how many institutions consider the development and education of employees as one of the key values (Čermáková *et al*. 2016). It is a matter of prestige and part of non-pecuniary incentives of employees. There are, however, also enterprises that secure only the education laid down by the law. As the research results indicate, the length of time provided for education amounts to one to four hours monthly in individual education. Education of individuals is affected also by the education ensuing from the law. There are still some enterprises that rely on spare resources on the labour market and think that the employee himself will find out the area in which he needs to be educated in order to maintain their job.

Results of regression analysis have confirmed that the individual education of employees predetermine also results achieved at work. The more time is given for the education; the better results are achieved. However, results are achieved more slowly than are periods of time devoted to education, which is expressed as the ratio of 1: 0.339. As has been mentioned in the text: "If we increase the time devoted to education of individuals by a unit, work results increase by 0.339-times, after consideration of the constant calculated 3.064".

Benefits of education can be increased via a systemic approach to education, where an important moment is a well-designed education policy, from the passive approach towards an approach integrating education in corporate processes.

The first approach is passive, *i.e.* enterprise management expect their employees to arrive at the idea of how to deal with work problems, or that employees will find it out by means of observing their co-workers. As soon as some entity starts to perceive the shortage of qualified employees; it starts recruiting the new ones. And invests in buying-up brains; these investments, along with those in investments in qualifications and motivation are considered an efficient means of achieving competitiveness.

The second approach can be denoted as a random one; it depends on an overall success of an enterprise. The amount of investment in education is influenced by current incomes of the enterprise. Educational activities are selected on a random basis according to offers of education institutions and most recent shortcomings in employees' competences.

The third approach is to the integration of education into enterprise processes of introduced systems and procedures and the corporate culture. This is a positive philosophy to education: enterprises with this philosophy of attitude to education understand that they operate in the world where competitive advantages are reached by means of a higher quality of human resources employed in these enterprises. Management enforces the opinion that education is an investment that pays off.

In view of the research and analysis conducted, we can conclude that education and training should not be provided by isolated and short-term learning activities. Instead, it has to be a flexible system whose content and time are planned. Further professional corporate education should be a continuous process based on a systemic approach, ranging from the identification of learning needs to its rigorous assessment rather than a random and short-term issue. If it is to produce positive results, it has to be part of work activity and its time should be substantially higher.

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Sustainability Accounting Practices and Disclosure by Multinational Corporations in Nigeria

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Abstract:

The objective of this study is to ascertain the level of sustainability accounting practice, and its relationship with sustainability disclosure by Multinational Corporations (MNCs) in Nigeria. Multinational firms represent a large and significant portion of the Nigerian economy and have contributed to her economic development. Therefore, studies addressing this sector are of prime importance to the economy and have been few over the years. The study employed the survey research design. Primary data was generated by administering a structured questionnaire and conducting interview sessions with key personnel. The formulated hypotheses were tested using One-Sample Chi -Square Test and Pearson Correlation coefficient. The study finds that there is a high level of social, environmental and economic accounting practice among Multinational Corporations in Nigeria; and also, a positive relationship between social accounting practice and social disclosure of Multinational Corporations in Nigeria; environmental accounting practice and environmental disclosure of Multinational Corporations in Nigeria; and, economic accounting practice and economic disclosure of Multinational Corporations in Nigeria. Based on this study, the study recommends that companies should make use of advanced systems for tracking social and environmental costs of their operations. Companies are also encouraged to adopt the use of sustainability reports. The study contributes to the accounting literature on sustainability, with a focus on the accounting and disclosure practice of MNCs in developing countries. It has shown how sustainability accounting can influence the level of triple bottom line disclosure in multinationals.

Keywords: sustainability; sustainability accounting; practices; disclosure; multinational corporations.

JEL Classification: F23; M41; Q56

Introduction

Sustainability is currently a burning issue and a major cause of concern across the globe (Aggarwal 2013). According to the World Commission on Environment and Development (1987) sustainability is defined as can be defined as “meeting the needs of the present generation without compromising the ability of future generations to meet their own needs”. The concept of sustainability hinges on the three components of triple bottom line (social, environmental and economic) also referred to as People, Planet and Profit (3P’s) developed by Elkington (Elkington 1997, Crane *et al.* 2009, Worlu 2014). Triple bottom line argues that companies should not only thrive on economic

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objective alone but should also concern themselves with societal and environmental issues affecting their operations (Worlu 2014).

The increase in unethical and irresponsible behaviour of corporations, increased regulations and level of awareness among stakeholders, has given pre-eminence to the concept of corporate sustainability among academics and practitioners (Aggarwal 2013, Oluwagbemiga 2014, Hasan and Yun 2017, Rokhmawati and Gunardi 2017, Rokhmawati *et al.* 2017, Ghani *et al.* 2018, Handayani *et al.* 2018, Mulyanto *et al.* 2018, Anazonwu *et al.* 2018).

In today's highly competitive markets and volatile economic environments, no organization, especially those that rely on limited or declining natural resources, can operate the way they did a decade ago (COSO 2013). Consumers are more sophisticated, driven, in part, by the wider availability of information, increased visibility into corporate business practices and a better understanding of the interconnectedness of all that we do (COSO 2013, Hartikayanti *et al.* 2018a, Hartikayanti *et al.* 2018b, Peng *et al.* 2018). Firms are therefore expected to take accountability for various beneficial and harmful impacts of their activities on the overall society and environment in which they exist (Aggarwal 2013). According to Vallesi *et al*. (2012) reporting is one of the tools used by organizations to engage with various stakeholders. Reporting can only be achieved if the organization has in place a sustainability accounting system capable of generating the needed information for inclusion in sustainability report.

Multinational Corporations (MNCs) have played a key role in the global and investment landscape of developing economies. UNCTAD estimates that approximately 60% of international trade takes place between different units within multinational companies or between multinationals and their global suppliers (World Investment Report 2013). Today, MNCs Corporations like the United African Company (UAC), Toyota Motors, British American Tobacco, Coca-Cola, Lever Brothers, Mobil, Shell BP *etc*. dominate the Nigerian economy (Eluka *et al.* 2016). The activities of MNCs have been a source of controversy (Stopford 1998). Ozoigbo and Chukuezi (2011) observed that the idea of investing in foreign land is not to better the lot of the host nation but to exploit as much as is possible in order to develop the home country. Most of these challenges occur due to changes in economic environment, political influence, technological know-how and reviews of accounting systems of its existing countries (Owojori and Asaolu 2010). Multinational firms are increasingly pressured by numerous stakeholders to engage in social and environmental responsibility (Orlitzky *et al.* 2011). However, the question still remains how many of these companies measure and assesses their own performance, for example, on human, social and natural capitals? Even if we consider only the listed companies worldwide, how many of these firms have really left the shareholder approach to adopt a more comprehensive stakeholder one? (Perrini and Tencati 2006).

Environmentalists are generally pessimistic about the contributions of MNCs to the protection of the natural environment, particularly in host developing countries (Hassan 2013). These schools of thought posit that the profit-maximizing nature of MNCs (Osuagwu and Obumneke 2013), is such that they would try to move their unwanted products from one country to another until a market is found for such products (ESCAP/UNCTC 1988, as in (Hassan 2013). Over the years, Nigeria has seen a considerable growth of Multinational presence in varying sectors, ranging from Telecommunication to Oil and Gas sector. However, research centred on sustainability practice by these multinationals are relatively scarce. This study also examines the theoretical support for accounting and disclosure.

The main objective of this study is to examine the level of sustainability accounting practice and its effect on sustainability disclosure by Multinational Corporations (MNCs) in Nigeria. Specifically, this study addressed the following:

- to ascertain the level of social accounting practice among Multinational Corporations;
- to examine the relationship between social accounting practice and social disclosure of Multinational Corporations;
- to ascertain the level of environmental accounting practice among Multinational Corporations;
- to examine the relationship between environmental accounting practice and environmental disclosure of Multinational Corporations;
- to ascertain the level of economic accounting practice among Multinational Corporations;
- to examine the relationship between economic accounting practice and economic disclosure of Multinational Corporations.

1. Methods

The study utilized survey research design. The respondents were drawn from the Accounting and Administrative sections of the under listed Multinational corporations. The study used convenient sampling to select fifteen staffs, ten from the Accounting/Finance Department and five from the Administrative Unit. A total of One Hundred and

Eighty staffs were used as the sample for the study. The selected multinationals are as follows: Nestlé Nigeria FMCG Multinational; Unilever FMCG Multinational; Guinness FMCG Multinational; Cadbury FMCG Multinational; Coca Cola FMCG Multinational; P&G FMCG Multinational; PZ FMCG Multinational; Friesland Foods WAMCO FMCG Multinational; British American Tobacco; 7-UP Bottling Company; UAC FMCG; May and Baker FMCG.

The study used primary data generated with the aid of a structured questionnaire. The questionnaire was designed using the Likert-scale format on a continuum of 5 to 1, the options are as follows: strongly agree (SA); agree (A); undecided (UD); disagree (D), strongly disagree (SD). The interview session involved asking the respondents "What drives sustainability in your corporations?" The reliability of the instrument was estimated using Cronbach Alpha value, the social dimension showed an α value of .842; the environmental dimension showed an α value of .853; and the economic dimension showed an α value of .942. The hypotheses were tested using One Sample Chi Square and Pearson Correlation Coefficient, the One Sample Chi Square was used to examine level while the Pearson Correlation Coefficient was used to test for relationship.

2. Results and discussion

Table 1-3 presents the descriptive statistics on social, environmental and economic accounting practice by the respondents from the sample firms.

Table 1. Social accounting practice of the company

	N	Minimum	Maximum	Mean	Std. Deviation
The company has in place a system for tracking social cost of its activities	129	3.00	5.00	4.5504	0.54431
The company conducts periodic assessment of its social impact on the society	129	3.00	5.00	4.7829	0.46706
The company makes use of experts' advice and consultations in social impacts assessment	129	3.00	5.00	4.8527	0.37709
Valid N (listwise)	129				

Table 2. Environmental accounting practice of the company

	N	Minimum	Maximum	Mean	Std. Deviation
The company has in place a system for tracking environmental cost of its activities	129	4.00	5.00	4.8527	0.35577
The company conducts periodic assessment of its environmental impact on the society	129	4.00	5.00	4.8605	0.34785
The company makes use of experts advice and consultations in environmental impacts assessment	129	4.00	5.00	4.8682	0.33957
Valid N (listwise)	129				

Table 3. Economic practice of the company

	N	Minimum	Maximum	Mean	Std. Deviation
The adoption of IFRS would safeguard investor interest in host countries	129	4.00	5.00	4.9147	0.28037
The company has a policy of environmentally and socially responsible investment	129	4.00	5.00	4.9225	0.26846
Product performance assessments are done in cognizance of its societal and environmental impacts.	129	4.00	5.00	4.9380	0.24212
Product information should also contain information on social and environmental impacts		4.00	5.00	4.8992	0.30220
Valid N (listwise)	129				

The highest mean values were recorded in level of economic practice by the respondents. The respondents agreed that product performance assessments were done in cognizance of its societal and environmental impacts (4.94), following this is the statement the company has a policy of environmentally and socially responsible investment (4.92). The lowest average value was recorded in the level of social accounting practice; the statement the company has in place a system for tracking social cost of its activities had a mean value of 4.55. The average mean values of the three dimensions used in measuring sustainability accounting practice in the firms, had values greater 4.0, this goes to prove that the firms had in place social, environmental and economic accounting systems.

Table 4-6 presents the descriptive statistics on social, environmental and economic disclosure practice by the respondents from the sample firms. The highest mean values were recorded in level of environmental disclosure

practice by the respondents. The respondents showed strong support for the company makes use of sustainability reports in disclosing additional and holistic information on environmental issues (4.91), following this is the statement the company's annual financial report is usually indicative of the amount and extent of damage caused on the local community and environment (4.90). The lowest average value was recorded in the level of social disclosure practice; the statement the company has a policy of socially responsible behaviour and reporting that guides corporate actions had a mean value of 4.81. The average mean values of the three dimensions used in measuring sustainability disclosure by the firms, had values greater 4.0, this goes to prove that the firms embedded social, environmental and economic disclosure as part of their corporate reporting process.

Table 4. Social disclosure practice of the company

	N	Minimum	Maximum	Mean	Std. Deviation
The company discloses the social effect of its operating activities in financial reports	129	4.00	5.00	4.8760	0.33090
The company makes use of sustainability reports in disclosing additional and holistic information on social issues	129	3.00	5.00	4.8295	0.39773
The company has a policy of socially responsible behaviour and reporting that guides corporate actions.	129	4.00	5.00	4.8140	0.39066
Valid N (listwise)	129				

Table 5. Environmental disclosure practice of the company

	N	Minimum	Maximum	Mean	Std. Deviation
The company discloses the environmental effect of its operating activities in financial reports	129	4.00	5.00	4.8682	0.33957
The company makes use of sustainability reports in disclosing additional and holistic information on environmental issues	129	4.00	5.00	4.9070	0.29160
The company has a policy of environmentally responsible behaviour and reporting that guides corporate actions.	129	4.00	5.00	4.8915	0.31226
Valid N (listwise)	129				

Table 6. Economic disclosure practice of the company

	N	Minimum	Maximum	Mean	Std. Deviation
Cost information used in policy formulation and decision making should also embed information on social and environmental costs that should form the core of social and environmental reporting	129	4.00	5.00	4.8915	0.31226
The company's annual financial report is usually indicative of the amount and extent of damage caused on the local community and environment	129	4.00	5.00	4.8992	0.30220
Valid N (listwise)	129				

The result of the hypothesis test (Table 7) showed that we should reject the null hypothesis and accept the alternate, thus there is a significant level of social accounting practice among Multinational Corporations.

Table 7. Social accounting practice among multinational corporations

Total N	12
Test Statistics	16.333
Degrees of Freedom	4
Asymptotic sig. (2-sided test)	0.003

Pearson correlation coefficient was computed to determine the relationship between social accounting practice and social disclosure. From the Table 8, the Pearson correlation coefficient was 0.492 (positive), and significant at 0.01 thus we reject the null hypothesis and accept the alternate there is a moderate relationship between social accounting practice and social disclosure of Multinational Corporations.

Table 8. Relationship between social accounting practice and social disclosure

		Social Accounting Practice	Social Disclosure Practice
Social Accounting Practice	Pearson Correlation Sig. (2-taled) N	1 129	0.492** 0.000 129.
Social disclosure Practice		0.492** 0.000 129	1 129

Note: ** Correlation is significant at 0.01 level (2-tailed)

The result of the hypothesis test (Table 9) showed that we should reject the null hypothesis and accept the alternate, thus there is a significant level of environmental accounting practice among Multinational Corporations.

Table 9. Environmental accounting practice among multinational corporations

Total N	12
Test Statistics	11.333
Degrees of Freedom	3
Asymptotic sig. (2-sided test)	0.010

Pearson correlation coefficient was computed to determine the relationship between environmental accounting practice and environmental disclosure. From the Table 10, the Pearson correlation coefficient was 0.87 (positive), and significant at 0.01 thus we reject the null hypothesis and accept the alternate there is a strong relationship between environmental accounting practice and environmental disclosure of Multinational Corporations.

Table 10. Relationship between environmental accounting practice and environmental disclosure

		Environmental accounting practice	Environmental Disclosure
Environmental Accounting Practice	Pearson Correlation Sig. (2-taled) N	1 129	0.868** 0.000 129
Environmental disclosure		0.868** 0.000 129	1 129

Note: ** Correlation is significant at 0.01 level (2-tailed).

Table 11. Economic accounting practice among multinational corporations

Total N	12
Test Statistics	6.500
Degrees of Freedom	2
Asymptotic sig. (2-sided test)	0.039

The result of the hypothesis test (Table 11) showed that we should reject the null hypothesis and accept the alternate, thus there is a significant level of economic accounting practice among Multinational Corporations.

Table 12. Relationship between economic accounting practice and economic disclosure

		Economic Accounting Practice	Economic Disclosure
Economic Accounting Practice	Pearson Correlation Sig. (2-taled) N	1 129	0.687** 0.000 129.
Economic disclosure		0.687** .000 0129	1 129

Note: ** Correlation is significant at 0.01 level (2-tailed).

Pearson correlation coefficient was computed to determine the relationship between economic accounting practice and economic disclosure. From the Table 12, the Pearson correlation coefficient was 0.687 (positive), and significant at .01 thus we reject the null hypothesis and accept the alternate there is a strong relationship between economic accounting practice and economic disclosure of Multinational Corporations in Nigeria.

The study makes the following findings; there is a significant level of social, environmental and economic accounting practice among Multinational Corporations. The respondents agreed that mainly companies conduct periodic assessment of its social and environmental impact on the society, which plays a role in the reporting practices of such corporations. They make use of experts' advice and consultations in social and environmental impacts assessment. Eccles *et al.* (2014) on the impact of corporate sustainability on organizational processes and performance showed that high sustainability companies are more likely to have established processes for stakeholder engagement, to be more long-term oriented, and to exhibit higher measurement and disclosure of nonfinancial information.

Interview sessions granted by the executives identified the following as key drivers for sustainability accounting in their corporations:

- growing awareness from consumers in developing countries on the social responsibility stance of the corporation. This is consistent with the respondents agreeing that product information should contain information on social and environmental impacts. One key motive for such is to boost consumer loyalty;
- increased pressure from host communities on social and environmental damages caused by corporate activities, more pronounced for oil and gas firms;
- the desire to reduce hidden social and environmental costs of operations;
- desire to meet the stakeholder requirements of the host country;
- regulatory compliance and tax benefits.

The interviewed executives showed tremendous support for GRI as a basis for reporting on sustainability matters and the dominant practice was the use of sustainability costing and management systems. A well-known reporting standard for implementing corporate social responsibility is the GRI, which has outlined guidelines for preparing social reports or sustainability (Gunardi *et al.* 2016, Asmeri *et al.* 2017). GRI develops reporting guidelines using a global consensus search process that involves both the company as the reported organization, and also the user of the report such as employees and investors (Galani *et al.* 2012). The key benefit of using the GRI framework, in addition to standardization of reports, is guidance on material issues. Other supported guidelines included the OECD Guidelines for Multinational Organizations, and the ISO series.

The study finds that there is a moderate relationship between social accounting practice and social disclosure of MNCs in Nigeria, and strong relationship between environmental and economic accounting practice and environmental and economic disclosure of Multinational Corporations. This is consistent with the literature, as sustainability accounting practice is expected to result in simultaneous improvement in the triple bottom line (Egbunike and Emudainohwo 2017). According to Schaltegger *et al.* (2003) corporate sustainability management as a business approach is designed to shape the environmental, social, and economic effects of a company in such a way that, first, results in the sustainable development of the company and, second, provides an important contribution toward the sustainable development of the economy and society. Disclosure that allows market participants to assess the firm's sustainability performance can have real economic consequences for the firm and its stock price (Joshi and Li 2016). The existence of social and environmental disclosure will create public confidence in the company (Asmeri *et al.* 2017). Eccles *et al.* (2014) show evidence that high sustainability companies significantly outperform low sustainability companies over the long-term, both in terms of stock market as well as accounting performance. Furthermore, stock market is considered as yard stick of economic health (Ong and Ng 2018). Akinlo and Iredele (2014) showed that corporate environmental disclosure has a positive relationship with market value of quoted companies in Nigeria.

Conclusion

This study sought to examine the level of sustainability accounting practice and its effect on disclosure by Multinational Corporations in Nigeria. In the wake of increased regulations and growth in level of awareness of stakeholders, the concept of corporate sustainability has been assuming great importance (Aggarwal 2013). Companies are increasingly pressured to be responsible to the society in which they operate. Corporate sustainability hinges on the three components of triple bottom line, namely social, environmental and economic. Triple bottom line argues that companies should not only thrive on economic objective alone but should also concern themselves with societal and environmental issues affecting their operations. Based on stakeholder and legitimacy theory, which explains the interaction of several groups with the company, and the desire to seek justification for corporate action managers must be able to determine how their organizations can become more socially responsible, ecologically sustainable, and economically competitive. This has led to the development of sustainability accounting; as an accounting mechanism for measuring and reporting on the triple bottom line of a company. The ultimate goal being to report outcomes of the three dimensions of sustainability.

The study makes the following recommendations for corporations:

- sustainability should form part of the overall business strategy. Managers should consider both the risk (macro and micro) and opportunity (internal and external) which it presents (Hutton *et al.* 2006). The three perspectives of sustainable development are interdependent; therefore, actions should be directed at economic, social and environmental domains. They should use systems for tracking social and environmental costs of activities, and where possible expert consultations and advice should be sought. Actions most often lead to results. A critical result for any firm is access to capital (Hutton *et al*. 2006);
- directing corporate attention to social and environmental issues may also generate tensions within the board room, therefore corporations are advised to create sustainability committees with the corporate board or embed them as part of their governance committees. The key is to have "a system in which all stakeholders feel they get a fair hearing, and in which commonly held values will be maximized over time" (Hutton *et al.* 2006);
- companies are also encouraged to adopt the use of sustainability reports as against conventional reporting, this holistic reporting system would be of more benefit to stakeholders as environmental and social impacts are assessed in addition to economic performance areas. This report can be part of annual financial reports or stand-alone reports issued quarterly, half yearly or annually, the frequency may also depend on the nature of activities which the companies engage in. A joint study by Ernst and Young and Boston College Center for Corporate Citizenship identified sustainability reports as a differentiator in competitive industries, which could foster investor confidence, trust and employee loyalty;
- the development of regulations and local rules backing sustainability practice should also be encouraged. Countries have different environmental and cultural setting, laws that are peculiar to particular national states would enhance the conservation of particular natural resources which the country has added competitive advantage. The non-existence of standards in the country leads to lack of uniformity in disclosure, and, therefore does not influence social and environmental practice in Nigeria (Musa *et al.* 2015).

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Database System for Storing Business Data Using in-Memory Database

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Abstract:

The goal of this article is to describe a system for storing business date with the use of In-memory database. The advantage of this paper is its universality. In paper are described the needs of the system which is designed for monitoring of any enterprise. Stored data can be subsequently used for complex data analysis. Part of the monitoring system are the four basic operations: adding a new type of object, adding new objects for monitoring, adding monitored criteria, and adding data about monitored objects. Paper presents an object data model which is suitable for having all data in main memory which will efficiently store business data. This paper also briefly presents the issue In-memory database systems and decision support systems because this proposed monitoring system may serve as a suitable part of complex decision support system.

Keywords: data storage systems; data modelling; in-memory database system.

JEL Classification: C80.

Introduction

The present time is characterized by the limited availability of resources (Turcinek, Motycka 2012). In addition to non-renewable natural resources businesses (as well as the whole society) are also restricted by the limited availability of renewable resources. And human resources are not an exception. Then absolutely everyone complains about lack of time (time resources) and money (financial resources). In this context obviousness of the demand for all the aforementioned resources constantly growing is schizophrenic. Decision-making processes in this area among other things lead to solving optimization problems with their management, selection, and use.

The problem's solution consists of two essentially separate stages:

- the phase of monitoring relevant processes and phenomena, which usually leads to the solution of the database of primary data, data derived from them (indicators) as well as the calculation of complex data (aggregates, derivative, etc.);
- the evaluation stage out over the available data.

The current business world is undergoing consistent change. To survive in the current competitive environment companies, have to be able to respond to such changes (Antlova 2009). One of the key aspects of a successful company is the key ability to react quickly and effectively to changes (Kosicek *et al.* 2012).

To increase the quality of production belongs to management goals of every single business, whether production means products or services providing (Simonova 2012). Managerial decision making is a process that is based on a complex dynamic environment (Turcinek, Landa and Koubek 2014). Managerial decision making is often based on empirical research. The first step of any empirical research is data collection. Empirical research is highly dependent on the quality of the data used (Mauša, Grbac and Bašić 2016). Today, companies are handling increasing amounts of transactional data (Hodinka *et al.* 2014). With computers introduction in the office, administrative functions have got a new generation of these tools for information processing and communication (Capek 2013). Perception of ICT is gradually transformed from something rather unique, bringing a competitive advantage in the market, to the necessity conditioning existence or not the existence of a business between competitive business organizations (Chalupova, Motycka 2008). Information systems are to ensure enough information and transfer it according to a company's need, in relation to a company´s organizational structure (Myskova 2009). As Vorisek, Pour and Buchalcevova (Vorisek, Pour, Buchalcevova 2015) stated: rising of complexity and heterogeneity of technological infrastructure and enterprise applications together with the growing

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possibilities of information service providers have contributed to a demanding management of business informatics. Through a change in culture and use of an intermediary between end users and the larger information technology area, a significant success was achieved for all involved (Foster *et al.* 2015).

Disk access performance is a major bottleneck in traditional information retrieval systems. Compared to system memory, disk bandwidth is poor, and seek times are worse (Strohman, Croft 2007). Main memories are becoming sufficiently large so that most OLTP databases can be stored entirely in main memory (Levandoski, Larson, Stoica 2013), (Kallman *et al.* 2008).

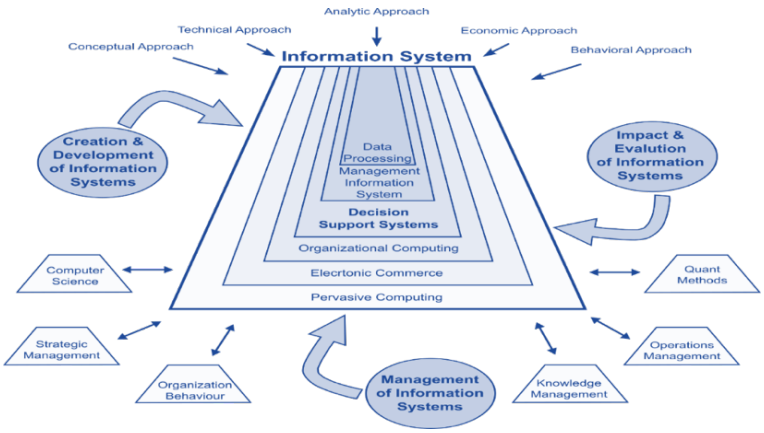
Observing behaviours, trends, and patterns on multivariate time series have been broadly used in various application domains, such as financial markets, medical treatments, economic studies, and electric power management (Ngan, Brodsky 2013). Data and information are becoming primary assets for many organizations (Demirkan, Delen 2013). Collecting particular data from many sources successfully and for a long period brings a hard additional problem. People cannot, due to the data volume, process the data manually within an acceptable time (Darena, Zizka, Prichystal 2014). In the past decade, corporations are increasingly engaging in efforts whose aim is the analysis and wide-ranging use of big data (Jukic *et al.* 2015). Big data has become an important topic in science, engineering, medicine, healthcare, finance, business and ultimately society itself (Yu, Mu, Ateniese 2015). The goal of this paper is to describe a system for storing business data with the use of In-memory database. In the paper, there will be described the needs of such a system and a data model which is designed for storing such data in main memory which will efficiently store business data.

1. Decision support system

Decision support systems (DSS) mean interactive computer systems, which assist decision making subjects to utilize both data and models to solve non-structured issues (Klimes, Farana 2014). Shim *et al.* (2002) define that DSS is computer technology solutions that can be used to support complex decision making and problem-solving. DSS is often proposed as a remedy to overcome the difficulties and complexities involved in such decision processes (Erdem, Göen 2012). They have evolved from two main areas of research—the theoretical studies of organizational decision making and the technical work.

Decision support systems include the main area of problems of information systems (IS), they are one of several significant expansions that have occurred in the field of information systems (shown in Figure 1).

Figure 1. Decision support systems – indispensable elements at the core of the IS field



Source: Burstein, Holsapple (2008)

The area of decision support systems (DDS), as a subject of research and practice, continues to grow toward the endless horizons, this area is often associated with other extensions of IS (Burstein, Holsapple 2008).

2. In memory database system

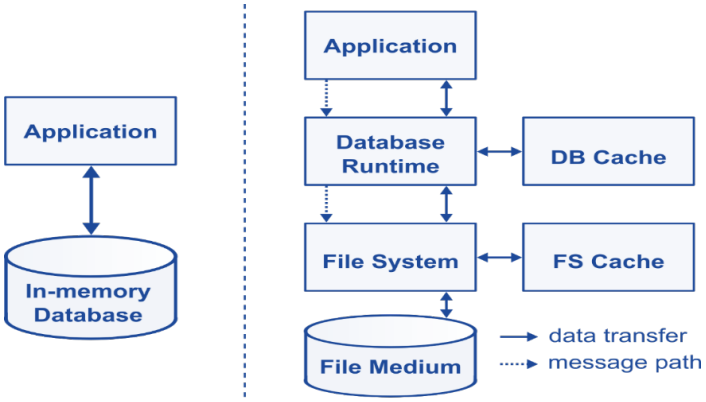
In-memory databases, which keep the full data set in the main memory for reading accesses, and their application in business information systems, receive more and more attention (Loos 2012). Main memory systems present a unique set of challenges and opportunities. Due to the architecture of modern CPUs and their complex cache hierarchy, comparing the performance of different main-memory layouts can be challenging (Grund *et al.* 2010).

In-memory databases are developed to keep the entire data in main memory. Compared to traditional database systems, read access is now much faster since no I/O access to a hard drive is required. In terms of write access, mechanisms are available which provide data persistence and thus secure transactions. In-memory

databases have been available for a while and have proven to be suitable for particular use cases (Loos *et al.* 2011).

At first sight, the dramatic explosion of the (Internet accessible) data volume may contradict this premise of keeping all transactional data main memory-resident. However, a closer examination shows that the business critical transactional database volume has a limited size, which favours main memory data management (Kemper, Neumann 2011). One of the advantages of In-memory database systems compared to disk oriented systems is represented by Figure 2 where (Graves 2012) describes a data flow in both approaches.

Figure 2. Comparison of In-memory system and disk oriented system



Source: Graves (2012)

3. Process of collecting data

In any business, there are objects or entities the data of which must be kept usually for further evaluation and for obtaining information how to optimize business processes. These objects can be departments, employees, etc. Usually, they can be divided into groups according to their meanings (*i.e*, they are of the same type). In some cases, a hierarchy can exist between these objects (*e.g*. the employee belongs to a department). These objects are described by the individual characteristics.

Under the term characteristic, it is necessary to imagine any description of data that will be stored about the object. There can be various kinds of characteristics. For example, when we register the names of employees, it is a single piece of information, although over time it could theoretically change, but the current is only one. A similar example can be an address, *etc*. However, there are characteristics which need to be stored repeatedly. As an example, there can be used evidence of arrival and departure to work, the values of which may vary each day and usually have a validity at a given time.

Let's consider a situation where we have an employee which sales our products. In the moment he/she enters into a contract, the system should be aware of it and store that information. It is clear that the employee may enter into tens, hundreds or thousands of such contracts.

Such a statement, however, can be described by more characteristics. For example: What kind of action it is (number of selling pieces)? Which product it is? In what region the sale took place? Depending on company´s requirements monitored characteristics may vary, and there may be a different number. However, even thus characterized information may occur more over the time. Therefore, it is always necessary to keep a timestamp when this information was recorded.

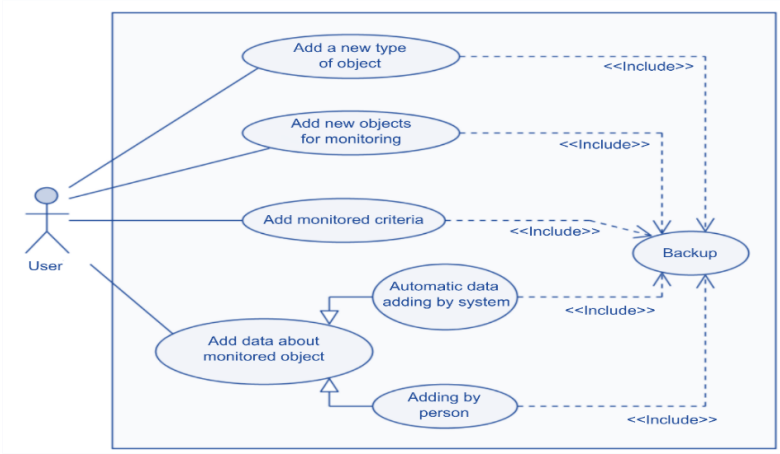
Such characteristics may occur across the enterprise plentifully. Among individual characteristics, there can occur some links. For example, a city located in a specific region, and therefore it would be certainly inefficient to characterize both the city and region. For this purpose, it is necessary to create categories and subsequently ensure that a given category can be chosen to describe the data, only one characteristic. Even so, it could lead to the formation of senseless combinations of characteristics.

It is certainly possible to imagine that some data items about an object are mandatory, some are optional and others are meaningless, and therefore should be not kept. The fact that the characteristics and their combinations make sense for the object type has to be decided by the management of the company. In addition to transaction data, there is often a demand for aggregate data storage in data warehouses that will allow a faster and easier data analysis. Data in data warehouses is often described by dimensions. These dimensions are described in our case by individual characteristics. Due to the proposed model, it will be easier to decompose the data. Over the stored data it will then be possible to perform a complex data analysis by using data mining tools.

4. Requirements for monitoring system

A summary of the functional requirements of the monitoring system is graphically summarized in the use case diagram. The monitoring system has been designed exclusively for storing necessary data for a subsequent analysis. It will include four basic operations: adding a new type of an object, adding new objects for monitoring, adding monitored criteria, adding data about monitored objects.

Figure 3. Use case diagram for monitoring phase

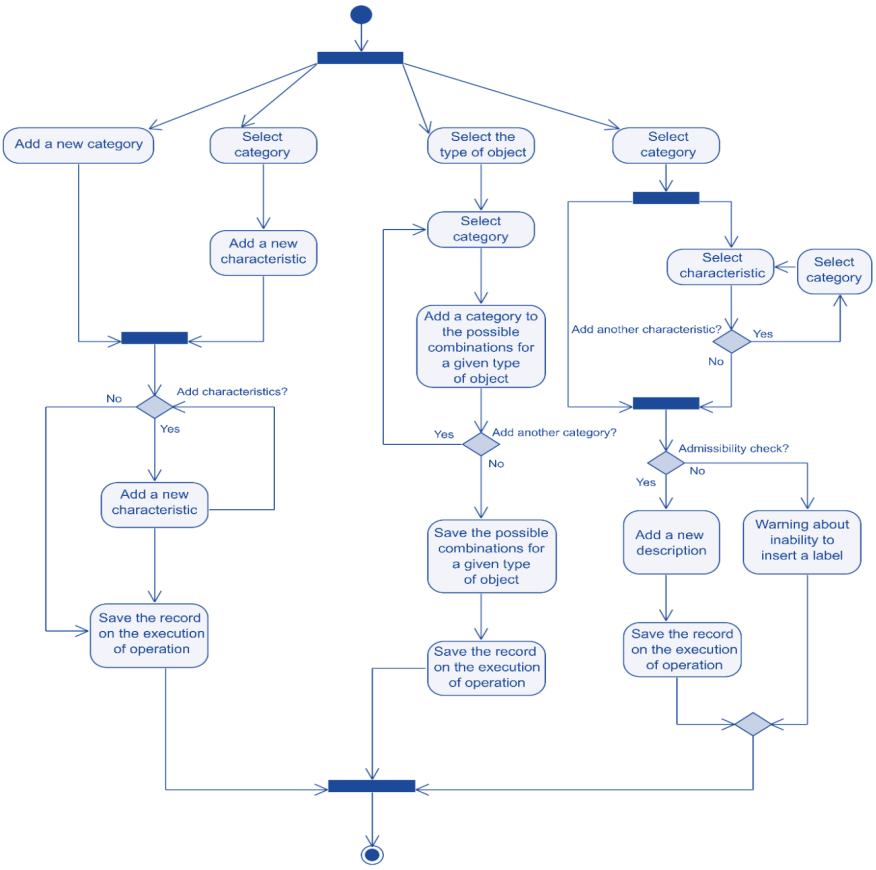


Source: Own

To prevent the loss of data for whatever reason, it is necessary to perform backups of all operations carried out. Thanks to the backup, it will be possible to restore the system to the desired state.

Operations of adding a new type of an object and adding a new monitored object will be not further described because their purpose and meaning is clear. The operation of adding monitored criteria is more complicated, and therefore the content of the operation is shown in an activity diagram.

Figure 4. Activity diagram - adding monitored criteria



Source: Own

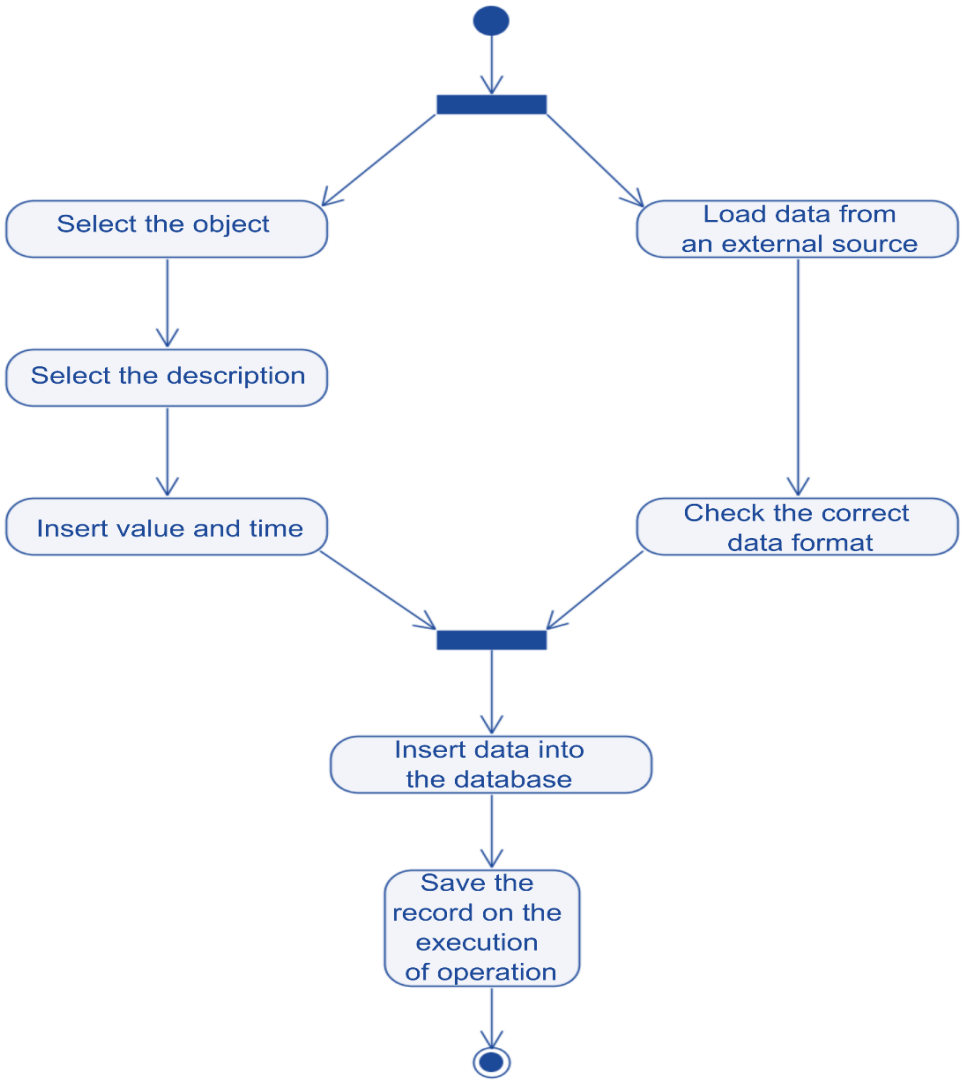
As it is shown in the diagram (Figure 4), there are four variants that may occur during this operation. The first one is to add a new category. As for this newly added category, it is subsequently possible to add its characteristics to it. The second option is to add characteristics to an existing category, as in the first variant, it is possible to add more of such characteristics. The third option is to add a description of the stored data. The stored information can be described by either category or several characteristics. After creating such a description, it is necessary to verify whether the combination is allowed at least for one type of the object. If that is so, it stores the information into the database. Otherwise, the user is notified that such a description is not possible to create. The fourth option adds an allowed combination of categories for the selected object type. In this case, it is necessary to select the object type as the first step. The next step is to choose categories for combinations and finally, to store this combination. Then it is mandatory to save a record of this operation for backup purposes for all options.

The use case diagram in Figure 3 shows that the addition of data on monitored objects can be done in two ways. Both are shown in the Activity diagram from the Figure 5.

When the data is inserted through the system, at first the user must select the object to which the added data belongs. As a next phase, the description of data must be chosen. After that, the user can enter the corresponding value marked with a timestamp.

In the case of entering data from external sources or even a larger number of prepared data, it is necessary to have a tool that allows such import. It is necessary to have a structured entering data so that the import is carried out in order. When importing, data it is advisable to choose a suitable format. For the purpose of data input that can be described by different numbers of dimensions, it seems convenient to use the application XML.

Figure 5. Activity diagram - adding data

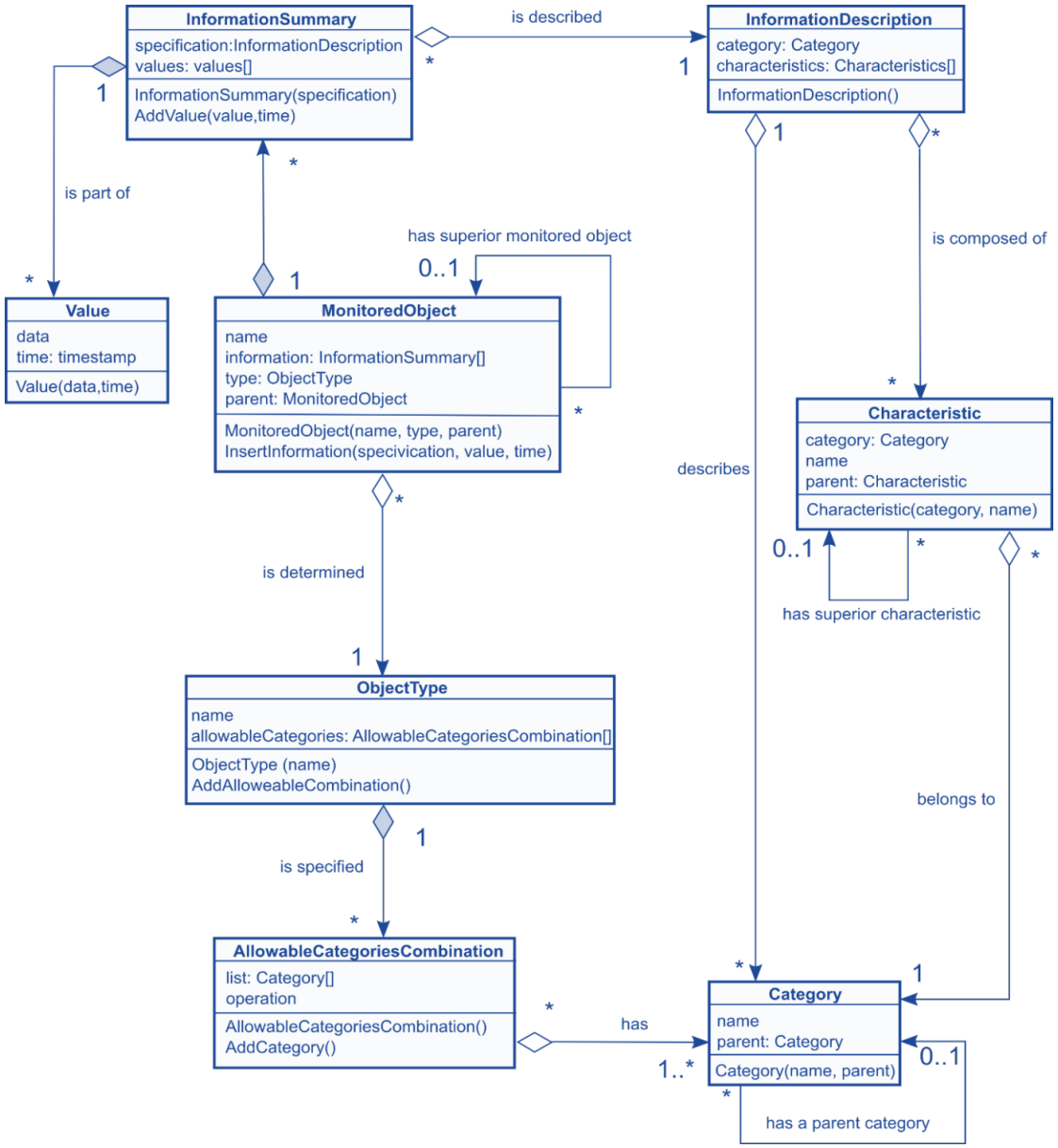


Source: own.

5. Data model design

In order to carry out the subsequent evaluation of monitored characteristics, it is necessary to have data stored. The following text will present a model, how is it possible to store monitored data to keep the system as versatile as possible. This model will be object-oriented to allow to store data directly in main memory. Because it is possible to maintain all the data in memory, the system can take advantage of the principles of In-memory database systems

Figure 6. Class diagram



Source: own.

This model is designed so that all required information about all of the monitored objects will be retained. This information will be stored in an appropriate manner as attribute *information* of objects of the class *MonitoredObject*. Attribute *information* will represent an array of objects of the class *InformationSummary*. The attribute *type* determines the object type of this class. It is a reference to an object of the class *ObjectType*. *InformationSummary* class will include two attributes:

- *specification*: describes a stored object. This attribute will point to the object of the class *InformationDescription*. The same description of data may be used for several different objects of classes *MonitoredObject*.;

- *values*: stores all the values related to the object of the class *MonitoredObject* and meets the specifications describing this information. As mentioned above, there can be more values, so for that reason, they will be stored in an array. Elements of this array will be objects of the class *Value*.

Class *Value* has two attributes. The first one is the attribute *data* that will keep the monitored value. The attribute *time* will save information about the time at which it covers the data storage.

Objects of the class *InformationDescription* are used to describe data. Description of data can be divided into two possible versions. The first one is for example for characteristics like name, date of birth, etc. This kind of data can be described by one dimension. Within the category, there is no other option. You could actually understand it as a characteristic. Therefore, description of such information is made up just as a reference to the object of the class *Category*. In such cases, the attribute *characteristics* will remain empty. The second variant is data such as the number of units sold, the number of complaints filed, *etc*. There may be added characteristics such as: where it happened, what product is involved, who is responsible etc. Attribute *characteristics* for such objects of *InformationDescription* class is an array which consists of links to objects of the class *Characteristic*.

Objects of the class *Category* serve primarily to a division of characteristics into groups. Furthermore, Category may serve for purposes of data description. Among the various objects of this class, there can be hierarchical relationships (*e.g.* region -> city).

Objects of the class *Characteristic* are used for the description of the data and are divided into categories based on the value of its attribute *category*, which is a reference to the object of the class *Category*. Even here may exist hierarchical relationships, replicating the relationships between categories.

As already mentioned, objects of the class *Object Type* serve to categorize objects of the class *MonitoredObject*. Allowable combinations of categories, by which the monitored data objects can be described are then stored as an array of references to class objects *AlowableCategoriesCombination*. This model does not address whether or not the combination for a given type of object is required.

Objects of the class *AlowableCategoriesCombination* contain a single attribute *list*, which is an array of references to objects of the class *Category*.

In this object model which is represented by the Class diagram in Figure 6, there are also constructors and other methods which are needed for a monitoring system. However, their list is not complete. It will be necessary to create for example a method for import of external data *etc*.

Conclusion

The aim of this paper was to describe a system for storing business date with the use of In-memory database. The advantage of this paper is its universality. In the paper there are described the needs of the system which is designed for monitoring of any enterprise. Stored data can be subsequently used for a complex data analysis. Part of the monitoring system are the four basic operations: adding a new object type, adding new objects for monitoring, adding monitored criteria, and adding data about monitored objects.

The paper presents an object data model which is suitable for having all data in main memory which will efficiently store business data. This paper also briefly presents the issue of In-memory database systems and decision support systems because this proposed monitoring system may serve as a suitable part of a complex decision support system such as management cockpit (Turcinek, Landa, Koubek 2014).

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Agent Based Modeling and Simulation for Home Financing. Application in Netlogo Platform

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Abstract:

The major goal of this paper, was to study in the first part the situation of the Home Financing by using the Agent Based Modelling (ABM), and the Agent Based Simulation (ABS) approachs based on the (ABMS), we made a comparative analysis between the different types of home financing contracts. In this study we focused on home financing contracts proposed by Conventional Banks (conventional mortgage), and the Islamic Banks (diminishing partnership mortgage-Mudaraba[20] mortgage). The use of the (ABM) approach, was to identify in the first part, the different link (points of similarities and differences) that can relate our agents (Home financing conventional bank - islamic bank-real estate market). And approve these interactions by using the (ABS) to simulate agent's synergy. And to illustrate in the second part, the influence of the owners' choice on the real estate market.

Keywords: agent based modeling; simulation; home financing; islamic bank; conventional bank; real estate market.

JEL Classification: R30; R32; G20; G24.

Introduction

To analyze real estate finance systems, we need effective tools, because of the complexity of the problem and the interdependence of several economic factors. Conventional modeling tools are no longer applicable, that why scientists and practitioners search for a more realistic view of these systems complex, what is possible using agent based modeling and simulation (ABMS).

The (ABMS) was recognize as the third way of doing science, "in addition to traditional deductive and inductive reasoning" (Axelrod 1997). Computational advances have made possible a growing number of agent-based models across a variety of application domains. Applications range from modeling agent behavior in the stock market, supply chains, and consumer markets.

ABMS has been applied to a broad range of domains in home financing (subprime crush-banks behaviorcustomer behavior-investor behavior-influence on the real estate market). These applications primarily fall into two methodological paradigms: individual-based models that study personal behavior of agents (consumers; investors; Islamic and Conventional banks) related to home financing and computational methods that study a collaborative and reactive home financing system (interactions between the different agents) that exhibits intelligence by modeling a collection of autonomous decision making of subsystem entities (agents).

This paper is a continuity of a paper (Aboulaich and Yachou 2016) it's present in the first part an introduction to agent based modeling concept and tools; in the second part we introduce home financing us a complex system; we propose an multi-agent based model which we simulate by using Netlogo-Platform, in order to study the different interactions that link agents using home financing from Islamic and conventional bank; In the final part, the agent based simulation results show the impact of the simulation on the Real Estate Market.

1. Model materials

Agent based modeling and simulation (ABMS) is a new approach to modeling systems composed of autonomous, interacting agents. Agent-based modeling is a way to model the dynamics of a complex systems and complex adaptive systems. Such systems often self organize themselves and create emergent order. Agent-based models

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also include models of behavior (human or otherwise) and are used to observe the collective effects of agent behaviors and interactions. The development of agent modeling tools, the availability of micro-data, and advances in computation have made possible a growing number of agent based applications across a variety of domains and disciplines (Gray 1998).

The concept of "agent-based" has been used to characterize the type of modeling approach that focuses on the individual behavior, and builds the image of the entire system based on the mutual interactions of the individuals.

Agent-based modeling is a term that is not associated with a specific mathematical computational algorithm. It is a modeling concept, in which many "agents" exist, and each behaves in a certain manner (says, "wander," "avoid," and "explore."). In general, a multi-agent system can be described as a system composed of physical individuals (robots for example) or "virtual" (artificial) ones that communicate among themselves, cooperate, collaborate, exchange information and knowledge, and perform some tasks in their environment (Rhee 2002).

The use of agent-based simulation models (ABMs) for researches is growing rapidly in a number of fields. For example, a steady, sharp increase in the number of ecology publications using IBMs started in about 1990 (Angelis 2005). This growth is driven primarily by the ability of these models to address problems that conventional system-level models cannot, but has been accelerated by the evolution of theory and strategies for doing science with ABMs and by the growing number and quality of software platforms for agent-based simulation (Grimm 2005).

Software development remains an obstacle to the use of ABMs for many researchers. However, this problem results in large part from absence of training in software skills in the education of researchers in many fields that use ABMs (*e.g.*, biology, ecology, economics, political science, sociology), and the computer skill that is taught programming is not the only one, or even the most important one, needed for developing ABMs (Minar 1996).

Most of the commonly used ABM platforms follow the “framework and library” paradigm, providing a standard of concepts for designing and describing ABMs along with a library of software implementing the framework and providing simulation tools. The first of these was Swarm (Grimm 2005) the libraries of which were written in Objective-C. Java Swarm is a set of simple Java classes that allow use of Swarm’s Objective-C library from Java. After that Repast (Tobias 2004) was started as Java implementation of Swarm but has diverged significantly from Swarm. Most recently, MASON (Luke 2005) is being developed as new Java platform.

In this work we used NetLogo plat-form 5.0.4, which is a multi-agent programming language and modeling environment for simulating individual and collective behaviors. Netlogo was designed for research and education and used across a wide range of disciplines and education levels (Naciri 2015). Although NetLogo recognized as a high-level platform that allows one to build and learn from simple agent-based models, it now contains many sophisticated capabilities (behaviors, agent lists, and graphical interfaces). NetLogo contains its own programming language that is simpler to use, admits an animation display automatically linked to the program, and optional graphical controls and charts. NetLogo also provides a classroom participatory simulation tool called *HubNet*. Models and Hub Net activities can be executed as Java applets in Web browser. NetLogo provides an error checker and makes it easy to develop and try code in small steps, but it lacks integrated development environment features, such as a stepwise debugger.

Reproducibility may be a concern for some scientific users, because NetLogo does not provide immediate access to the algorithms. (Minar 1996). NetLogo is highly recommended, even for prototyping complex models, it’s environment enables exploration of emergent phenomena. In addition to its comprehensive documents and tutorials, netlogo also comes with a library of models and a large collection of pre-written simulations that can be used and modified. Railsback (2004) argued that NetLogo is suitable for developing models that are compatible with its paradigm of short term, local interaction of agents and a grid environment, and not extremely complex. It is even recommended for developing prototyping models that may be implemented later by using lower level platforms.

Starting to build a model in Netlogo can be a quick and thorough way to explore design decisions. Its intermediate execution speed may not be a significant limitation for many applications, especially compared with the potential reduction of programming time (Budenske 1998). In this paper, we jugged that Netlogo platform 5.0.4 is the most adequate platform to our complex system.

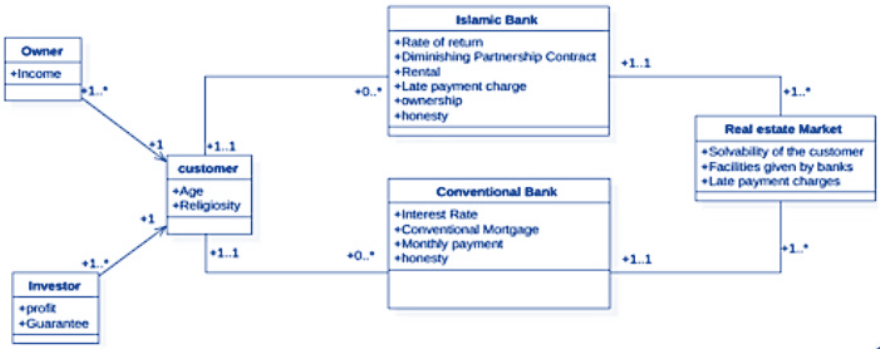
2. Model description

In our paper, we used the agent-based modeling approach to study the interactions between customers and conventional or Islamic banks. In the first part, the agent-based model simulates autonomous individual components, called agents (customers, investors, conventional banks, Islamic banks) that each follow a set rules governing their behavior and interaction.

These simulations will be used as a dynamic representation of concepts, to help customers and investors to make the connection from qualitative description to functional representation. Agent based modeling can be used to test how changes in individual behaviors will influence the system's emerging overall behavior. In order to simulate the evolution of the real estate market, we use four essential agents which are: Islamic banks- Conventional banks- customers- real estate Market.

Firstly, we have to characterize every agent. In the second part, we will study the different interactions that link agents. The idea of the model is to present, depending on a several parameters: customers' behavior (Age- Religiosity- Income- guarantee); and investors behavior (Age- Religiosity- guarantee- profit), for choosing between Islamic banks (Rate of return - Diminishing contract - Rental-Late Payment Charges - Ownership-Honesty), or Conventional banks (Interest rate-Conventional Mortgage-Monthly payment-Honesty). Also, to identify the real estate market behavior after customers and investors decision.

Figure 1. Agents interaction



The considered complex system was presented in two diagrams; each one presents a specific approach. The first diagram evaluates in the first part, the owner's decision by choosing between conventional and Islamic banks for home financing; and in the second part, the diagram show the influence owners decision on the real estate market. The second diagram evaluate in the first part, the investors decision by choosing between conventional and Islamic banks for home financing investment. In the second part, the diagram shows the influence investors decision on the real estate market.

For owners

The owner diagram figure, presents in the first part the capacity of owners to choose between conventional and Islamic banks for home financing; and in the second part, the diagram shows the influence owners decision on the real estate market.

The diagram includes:

- agents parameters (islamic banks- conventional banks-owners- real estate market);
- agents interactions (islamic banks- conventional banks-owners- real estate market);
- agents decision (owners);
- agent behavior (real estate market);
- neighbors influence.

Table 1. Main agents, markets, and messages in the model

Agents	Context	Rôles	Messages
Owners	Credit market	Borrower	Loan request
Islamic banks	Credit market	Lender	Credit conditions
Conventional banks	Credit market	Lender	Credit conditions
Real estate market	Real Estate Market	Simulator	Islamic and Conventional Mortgage influence

For Investors

The diagram evaluates in the first part, the investors decision by choosing between conventional and Islamic banks for home financing investment; and in the second part, the diagram show the investors decision influence on the real estate market.

The diagram includes:

- agents parameters (islamic banks- conventional banks- investors - real estate market);
- agents interactions (islamic banks- conventional banks- investors - real estate market);
- agents decision (investors);

- agent behavior (real estate market);
- neighbors influence (investors).

Table 2. Main agents, markets, and messages in the model

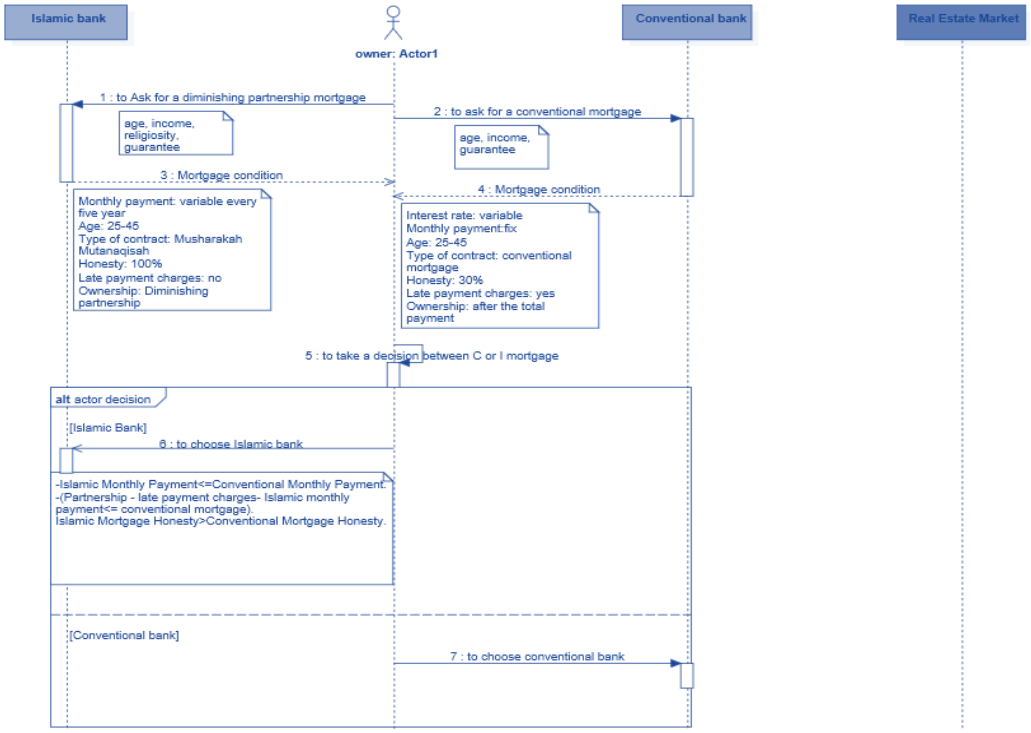
Agents	Rôles	Messages	Context
Investors	Borrower	Loan request	Credit market
Islamic bank	Lender	Credit conditions	Credit market
Conventional banks	Lender	Credit conditions	Credit market
Real estate market	Simulator	Islamic and Conventional Mortgage influence	Real Estate Market

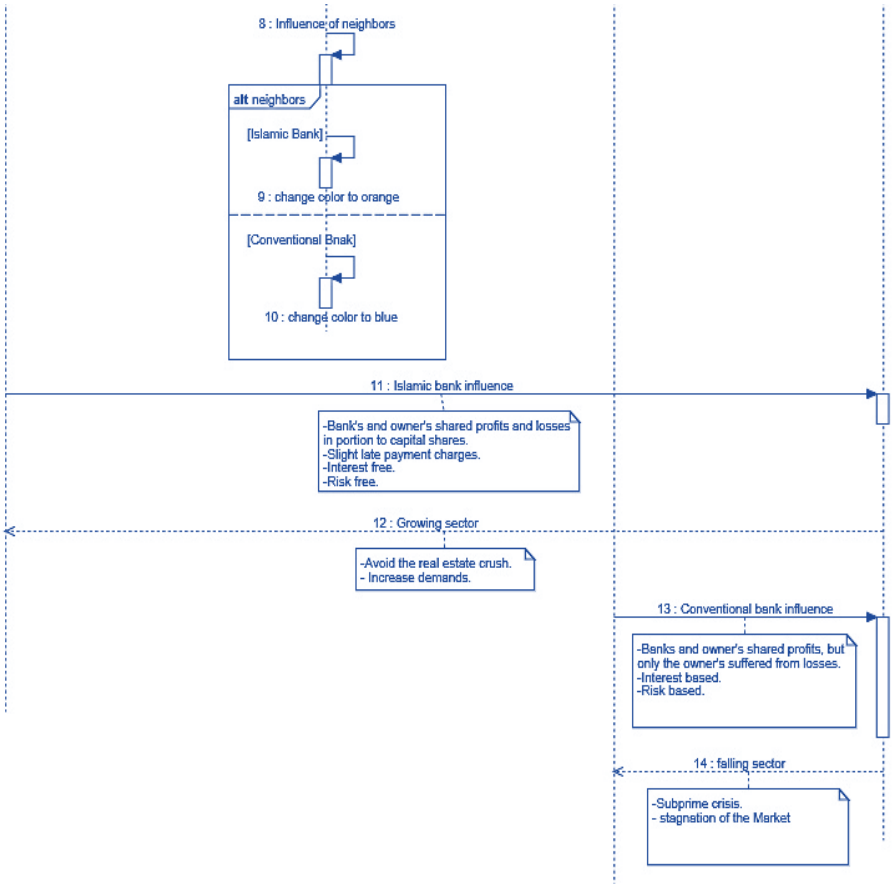
2.1. Unified Modelling Language (UML) chart flow

2.1.1. Owner diagram

The idea of the simulation in the first part is to give the owners, depending on a several parameters, the right to choose between Conventional and Islamic banks, also to study the influence of neighbors of customer decision. In the second part, the goal is to study the influence of customer's choice on the real estate market.

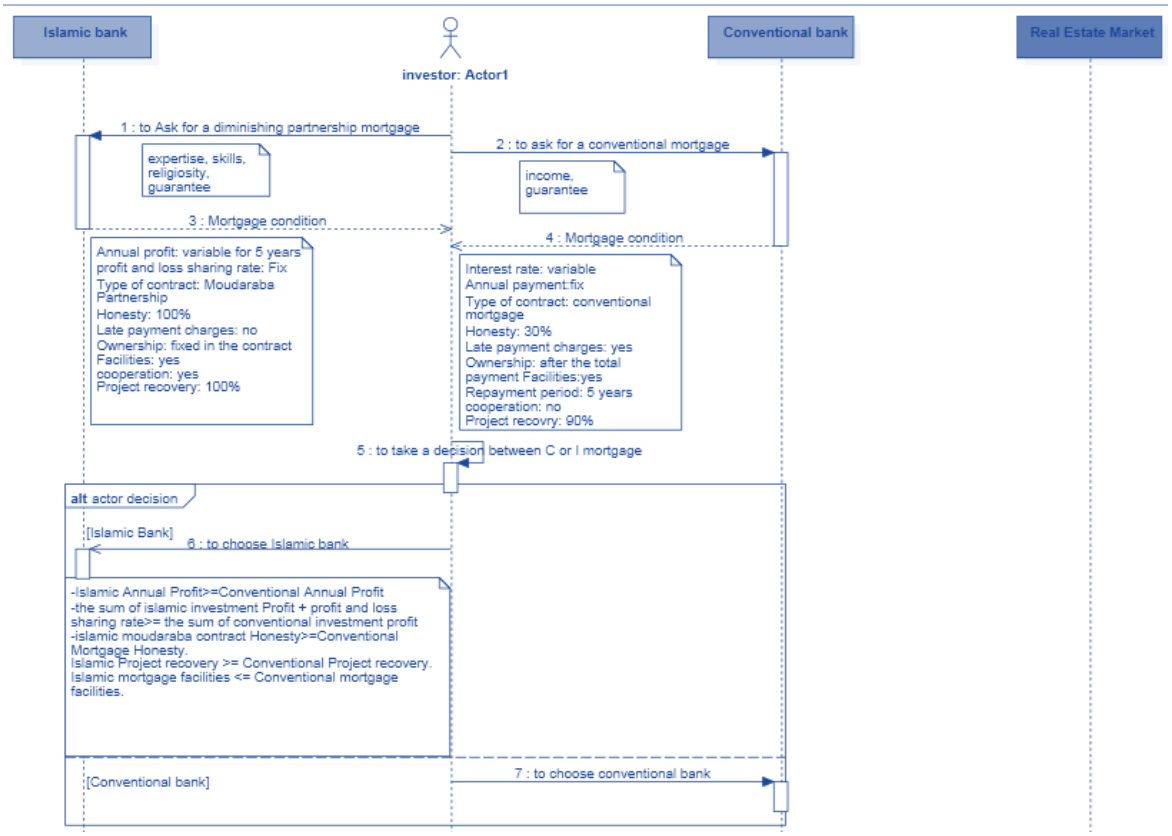
Figure 2. Owners diagram

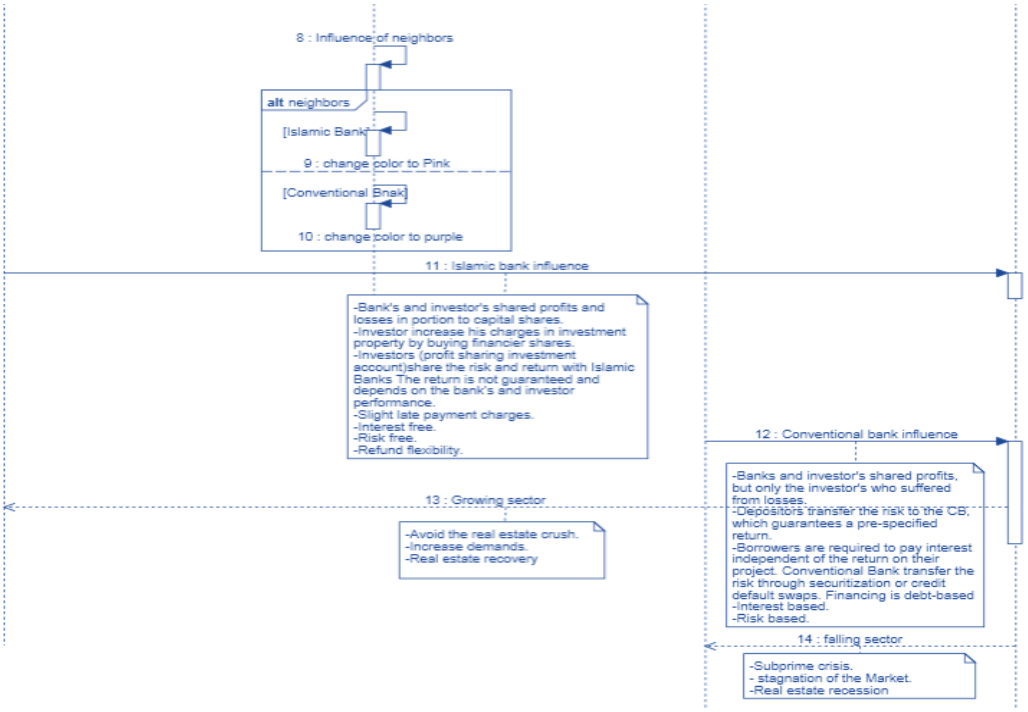




2.1.2. Investor diagram

Figure 3. Investors Diagram





The algorithm gives a specific idea about the considered complex system like investor's behavior in choosing between Islamic or conventional banks.

2.2. Program description

2.2.1. Input Parameters

In the simulation, customers will choose between Modified Diminishing Partnership Contract and Conventional Mortgage based on a sevral parameters. Before simulation, we need to identify the parameters of Islamic and Conventional Contract. These global parameters are set by user in NetLogo interface.

For customers

The customer Netlogo interface is composed of:

- number of owners is used to set customers number in the study;
- religiosity is used to set customer's religiosity preference;
- neighborhood: is used to set neighbors influence;
- type of contract.

Diminishing Partnership Parameters:

- Monthly payment is used to set the customers reimburesement which is equal to:

  Rental + Redemption **(**Aboulaich and Yachou 2016) (see Apendix1)

- Variable Rent every 5 years: rent *0.2 (inflation)

$$R_j = \frac{A}{N+1}\left[1+\frac{A}{(N+1)B}\right]^{J-1} \quad (1)$$

where: R_J is Additional periodic payment by customer to redeem the financier's equity; *A* is Periodic rental; M = R + A, is the total periodic payment; *B* is Financier's contribution into the partnership; *C* is Customer's contribution into the partnership; *N = B/C*; *J* denotes total years that customer need to own the house.

- Ownership is used to set the financier's and customer's ownership; based on that, financier's shares reduce over time as the customer purchases a share with each monthly payment. The periodic payments of the customer can be divided into two parts; the first part is paying a proportionate rental to the financier based on the financier's shares of the property and the other part, the equity contribution to buy out the financier's share of the equity.

- Gradually, over time, the customers are able to buy out the financier's shares until they complete the ownership of the property.
- Profit and Loss Sharing is used to set the financier's and customer's profit as stipulated in the contract, while losses are shared in proportion to capital shares.
- Late payment charges are not allowed in the Islamic Bank.

Conventional Mortgage Parameters:

- Interest rate is used to set the conventional banks profit.
- Monthly Payment is used to set the customer's reimburesement, which is defined by the Formula:

$$\mathrm{Pmt} = \frac{\mathrm{i}(1+\mathrm{i})^{\mathrm{n}}\mathrm{PV}}{(1+\mathrm{i})^{\mathrm{n}}\text{-}1} \quad \text{(Ahamed and Dzuljastri 2009) (see Apendix 2)} \qquad (2)$$

where: PV is the present value of the monthly or periodic installments; Pmt denote the monthly or periodic installments (principal and interest); *i* is the monthly or periodic interest rate; *n* is the number of months or periods.

- Ownership is used to set customer's ownership; in this case the property papers remain in the bank until paying of all scheduled amounts.
- Profit and Loss sharing is used to set the financier's and customer's profit and loss sharing contract. This approach is nit applied by conventional mortgage contract indeed The financier and the customer shared profits but only the investors who suffered from losses.
- Late payment charges are used to set conventional banks charges which are a cumulative interests on late payments and defaulting investors.

For investors

In the simulation, investors will choose between Mudarabah Contract and Conventional Mortgage based on a sevral parameters:

Before simulation, we need to identify the parameters of Islamic and Conventional Contract.

- The interface Netlogo of investor's simulation is composed of:
- Number of investor's which is used to set investors number in the study.
- Religiosity is used to set investor's religiosity preference.
- Neighborhood is used to set neighbors influence.
- Type of contract is used to set the proposed islamic and conventional banks mortgage contract.

Mudarabah Contract Characteristics:

- Annual profit is used to set investors annual profit (variable every 5 years)

$$\mathrm{R_j} = \frac{\mathrm{P}}{\mathrm{N}+1}\left[1 + \frac{\mathrm{P}}{(\mathrm{N}+1)\mathrm{B}}\right]^{\mathrm{j}\text{-}1} \quad \text{(Boualem and Tariqullah 1995) and (Elmalki 2011) (see Apendix 3)} \qquad (3)$$

where: *RJ* represents the part of the profit in the investment at the disposal of the contractor in the period *J* with *J* the total year that customer need to got the property of the house; *P* is the profit of the period; *N* is proportionality coefficient of *K* compared to *B*, N > 1; *B* is customer's contribution; K= N*B is Islamic bank contribution.

- Profit and loss sharing rate is used to set the profit shares between financier and entrepreneur. The Profits can be shared in any ratio agreed at the outset of the mudarabah. Losses should be shared according to the financing shares of each part of the outset. The financier's maximum loss is limited to his shares of the financing and the financier must not bear any of loss attributable to invested capital. Any liability is limited to the extent of the total capital contribution made by the entrepreneur, except where such an entrepreneur has allowed the entrepreneur to incur debts on his behalf.
- Ownership is used to set the entrepreneur and financier owership in this case the invested assets remains with the entrepreneur at all times.
- Late payment charges is used to set banks late payment charges which is not allowed in the Islamic Bank.
- Facilities is used to set banks facilities.
- Cooperation is used to set the banks and entrepreneur cooperation not only in the financial side but also in expertise, knowledge, efficiency.
- Project recovery is used to set banks project recovery.

Conventional Contract Characteristics:

- Interest rate is used to set the interest rate applied by Conventional banks;
- Annual payment is used to set the reimbursements of investor's loans;
- Type of contract is used to set the Conventional mortgage contract;
- Late payment charges are used to set the investor's penalty charges;
- Ownership is used to set the investor's ownership;
- Facilities is used to set the the banks facilities;
- Repayment period is used to set banks repayment options;
- Cooperation is used to set banks options;
- Project recovery is used to set banks project recovery.

2.2.2. Agent variables

For customers

- Conventional banks are used to set customer's number who choosed Conventional mortgage;
- Islamic banks are used to set customer's number who choosed Modified Diminishing Partenership mortgage;
- Type of contract care is used to set the pourcentage of contract preference;
- Sample religiosity mean is used to set religiosity customers influenced;
- Care to neighbors is used to set the percentage of neighbor's influence;
- Current customers are used to set the customer's preference between conventional and islamic mortgage;
- Sample's history results are used to set customer's preference in time set.

For investors

- Conventional banks is used to set investor's number who choosed Conventional mortgage;
- Islamic banks is used to set investor's number who choosed Mudarabah mortgage;
- Conventional neighbors influence is used to set investor's neighbors influence;
- Islamic neighbors influence is used to set investor's neighbors influence;
- Sample's religiosity mean is used to set religiosity investors influenced;
- Care to neighbors is used to set the percentage of neighbor's influence;
- Current customers is used to set the customer's preference between conventional and islamic mortgage.

2.2.3. Procedures

For customers

- To setup used to initialize all the agent variables according to the input parameters;
- To go stop when all customers choose between Modified Diminishing Partnership and Conventional mortgage:
  Set 1. Call procedure create- input parameters;
  Set 2. Call procedure create- agent variables;
  Set 3. Call procedure loan decision;
  Set 4. Call procedure customer's decision;
  Set 5. Call procedure neighbors influence;
  Set 6. Call procedure customer's neighbors influence.

For invetors

- To setup used to initialize all the agent variables according to the input parameters;
- To go stop when all invetors choose between Mudarabah and Conventional mortgage:
  Set 1. Call procedure create- input parameters;
  Set 2. Call procedure create- agent variables;
  Set 3. Call procedure loan decision;
  Set 4. Call procedure investor's decision;
  Set 5. Call procedure neighbors influence;
  Set 6. Call procedure investor's neighbors influence.

2.3. Outputs

Different outputs are displayed in this program. First, we introduced a new islamic mortgage called Modified Diminishing Partenership (Aboulaich and Yachou 2016) in comparison with conventional mortgage for customers' home financing.

Secondly, we tried based on input parameters to help customers and investors to choose between the Modified Diminishing Partenership and conventional Contract. The idea is to identifie based on islamic and conventional contract parameters, the most competitive way for home financing.

The last output, is to introduce the neighbors influence; the idea is to identifie after the first simulation, how many customers and investors will be influenced by environment; and how many will change their mode of contract home finance.

3. Simulation results

Several simulations have been performed to understand the relationship between the different parameters. The outputs were devided in customer's and investor's choice to choose between Modified Diminishing Partenership and Conventional contract.

3.1. Customers simulation

Let us consider the first perspective which is customor's decision. We consider a pool of a large number of customers, looking for a mortgage, and have to choose between islamic and conventional mortgage.
The mortgage selection based on islamic and conventional mortgage input paremeters.

Case 1: Mortgage preference based on input and agent variables with no neighbors' influence

Figure 6. Customer's simulation

The capture shows the customer's preference to Modified Diminishing Partenership mortgage conditions.

For Religiosity: 50%, Late payment charges: 50%, Type of contract: 60%, 628 of customers choose Islamic mortgage for home financing through a Modified Diminishing Partnership 372 of customers choose Conventional mortgage for home financing through Conventional Mortgage.

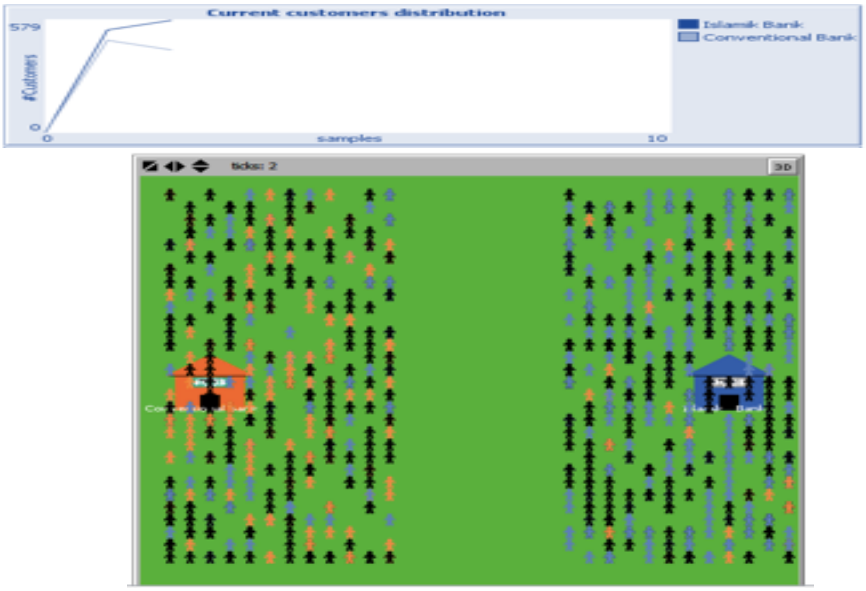
Neighbors influence

After the first simulation, which give us a hight interest to islamic mortgage compared to conventional mortgage we introduce in the second simulation the neighbors influence variable.

Case 2: Neighbors influence in the first period

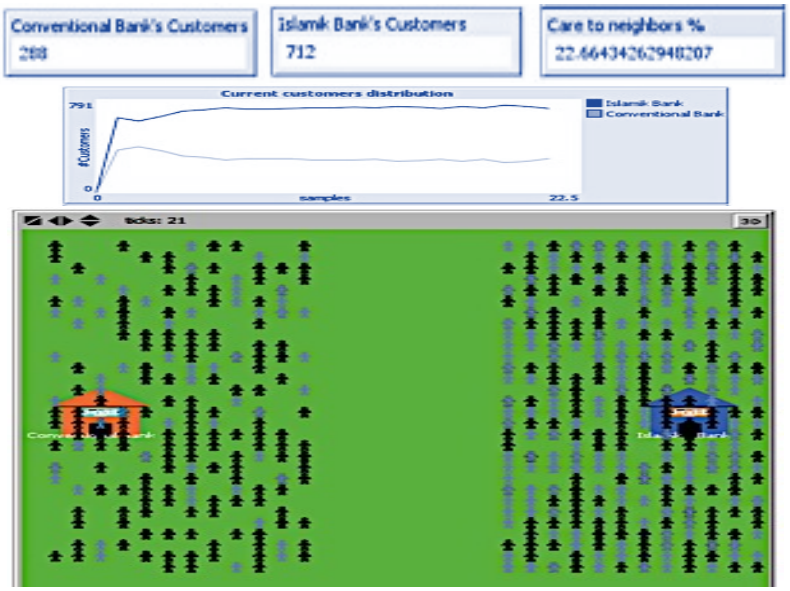
The capture shows customor's relevance after introducing the influence of neighbors' parameter; in the this period; the change color to yellow reveal the preference of the owners to Conventional Mortgage.

Figure7. Neighbors impact in the simulation (first period)



Case 3: Neighbors influence in the total period

Figure 8. Neighbors influence in the simulation (total period)



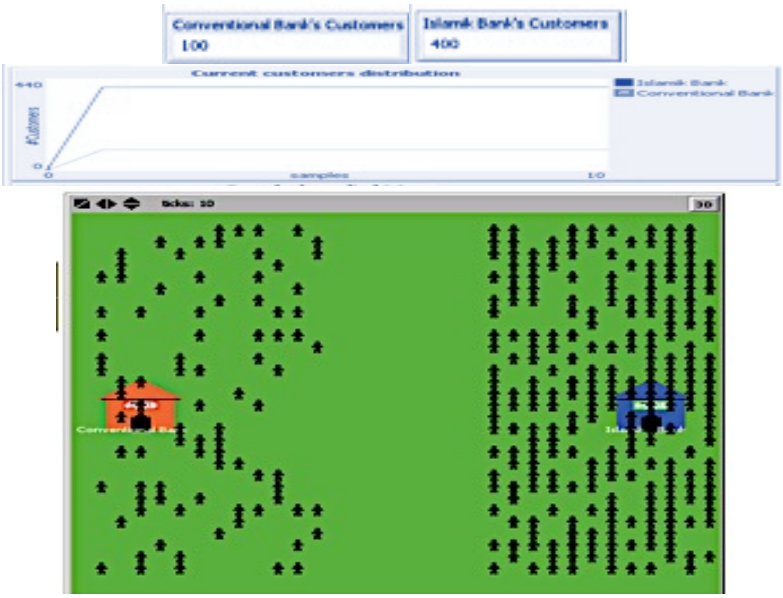
The total simulation shows the changes in customer's behavior; by changing to the blue color, which means that customers showed more interst to islamic mortgage. For 50% of neighbor influence, 22.66 % of customers were influenced by their neighbors. 712 customers choose Modified Diminishing Partnership Contract; and 288 Customers choose Conventional
Mortgage.
For a sample of 1000 customers, 29% suffered from late payment charges.

3.2. Investors simulation

Let us consider the second perspective which is investor's decision. We consider a pool of a large number of customers, looking for an investment mortgage, and have to choose between Mudarabah and conventional mortgage. The mortgage selection based on islamic and conventional mortgage input paremeters.

Case 1: Mortgage preference based on input and agent variables with no neighbors' influence.

Figure 9. Investors simulation



The capture shows the investor's preference to choose between islamic and conventional real estate Financing based on mortgage conditions. For 50% of religiosity, 400 investors choose Mudarabah Contract for real estate investment, and 100 investors choose Conventional Mortgage. For the 500 investors, 25.28% were influenced by religiosity parameter.

Neighbors influence

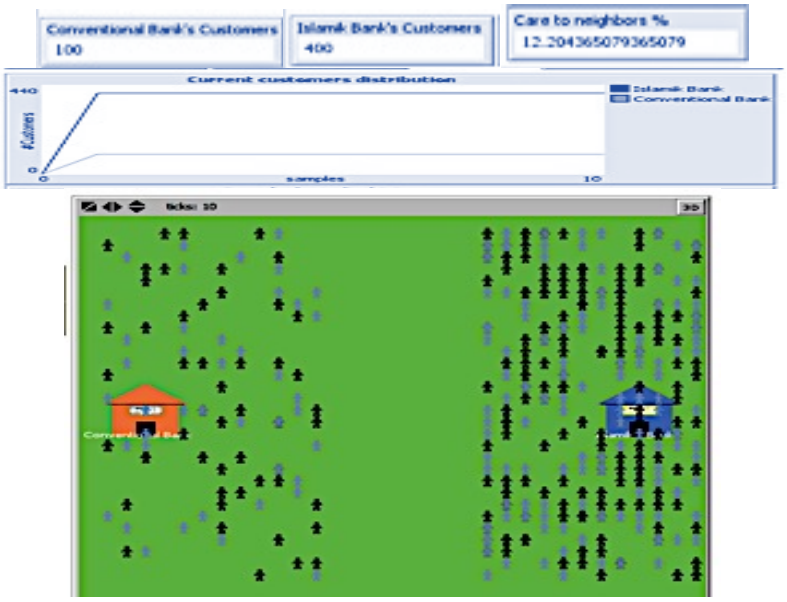
After the first simulation, which give us a hight interest to islamic mortgage compared to conventional mortgage; we introduce in the second simulation the neighbors influence variable.

Case 2: Neighbors influence

By changing to the blue color, the investors show more interest to islamic mortgage, but they didn't change their banks. For 50% of neighbor influence, 12.20% of investors were influenced by their neighbors.

For a sample of 500 of investors, 400 have chosen Mudarabah contract; and 100 investors have chosen Conventional Mortgage. The simulation proved the efficiency of "the agent based simulation" method, for simulating customer behavior for choosing between Islamic and Conventional Mortgage and detecting agent's interactions.

Figure 10. The impact of neighbors' influence



4. Influence on the real estate market

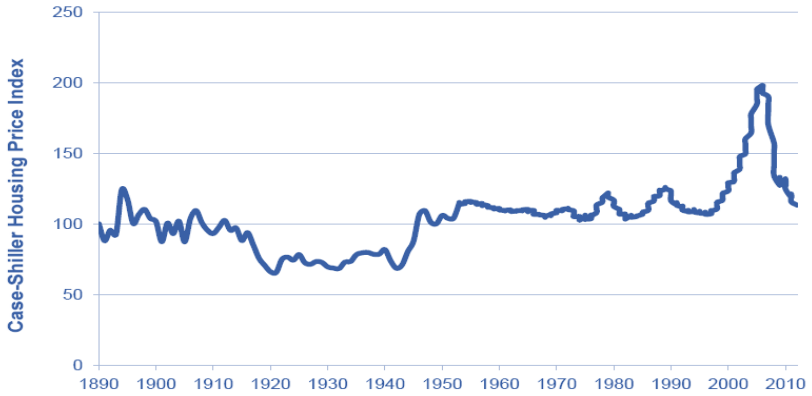
4.1. Influence of the conventional mortgage

The housing bubble was an archetypal bubble. Like others before it, this bubble began innocently enough, as an increase in demand for real estate. As we learned, an increase in market demand tends to increase prices, and the housing market proved no exception (Chapra 2009).

Unfortunately, the increase in home prices fed a speculative frenzy, and millions rushed to buy, believing that prices could only go in one direction-up. The buyers included not only would-be homeowners, but also speculators who were buying simply with an interest in “flipping” the property (reselling at a higher price).

The naive view exhibited by so many is characteristic of earlier bubbles, during which the lessons of the past was ignored (Beck and Quarda 2010).

Figure 11. Historical housing prices

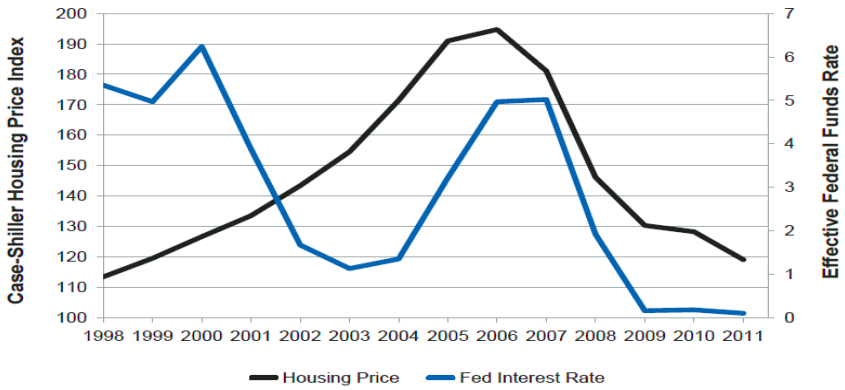


Source: Shiller dataset www.econ.yale.edu/Siller/data.htm

This graph shows the real (inflation-adjusted) cost of housing over the long term, with an index of 100 representing the average cost over the twentieth century.

The graph shows fluctuation in real housing prices, with dips around 25% below average in the 1920s and ’30s, upward spikes of only about 25% in later parts of the twentieth century, and then a spike that nearly doubled average.

Figure 12. Housing bubble and credit acess



Sources: Federal Reserve www.newyorkfed.org/markets/statistics/dlyrates/fedrate.html)

The graph illustrates the effective federal funds rate, it’s shown on the right hand vertical axis, plummeted from 2000 until 2004. Although it then began to move backup, the momentum of the housing bubble continued untill a softening in housing prices began to be apparent in 2006.

Indeed, sevral papers spoke about the causal relationship between housing price and mortgage volume (interest rate); a study by the Federal Reserve found that the average difference between subprime and prime mortgage interest rates (the "subprime markup") declined significantly between 2001 and 2007. The combination of declining risk premiums and credit standards is common to boom and bust credit cycles.

For (Simkovic 2008) the housing bubble resulted in quite a few homeowners refinancing their homes at lower interest rates, or financing consumer spending by taking out second mortgages secured by the price appreciation.

(Stevmen 2008) jugged that Low interest rates and large inflows of foreign funds created easy credit conditions for a number of years prior to the crisis, fueling a housing market boom and encouraging debt-financed consumption.

4.2. Influence of the Islamic Mortgage

Islamic financing industry has attracted widespread attention since the onset of the financial crisis, especially due to their limited exposure to subprime and toxic structured products. Amid the financial turmoil in late - 2008 that crippled many large Western institutions, Islamic banks have continued to grow both in prominence and size (Stiglitz 2003).

Indeed, real estate has been an increasingly important asset class for Islamic compliant transactions and banks. Islamic compliant finance has proved to be an alternative source of funds entering the European real estate market (Samad 2004).

Several European jurisdictions have sought to attract Islamic finance transactions. The United Kingdom has, in addition, enjoyed an in-built advantage in its attempt to become the hub of Islamic finance in Europe. This is due to English law often being the governing law of international Islamic finance transactions. An Islamic finance transaction might involve a Swiss bank and a Middle Eastern counterparty, but they may well choose to use English law to structure their documentation in order to give flexibility and certainty to both sides (Warde 2011). Ruled that Islamic finance could avoid the crush because islamic banks are interest-free; also due to the prohibition of investment in items or activities deemed un-Islamic, such as prostitution, gambling, pornography, pig farming and alcohol. In contrast to conventional loans, Islamic bank loans are confined to financing the purchase of physical assets, to which they have recourse in case of default (Laldin and Mokhtar 2009).

Creditors and debtors alike must share business risks; Islamic finance prohibits speculation and similarly prohibits trades that are considered to have excessive risk due to uncertainty, such as naked short-selling, where there is uncertainty involved in the future delivery of the underlying asset; No moral hazard, so brokers won't sell mortgages without carrying out appropriate credit checks; also, risk must be explicitly communicated to all stakeholders, and financial institutions are under obligation to conform to comprehensive disclosure and transparency standards (Laldin and Mokhtar 2009).

Conclusion and future research

After the subprime crisis, which had as an ultimate cause the laxity of lending standards often adopted by conventional financial institutions driven by greed and appetite for excessive returns by applying a variable interest rate to borrowers; and facilitated by the absence of adequate and appropriate government regulatory control (Aziz 1992 and Chapra 2009).

A lot of academic and financial persones suggested that islamic finance could be a way out of the global financial crisis not to have presented inclusive answers to the many questions it has raised (Michelle 2011).

However, evidence at hand strongly suggests that Islamic finance are the most adequate approach for more stable international economy; simply, because most, if not all, of the factors that have caused or contributed to the development and the spread of the crisis are not allowed under the rules and guidance of Shariah.

In this work, we prove the efficiency of the proposed system by using the agent based modeling and simulation approach. The ABM helped to make a comparison between the different concepts related to Conventional mortgage (Conventional Contract) and Islamic mortgage (Diminishing Partnership and Murabahah contract) for home financing; which permit to verify the validity of this approach by showing the different interactions that link agents related to home financing to know Islamic and conventional bank.

The main goal is to help customers and investors to make a competitive decision between the Islamic and Conventional mortgage selection. We remark that the Participative mortgage (Diminishing Partnership and Murabahah contract) are preferable, because of the advantages that offered to customers and investors in term of profit and loss sharing, property of the assets, and project monitoring.

All the factors that we argued previously, prove that the Participative mortgage like Diminishing Partnership and Murabahah contract can be an adequate alternative the conventional mortgage for the stability of the Real Estate market. As perspective, and based on this paper. We will use the Agent Based Simulation (ABS) model to simulate the real estate market in dual home financing system Participative and Conventional mortgage.

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APPENDIX (1)

Years	Anual Rent (1)	Anual Payment (2)	Costumer Equity(3)	Financier Equity(4)	customer ratio (5)	Rental Division(6)		Total Payment(7)
	A	R	K	B		custmer	financier	P+R
1	18000	14400	60000	240000	0,2	3600	14400	18000
2	18000	14119,2	78000	222000	0,26	4680	13320	18799,2
3	18000	13698,98	96799,2	203200,8	0,322664	5807,95	12192,4	19506,9371
4	18000	13126,93	116306,137	183693,862	0,387687	6978,36	11021,63	20105,3080
5	18000	12391,60	136411,445	163588,554	0,454704	8184,68	9815,31	20576,2935
6	21600	14577,38	156987,738	143012,261	0,523292	11303,1	10296,8	25880,5046
7	21600	12798,99	182868,243	117131,756	0,609560	13166,5	8433,48	25965,5083
8	21600	10678,98	208833,75	91166,2482	0,696112	15036,3	6563,96	25715,0175
9	21600	8218,803	234548,769	65451,2306	0,781829	16887,5	4712,48	25106,3148
10	21600	5430,932	259655,084	40344,9157	0,865516	18695,1	2904,83	24126,0982
11	24000	2801,216	283781,182	16218,8175	0,945937	22702,4	1297,50	25503,7114
12	24000	71,9216	300084,89	-84,893899	1,00094	24002,7	-2,7915	23930,869

(1) Variable Rent every 5 years is rent *0.2(inflation) (Aboulaich and Yachou 2016)

(2) $$R_j = \frac{A}{N+1}\left[1 + \frac{A}{(N+1)B}\right]^{j-1}$$

where: R_J is Additional periodic payment by customer to redeem the financier's equity; A is Periodic rental*;* M = R + A, is the total periodic payment*;* B is Financier's contribution into the partnership*;* C is Customer's contribution into the partnership*;* N = B/C*;* J denotes total years that customer need to own the house.

(3) Customer contribution + total payment;
(4) Financier contribution - total payment;
(5) Customer Equity/ total price of the house (300000);
(6) Anual Rent* Customer ratio;
Anual Rent- customer rent division;
(7) Anual Payment + customer rent division.

APPENDIX (2)

Years	Capital	interest	Capital balance
1	6.716,35	7.736,90	193.283,65
2	6.985,00	7.468,25	186.298,65
3	7.264,40	7.188,85	179.034,24
4	7.554,98	6.898,27	171.479,26
5	7.857,18	6.596,07	163.622,08
6	8.171,47	6.281,78	155.450,61
7	8.498,33	5.954,92	146.952,29
8	8.838,26	5.614,99	138.114,03
9	9.191,79	5.261,46	128.922,24
10	9.559,46	4.893,79	119.362,78
11	9.941,84	4.511,41	109.420,94
12	10.339,51	4.113,74	99.081,43
13	10.753,09	3.700,16	88.328,34
14	11.183,22	3.270,03	77.145,12
15	11.630,55	2.822,70	65.514,58
16	12.095,77	2.357,48	53.418,81
17	12.579,60	1.873,65	40.839,21
18	13.082,78	1.370,47	27.756,43
19	13.606,09	847,16	14.150,34
20	14.150,34	302,91	0,00
Total payment	200.000,00	89.065,00	0,00

Monthly Payment: $Pmt = \frac{\mathrm{i}(1+\mathrm{i})^{\mathrm{n}}\,\mathrm{PV}}{(1+\mathrm{i})^{\mathrm{n}}-1}$ (Ahamed and Dzuljastri 2009)

where: *PV* is the present value of the monthly or periodic installments; *Pmt* denote the monthly or periodic installments (principal and interest); *i* is the monthly or periodic interest rate; *n* is the number of months or periods.

Appendix (3)

Years	Total Profit	Profit of Investor	Customer Equity	Financier Equity
J	P	R	K	B
1	288000	230400	480000,00	1920000,00
2	288000	227082,24	710400,00	1689600,00
3	288000	254332,10	795648,00	1435267,89
4	288000	266706,54	898362,14	1168561,35
5	288000	274365,31	1023537,70	894196,03
6	288000	270309,18	1177249,79	623886,84
7	288000	242925,31	1365490,89	380961,53
8	288000	182874,14	1590668,15	198087,39
9	288000	105286,67	1846774,93	92800,71
10	288000	47903,66	2120995,32	44897,05
11	288000	58	2403025,33	44839,05

Annual profit (variable every 5 years): $R_j = \frac{A}{N+1}\left[1 + \frac{A}{(N+1)B}\right]^{j-1}$ (Boualem and Tariqullah 1995) and (Elmalki 2011) (Apendix 3)

where: *Rj* represents the Part of the profit in the investment at the disposal of the contractor in the period *j* with *j* the total year that customer need to got the property of the house; *P* is the profit of the period; *N* is proportionality coefficient of *K* compared to *B*, N > 1; *B* is customer's contribution; K= N*B is Islamic bank contribution.

Volatility Modelling in Market Risk Analysis

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Abstract:

Volatility is an important parameter for market risk management and it is applied in many issues such as portfolio optimization or *VaR* methodology. The forecasting of volatility can be considered as a problem of financial modelling. In this paper, we calculate one of the most used instruments for measuring market risk - value at risk (*VaR*) and we estimate the volatility use different approaches, then we apply the GARCH model and the EWMA model in the same stock data of CAC 40. The EWMA model and the GARCH model is time variation in risk. The share index CAC 40 is the most common index of Paris market and it reflects efficiency of 40 greatest shares listed companies on French stock exchange, which are measured by market capitalization of companies tradable on free market and liquidity. The fluctuation of CAC 40 index correlates with trends of whole market closely.

Keywords: market risk; volatility; Value at Risk; historical simulation method; EWMA model; GARCH model; Monte Carlo simulation.

JEL Classification: G17; C61

Introduction

All companies are exposed to some forms of market risk. Market risk is the exposure to potential loss that would result from changes in market prices or rates. The level and form of market risk exposure differs by industries, and by companies within an industry. The relevant prices or rates – sometimes called the market risk factors – might include equity or commodity prices, interest rates, and foreign exchange rates. One form of market risk faced by a financial institution would be its exposure to changes in interest rates if the durations of its assets and liabilities are mismatched. Other market risks at financial institutions might arise from proprietary trading and market-making activities. While different industries face specific forms of market risks, there are some market risks that are faced by all companies. For example, the performance of a company's investment portfolio directly impacts its financial performance. All companies will only stay solvent by ensuring that all cash obligations can be met by a combination of investment liquidity, funding sources, and contingent liabilities (Lam 2014).

Value at risk (*VaR*) is one of the most common forms of market risk measurement. There are three broad approaches to calculating *VaR*, each with its own strengths and weaknesses. The parametric approach uses volatilities and correlations of risk factors. The Monte Carlo simulation method uses a simulation model to generate a large number of possible outcomes. The historical simulation technique uses previously observed price and rate movements.

1. Methodology

We will make all calculations and simulations in an R language. The R language is a shareware programming language specialized on statistic calculations and graphics. These analyses can be made easy in standard version

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or after concrete upgrade of packages, in which many advanced functions are implemented. There is possible to create also own functions and scripts (Páleš 2017). We will mention the key codes for the calculations.

This article is about the analysis of individual asset in bank portfolio and used methods follows the methodology by (Jurča 2017). We consider with one-day *VaR*, α = *5%* in mentioned R language like calculation tool. We have the values of share index CAC 40 of period 1447 days (January 3, 2007 – August 8, 2012; https://finance.yahoo.com/). The share index CAC 40 is the most common index of Paris market and it reflects efficiency of 40 greatest shares listed companies on French stock exchange, which are measured by market capitalization of companies tradable on free market and liquidity. The fluctuation of CAC 40 index correlates with trends of whole market closely.

2. Market risk management

All of institutions of financial market like banks, insurance companies and funds, are focused on management, prediction, intermediation of protection and counseling of financial risks. These institutions have to measure the source of risks appropriate for good control of price of risks. The risk is understanding like loss or danger in common meaning. The risk, in financial area, more-accurately the area of market transactions with assets, is about the volatility of stochastic processes, which have influence to profit of companies. During development of risk management many tools of measurement had brought into being. The raising volatility of exchange rates, interest rates and prices of commodities caused demand on creation of new financial and analytics tools.

The risk management was developed in two ways. The first way is development of IT, cheaper calling, 7/24 trading, software solutions of applications for measurement of risk which allow make complicated mathematical calculations. The second way is development of financial theory, the creation of new products which reduce the risks or better said heading. At first the quantitative methods were used for measurement of market risks. This article is focused on these market risks. The measurement of market risk means to bind set to portfolio proper value which defines the range of change portfolio's value from current value and how high is the probability it can happen; the interpretation depends on the used metrics. There are many software solutions for this measurement, analysis and management of market risks or effective work with the portfolio, which we understand like purchase and sale of assets consistent with our indifference curve of risk rate and our budget. The overview of tools for measurement of market risk is mentioned *e.g.* Štalmach (2007).

The *VaR* offers the value of the highest loss which we can reach in regard to owned portfolio with ahead specified probability and during ahead specified time period. The results of this analysis can be used many ways, e.g. Páleš (2016):

- prescription of capital requirement within the capital adequacy in banks and insurance companies;
- allocation of investment assets;
- valuation of individual brokers like an aspect of risk rate of their investment activities;
- information about risk rate of made transaction for top management and shareholders,
- integration of different type of risks into one value, in comparison of different systems loaded of different type of risks (*e.g.* bank and insurance company in one financial group).

The *VaR* is one of most common tool for measurement of market risk also in present time and we will talk about this tool in next parts of this article.

3. The theoretical basement and definition of the risk rate VaR

The *VaR* is not possible to define uniquely, because there is not homogenous opinion, neither in academic community, nor in financial area, what the *VaR* should represent exactly. But in last period, the regulation of risk goes ahead in financial sector and the *VaR* becomes one of tools for measurement of risk which is required by regulator. This process determined also the *VaR*, but it did not bring the *VaR* consistence in the bank sector or differently said, the measurement of risk was not unified like the IAS/IFRS standards unified the bookkeeping. The definition can be used directly from RiskMetrics documents, or from significant publications of authors Jorion, Embrechts, Bulter, Holton *et al*. The management of risk measurement in context of the *VaR* methodology is mentioned in *e.g*. Cipra (2015), Horáková, Páleš, Slaninka (2015), Mucha (2017).

The calculation of the VaR is not direct and we can talk about „serious" statistics problem. The solution of this problem consists in determination of distribution the profit and loss (*P/L*) or another factor from which we estimate the *P/L*, and in finding the required quartile of this distribution. We can define the distribution of *P/L* (or another risk factor) by different ways; it will be matched to the particular parametric class of distributions or it will be derived of empiric probability of distribution or we will simulate the stochastic process which will represent the

P/L. The methodology of calculation is mentioned in the first free commercial publication about *VaR* (The 1996 RiskMetrics Technical document), or its newer version (*e.g.* Return to RiskMetrics: The Evolution of a standard), the law documents *CAD III* (legislation of EU) *Basel II/III* (for countries associated in BIS), the measures of the National Bank of Slovakia.

The *VaR* is the estimation of maximum loss, which can occur with prescribed reliability in next future period according to (Cipra 2015). If the daily *VaR* is 1 mil. EUR with reliability 95%, when possible daily loss over 1 mil. EUR can occur with probability 5%, so we can expect the loss higher 1 mil. EUR in maximum one day of next 20 trading days during unchanged conditions (20 · 0,05 = 1).

The rate of *VaR* is specified by two factors, which are chosen subjectively, but in directions of regulators (*e.g. Solvency II, Basel III*) their size is determined strictly. We mean these factors:

- time period – is specified the period during which can possible loss occur (*daily VaR, 10-days VaR*...) and this choice is influenced by *e.g.* liquidity of market, permanency of portfolio and verifiability of results;
- reliability – is specified rate of the probability with which the real loss will not achieve value in risk during specified period, or equivalent, which is a maximum possible loss with this reliability during this specified period. This value is often setting in value on 95%, 99%, but sometimes on 99,9%.

According to Horáková, Páleš, Slaninka (2015) the distribution function *F* of the random variable *X* is defined with relation: $F(x) = P(X \leq x),\ x \in R$ and F^{-1} is a quantile function, in which is valid

$$F^{-1}(p) = \inf\{x,\ F(x) \geq p\},\ 0 < p < 1 \tag{1}$$

The values $F^{-1}(p)$ are called 100 *p* % *quantiles* and we marked that x_p .

The $VaR_p(X)$ of the random variable *X* describing loss with probability *p* is *100 p% quantile,* marked like x_p, for which is valid:

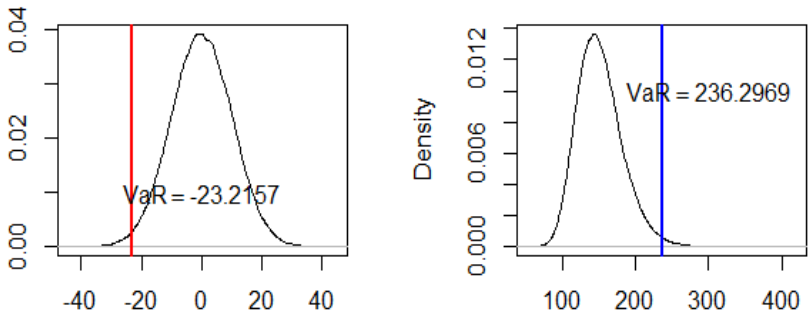
$$VaR_p(X) = x_p = \inf\{x \in R:\ F_X(x) \geq p\},\ 0 < p < 1 \tag{2}$$

The $VaR_p(X)$ is the maximum loss which can occur with particular probability during specified period. This value of *VaR* is marked like the absolute value $VaR_p(X)$. The relative value $VaR_p(X)$ marches to economic equity *(EC),* which we determine like:

$$VaR_p^{rel}(X) = EC = VaR_p^{abs}(X) - E(X) \tag{3}$$

where: E(X) is middle (expected) value of random variable *X*.

Figure 1. Graphic representation of value $VaR\varepsilon$, *VaRp*; p = 0,99; $\varepsilon = 1 - p$



Source: own

The rate of risk *VaR* is used usually for measurement of market risk (loss/profit) in practice, *e.g.* in bank portfolio in short periods (left chart) and for measurement of insurance risk (damage) in period *e.g.* one year (right chart). There is a graphic illustration of value VaR_ε, VaR_p on curve line of density determined with simulations, if we know allocations of random variables, *e.g.* $X_1 \sim N(0;10^2)$, $X_2 \sim LN(5;0,2^2)$ on Figure 1. We can consider the loss in bank portfolio also like positive and then the *VaR* definition is constant on curve line of density.

If we consider about bank portfolio (and left chart), we can define the *VaR* also like, according to Jurča (2017) in identification in upper limit of integral:

$$\int_{-\infty}^{-VaR_t^d(1-\alpha)} f(x)\,dx = \alpha \tag{4}$$

In connection with mentioned definition $\alpha \equiv \varepsilon$. In this meaning, we have to be careful due to different definitions of value *VaR* in different sources and also on premise using the standard normal determination quantile in calculation, which function of density is symmetric.

4. Calculating VaR

There are used different methods for calculation or estimation *VaR* (non-parametric, parametric, combined (semi-parametric)) according to (Cipra 2015):

- historical simulation method;
- variance-covariance method;
- Monte Carlo simulation method;
- on extreme value theory based method.

The banks, which calculate *VaR* and their model of calculation has to be verified by regulator, use one method mainly and they have to make decision at the beginning. The cost of method´s change is usually very high and the approval by regulator is required. At the beginning the decision is made which risk factor or method will be used.

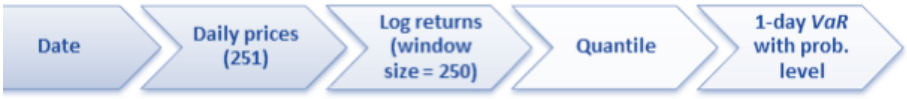
We have to mention that the regulator´s methodology often requires to calculate *10-days* (*2 weeks*) *VaR*. The study is focused on calculation of *1-day VaR*. There are used two ways for calculation of *d days VaR* in practice:

- estimate *VaR* on base of history *d-days* dates – risk factors;
- estimate the *1-day VaR* and calculate it into *d-days* by the help of rule square root of time, so multiply the *1-day VaR* with square root of *d*.

4.1 The Historical simulation method

The historical simulation method is one of non-parametric methods to calculate *VaR*. All of non-parametric methods are based on premise that the lose future will be developing according to last past, so we use the dates of recent time and we estimate risk for future. The basic position of historic simulation can be, but also has not be completed, but in spite of this the method is the most widely used method in practice. We describe it simply on Figure 2.

Figure 2. Process of the historical simulation method



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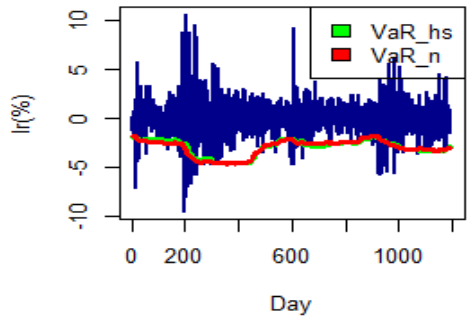
where: native logarithm of earnings (v R *lr* < *-diff*(*log*(*r*)) are defined like:

$$r_t = \ln\left(\frac{S_t}{S_{t-1}}\right) \tag{5}$$

The adequate quantile is calculated usually with linear interpolation. We have used built-function R *quantile(x 0.05)*. The results of calculation for one asset are illustrated in Figure 3.

Figure 3. Historical simulation vs. Normal distribution



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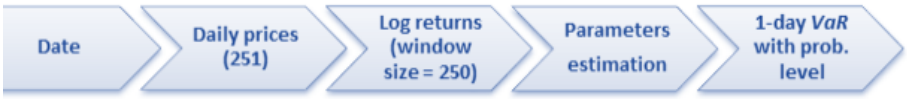
The main advantage of this method is simple calculation, which does not need any special premise for class of determination. The main question is premise of volatility (at least we suppose that the determination for next day will be equal to determination of last working days). This premise could be very misleading, mainly in case that after period of low volatility turbulent period occurred on market. In that case, the calculated *VaR* using the history simulation method is adapted very slowly to new conditions and the *VaR* has tendency to underestimate the risk during certain period (we can see it on Figure 3). There is necessary to determine the size of window (n) very carefully. If this window is very „big/long", the *VaR* is calculated of very old historical values which cannot illustrate adequately the situation on the market. If this window is very short, the calculation cannot be enough rugged, especially for quantiles with low level of probability.

4.2 The Variance-Covariance method

Parametric methods are based on the special assumption about the basic distribution. Advantage of these methods is simplicity. The assumption of normal distribution is often unrealistic, the calculation responds slowly - mainly in the turbulence time, and the calculation of the average return is not robust to select a time window. The baseline of this method is described in Figure 4

Figure 4. Procedure of the variance-covariance method



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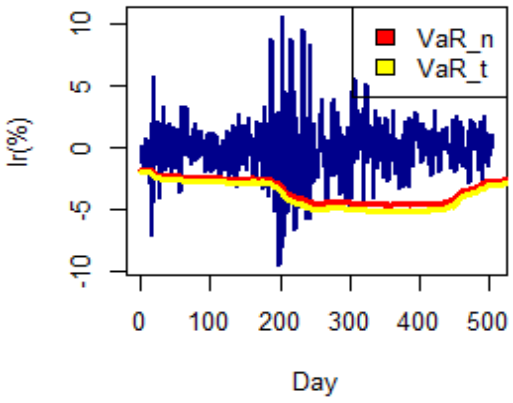
We determine *VaR* for normal distribution and Student-*t* distribution is given by:

$$VaR_t^1(1-\alpha) = -\left(\hat{\mu} + \Phi^{-1}(1-\alpha)\hat{\sigma}\right) \tag{6}$$

$$VaR_t^1(1-\alpha) = -\left(\hat{\mu} + t_v^{-1}(\alpha)\sqrt{\frac{v-2}{v}}\hat{\sigma}\right) \tag{7}$$

Figure 5. Normal distribution vs. Student-t distribution



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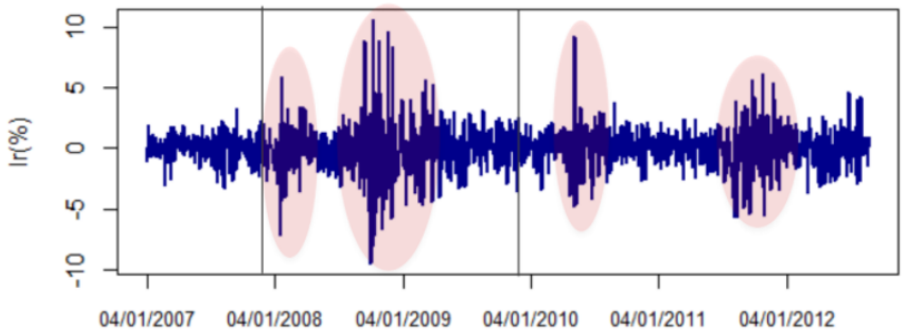
4.3 Models with time-varying volatility

As stated in the introduction, the stationary distribution with constant volatility does not correspond with the empirical character of market data. Specifically, real data tend to show a significant level of heteroskedasticity, especially in the form called *volatility clustering*. The presence of volatility in the reviewed time series is shown in Figure 6. Therefore, it is possible to devise model with time-varying volatility using *the exponentially weighted moving average* (EWMA), which is a method proposed by RiskMetrics. Then the formula for the EWMA volatility, which is governed by ARIMA (1,0,0) by the process, has the form:

$${}_{EW}\sigma_t^2 = \lambda\sigma_{t-1}^2 + (1-\lambda)(r_t - \hat{\mu})^2 \tag{8}$$

where: μ is an unconditional mean and λ is any constant of the interval (0;1), for proof see Jurča (2017). The value λ corresponds to 0.94 (according to Riskmetrics) in practical applications. However, this can be estimated directly from the data using the maximum likelihood method.

Figure 6. Volatility clustering, stock index CAC 40



Source: own. Data source: finance@yahoo.com

The results for one asset are shown in Figure 7. When we performed the calculation, we proceeded by estimating the mean $\hat{\mu}$ from the selected sample of the monitored data and these we recalculated using the formula σ_t^2 above for the whole period. The initial value was set to 0. So *VaR* we define as:

$$VaR_t^1(1-\alpha) = -\Phi^{-1}(1-\alpha)_{EW}\sigma_t^2. \tag{9}$$

These assumptions are the fundamentals for generalized autoregressive models of conditional heteroskedasticity (*GARCH*), see e.g. (Jurča 2017, Cipra 2015). In this case, we proceed similarly to the *EWMA* models:

$${}_G\sigma_t^2 = \hat{\beta}\sigma_{t-1}^2 + (1-\hat{\beta})(r_t - \hat{\mu})^2, \tag{10}$$

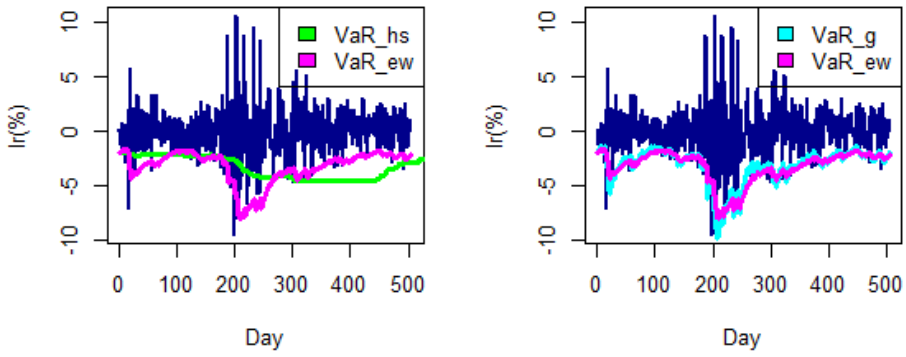
$$VaR_t^1(1-\alpha) = {}_G\hat{\mu} - \Phi^{-1}(1-\alpha)_G\sigma_t^2, \tag{11}$$

where: the parameters $\hat{\beta}$ and ${}_G\hat{\mu}$ of the GARCH(1,1) we estimate in software R by using the fGarch library;

```
r<-read.csv2("D:/VaR4.csv",header=F);
r<-as.matrix(r);
lr<-diff(log(r))[1:end];
model<-garchFit(formula = ~ garch(1, 1), data = lr);
vol_gf<-model@sigma.t;
mu<-as.vector(model@fit$params$params[1])      #0.00028;
beta<-as.vector(model@fit$params$params[5])    # 0.865886.
```

Appropriate graphs are generated using embedded functions like par, plot, lines, legend.

Figure 7. Historical simulation vs. EWMA (left) and GARCH vs. EWMA (right)



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4.4 Monte Carlo simulation

Monte Carlo methods are a broad class of computational algorithms that rely on repeated random sampling to obtain numerical results. For *VaR* determination purposes, each simulation gives the potential price of our portfolio at the end of the period for which we calculate *VaR*. If we do a lot of simulations, the simulated price distribution or simulated portfolio yield will be closer to the actual but unknown price distribution or portfolio yield and than from this distribution we can deduce the empirical portfolio distribution *P/L* and calculate the *VaR*.

First, we need to determine the stochastic process that describes the behavior of the risk factor. Then we estimate the parameters of this stochastic process on the basis of historical risk factor development or empirically - for example based on links to macroeconomic indicators. Next, we build a simulation for all the risk factors with we calculate the value of the portfolio. Simulation of risk factors determines the hypothetical value of the portfolio. We repeat the simulation process enough times to make sure that the hypothetical distribution is closer to the real one.

Monte Carlo simulations are thus aligned with the nonlinear dependence of portfolio value and risk factors, with heavy tails, with optional dependencies, with the complexity of dependencies among risk factors (Štalmach 2007).

Similarly, to parametric methods, this method is based on positional or portfolio approach. For positional approach, the value of the portfolio depends only on one risk factor, and the modelling of dependencies between random variables is out. In the case of a positional approach, the value of the portfolio is based on more risk factors, each other may have complicated also non-linear relationships.

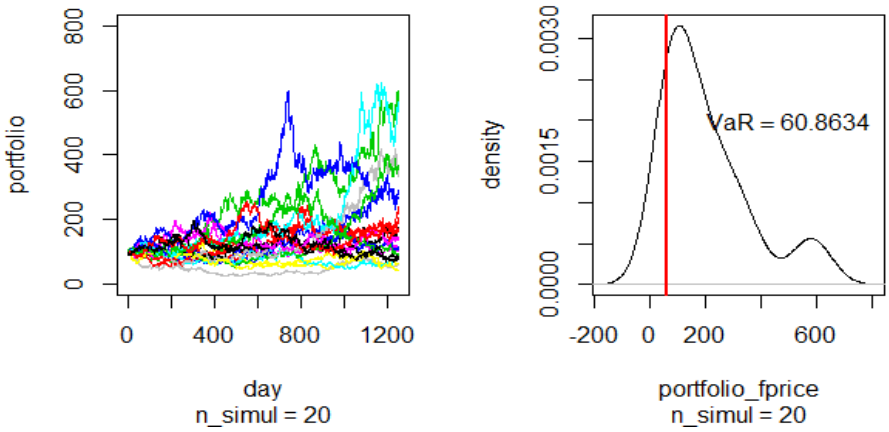
In practice, we distinguish several stochastic processes that are used in finance. The best known is, of course, the geometric Brownian motion and then the derived processes of them. In this case, several thousand simulations of the portfolio value (or other risk factor) simulation that correspond to Brownian geometric motion (the Wiener process) are generated. We have formula:

$$\ln\left(\frac{P_{t+\Delta t}}{t}\right) \sim \mu\Delta t + \sigma(w_{t+\Delta t} - w_t) \sim \mu\Delta t + \sigma\sqrt{\Delta t}\cdot\Phi(0;1) \tag{12}$$

for *i*-simulation if we want 1-day *VaR*, so $_{\Delta t}$ = 1 and $\mu_1 + \sigma_1 \cdot rnd$, where *rnd* is a function that generates a series of pseudo-random interdependent numbers from the standard normal distribution. Then the portfolio value at time *t* is $P_t = P_0 \cdot e^{\mu \cdot t - \sigma w_t}$.

Consider and simulate in a R model situation (unrelated to the analyzed data above) that the stock price follows geometric Brownian motion. Let the μ = 0.1 and the volatility σ = 0.4, the initial value of the stock *p* = 100€, the simulation time is 5 trading years, provided that one trading year has 250 days, so *T* = 1250 days. Number of possible scenarios only illustrative - *n* = 20 shows Figure 8 on the left. On the right is a kernel estimate of the stock values with a calculated *VaR*.

Figure 8. Monte Carlo simulation of stock prices



Source: own

The code for implementing the first scenario (*n* = 1) is as follows:

```
d<-250; mu<-0.1; vol<-0.4; p<-100; T<-5*d
mu1<-mu/d; vol1<-vol/sqrt(d)
rnd<-rnorm(T,0,1)
```

```
rg<-mu1+vol1*rnd
price<-c(p*exp(rg[1]),numeric(T-1))
for(i in 2:length(price))
{price[i]<-price[i-1]*exp(rg[i])}
and for the graphical output of the first scenario
x<-c(1:T)
plot(x,price,type="l",col=20,ylim=c(0,800),ylab="portfolio",xlab="day")
```

For 20 or more scenarios using the replicate function, see (Páleš 2017). Monte Carlo simulations of a multidimensional random process use multidimensional distributions, generating a time series of multiple random variables that are linked to one another by a variance-covariance matrix. For this purpose, we have Cholesky decomposition. For more information, see Hull (2002).

5. Backtesting and criticism of VaR

Monte Carlo simulations, parametric methods and also the historical simulation method have advantages and disadvantages. Each method works with assumptions and it is more or less sensitive to changing or deviating reality from these assumptions.

Thus, *VaR* models are useful only if they predict future risks accurately. In order to verify that the results acquired from *VaR* calculations are consistent and reliable, the models should always be backtested with appropriate statistical methods.

Backtesting is a procedure where actual profits and losses are compared to projected *VaR* estimates. Jorion (2001) refers to these tests aptly as 'reality checks'. If the *VaR* estimates are not accurate, the models should be reexamined for incorrect assumptions, wrong parameters or inaccurate modeling. Backtesting is a procedure that can be used to compare various risk models. It aims to take ex ante *VaR* forecast from a particular model and compare them with ex post realized return. Backtesting is useful in identifying the weaknesses of risk forecasting models and providing ideas for improvement, but is not informative about the causes of weaknesses. Models that not perform well during backtesting should have their assumptions and parameter estimates questioned. Backtesting can prevent underestimation of *VaR* and ensure that a financial institution carries sufficienty high capital. At the same time backtesting can reduce the likelihood of overestimating *VaR*, which can lead to excessive conservatism. (Daníelsson 2011) This area is further pursued for example, (Cipra 2015, Štalmach 2007, *etc.*).

Consider two real value random variables X a Y. Note that *VaR* has these important attributes:

- positive homogenity, $VaR(cX) = c \cdot VaR(X),\ c \geq 0$;
- translation invariance, $VaR(c + X) = c + VaR(X),\ c \in R$;
- monotonicity, $VaR(X) \leq VaR(Y),\ X \leq Y$.

But $VaR(X)$ does not apply the subadditivity condition $VaR(X + Y) \leq VaR(X) + VaR(Y)$. This is often referred to as the greatest disadvantage of *VaR*. *VaR* is subadditive in the special case of normally distributed random variable. Subadditivity for the *VaR* is only violated when the tails are super fat. If the subadditivity is not met, the *risk* of the combined portfolio may be larger than the sum of the two individual risks. For an example of a violation of the assumption of subaditivity, see (Jurča 2017).

The disadvantage of the *VaR* is that it does not say anything about the size of the loss if the loss exceeds *VaR*. In practice, therefore, other risk measures that address this deficiency are also used and also meet the subaddition condition (*Tail VaR* (*TVaR*), *Conditional tail expectations* (*CTE*), *Conditional VaR* (*CVaR*), *expected shortfall* (*ES*). A coherent (meaning we can understand the relevant, appropriate, comprehensive) risk measure ideally should meet all of the features mentioned above. Such a measure is, for example, *CVaR*. Even though, for example, *TVaR* or *CVaR* are coherent risk measures, *VaR* is a generally accepted risk measure, and many insurance and other financial institutions are currently measuring and managing their risks with *VaR*. Conceptually, *VaR* is easier to interpret for third parties for the simplicity of its calculation. The *CVaR* calculation is more complex and requires greater mathematical knowledges. (Páleš 2016)

Conclusion

In the previous chapters, we have presented the calculation of the 1-day $VaR_{0,95}$ using various methods of the analyzed financial instrument. These results are summarized in Table 1, which is a prediction for six consecutive days.

Table 1. Output from R for various methods of calculating 1-day $VaR_{0,95}$ (%)

Day	Ir	VaR_HS	VaR_N	VaR_t	VaR_EWMA	VaR_G
252	0.2348423	-1.875654	-1.771454	-1.978834	-1.913318	-1.792436
253	-0.0040868	-1.875654	-1.766776	-1.974023	-1.858552	-1.674577
254	-0.2343126	-1.875654	-1.759361	-1.966221	-1.802024	-1.556530
255	-1.1414976	-1.875654	-1.760567	-1.967448	-1.748722	-1.450672
256	-0.0771380	-1.875654	-1.770005	-1.977333	-1.751656	-1.497226
257	-1.8064934	-1.875654	-1.767098	-1.974314	-1.698331	-1.391370

Source: own

The graphical outputs already presented in Figure 7 are more pronounced, we can see there how *EWMA* and *GARCH* models are capturing the changing volatility over time. The *GARCH* model (*VaR_G* column) can be evaluated as the most reliable model capturing volatility shocks.

In the paper, we also introduced Monte Carlo simulations, which can also work with other classes of distribution, such as normal distribution or Student-*t* distribution. Calculation of *VaR* using Monte Carlo simulations can be considered as the most comprehensive approach. Parametric and nonparametric *VaR* methods for market risk management have both pros and cons. Each method works with certain assumptions and each method is more or less sensitive on reality changing or deviating from these assumptions. For this reason, backtesting is used. In this times we have motivation to use sophisticated processes in calculating other risk measures not only *VaR*. We can use complicated distributions of random variable in parametric methods, we can use copula function in the expression of causality in multidimensional distributions, we can use extreme value theory, and so on.

Acknowledgements

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Food Product Decision Making. Testing a Mediation Effect of the Intention Towards Using Desired Information on the Product Label under Normal Circumstances

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Abstract:

The theoretical understanding of consumer purchasing decisions before buying a new product using the question of control behaviour is a fairly under explored research domain in the Czech Republic. The aim of this study was, generally, to investigate attitudes towards information that directly or indirectly influences consumer behaviour. This was in order to analyse the link between attitudes towards information about products, food related lifestyle and consumer behaviour. Respondents of the questionnaire survey were university students from the Czech Republic. Ordered probit regression was used to analyse data. These results suggest that the attitudes towards information can influence consumer behaviour related to the checking of food composition (both directly and indirectly) through the behavioural intention to find the desired information about the food. With regards to the results, brand has a significant impact on behavior.

Keywords: decision making; search; information; consumer behaviour

JEL Classification: D9; D87; D82; D7; D10; D9

Introduction

Little is known about the effect of product information on consumer control behaviour in the Czech Republic (Zagata 2012). Numerous studies, mostly from the European Union, have been conducted on the effect of information in connection with environmental pollution (Mc Eachern and Willock 2004); animal welfare (Mintel 2003); health benefits (Magnusson *et al.* 2003); genetic modification (GM) free (Xia 2014); no chemicals, additives and pesticides; and supporting the local community (Zepeda and Li 2006). Von Alvesleben (1998) found that the information on organic food labels is critical for consumers to identify the quality of organic food products. All these studies have shown, firstly, that expectations can affect quality perception and, secondly, consumers with positive attitudes towards organic products show a higher connection with issues about food.

Although the importance of product information has been researched intensively, its impact on consumer behaviour has not been fully established. On this basis, in this study, we will analyse relationships among attitudes towards specific information about food, consumer behaviour towards checking information about food composition before purchase and consumer intentions regarding the use of the desired information on the product label under normal circumstances.

1. Literature review

Organic food is produced according to strictly defined standards and is able to satisfy many consumer expectations concerned with various aspects of food quality (Napolitano *et al.* 2010). But, according to Roddy *et al.* (1996), consumers do not buy organic products because they are satisfied with conventional food product consumption. However, there are dozens of factors which influence individuals' behaviour and, thus, consumer intentions to buy organic food, such as attitudes (Teng and Wang 2015). For these consumers, motives, as well as the information on the label, play a key role in defining product quality. There have been studies on how product information affects

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consumer behaviour. For example, Napolitano *et al.* (2010) found that information about organic farming can be a major determinant of cheese preferences and consumer willingness to pay, thus providing a potential tool for product differentiation, particularly for small scale and traditional farms.

Grunert and Bredahl (2003) have conducted a lot of research concerning the relationships between attitude and behaviour. Their qualitative study suggested that negative attitudes toward GM guide the perception of food products involving the use of GM and lead to a range of sweeping negative associations that overcompensate for the potential perceived benefits. Numerous studies have been conducted on the environmental labels and impact of consumption of food. Examples of environmental impact labels include the United Kingdom Tesco grocery store carbon label, the carbon footprint stoplight label designed by Vanclay *et al*. (2011). Also a simple ''stoplight" carbon labeling approach resulted in small changes of purchasing patterns with a large shift only occurring when the green product was also the cheapest (Vanclay *et al.* 2011). The water footprint of products has been well studied (Mekonnen and Hoekstra 2011 2012). Leach *et al.* (2016) studied the three footprint calculation methods to four example labels (stars label, stoplight label, nutrition label add-on, and a detailed comparison label) that vary in design and the amount of detail provided. They found that the stars label is simple and easily understood but provides minimal detail about the footprints. At the other end of the spectrum, the detailed comparison label gives context in relative terms (*e.g*., carbon emissions for equivalent distance driven) for the food product. They concluded that implementing environmental impact food labels requires additional understanding of how consumers use footprint labels, and label suitability may vary for government organizations, retail and local grocers, and farmers.

Brunsø and Grunert (1995) produced an interesting piece of research, which illustrated mediator variables, such as variables or lifestyles related to food consumption. A better understanding of the cause-effect relationships between food-related lifestyles and the cost of participation in Purchasing Activities was analysed by Cembalo *et al.* (2015). They found an indirect effect through food-related lifestyle. Mediation is a hypotheses causal chain in which one variable affects a second variable that, in turn, affects a third variable. Ghvanidze *et al.* (2016) explored the moderating role of perceived consumer effectiveness (PCE). They found that for individuals with higher levels of PCE, who are environmental conscious and ethically concerned, information on food labels relating to environmental and social issues represents value by itself. Interestingly, health and nutrition information on food labels was not perceived valuable by consumers with high PCE. Consumers have become important contributors to a sustainable society by making food choices that are made respecting environmental and in accordance with socially ethical standards (Macdiarmid *et al.* 2012, Zander and Hamm 2010). Szakaly *et al.* (2014) argue that personal value orientation is a prerequisite for a change in health behaviour toward making health-conscious food choices.

We analysed whether attitudes towards information directly (checking the ingredients of a product), or indirectly (through the mediation variable "using desirable information", which is one of the mediation variables food related lifestyle proposed by Brunsø and Grunert (1995)) influenced consumer behaviour. Finally, analysing a person's inspection of a product's ingredients was proposed by Cembalo *et al.* (2015) as a measure of how important ingredients are to that person. The hypothesis underlying this study is that consumer control behaviour is affected by consumer attitudes towards information about product or food related lifestyles. This means that attitudes do not affect control behaviour directly, but they do so through their influence on the food-related lifestyle (intention towards using desired information on the product label under normal circumstances). Based on the above discussion, this study proposes the following conceptual model.

The proposed conceptual model assumes a three-variable system for testing the direct and indirect effect as a mediator position. Instead, when testing the direct and indirect food-related lifestyle effect as a mediator between values and behaviour, Brunsø *et al.* (2004) developed six relationship types between values, lifestyle and behaviour. Although the importance of product information has been researched intensively, its impact on consumer behaviour has not been fully established. On this basis, in this study, we will analyse relationships among attitudes towards specific information about food, consumer behaviour towards checking information about food composition before purchase and consumer intentions regarding the use of the desired information on the product label under normal circumstances.

Consumer behaviour is being guided by a decision process based on information importance to personal needs and motivations (Van Dam and Van Trijp 2011). The purpose of the present study is to test whether attitudes towards information directly influence consumer behaviour in terms of checking information about food composition before purchase or indirectly influence consumer behaviour through the mediation variable, namely the intention to

use the desired information on the product label under normal circumstances[24]. The question underlying this study is whether the impact of attitudes on information and control behaviour is mediated by the intention to use information.

Based on the six relationships in the food related lifestyle developed by Brunsø *et al.* (2004), we also explored the relationship between attitude and eleven specific information categories regarding food on consumer behaviour via the intention to use information. Although six relationships in the food related lifestyle are modified (see below).

- a "no-effects" model, assuming that attitudes towards information and the use of information about food are independent, and that neither affects consumer behaviour at all;
- an "attitudes-effects" model, again assuming that attitudes towards information and the use of information about food are independent, and that attitudes influence control behaviour directly, but the use of information about food does not influence behaviour at all;
- a "using information-effects" model, assuming that attitudes towards information and the use of information about food are independent, and the use of information about food influences control behaviour directly, but that attitudes do not influence behaviour at all;
- an "additive-effects" model, assuming that attitudes towards information and the use of information about food are independent, and that both influence behaviour directly;
- an "indirect effect-effects" model, assuming that attitudes towards information influence the use of information about food, and that the use of information about food influences behaviour, but that there is no direct effect of attitudes on control behaviour (strict mediation);
- a "total-effects" model, assuming that attitudes towards information influence the use of information about food, and that the use of information about food influences behaviour, but that there are also direct effects of attitudes on control behaviour (partial mediation).

2. Methodology

Data collection

The data used in this paper is from a survey conducted in the Czech Republic involving 909 students enrolled in universities in Prague, České Budějovice, and Brno. The data collection was carried out from November 2010 to February 2011. Students answered a questionnaire on attitudes toward information in general, intention to use information, and behavioural control. Young people may perceive problematic issues in relation to food differently from older generations. Data was analyzed in the statistical program STATA to test for mediation using multi-regression model ordered probit.

Measures

Three key variables were used in this study.

Attitudes towards information about food products (A) consists of information on the labelling – producer, name of the product, product ingredients, quantity – by weight/volume, nutrition facts, safe-food handling, origin of milk, website link, date of production, allergen, brand. All attitudes towards information were answered via a three-point scale (not at all important; important; very important).

The intention to use the desired information on the product label under normal circumstances before buying (I) consisted of information using the frequency item, and was answered on four-point scale (never, rarely, sometimes, always).

The consumer control behaviours (B) consists of the frequency question: Checking what composition is stated on the label (ingredients about a product), and was answered via a four-point scale (never, rarely, sometimes, always).

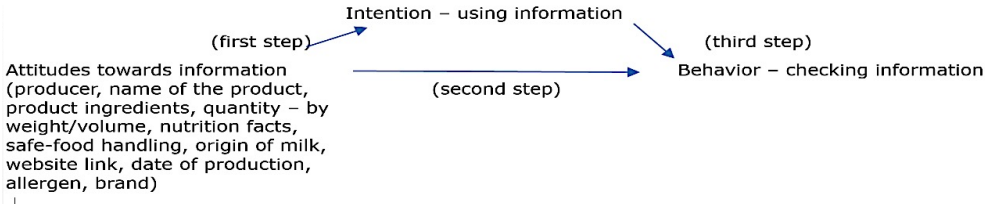
Data analysis

We expected that the impact of attitudes towards information on control behaviours would be mediated by the intention to use information. The concept in this study (see Figure 1) provides a framework for how intentions lead to behaviours, specifically the implementation of intention as a mediation. The analysis was processed in four steps (Barron and Kenny 1988), with a minor modification. Instead of a simple regression analysis, we used a multi-regression model ordered probit.

[24] Whether consumer control behavior is affected by consumer attitudes towards information about product or solving food-related issue. This means that attitudes do not affect control behavior directly, but they do so through their influence on the using information related to food.

In the first step, the effects of significant information on intention were assessed. The effects of non-significant information on intention were excluded from the second and fourth steps. In the second step, the effects of information on behaviours were assessed. If attitude affects behaviour, then this effect is supportive of the mediation hypothesis. However, direct evidence for mediation was provided in the next step. In the third step, the direct effect of intention on behaviour was measured. For Intention to mediate the attitudes-to-behaviour relation, attitude must affect Intention and Intention must affect behaviour. If Attitude affects behaviour (after controlling for attitude towards information), a partial mediation is indicated. However, if attitude towards information is no longer significant, the findings support a full mediation.

Figure 1. Proposed conceptual model – "testing a mediation effect"



Legend: Illustration of intention effect on behaviour. First step is effect between attitudes towards information and intention, second step is the relations between attitude towards information (that information which significant effect on intention assessed in the first step) and behaviour, third step is a direct effect between using information about food and behaviour. The mediational effect, in which intention leads to behaviour is called the indirect effect.

Source: Author's own content

3. Results

The question underlying this study is that of whether the impact of attitudes upon information on control behaviour is mediated by the intention to use information. Although, during the analysis (performed using multi-regression models), we discovered that attitude can influence behaviour (not only indirectly) through Intention. Surprisingly, of all the significant attitudes examined, two attitudes appeared to be partial mediators. Intention appeared to partially mediate two attitudes.

The first and the second steps of the mediated assumption tested the significant influence of attitudes on intention and behaviour; the eleven attitudes employed contained different information. The attitude for each type of information was tested in the first step with the intention and with behaviour in the next step, allowing the effect to be determined. Although producers, name of the product, product composition and nutrient value positively influence behaviour (see Table 1 – the second step), and the addition of information about the origin of milk positively influenced the intention to use the desired information on the product label (see Table 2 – the first step), the regression coefficient of significant information varied for the different combinations of models. For example, a higher regression coefficient suggested that information about the nutrients and components of food are responsible for changes in consumer behaviour. Such attitudes towards information seem to have a crucial role in most of the lifestyles related to food. The direct effect between using information about food and behaviour was tested in the third step (see Table 3 – the third step). Secondly, attitudes towards the name of a product, producer and the origin of its ingredients did not directly affect participants' checking of ingredients, but indirectly affected their participation through intention (as a variable of lifestyle) (see Table 4 and 5 – the fourth step and fifth step). These results support full mediation.

Table 1. Ordered probit estimates - control behaviour -second step

Attitude	Coefficient	p-Value
Producer	0.16	0.004***
Common name of product	0.08	0.073*
Origin of milk	0.07	0.180
Product ingredients	0.40	0.000***
Nutrition facts (*e.g.* salt)	0.30	0.000***
Allergen (healthy) food safety	-0.09	0.045**

Source: Own calculation on data from survey in software STATA.

Legend: Multiple regression analysis with Attitude toward information predicting moderator variable (find the desired information on the product label under normal circumstances) to test for path *a* (see equations (1) in the Ordered probit model section).

Note: *p<0.1; **p<0.05; *** p<0.01

Table 2. Ordered probit estimates - find the desired information on the product label under normal circumstances - first step

Attitude	Coefficient	p-Value
Producer	0.348	0.000***
Common name of product	0.137	0.002***
Origin of milk	0.089	0.103*
Product ingredients	0.200	0.001***
Nutrition facts (*e.g.* salt)	0.174	0.003***
Allergen (healthy) food safety	-0.102	0.043**

Source: Own calculation on data from survey in software STATA.
Legend: Multiple regression analysis with Attitude toward information predicting consumer behaviour (checking ingredients of a product) to test for path *c* (see equations (3) in the Ordered probit model section).
Note: *p<0.1; **p<0.05; *** p<0.01

Table 3. Ordered probit estimates - control behaviour - third step

Intention	Coefficient	p-Value
…find the desired information on the he product label under normal circumstances……	0.6	0.000***

Source: Own calculation on data from survey in software STATA.
Legend: A simple regression analysis with moderator variable predicting consumer to test for path *b* (see equations (2) in the Ordered probit model section).
Note: *p<0.1; **p<0.05; *** p<0.01

Table 4. Ordered probit estimates - check information before buying - fourth step

Attitude and Intention	Coefficient	p-Value
Producer	0.04	0.48
Common name of product	0.02	0.553
Origin of milk	0.05	0.351
Product ingredients	0.34	0.000***
Nutrition facts (*e.g.* salt)	0.26	0.000***
Allergen (healthy) food safety	-0.06	0.213
…find the desired information on the he product label under normal circumstances…..	0.52	0,000***

Source: Own calculation on data from survey in software STATA.
Legend: Multiple regression analysis with Attitudes toward information and moderator variable predicting consumer behaviour (checking ingredients of a product) (see equations (4) in the Ordered probit model section).
Note: *p<0.1; **p<0.05; *** p<0.01.

Table 5. Ordered probit estimates - control behaviour - fifth step

Attitude and Intention	Coefficient	p-Value
Brand	0.122	0.028***
Product ingredients	0.337	0.000***
Nutrition facts (*e.g.* salt)	0.257	0.000***
…find the desired information on the he product label under normal circumstances…..	0.534	0.000***

Source: Own calculation on data from survey in software STATA.
Legend: Multiple regression analysis with all Attitudes toward information and moderator variable predicting consumer behaviour (checking ingredients of a product) (see equations (5) in the Ordered probit model section.
Note: *p<0.1; **p<0.05; *** p<0.01.

To summarise our results, according to the modification of six models, which determine the effect on food related lifestyles (developed by Brunsø *et al.* 2004), we determined information about website links, date of production, quantity and safe-food handling via the information-effects model, followed by information about the brand as attitude-effects model and information about product ingredients and nutritional facts (total effects model). the rest of the information can be attributed to indirect effect-effects model, see Table 6.

Table 6. Summary statistics of the variables

Attitude and Intention	Effects
Producer	Indirect effect-effects
Common name of product	Indirect effect-effects
Product ingredients	Total-effects
Quantity (by weight/volume)	Using information-effects
Nutrition facts (e.g. salt)	Total-effects

Attitude and Intention	Effects
Safe-food handling	Using information-effects
Origin of milk	Indirect effect-effects
Website link	Using information-effects
Date of production	Using information-effects
Allergen (healthy)	Indirect effect-effects
Brand	Attitudes-effects

Source: Author's own content

Attitudes towards all significant information are positive in the models - the only exception being that of allergens. Thus, the negative coefficient related to potential allergens shows that consumers are more likely to be motivated to use information on the label or to check the composition of a product in the decision-making process. Allergens have a negative impact on behaviour. This is similar to the results of Sheth and Wasserman *et al.* (2010). According to their survey, food-allergic individuals found labelling to be inappropriate. They concluded that the clear and consistent labelling of food allergens, combined with an increase in consumer education, is necessary.

These results suggest that the attitudes towards information can influence consumer behaviour related to the checking of food composition (both directly and indirectly) through the behavioural intention to find the desired information about the food. In the analysis, we identify the attributes that influence behaviour in the context of environmentally friendly food product consumption.

Conclusion

The aim of this study was, generally, to investigate attitudes towards information that directly (specifically, the checking of information about food composition before purchase) or indirectly (through the mediation variable, the intention to use the desired information on the product label under normal circumstances) influences consumer behaviour. This was in order to analyse the link between attitudes towards information about products, food related lifestyle and consumer behaviour. The data was analysed via its implementation in a model of ordered probit.

According to our survey results, consumers' attitudes towards information about food products have the potential to positively impact their food lifestyle behaviours and to control the composition of food products.

This paper explored how the intention to use information about food leads to consumer behaviours; specifically, the employing of that intention as a mediator to behaviour suggests strategies to better understand such information's effect on consumer behaviour. In this way, the role of consumer attitudes to information, as well as the characteristics of consumer behaviour, could be better understood, thus determining the solution for environmentally friendly food products in the future. We show that they directly affect the likelihood of consumers gathering information to identify the quality of food products. Moreover, the theoretical understanding of consumer purchasing decisions via the question of control behaviour is, as yet, a fairly under explored research domain in the Czech Republic. For consumers, the information may be even more important to environmentally friendly food product purchase decisions than conventional ones. Moreover, empirical evidence indicates that purchase related data, but not product specific data about consumers, should be suitable for detecting long term trends in consumer markets (Grunert 2002). In the analysis, we identify the attributes that influence behaviour in the context of environmentally friendly food product consumption.

We also acknowledge a number of limitations in our study. First, this research is limited to the consumer market that has developed in the Czech Republic, where consumers have specific socio-demographic and economic characteristics. Moreover, younger consumers have been found to hold more positive attitudes toward organically grown food (Magnusson *et al.* 2001).

Acknowledgments

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Profit Volatility of Small Laying Hens Poultry Farm and Rice Farming Relation to Capital Productivity

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Abstract:

Rural area business is divided to high risk and profit business promising such as laying hen poultry and little risk and profit business such as rice farming. Intensive small laying hen poultry farm has a high risk because eggs and feeds price fluctuation, uncertain productivity and mortality. This uncertainty caused profit volatility. This research aimed to collate probabilistic model relation between profit volatility and capital productivity. High profit volatility and low capital productivity business is categorized as high risk business and avoided by villagers. This study was done at egg central production I Banyumas Regency. The respondent was laying hen poultry farmers that rear 2,000 birds of hens and 1.5 ha farm land. The respondent is total population on that range business (was 8 poultry farms and 12 farmers). The respondents were determined by equality of both capitals used. The research data was taken at 2014 – 2016. Data analyzed using Monte Carlo simulation. Simulation result showed that rice farming capital productivity is higher than laying hen poultry capital productivity and laying hen poultry profit volatility is higher than farming profit volatility. Low capital production and high profit volatility on laying hen poultry farming showed that it is portfolio lower than rice farming. The result showed that the villagers more likely choose certain and low risk business even if the profit is lower.

Keywords: Monte Carlo simulation; stochastic model; profit volatility; capital profitability; business risk.

JEL Calssification: C10; C18; C40; C51

Introduction

The laying hen poultry farming has crucial economic role to villager (Fentie *et al.* 2012, Slassie *et al.* 2015, Maoba 2016, Hossen 2010). Intensive small laying hen poultry farm is popular in Indonesia since 1980. This business profit is higher than rice farming but has higher capital and business risk (Irmasusanti *et al*. 2013, Maoba 2016, Salman *et al*. 2013). The risk is caused because of egg and feed price fluctuation (Kumarmangalan *et al*. 2012, Sumanto *et al.* 2015), hen mortality and productivity bertelur (Lestari *et al.* 2011, Wantasen *et al.* 2013). The cost of feed is the highest component in laying hen poultry farm business (Irmasusanti *et al*. 2013, Sumanto *et al*. 2016).

The problems in poultry farm that has 1000 heads of hen are outside labor domination (labor cost, and labor inefficiency), more warehouse needed (warehouse cost), more inspection, fence, and third-party capital loaning. The problems caused higher financial risk to farmers. This research is aimed to find simulation design that can explains the external factor fluctuation (egg and feed price) and internal factor (hens' productivity, mortality, cost, and loan) relation to profit volatility.

1. Literature review

Egg prices is decreased from May 2014 to August 2014. In this period egg prices are lower than IDR 17,000/kg. Egg price at 4th week of August 2014 is IDR 16,025/kg (Sumanto 2016). Bad hen maintenance had caused high hen mortality and low egg production (Wantasen *et al.* 2013, Lestari V.S. *et al.* 2011).

Rice farming business has problems such as weather, pest, and plant disease (Pasaribu 2015, Al-Hassan *et al.* 2012). Rice production in good condition is 5.5 tons – 6.5 tons/ha (Dipertan Kabupaten Banyumas 2016). The problems caused rice productivity decreased to 20% in total production % (Al- Hassan *et al.* 2012). The average price of grain in 2016 is IDR 3,800/kg. Rice prices are decreased when the harvest is abundant or in the wet season

(Libna 2017). Unreliable product and profit caused capital volatility. This research compile Monte Carlo simulation and profit volatility graphic and relate it to capital productivity to the laying hen and rice farming business.

1.1. Profit volatility concept and risk level

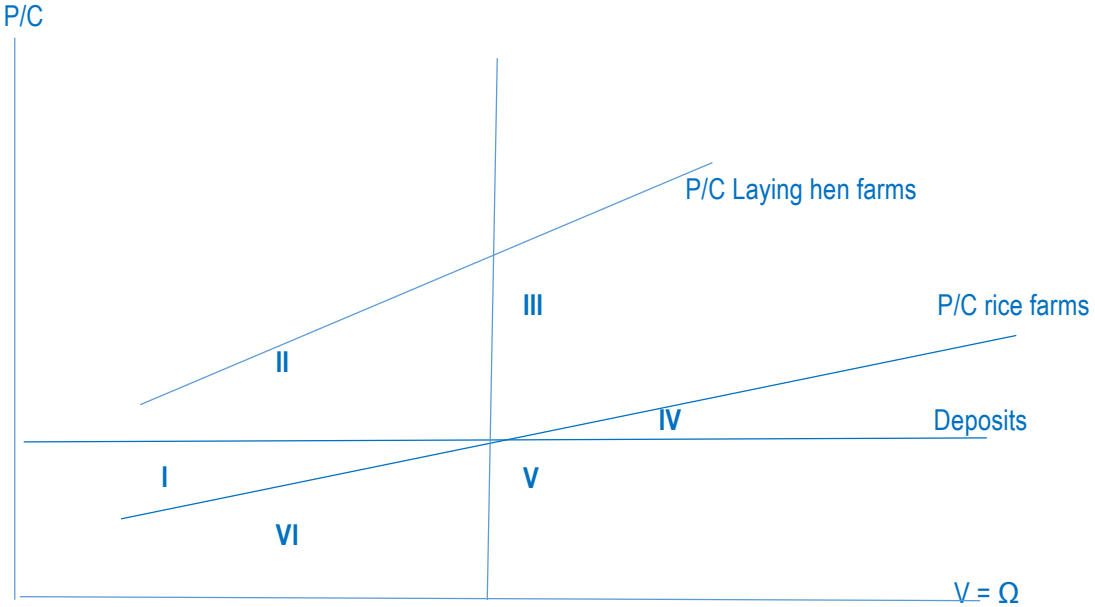
Volatility can be interpreted as objects' value change, higher the value change mean higher the volatility. Unpredicted profit is interpreted as high volatile profit. Profit value is calculated by how much capital used. The concept is known as capital profitability (profit/capital in %). Lauwers *et al.* (2010), Danila (2012) measured profitability by ROA (return of assets). Profitability method and ROA method are different. In profitability method there is no permanent capital.

Based on axis cut in the Figure 1 below, there are six different segment:

- *Segment* I: Low profitability, profitability lower than deposit rate, low volatility, portfolio is very bad.
- *Segment* II: Fairly high profitability, higher than deposit rate, higher than rice farm portfolio, low volatility, good portfolio.
- *Segment* III: Very high profitability, higher than deposit rate, higher than rice farm portfolio, average volatility, very good portfolio.
- *Segment* IV: Average profitability, higher than deposit rate, lower than rice farm portfolio, high volatility, average portfolio.
- *Segment* V: Low profitability, lower than deposit rate, lower than rice farm portfolio, low volatility, bad portfolio.
- *Segment* VI: Low profitability, lower than deposit rate, lower than rice farm portfolio, low volatility, bad portfolio.

Theoretical design above was used to measure laying hen farm business performance. Figure 1 horizontal axis represent volatility (V) measured with deviation standard (Ω). Vertical axis represents capital profitability (P/C). Deposits portfolio is assumed to be stable. Rice farming portfolio shown low volatility level and laying hen farming portfolio show high volatility. The middle axis represents profit expectation or capital profitability of each portfolio.

Figure.1 Relation design between capital productivity (P/C) and Profit Volatility (V) measured from deviation standard Ω



1.2. Monte Carlo simulation method

Monte Carlo simulation is a computational algorithmic to simulate physical and mathematical system. This simulation method is filled with randomized values of computation algorithmic from known probability (Lauwers *et al.* 2010, Heizer, Render 2006, Anderson and Dillon 1998). Monte Carlo simulation is used in Microsoft Office Excel program. This simulation is commonly used in social research, but can be used in other research such as: share portfolio (Arthini *et al.* 2012), operation chamber utility (Basri 2012), and cacao farm (Hidayatno *et al.* 2009).

The problem in Monte Carlo simulation is design used to compare simulation data and real data. Hardaker *et al.* (1999) stated that an expert is needed to analyze and compare simulation data and real data. Batskovskiy *et*

al. (2017) use Monte Carlo simulation to simulate random variables for selecting and viewing the most relevant output scenarios.

2. Methodology

2.1. Study area and respondents

This research was done in egg production center and rice farming center in Banyumas Regency, Central Java. Area of sampling was determined by the availability of farmers. The respondents were determined by business scale and capital used in the business, laying hen farmers have 2,000 heads and rice farmers have 1.5 ha rice field. Total laying hen farmer respondent was 12 respondents and rice farmer respondents was 8 respondents that is all of population on the range of farms.

The primary data analyzed was obtained from past laying hen farm information and activity. The historic data namely: hens' population, production means, labors, total egg production, and marketing for 20 months. The static data namely: hens' maintenance operation standard, shedding, other supporting facility, farm environment.

Analysis methods used were:

Descriptive and Cross Tabulation Analysis: this kind of method is used to describe newest condition of research object. The descripted aspects are:

- Business facility: area, shed, total hen maintenance, tools, and other supporting facilities;
- Breeding technique and Breeding Operational Standard;
- Business administrative;
- Marketing;
- Labor.

Financial Analysis: Cost Structure Analysis; *I*ncome and Profit; Capital Productivity.

$$CP = Profit/Capital \times 100\% \quad (1)$$

- *Business Profit Simulation Analysis, simulated data was financial data:* Range of profit values*;* Profit probability; Capital productivity.
- *Technically there are variables that need to be constant and do not need simulation, such as:* Feed*;* DOC*;* Labor and Labor Cost*;* Shed Building Cost.

Simulation equation is:

$$\pi sim = (X1*X2*X3*X4)–((X2*Qpkn)+(X5*Qdoc)+(X6)) \quad (2)$$

Information: X1 = Simulated hen productivity (%); X2 = Simulated Q (total hen maintenance); X3 = Simulated egg produced (kg); X4 = Simulated egg price (IDR/kg); X5 = Simulated Hpkn (IDR); X6 = Total cost (IDR).

- *Profit Volatility:* Profit value volatility was simulated and measured in standard deviation quantity. Higher the deviation value mean higher the profit volatility.

$$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}} \quad (3)$$

Information: *s* = profit standard deviation (δ); *xi* = Profit value of (i); $\bar{x}$ = profit average value; *n* = total sample.

- *Implementation of simulation. Microsoft excel program was used. The program was manually made using excel formula. Simulation was done 1,027x.*

3. Case studies

The average production of 1.5 ha rice field is 9.75 tons grain/ harvest season, the average price of grain in 2016 was IDR 3,800/kg. Data from the average of cost and profit in rice farming at one harvest season. Table 1 showed that gross profit in rice farming was IDR 21,457,500. The value of capital productivity was 130.72%.

Table 1. The average of cost and profit in 1.5 ha rice field

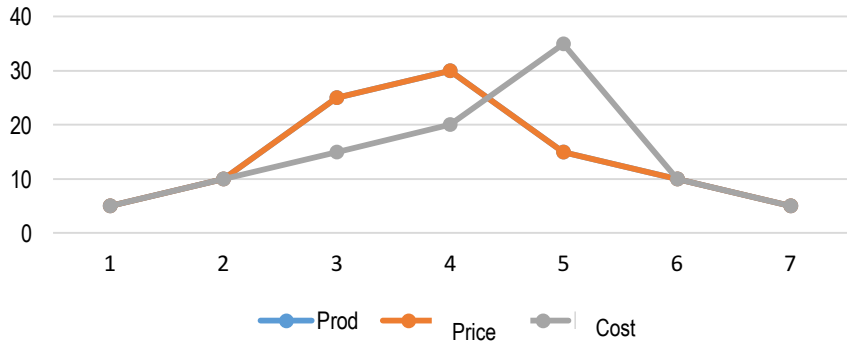
A. Cost	Unit	Price (IDR/kg)	Total (IDR)
Land Rent (ha/MT)	1	7,500,000	7,500,000
Seeds (kg)	30	12,000	360,000
Urea Fertilizer (kg)	375	2,500	937,500
SP36 Fertilizer (kg)	150	2,500	375,000
KCL Fertilizer (kg)	-	7,500	-
Labor (hko)	45	70,000	3,150,000
Tractor Rent (hk)	5	300,000	1,350,000
Pesticide (lt)	5	100,000	450,000
Harvest	21	70,000	1,470,000
Total Cost			15,592,500
B. Total Marketing Revenue	9,750	3,800	37,050,000
C. Gross Profit			21,457,500

To simulate financial performance of rice farming business the factor such as: production, grain price, rice farming business cost, and probability value showed at Table 2. Table 2 showed that lowest and highest range of price is at 4000 kg or 75,47%. The high value showed there are risk in the business because of weather, pest, and disease (Pasaribu 2010, Al Hassan *et al.* 2012, Libna 2017). Grain price ranged at IDR 500/kg or 15.15% and total cost at IDR 3,000,000 or 20.69%. This value showed that rice farming business is stable at 2016.

Table 2. Production probability, rice farming total price and cost

Probability	Production	Probability	Price	Probability	Total cost
(%)	(kg)	(%)	(IDR/kg)	(%)	(IDR)
0.05	5,300	0.05	3,300	0.05	14,500,000
0.1	6,050	0.1	3,400	0.1	15,000,000
0.25	6,800	0.25	3,500	0.25	15,500,000
0.3	7,550	0.3	3,600	0.3	16,000,000
0.15	8,300	0.15	3,700	0.15	16,500,000
0.1	9,050	0.1	3,800	0.1	17,000,000
0.05	9,800	0.05	3,900	0.05	17,500,000

Figure 2. Production probability, rice farming total price and cost



The figure showed probability of production and cost is inclined to the right. It means that price probability distribution is normal than production and cost. The similarity of data to it is theoretical probability will make accurate simulation design (Waller *et al.* 2003).

3.1. Cost and revenue of laying hen farm

The production of egg at 78% is 5,560 kg of eggs per month at 20 month of maintenance. This productivity is lower than past research done by Maoba (2016) and Diara and Tabuaciri (2014). The productivity is high if compared to local hen that maintained traditionally (Hossen 2010, Fentie 2013). The average profit/month is IDR 2,976,000 at IDR 18,000/kg egg's price, average capital used every month is IDR 82,925,250. Capital productivity is 3.59/ month, showed high value.

Table 3. Cost and Income of Laying Hen Farm

Item	Unit	Price (IDR)	Total (IDR)
Feed: (2:3:1)			
Concentrate feed (kg)	44.800	7.400	331.520.000
Corn (kg)	67.200	4.700	315.840.000
Bran (kg)	22.400	3.200	71.680.000
Feed Total Cost			719.040.000
DOVV			16.750.000
Pullet Cost (head)	2.050	53.500	109.675.000
Marketing Cost			7.000.000
Total Operational Cost			852.465.000
Shedding (unit)	1		26.500.000
Labor (2 people)	1.120	50.000	56.000.000
Electricity and Water Cost			4.500.000
Total Permanent Cost			87.000.000
Total Cost/Periods			939.465.000
Income	54.000	18.500	999.000.000
Total Income			999.000.000
Profit			59.535.000
Profit/ Month			2.976.750

To simulate laying hen farm business performance, data needed are: Variable value (price, egg production, and cost) and probability, production range and probability, total cost and probability.

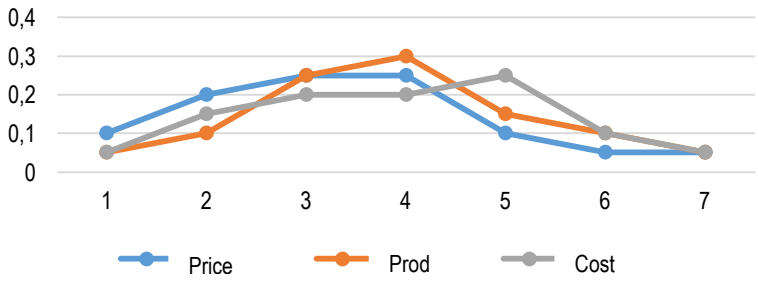
Table 4. Distribution Probability of price, cost, and egg production

Probability (%)	Price (IDR/kg)	Probability (%)	Production (kg)/month	Probability (%)	Total Cost (IDR)
0,1	16.000	0,05	5.925	0,05	97.000.000
0,2	17.000	0,1	6.175	0,15	100.000.000
0,25	18.000	0,25	6.425	0,20	103.000.000
0,25	19.000	0,3	6.675	0,20	106.000.000
0,1	20.000	0,15	6.925	0,25	109.000.000
0,05	21.000	0,1	7.175	0,10	112.000.000
0,05	22.000	0,05	7.425	0,05	115.000.000

Table 4 showed that lowest to highest egg price ranged at IDR 6,000/kg or 37,50%, the difference is high. Egg price volatility is happened because of season factor (Kumarmangalam and Vetrivel 2012, Sumanto *et al.* 2016). Lauwers *et al.* (2010) stated that important factor of price is market aspect.

Production range value of egg is 25.32 %, this high value showed that farmers did not fully adept in marketing process. Susilowati *et al*. (2013), Musa *et al.* (2012), stated that farmers did not pay attention to shed sanitary that impacted on hen health and productivity. The figure showed that price and production distribution probability is better than cost distribution probability. It means there is compatibility between real and simulated data.

Figure 3. Distribution probability of laying hen farm price, productivity and cost

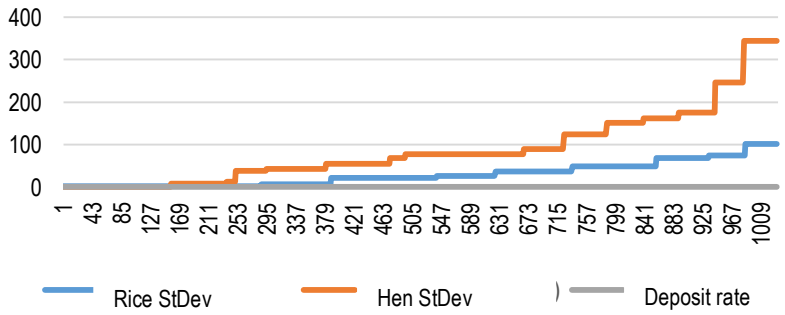


3.2. Capital volatility rice farming and laying hen farming

Capital volatility is measured by it is standard deviation value. The values showed that capital volatility of rice farming is lower than laying hen farming. There is no volatility in deposit rate. Danila (2012) stated that the risk of the business can be shown on it is capital volatility. The result from increased data showed that capital growth

pattern of rice farming and laying hen farming are similar. The result showed that rice farming has the same risk as laying hen farming.

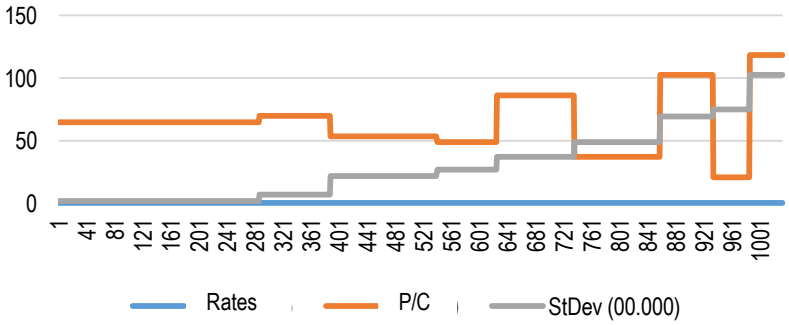
Figure 4. Capital volatility of rice farming, laying hen farming, and deposit rate



3.3. Relation between capital volatility and productivity in rice farming

The average capital productivity of rice farming from simulation is 64.30%, deterministic analysis result is 133.60%. Higher the profit volatility then higher the capital volatility. Profit volatility increase in value up to 20% decreased the value of capital volatility up to 20%. It means that high capital usage in rice farming not necessarily give high profit.

Figure 5 Relation between capital volatility and productivity (P/C) in rice farming

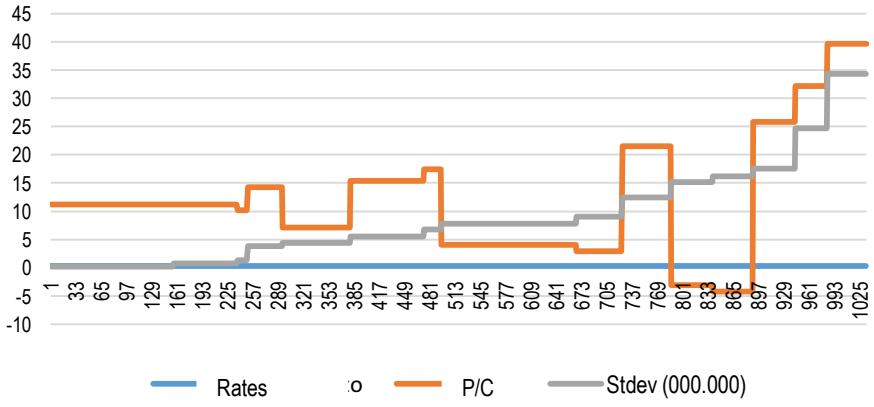


3.4. Relation between capital volatility and productivity in laying hen farming

The average profit of laying hen farming from simulation is 11.90%. Danila (2012) stated that average capital portfolio in Indonesia is 6.98 a year, and 2.98 a year for risk free portfolio. This result showed that rice farming capital profit is higher than laying hen capital profit.

The simulation showed that higher the profit volatility then higher the capital productivity. Capital productivity was increased when profit volatility is low however, when profit volatility increased to 5 points then profit productivity is fluctuating. This result stated that capital usage did not always increased profit productivity.

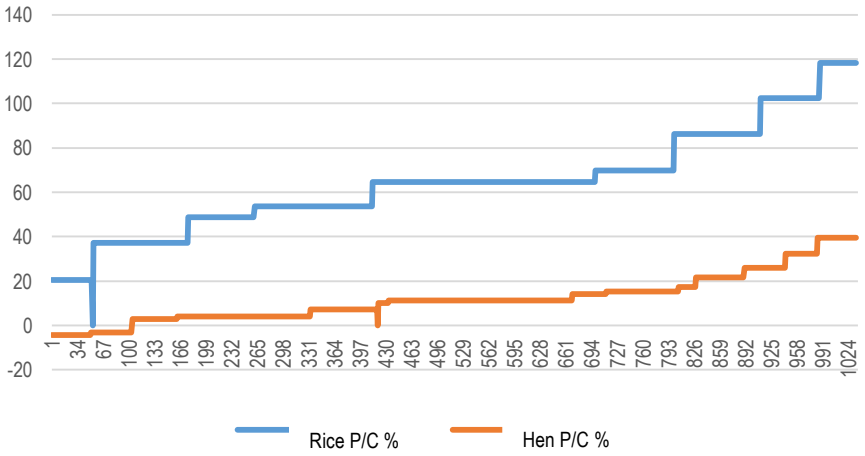
Figure 6. Relation between capital volatility and productivity (P/C) in laying hen farming



3.5. Capital productivity comparison between rice farming and laying hen farming

Laying hen farming capital and profit value are higher than rice farming value, but it is capital productivity is lower. There is 14% of negative value in laying hen farming capital productivity. Chand and Raju (2013) stated that rice farming profit is lower but it is loss probability also lower. The capital productivity increased pattern of rice farming and laying hen farming are similar.

Figure 7. Capital productivity comparison between rice farming and laying hen farming



The simulation showed that capital productivity of rice farming is higher than laying hen farming. Profit volatility in rice farming is lower than laying hen farming. There no segment formed in the figure as hypothesis. This result showed that profit certainty in rice farming is higher than laying hen farming.

Conclusion

Laying hen farming capital productivity is lower and it is profit volatility is higher than rice farming. This result showed that laying hen farming portfolio is lower than rice farming. There is no line meet in capital productivity simulation figure. The profit volatility and capital production between two businesses are similar.

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The Development of Quality Milk and Dairy Products Market with the Consideration of State Support

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Abstract:

The publication contains scientifically grounded proposals and practical recommendations for the development of quality milk and dairy products market with the consideration of state support in the Krasnoyarsk Territory. The authors consider the market development concept of high-quality milk and dairy products in the region, the implementation of which as expected will increase the production volume and sales of high-quality milk and dairy products, improve the self-sufficiency of the region and the needs of the population in milk and dairy products. It will minimize adulterated products in the market, ensure the market positioning of local single brand products, and increase exports of dairy products, as well as improve profitability of agricultural producers, processors and trade organizations. All these improvements can be achieved not without the means of state support. Besides, the authors substantiate the subsidization methodology of the milk and dairy products market and define measures of state support for the milk and dairy products market development based on the proposed subprogram.

Keywords: Krasnoyarsk territory; milk and dairy products market; concept; subsidization; quality.

JEL Classification: O10; O18

Introduction

In general, both the cow population and the gross milk production in the Russian Federation are decreasing from year to year. Currently, the consumption of dairy products has decreased by 1.6 times as compared to the level of 1990. The average resident of the country consumes about 248 kg of this product per year that is almost a quarter below the medical norm. At the same time, in accordance with the Doctrine of Food Security of the Russian Federation, the level of self-sufficiency of the country in milk and dairy products should be at least 90%, while in fact it is lower (Altukhov 2014, Semin 2015).

In modern conditions, more and more attention is paid to the milk and dairy products' quality. In the Russian Federation, due to the efforts of the state, in 2012-2015, there was a significant increase in the share of the highest grade milk in the structure of the milk sales – up to 70% of the total sales revenue. Though, since January 1, 2016 according to Technical guidelines of the Customs Union "About safety of milk and dairy products" sorting of milk into quality grades is not provided (Pyzhikova *et al.* 2016).

Currently, dairy products the actual quality of which differs from the declared, are increasingly detected in the market. In accordance with the data of official statistics, more than one third of checked products were attributed to the adulterated products. As practice shows, not all high-quality dairy products are natural. Under these

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circumstances, the role of the state in determining the order of interaction among market participants, establishing rules for the production of quality products, and its subsidization increases significantly (Ovsyanko and Proskuryakov 2017).

During the years of implementation of state programs of agriculture development and market regulation of agricultural products, raw materials and food for 2008-2012 and 2013-2020, the domestic dairy cattle breeding, despite substantial financial support from budgets of all levels, was unable to embark on a path of sustained import substitution in the domestic market (Baryshnikov 2008, Bespakhotny 2006).

In the current conditions, the development of the milk and dairy products market is possible subject to the improvement of the state support, standardization and products certification system, the association of market participants into industry unions that led to the relevance of this study.

A significant contribution to the study of the current state and issues of the milk and dairy products market development, as well as state support of this sector, was made by prominent scientists such as Altukhov (2014), Baryshnikov (2008), Bespakhotny (2006), Semin (2015), Stadnik (2015), Strekozov (2016), Suvortsev (2016), Tkach (2015), and Ushachev (2015). Their works served the scientific basis for further research.

1. Methods used and results obtained

The abstract-logical, monographic, economic and statistical, and computational design research methods were used when conducting this work.

Using the abstract-logical method, the concept of market development of the high-quality milk and dairy products was substantiated. This concept includes the main goal, the tasks to be solved towards achieving this goal, implementation directions, and expected results. When using the economic and statistical research method, the dynamics of the main indicators characterizing the milk and dairy products market development in the Krasnoyarsk Territory was revealed.

On the basis of monographic research method, the calculation methodology of the subsidy required for the development of the milk and dairy products market, as well as its components, were defined.

The application of the computational design method allowed determining the prospects for the milk and dairy products market development in the Krasnoyarsk Territory on the basis of the proposed market development subprogram.

Results

The concept of high-quality milk and dairy products market development in the Krasnoyarsk Territory is substantiated and the main implementation directions of this concept are identified, that includes the creation of the Association of agricultural producers, processors and trade organizations, definition of unified scientifically grounded product quality standards, the use of a unified product brand by the Association members, state support for the products certification and promotion, reasonable increase in sales prices at the expense of ensuring product quality, ensuring technology compliance, and implementation of innovation in the milk and dairy products manufacture.

The methodology for determining the subsidy for the milk and dairy products market development is updated. This subsidy consists of subsidy to ensure continuity in scheduled supply of raw milk for processing in the required amount, subsidy to producers and processors for voluntary certification, subsidy for product promotion (extensive advertising, presale preparation, equipping and decoration of points of sale, etc.), as well as subsidy for scientific support (carrying out various marketing studies, optimizing supply, developing and implementing new bio-based products and environmentally friendly packaging, implementing energy-saving technologies, etc.). Subsidies are provided in the form of reimbursement of costs incurred by market participants with differentiation of reimbursement percentage by periods. In the period from 2017 to 2021, the total amount of the subsidy will increase from 545.8 to 967.7 mln rubles.

The subprogram of milk and dairy products market development in the region was drawn up. This subprogram is based on subsidizing market development, conducting certification, increasing the number of Association members, fighting against adulterated products, maintaining the local brand, and expanding exports. Based on the proposed measures in the framework of the implementation of the drawn up subprogram, the projected market development indicators are identified. Thus, by 2025, the supply of milk and dairy products by agricultural enterprises per average resident of the region will amount to 380 kg/year, the self-sufficiency of the region's milk and dairy products will reach 100%, production of butter will amount to 11.5 thousand tons, cheese and cottage cheese – to 13 thousand tons, and whole-milk products – to 873.3 mln tons. At that, profitability of agricultural organizations with subsidies will reach 30%. All the products sold on the market will be certified.

2. Discussion

The history of the milk and dairy products market development in Russia has accumulated vast positive experience. Thus, at the beginning of the XXth century dairy farming in Russia was among the priority sectors. Significant amounts of butter were exported abroad. Due to the predominance of cooperative business practically across the whole country, the production of raw milk, its collection and processing were well organized based on the use of imported equipment and advanced technologies. High-quality butter produced in Russia was highly appreciated in the European market. Raw material zones for milk processing enterprises were specially allocated, integration and cooperation between milk producers and processors was developed and improved (Tkach 2014).

Currently, the import dependence of the domestic food market on the main products of cattle breeding continues to be very high, the share of domestic producers in dairy products reached 75%. This is significantly less than the indicator determining food security. With a sharp rise in the price of high-grade proteins (for seven years, cost of milk protein has risen by more than 80%), Russia faced a shortage of high-grade proteins production (Ushachev 2015, Strekozov *et al.* 2016).

During the period of the agricultural complex reformation, the gross yield of milk decreased by 25 mln tons. The decline in milk production was also due to the poor condition of the material and fodder base, as well as absence or illiterate selection work (Stadnik *et al.* 2015).

Some scientists believe that the lack of growth, or decline in production volume by agribusiness industries as well as rising prices allows characterizing them as "industries with increasing costs", that indicates the inefficient implementation of innovative technologies, including that as a result of ignoring the industry specifics (Suvortsev and Nikulin 2016).

The high proportion of dairy products import is due to the lack of raw milk to ensure the processing industry, and the reduction of import duties on milk and dairy products to 15%. Saturation of the market with dairy products made of vegetable fats, the production of which is less expensive, led to the supersession of natural milk. However, this had a negative impact on product quality and market development (Pyzhikova *et al.* 2016).

The dairy market in the Krasnoyarsk Territory plays an important economic and social role. At the present stage, it is characterized by shortage of raw milk and low investment activity, whereas the utilization of processing capacity is only 50%. Today's trend is such that the market is filled with a variety of dairy products, both produced locally and imported from other regions, though just part of it meets the imposed requirements. Therefore, the issue of market regulation through certification, the establishment of uniform quality standards and their compliance at all stages from production to sales is becoming increasingly important challenge.

In this regard, there is a need to substantiate the concept of the quality milk and dairy products market, which the authors understand as a system of equal, mutually beneficial relations at the initiative of the state, with respect to the production, processing and sale of products in accordance with developed unified scientifically grounded quality standards, uniting agricultural producers, processors and trade organizations in order to meet the needs of the population in healthy, ecologically clean products, improve production and processing performance as well as increase their profitability by selling products under the national brand at more favorable prices.

The high-quality milk and dairy products market should be formed and developed systematically rather than chaotically. The conceptual approach to the development of such a market involves the development of a number of key elements, presented in Figure 1.

Figure 1. The concept of the high-quality milk and dairy products market development in the region

PURPOSE

THE DEVELOPMENT OF THE HIGH-QUALITY MILK AND DAIRY PRODUCTS MARKET

GOALS

- Ensuring the profitability of agricultural producers, processors and trade organizations at the expense of higher sale prices of quality products, through their integration;
- Meeting the needs of the population in quality milk and dairy products in accordance with medical standards;
- Ensuring self-sufficiency of the region with quality milk and dairy products;
- Utilizing regional milk processing facilities more complete;
- Modernizing production and processing;
- Fighting against adulterated products;
- Attracting additional state funds to the industry.

IMPLEMENTATION AREAS

- Developing the Association of agricultural producers, processors and trade organizations;
- Creating unified brand of products of the Association members;
- Defining a single scientifically grounded standards of product quality;
- Carrying out product certification;
- Providing state support of products certification and promotion;
- Ensuring technology compliance and the creation of high-tech milk and dairy products;

RESULTS

- Increasing the output and sales of high-quality milk and dairy products;
- Increasing self-sufficiency of the region and meeting the needs of the population
- in milk and dairy products;
- Minimizing adulterated products in the market;
- Positioning the local uniform brand in the milk and dairy products market;
- Increasing dairy products exports;
- Increasing profitability of agricultural producers, processors and trade organizations,
- including that at the expense of the state support.

Source: developed by the authors

The main directions in implementation of the development concept of the high-quality milk and dairy products market in the Krasnoyarsk Territory are as follows:

- *The creation of an Association of agricultural producers, processors and trade organizations*, that will allow uniting capabilities and efforts of all Association members to achieve common goals in the production, processing and sale of milk and dairy products, as well as to meet consumer demand;
- *Developing a single brand of the Association members' products* that will lead to a greater focus of consumers' attention on the products of local market participants; this will strengthen their competitive advantages among milk and dairy products producers of other brands;
- *The definition of a universal scientifically grounded product quality standards* that are needed to certify milk and dairy products, taking into account primarily the naturalness of milk and dairy products;
- *Certification of products* will allow identifying the compliance of milk and dairy products to the established requirements regardless of the manufacturer and the consumer;
- *State support for products certification and promotion* in the current context should be aimed not only at increasing production volumes by subsidizing the enhancement in milk herd productivity but also at ensuring compliance of milk and dairy products with established requirements, as well as their positioning in the market;
- *Ensuring compliance with technology and the creation of high-tech production of milk and dairy products* in modern conditions will provide competitive advantages to milk and dairy products producers and processors that will attract more consumers and ensure profitability;
- *A reasonable increase in sales price at the expense of product quality assurance*: production, processing and sales of high quality products entails additional costs at all stages, directly affecting the increase in sales prices.

Thus, implementation of the proposed concept of the high-quality milk and dairy products market development in the region will lead to increase in the volume of production, processing and marketing of milk and dairy products, as well as to increase of consumption among the local population and outside the region. This will remove adulterated milk and dairy products from the market and lead to more active participation of the state in market development, as well as enhance social and economic efficiency of all market participants.

During the study period in the Krasnoyarsk Territory there was a reduction in the dairy herd population in all categories of farms and agricultural organizations by 2.1 and 12.1%, respectively (Table 1) (The agro-industrial complex of the Krasnoyarsk Territory in 2012 and 2013; The agro-industrial complex of the Krasnoyarsk Territory in 2013 and 2014; The agro-industrial complex of the Krasnoyarsk Territory in 2013 and 2014; The agro-industrial complex of the Krasnoyarsk Territory in 2014 and 2015; The agro-industrial complex of the Krasnoyarsk Territory in 2015 and 2016; The agro-industrial complex of the Krasnoyarsk Territory in 2016 and 2017). Despite this, in general milk production increased by 6,600 tons due to the growth of average annual productivity of cows both in all farms and agricultural organizations up to 4,578 and 5,125 kg/head, respectively. The proportion of regional production of milk and dairy products in the total volume had also increased up to 85%. The production of dairy

products in the region for a number of positions declined, while inbound of milk and dairy products, including imports, exceeded taking-out including exports in the reporting year by 35.4 thousand tons. Milk consumption in the region was below the medical standards by 24.3%. A significant role in stabilizing the situation in the dairy industry was played by the state.

Table 1. The milk and dairy products market condition in the Krasnoyarsk territory

Type of product	2012	2013	2014	2015	2016
Total cow population, thousand heads	172.7	168.5	168.6	170.6	169.1
including in agricultural organizations	87.9	84.0	82.7	81.0	77.3
Total milk production, thousand tons	726.9	708.1	724.5	739.8	733.5
including in agricultural organizations	366.4	355.2	367.4	371.1	355.8
Average annual milk yield, kg/head.					
in farms of all categories	4367	4314	4446	4603	4578
in agricultural organizations	4538	4463	4702	5052	5125
Production of dairy products:					
Liquid processed milk, kt	293.8	296.0	265.5	211.8	238.9
Whole milk products, kt	382.8	372.4	329.4	284.7	283.8
Butter, kt	1.9	1.9	3.3	3.5	4.1
Cheese, cheese products, and cottage cheese, kt	2.3	2.9	3.3	4.1	3.5
Condensed milk, m.c.c	13.7	13.8	13.8	0	0
Powder milk, kt	0.6	0.5	0	0	0
Inbound of milk and dairy products, including import, kt	170.6	221.9	216.1	182.6	180.2
Taking-out of milk and dairy products, including export, kt	122.8	150.0	154.4	149.1	144.8
Consumption of milk and dairy products, kg/person/year	249.0	250.0	251.0	248.0	246.0
The proportion of regional production of milk and dairy products in the total volume, %	79.1	79.5	80.3	80.6	85.0
Subsidies to agricultural producers from budgets of all levels, mln rubles,	3767.4	4417.6	3845.1	4581.7	4900.1
including that for the development of the dairy industry	601.6	739.5	899.7	621.4	736.9

Note: *according to the collections of the Agro-industrial complex of the Krasnoyarsk Territory for 2009-2014

Over the 2012-2016 state support to agricultural producers in the region increased by 30.1% and amounted to 4.9 bln rubles. Its predominant share was made up of funds from the regional budget. At that, in 2016, 15% of the total amount of budget financing was spent for the dairy industry development. This included the following main areas in accordance with the law of the Krasnoyarsk Territory "On state support of subjects of agro-industrial complex of the region" (2017): partial refund of interest rate on investment loans (borrowings) on the construction and reconstruction of dairy cattle breeding facilities made up 34123,4 thousand rubles; partial refund of interest rate on short-term loans (borrowings) for the development of cattle breeding made up 7275,1 thousand rubles; subsidies for partial refund of expenses on interest payment on the loans received for primary and subsequent processing, term up to one year, made up 21400 thousand rubles; partial refund of interest rate on short-term loans (borrowings) for development of dairy cattle breeding term up to one year made up 32595,6 thousand rubles; subsidies for the maintenance of breeding stock of farm animals (the dairy sector) made up 112.433,5 thousand rubles; subsidies per one liter of the sold milk made up 525757,6 thousand rubles; partial refund of expenses for payment of insurance premiums accrued under the contract on agricultural insurance in livestock breeding made up 3299,3 thousand rubles.

At the same time, the promotion of milk and dairy products from the producer to the consumer is quite costly and important process which also requires state support. It is the state that acts as the main coordinator of the actions of all market participants, ensuring their effective interaction, as well as assisting raw milk producers since it is a main raw material of the industry. At that, budget financing funds should be directed to the development of the quality products market.

In our opinion, the state support of the milk and dairy products market should be provided in the following main areas (Table 2).

Table 2. State support of the milk and dairy products market

The recipient (contractor)	Budget	Financing	Area	Measures
Agricultural organizations supplying raw milk for processing	Regional	On monthly basis	Ensuring a steady supply	Subsidizing the continuity of milk supply (S_{CS})
Center for standardization and metrology	Federal	On quarterly basis	Conducting voluntary certification of milk and dairy products	Partial refund of expenses on carrying out voluntary certification (S_{VC})
Agricultural and processing organizations supplying certified products	Regional	On monthly basis	Services to promote milk and dairy products on the market	Partial refund of expenses on promotion of milk and dairy products in the market (S_{PP})
Research institutes and higher education institutions	Regional	As requested	Scientifically grounded support of market development	Partial refund of expenses on the costs of scientific support of market development (S_{SS})

Note: * developed by the authors

Dairy cattle breeding industries are characterized by own specific features. Thus, milk is produced, processed, stored and sold daily, while its losses in violation of at least one of the stages of the production cycle are significant, as well as lead to decrease in the quality of products. Therefore, to ensure the production discipline and encourage the agricultural organizations we suggest introducing the subsidy provided on ensuring continuity of deliveries of raw milk for processing in necessary amount and in the terms established by the schedule (S_{CS}). The subsidy should be of incentive nature and make 5% of the volume of deliveries (VD_M):

$$S_{CS} = VD_{\text{M}} \times 0.05 \text{ (1)} \quad (1)$$

In modern conditions characterized by a variety of dairy products on the market, buyers prefer to purchase certified products that have passed quality tests. Therefore, the authors propose to introduce a subsidy for voluntary certification to producers and processors (S_{VC}) calculated by the formula:

$$S_{VC} = C_{VC} \times PC_{VCi}, \quad (2)$$

where: C_{VS} – is the cost for voluntary certification; PC_{VCi} – is the percentage cost recovery for voluntary certification in the i-th year (1st year – 0.75, 2nd year – 0.50, 3rd and subsequent years – 0.25).

In order to recover part of the costs incurred by market participants, the authors propose a subsidy for the products promotion (S_{PP}), which should be calculated as follows:

$$S_{PP} = C_{PP} \times 0.9, \quad (3)$$

where: C_{PP} – is the cost for product promotion (extensive advertising, presale preparation, equipping and decoration of points of sale, *etc.*).

Equally important is a scientific approach to market development, which includes carrying out various marketing studies, optimizing supply, developing and implementing new bio-based products and environmentally friendly packaging, implementing energy-saving technologies, etc. Scientific support also needs a subsidy (S_{SS}) that can be calculated by the formula:

$$S_{SS} = C_{SS} \times 0.5, \quad (4)$$

where: C_{SS} – is the cost for scientific support.

Consequently, state support for the milk and dairy products market development in the region should be provided in the form of the subsidy for market development ($S_{\text{market development}}$):

$$S_{market\ development} = S_{CS} + S_{VC} + S_{PP} + S_{SS} \quad (5)$$

The projected amount of subsidies for the development of the regional market of milk and dairy products for described purposes is presented in Table 3.

Table 3. Subsidizing the milk and dairy products market development in the Krasnoyarsk territory, mln rubles

Indicator	2017	2018	2019	2020	2021
S_{CS}	399.4	447.3	500.3	527.2	579.1
S_{VC}	45.0	52.0	33.8	45.0	56.3
S_{PP}	86.4	145.8	216.0	280.0	312.3
S_{SS}	15.0	15.0	20.0	20.0	20.0
$S_{\text{market development}}$	545.8	660.1	770.1	872.2	967.7

Note: * - Developed by the authors

Thus, the total amount of subsidies for the milk and dairy products market development in the Krasnoyarsk Territory on average in 2021 will amount to 967.7 mln rubles that is by 77.3% higher than that in 2017.

At the current stage of development of the regional market of milk and dairy products, the main measures of the state should be aimed at promoting certified products of local producers under single brand and package style. The authors have developed the subprogram on "Development of the natural certified milk and dairy products market" in the framework of the program "Development of agriculture and regulation of agricultural products, raw materials and food markets for 2014-2020" (On the State program for agricultural development and market regulation of agricultural products, raw materials, and food for 2013-2020, 2012; On safety of milk and dairy products, 2013) and the Federal law "On the development of agriculture" (2017). The key measures stipulated by this subprogram are shown in Table 4.

Table 4. Measures aimed at developing the quality milk and dairy products market

Stage	Measure
Preproduction	Activating breeding work
	Increasing own fodder production
	Modernizing livestock farms
Production	Implementing the system of precise dairy cattle breeding
	Ensuring obligatory certification
Processing	Providing full capacity utilization
	Expanding the range of dairy products
	Ensuring obligatory certification
Presale	Creating a more competitive and versatile packaging
	Conducting advertising campaigns and fairs, including events outside the Krasnoyarsk Territory
	Organizing social commerce
Sale	Carrying out presale preparation, equipping and registering trading places under the uniform logo
	Ensuring proper conditions for products storage in retail chains
	Delivering production in neighboring regions and China
	Monitoring the presence and conformity of markings Fighting against adulterated products

Note: * - Developed by the authors

The main indicators of the subprogram include:

- the list of Association members – producers and processors of milk and dairy products in terms of product type;
- list of products subject to voluntary certification;
- the planed sales amounts of products at retail outlets;
- measures to promote products to the market broken down by performers;
- deadlines of program measures implementation.

On the basis of the proposed measures in the framework of the implementation of the subprogram we determined the predicted values of the market development indicators (Table 5).

Table 5. Milk and dairy products market development indicators of the Krasnoyarsk territory, taking into account the implementation of the proposed recommendations for the period 2017-2025*

Indicator	Years								
	2017	2018	2019	2020	2021	2022	2023	2024	2025
Market development subsidies, mln rubles	545.8	660.1	770.1	872.2	967.7	1074.1	1213.8	1408.0	1647.4
Dairy industry organizations included in the Association; % in the total amount	30	45	50	55	60	65	70	75	80

Indicator	Years								
	2017	2018	2019	2020	2021	2022	2023	2024	2025
Provision of population with milk and dairy products per year, kg/person	280	290	300	310	330	350	360	360	380
Production of butter, thousand tons	5.5	6.5	7.5	8.0	8.5	10	10.5	11	11.5
Production of cheese and cottage cheese, thousand tons	5.8	7.5	8.5	9.5	10.8	12	12.5	12.5	13
Production of whole-milk products, thousand tons	477.8	545.7	568.8	655.0	669.8	738.1	761.1	842.2	873.3
Self-sufficiency of the region with milk and dairy products, %	96	96.5	97.0	98	98.5	99.5	100	100	100
Proportion of certified dairy products in its total volume, %	50	65	75	80	85	95	100	100	100
Export of milk and dairy products (in terms of milk), kt	190.2	200.5	230.9	240.5	250	270	300	310	350
The profitability of subsidized agricultural organizations, %	20.5	21.6	22.8	24.0	25.0	26.2	27.0	28.5	30.0

Note: * - Developed by the authors

The measures for the milk and dairy products market development, drawn up by the authors, will contribute to improving market functioning. Thus, when subsidizing the market development and increasing the share of members of the Association of agricultural producers, processors and trade organizations, the provision of the population with milk and dairy products by 2025 will amount to 380 kg/person/year. It is planned to increase the region's self-sufficiency in milk and dairy products, as well as the proportion of certified dairy products in the total volume, to 100%. Production of main types of products and exports will increase by almost twice. At that, the profitability of subsidized agricultural organizations will be 30%.

Conclusion

Effective functioning of the milk and dairy products market is one of the conditions of food supply both in the region and in the whole country. At the same time, not only the issue concerning the level of country's self-sufficiency in milk and dairy products, but also the problem of their quality are becoming increasingly important. The share of adulterated dairy products is decreasing, though still remaining significant, in 2016 it amounted 7%. The authors have proposed a refined concept of the natural certified milk and dairy products market which is understood as a system of equal, mutually beneficial relations at the initiative of the state, with respect to the production, processing and sale of products in accordance with developed unified scientifically grounded quality standards, uniting agricultural producers, processors and trade organizations in order to meet the needs of the population in healthy, ecologically clean products, improve production and processing performance as well as increase their profitability by selling products under the national brand at more favorable prices.

The authors have formulated the milk market formation and development concept. The critical paths in the implementation of this concept are: creating the Association of agricultural producers, processors and trade organizations; using a unified product brand by the Association members; defining unified scientifically grounded product quality standards; conducting product certification; providing state support for the products certification and promotion; ensuring technology compliance, and implementing innovation in the milk and dairy products manufacture; and conducting reasonable increase of sales prices at the expense of ensuring product quality.

The implementation of the proposed concept will allow increasing production and sales volumes of quality milk and dairy products, raising level of self-sufficiency of the region, satisfying needs of the population in milk and dairy products, minimizing presence of the adulterated product in the market, as well as positioning local uniform brand in the milk and dairy products market, increasing export of dairy products, enhancing profitability of agricultural producers, processors and distributive trade, including that at the expense of state support.

During the study period in the Krasnoyarsk Territory, the dairy herds population in all categories of farms and agricultural organizations has decreased by 2.1 and 12.1%, respectively. Despite this, in general milk production has increased by 6,600 tons due to the growth of average annual productivity of cows both in all farms and agricultural organizations to 4,578 and 5,125 kg/head, respectively. Also, the share of regional milk production and dairy products in the total production volume has increased to 85%. The production of dairy products in the region for a number of positions declined, while inbound of milk and dairy products, including imports, exceeded taking-out including exports in the reporting year, by 35.4 thousand tons. Milk consumption in the region was below the medical standards by 24.3%. At that, state plays significant role in stabilizing the situation in the dairy industry.

The amount of state support to agricultural producers of the Krasnoyarsk Territory in 2016 amounted to 4900.1 mln rubles that was higher than that in 2012 by 30.1%. At that, 736.9 mln rubles out of the entire amount of budget financing accounted for the development of the dairy industry that includeed the following main areas: partial refund of interest rate on investment loans (borrowings) on the construction and reconstruction of dairy cattle breeding facilities made up 34.1 mln rubles or 4.6%; partial refund of interest rate on short-term loans (borrowings) for the development of cattle breeding made up 7.3 mln rubles or 1%; subsidies for partial refund of expenses on interest payment on the loans received for primary and subsequent processing term up to one year made up 21.4 mln rubles or 2.9%; partial refund of interest rate on short-term loans (borrowings) for development of dairy cattle breeding term up to one year made up 32.6 mln rubles or 4.4%; subsidies for the maintenance of breeding stock of farm animals (the dairy sector) made up 112.4 mln rubles or 15.2%; subsidies per one liter of the sold milk made up 525.8 mln rubles or 71.4%; partial refund of expenses for payment of insurance premiums accrued under the contract on agricultural insurance in livestock breeding made up 3.3 mln rubles.

The authors have supplemented the methodology for determining the subsidy for the milk and dairy products market development, consisting of subsidy to agricultural producers to ensure continuity in scheduled supply of raw milk for processing, subsidy to the center for standardization and metrology for conducting voluntary certification, subsidy to agricultural and processing organizations for product promotion, and subsidy to research institutions and higher education institutions for scientific support of market development. According to estimations, the size of the subsidy intended for development in 2021 should amount to 967.7 mln rubles, that is more than the level of 2017 by 1.8 times.

The key measures of the subprogram on "Development of the natural certified milk and dairy products market" drawn up by the authors within the framework of the program "Development of agriculture and regulation of agricultural products, raw materials and food markets for 2014-2020" (2012) include certification of products, subsidizing, involvement of more agricultural producers in the Association, supporting the local brand, and exporting milk products.

When subsidizing market development and increasing the share of members of the Association of agricultural producers, processors and trade organizations, the provision of the population with milk and dairy products by 2025 will amount to 380 kg/person/year. The region's self-sufficiency in milk and dairy products, as well as the proportion of certified dairy products in the total sales volume will reach 100%. Production of main types of products and exports will increase by almost twice at the profitability of subsidized agricultural organizations equal to 30%.

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Economic and Mathematical Modeling of Quantitative Assessment of Financial Risks of Agricultural Enterprises

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Abstract:

The paper is devoted to the relevant issue of assessing the level of financial risk of agricultural enterprises. The authors present the results of the study of time series of production volumes and average market prices for livestock products in Russia. The result of the study of time series was a statistical assessment of the probabilistic characteristics of these data, the development of economic and mathematical models of their dynamics. The obtained results were used while forecasting the market movement and the volume of production of livestock products, which in turn became the basis for prognosis evaluation of the level of financial risk of agribusinesses. The authors have simulated a quantitative liquidity risk assessment for agricultural enterprises producing livestock products. The obtained results can be used by producers in the system of planning the activity of agricultural organizations. At the same time, planning the indicators of production and sales of livestock products on the basis of a predictive assessment of the level of financial risk will allow producers to develop in advance effective measures to reduce the possible level of losses and improve production efficiency.

Keywords: livestock; financial risk; liquidity; risk level; sale price; forecast; modeling; profit; loss; insurance.

JEL Classification: J32; O13

Introduction

In market conditions, the problem of risk analysis and assessment becomes more important. The need for research in this area is relevant since the risk problem is closely linked to the financial sustainability of the agricultural organization, which allows it to freely manage money, ensure timely payments and expand production. The measurement of risks in the agro-industrial complex is of particular importance since the functioning of agricultural enterprises is obviously accompanied by a risk that is expressed in failing to achieve the planned results in the required time. In order to survive in a free market, enterprises in the agro-industrial complex need to have a clear idea before investing in production, to have a realistic prospect of not only cash return but also of profit-making (Melnikova and Osipova 2018).

The production of livestock products plays one of the key roles in the economic development of Russia. However, the weak ability of enterprises producing livestock products to adapt quickly to changing market conditions and make rational decisions in a risk environment is reflected in a slowdown in development, and, correspondingly, a decrease in the efficiency of functioning in general. In the context of the growing uncertainty of the economic environment, the endless transformation of market relations, the emergence of new requests from

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consumers, the instability of sales markets, it is necessary to clearly understand that the planning of the activities of agricultural organizations is impossible without creation of a well-functioning risk management system based on an early quantitative assessment of the level of financial risk.

The purpose of the paper is to analyze and quantify the financial risks of agricultural organizations, primarily related to the occurrence of unforeseen financial losses from changes in the prices of the sale of basic livestock products.

1. Materials and methods

As the basic material of the study, the statistical data of the Federal State Statistics Service of the Russian Federation were used. The authors used the following research methods: monographic, descriptive, statistical, inertial, economic and mathematical ones. Using descriptive, monographic methods, the authors examined trends in the development of the price situation of the market for livestock products, the dynamics of production.

On the basis of the inertial method, the authors investigated the regularities of time series and modeled the forecast of the dynamics for the future, using wide possibilities of economic and mathematical modeling. The main method of research was the statistical method of risk assessment, the essence of which was to determine the probability of occurrence of losses based on statistical data of the period preceding the current observations. The level (magnitude, degree) of the risk was measured on the basis of statistical indicators such as mathematical expectation, variance, standard deviation, the coefficient of variation and variability of the possible result. Calculations were carried out through Statistica and Microsoft Excel application programs.

2. Results and discussion

Livestock breeding is one of the key industries of Russian agriculture. The food security of the state directly depends on the level of its development; therefore, the task of increasing the volume of livestock production is one of the strategic tasks of our country. In the course of the well-known reforms of the early 1990s, animal husbandry in Russia suffered heavy losses. Until 2000, the industry experienced a deep and protracted decline – both in quantitative terms and in terms of productivity. During the recent 10 years, due to the use of innovative technologies in this sector and the expansion of state support measures, the situation is beginning to change for the better. The livestock sector is one of the most dynamically developing types of agricultural activities (Food and Agriculture Organization of the United Nations 2009). Nevertheless, almost 20 years after the reforms, livestock indicators still do not reach the required level. The functioning of enterprises producing livestock products is accompanied by risks of a different nature, generated by a whole complex of mutually intertwining factors. Financial risks are particularly acute in a market economy.

Financial risks are usually understood as the probability of unforeseen financial losses (declining profits, incomes, *etc*.) in the situation of uncertainty in the terms of the financial activity of the enterprise of the agro-industrial complex (Raizberg, Lozovskii and Starodubtseva 2003, Center for Financial Management, *n.d*.). One of the types of financial risk is liquidity risk (or so-called "commercial risk" or "price risk") – this is the risk that may arise in the process of selling agricultural products produced or purchased by the enterprise due to changes in the price situation of the market. The risk of losses due to possible changes in the market price of the goods is one of the most dangerous types of risk, as it directly and to a large extent affects the possibility of loss of income and profits of the agricultural organization. Since the liquidity risk constantly accompanies the economic activity of the enterprise, in the process of making managerial decisions in different situations, the management of the enterprise of the agro-industrial complex should take into account correctly received risk assessments.

The authors of the paper conducted an analysis of the liquidity risk for agricultural enterprises producing the main livestock products in Russia. Among the variety of livestock products, meat cattle, pork, sheep, and poultry play the main role. It was these categories that were of interest to the study. On the basis of the economic-statistical method, the authors conducted an assessment of the risk of unforeseen financial losses during the sale of these products from changes in the level of market prices. The official data of the Federal State Statistics Service of the Russian Federation on the dynamics of production of basic livestock products in all types of economy in the Russian Federation (Table 1) and average prices for the same products for the period from 2000 to 2016 served as the initial data (Figure 1).

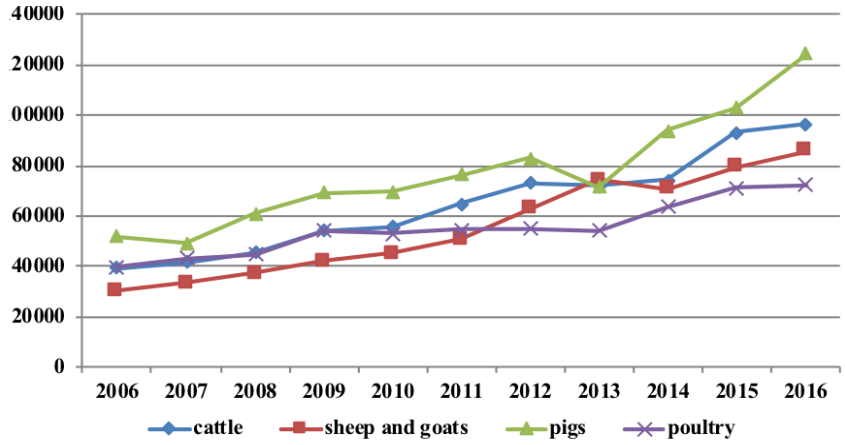
Table 1. Production of basic livestock products in the Russian Federation, thousands of tons (carcass weight equivalent) (EMISS – a Single Interdepartmental Information and Statistical System 2017, Federal Service of State Statistics of Russian Federation, *n.d.*)

Year / Products	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cattle	1,699.2	1,768.7	1,740.6	1,727.3	1,625.5	1,641.5	1,633.3	1,654.1	1,649.4	1,619.0
Pigs	1,929.7	2,042.1	2,169.5	2,330.8	2,427.6	2,559.5	2,816.2	2,973.9	3,098.7	3,368.2
Sheep and goats	167.9	174.2	182.6	184.6	189.0	190.4	190.0	203.9	204.5	213.1
Poultry	1,925.3	2,216.7	2,555.1	2,846.8	3,204.2	3,624.8	3,830.9	4,161.4	4,535.5	4,620.8

Analyzing the data of Table 1, we note the positive dynamics in the production of pork and poultry. In contrast, the rate of production of the main products of sheep breeding is weak, and the practically zero dynamics of cattle production (cattle) indicate the continuation of stagnation of one of the system-forming subsectors of animal husbandry.

Prices are the key parameter that characterizes the market situation, because they reflect the interaction of demand and supply and perform a stimulating function, expressed in the incentive (or restraining) effect of prices on the production and consumption of goods through the number of their profits. Guided by the forecasted price indices, the manufacturer makes strategic decisions about the structure of production (Alexandrova and Melnikova 2016). The dynamics of average producer prices of agricultural products are mainly reflected by an upward trend (Figure 1).

Figure 1. Average prices of producers of agricultural products sold by agricultural organizations in Russia



The analysis of the graphs showed that, compared to 2010, the price of selling the main livestock products increased by an average of 169.36%. The minimum growth is demonstrated by the price of poultry products (an average of 9.7% annually), the maximum – for pig production (an average of 15.7% annually). The growth of prices is ensured, first of all, by an increase in the cost of production, an increase in costs and a decrease in the efficiency of production. For comparability of data in further studies, it is more expedient to proceed to the rates of price growth (Table 2).

Table 2. The rate of growth in prices of agricultural products, %. (EMISS – a Single Interdepartmental Information and Statistical System 2017, Federal Service of State Statistics of Russian Federation, *n.d.)*

Year / Products	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cattle	1.06	1.09	1.19	1.03	1.16	1.12	0.99	1.03	1.25	1.03
Sheep and goats	1.11	1.12	1.12	1.07	1.13	1.24	1.18	0.96	1.12	1.08
Pigs	0.95	1.24	1.14	1.01	1.10	1.09	0.86	1.31	1.10	1.21
Poultry	1.09	1.04	1.20	0.98	1.03	1.01	0.99	1.17	1.12	1.02

In the quantitative assessment of risk, the following statistical indicators are most often used to measure the magnitude of the risk in the economic literature: mathematical expectation, variance, standard deviation and coefficient of variation (Balabanov 1996, Van der Waerden 1960, Eliseeva and Yuzbashev 2001, Sinyavskaya and Kaida 2014, Shevelev and Eliseeva 2009). The mathematical expectation characterizes the average expected value of the studied indicator. The best of the two solutions is that the mathematical expectation of the indicator is

higher. The mathematical expectation of a random variable in statistics is the sum of the products of all possible values of a random variable by the probabilities of these values:

$$M[X] = \sum_{i=1}^{n} x_i \cdot p_i, \quad (1)$$

where: X is the random variable; x_i is the possible values of random variable; p_i is the probabilities of values.

In other words, the mathematical expectation is the average expected value for repeated repetition of tests.

However, this indicator does not take into account the risk of random fluctuations of the studied indicator around the mean. To characterize such fluctuations, the absolute values of the degree of risk – variance and standard deviation are widely used in theory and practice.

Dispersion is a measure of the spread of values of random variable relative to its mathematical expected value. Dispersion is the degree of variability of the statistical index being studied. The higher the fluctuation, the higher the variability. Calculation of the variance is carried out according to the following formula:

$$D = M[(X - M[X])^2] \quad (2)$$

where: D is the variance; *X* is the random variable defined in some probability space; *M* is the mathematical expected value of the random variable *X*.

The standard deviation characterizes the degree of dispersion of the values of random variable with respect to its mathematical expected value. The formula for calculating the standard deviation is, as follows:

$$\sigma = \sqrt{[(X - M[X])^2]}, \quad (3)$$

where: σ is the root-mean-square (standard) deviation.

For the final decision about the degree of risk, the coefficient of variation is used. This indicator determines the degree of deviation of the expected value of the result from its mathematical expectation. Its calculation is carried out according to the formula:

$$CV = \mp \frac{\sigma}{M} \cdot 100\% \quad (4)$$

The coefficient of variation is expressed in percentages and ranges from 0% to 100%. The coefficient of CV variation allows determining the level of risk. The higher its value, the greater the variation and the higher the level of risk. As a result of calculations using the formulas (1) – (4), the following statistical characteristics were obtained (Table 3).

Table 3. Descriptive statistics according to the samples of the rates of price growth.

Index / Products	Mathematical expected value	Standard deviation	The coefficient of variation	Dispersion	Risk level
Cattle	1.14	0.1372071	0.1203621	0.0188	12%
Sheep and goats	1.15	0.1429067	0.1239624	0.0204	12%
Pigs	1.14	0.1708818	0.1500406	0.0292	15%
Poultry	1.10	0.1100925	0.1004594	0.0121	10%

Note: calculated by the authors

The analysis of Table 3 shows that the sampling of prices for pig production is the most fluctuating; therefore, the production of this category of products is subject to the greatest risk of price change in the future. According to calculations, the probability of unforeseen financial losses in the sale of pork from the change in the level of market prices is 15%. The lowest indicator of variability is the sampling of poultry sales prices. The risk of losses arising from changes in the market price of these products is 10%. According to the risk assessment scale (Van der Waerden 1960, Eliseeva and Yuzbashev 2001), it is generally assumed that a value of less than 10% corresponds to a low-risk level, from 10% to 25% - to an average level, more than 25% - to a high level. Then, in accordance with the results of the study, it can be concluded that the calculated level of risk of variation in the price of poultry is low, for products of cattle, pig, sheep and goat categories – average one.

The results of the qualitative analysis are the basis of quantitative risk assessment. Quantitative risk assessment gives the most objective characterization of its magnitude and requires the use of analytical procedures and mathematical methods. The choice of the risk indicator is important here. Its choice depends on the type of risk being assessed and predetermines the reliability and adequacy of the risk assessment (Shapkin and Shapkin 2014, Shapkin and Shapkin 2012, OECD 2009). When studying the risk of liquidity of livestock products as

indicators, the planned indicators of the volume of production and the estimated price of its sale can be the main indicators. Since the liquidity risk of the main livestock products is associated, first of all, with the loss of the part of income, it is natural to determine the quantitative measure of risk as a possible level of losses of the expected planned profit (Altukhov 2010, Raizberg, Lozovskii and Starodubtseva 2003). Thus, for the subsequent quantification of the possible financial risk, it is necessary to have calculated data with the planned indicators of the production volume and the forecasted levels of the sales prices. The authors of the paper calculated the forecast values of production volumes and prices for the products under consideration for the period of 2018-2020. In the forecasting, the inertial method was used, the essence of which was to analyze the available statistical sample of data, to identify trends in its variation, and to extrapolate patterns to the forecast period. The equations of polynomial models for predicting the corresponding parameters were calculated by the authors on the basis of approximating functions and are presented in Table 4.

Table 4. Modeling the dynamics of data

Products	The equation of the production volume model and the coefficient of determination	The equation of the model for the forecast of prices and the coefficient of determination
Cattle	$y = 3.5772x^2 - 52.621x + 1823.1$ $R^2 = 0.828$	$y = 161.08x^2 + 4190.7x + 37973$ $R^2 = 0.9618$
Sheep and goats	$y = 0..2111x^2 + 2.2369x + 174.61$ $R^2 = 0.9438$	$y = 93.504x^2 + 5082.7x + 26746$ $R^2 = 0.9701$
Pigs	$y = 6.0535x^2 + 102.25x + 1940$ $R^2 = 0.995$	$y = 539.16x^2 + 788.98x + 55085$ $R^2 = 0.8962$
Poultry	$y = -4.8659x^2 + 368.04x + 1515.2$ $R^2 = 0.9961$	$y = 182.33x^2 + 1002.2x + 44166$ $R^2 = 0.8972$

Note: calculated by the authors

The result of the forecasted values of the volume of production of the main livestock products in Russia and the price level in accordance with these models are presented in Table 5.

Table 5. Results of the inertial forecast.

Period / Products	2018	2019	2020
Forecast values of volume of production of the main products of livestock in the Russian Federation, thousands of tons			
Cattle	1,535.07	1,513.93	1,493.08
Pigs	3,234.53	3,336.69	3,438.85
Sheep and goats	216.99	222.14	227.41
Poultry	4,897.17	5,137.45	5,377.73
Forecast values of the price level for the main products of livestock, rubles/ton			
Cattle	99,415.16	104,306.22	109,197.27
Pigs	116,217.85	121,599.17	126,980.50
Sheep and goats	88,000.94	92,430.33	96,859.72
Poultry	76,826.92	79,902.05	82,977.19

Note: calculated by the authors

Based on the forecast data of Table 5, the authors calculated the projected values of the possible level of income (profit) of producers from the sale of livestock products (Table 6).

Table 6. Modeling the forecasted level of income from the sale of livestock products in Russia, million rubles.

Period / Products	2018	2019	2020
Cattle	152.61	157.91	163.04
Pigs	284.64	308.41	333.09
Sheep and goats	25.22	27.01	28.88
Poultry	376.23	410.49	446.23

Note: calculated by the authors

Analyzing the data of Tables 4-6, we can conclude that poultry and pig production will retain the leading positions in the production structure of livestock production in Russia. According to the forecast calculations, the output of these two categories will grow by an average of 4% per year. The volume of production of the sheep and goat category will grow slower and will average 3.1% annually. The production of cattle (slaughter weight),

according to the authors' forecast, will have a negative trend and by 2020 will decrease by 2.7% compared to 2017. A significant part of the profit received for enterprises producing the main livestock products in accordance with the forecast will make a profit from the sale of poultry (more than 44%). In the context of unstable market conditions, fluctuations in prices for manufactured products and the consequences of possible losses fall directly on the producer and directly affect the results of his financial and economic activities. Obviously, in order to reduce the level of losses when planning the sales volumes of products and profits, producers need to take into account liquidity risks associated with the possible change in the value of products in the market. On the basis of all the above calculations, the quantitative assessment of the level of financial risk with the projected output of products, revenues from their sale and calculated relative risk values in absolute terms is presented in Table 7.

Table 7. Quantitative modeling of the forecast estimate of the level of financial risk, million rubles.

Period / Products	2018	2019	2020
Cattle	18.37	19.01	19.62
Pigs	42.71	46.27	49.98
Sheep and goats	3.13	3.35	3.58
Poultry	37.80	41.24	44.83

Note: calculated by the authors

The results of the calculations show that the total possible losses for the producers of the main livestock products in Russia due to fluctuations in market prices may amount to 102 million rubles in 2018 and to 118 million rubles in 2020. In the production of cattle, the loss of expected profits can be from 18.4 million rubles in 2018 to 19.6 million rubles in 2020, in pig production – from 42.7 million rubles in 2018 to 50.0 million rubles in 2020, in sheep breeding – from 3.1 million rubles to 3.6 million rubles in 2020 and in poultry farming – from 37.8 million rubles to 44.8 million rubles, respectively. These figures testify to the need not only to quantify financial risk but also to develop early measures to reduce its impact with a view to minimize the negative consequences in the process of implementing the enterprise development strategy.

Specific features of production of livestock products justify the need for state support for the profitability of agricultural producers. One of the promising areas of state support is the development of agricultural insurance, which, according to the WTO agreement on agriculture, refers to domestic support measures that are not subject to reduction.

The current system of agricultural insurance in Russia cannot be considered effective, able to protect against negative consequences of adverse natural events (Benkovskaya 2015). The low profitability of agricultural production, especially animal husbandry, its high financial instability, irregular state support has a negative impact on the efficiency of the industry development. In addition, Russia's accession to the World Trade Organization requires the government to review the set and size of government support measures in accordance with WTO rules (Agapova, Ilyenkova and Medvedeva 2013, Balabanov 1996). The current state of the country's agro-industrial complex, the limited level of state support for the production of livestock products by the WTO rules, on the one hand, and the need to ensure food security in the context of prevailing geopolitics and sanctions decisions, on the other hand, require optimization of existing management tools and search for new ones. To date, one of the most common instruments is agricultural insurance. Insurance companies offer a wide range of insurance products that differ in the insurance object, a set of insurance risks, the level of insurance protection, the insurer's own participation in the loss payment (franchise). At the same time, most agricultural producers in Russia do not carry out insurance for their products because of the high cost of agricultural insurance and their low solvency (The Problem of Economic Risks in the Agro-Industrial Complex, *n.d.*). According to the authors, only insurance with state support is able to ensure the maximum availability of insurance services and cover losses of agricultural producers as a result of financial risks.

Conclusion

The conducted research shows the important role of risk analysis in the course of financial management of an agricultural enterprise. The results of the research prove the necessity and expediency of accounting for the magnitude of financial risk when making rational management decisions.

The quantitative assessment of risk and the use of current methods of risk management should become the basis of financial management of an agricultural enterprise, which will reduce the level of potential losses of the enterprise in the course of selling products. The effective management of risks of livestock products' production

should form the basis for sustainable development of agriculture, ensuring food and national security, and stable development of the Russian economy as a whole.

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Methodical Aspects of the Decomposition Approach to the Formation of the Managerial Cost Accounting System in the Organizations of the Russian Agroindustrial Complex

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Abstract:

The development of market relations and the growing competitive struggle necessitate the introduction of modern methods of management and cost control by business entities. The purpose of the study is to develop a methodology for cost accounting and management in the industrial beet growing based on the decomposition formation of the management accounting system. The empirical data of 168 Russian agricultural organizations were used in the study, which allowed grouping these research objects according to the level of specialization, concentration, and intensification of production. On the basis of the business processes carried out in agricultural organizations, the classifier of responsibility centers was constructed, their main functions were revealed, and recommendations were developed for the decomposition formation of management accounting for selected centers based on segmentation of activities, which made it possible to improve the quality of information provided for the management of an economic entity. The mechanism of cost accounting and calculation of beet production regarding its quality was also developed and implemented, by means of modeling business processes within the framework of the proposed responsibility centers, enabling to determine the efficiency of the activities of the economic entity as a whole and of its individual structural units. The practical application of the developed measures provides many opportunities for generating more reliable information on the costs that is necessary for effective management.

Keywords: management accounting; responsibility center; cost management; horticulture

JEL Classification: J53; M41; O13; O18

Introduction

The dynamics of the development of modern economic relations in the national and international markets is characterized by an increase in the scale of world trade, strengthening of international financial flows, and scientific and technical cooperation. This necessitates the modernization of production processes and management of the activities of participants in these relations (Cherkas 2013, Zhuravleva 2013). Accounting becomes an instrument and an object of globalization. However, its influence is not uniform in all developed and developing countries (Hopper *et al.* 2017). Institutional conditions also affect the quality of business accounting (Gray *et al.* 2015).

The conditions of the innovation economy require forming an information system that provides timely and qualitatively relevant data to the organization's management for solving tactical and strategic tasks. Conventional instruments of accounting, analysis, and control should be actively integrated in this system (Abdel-Kader and Luther 2006).

Currently, the practice of management accounting, which considers the impact of various factors of the business environment, is actively being studied. In this case, the influence of information and communication technologies, computer systems, integration processes occurring within the framework of an economic entity on the development of management accounting is evaluated (Mat *et al.* 2010).

This determines the importance of developing an integrated system for recording and processing information on the costs and performance of the organization, including its identification and analysis in order to develop new managerial methods. For the purposes of accurate and prompt computation of the cost of production, calculation of the possible reserves of growth in the efficiency of production activities, a need arises to increase the information

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and analytical capabilities of the conventional methods for cost accounting and product calculation in the system management accounting (Fullerton *et al.* 2013). The implementation of these measures provides an opportunity to obtain the necessary data for the execution of the functions of planning, analyzing, and forecasting the performance of each economic entity in the agroindustrial complex.

Cost management of an economic entity is a multifaceted and time-consuming business process. Since it covers most aspects of production activities, it essentially characterizes the management of all activities of the enterprise. Based on the above facts, it should be noted that the modern concept of cost accounting and product costing is viewed as the process of forming past, current and future costs of the organization's operations in the conditions of the applied managerial system aimed at achieving the formulated tasks (Khromova *et al.* 2017). This system is consistent with the main objectives of cost management.

The results of the scholars' work in the field under research indicate that the majority of studies on the formation and development of managerial cost accounting are presented in a generalized format, without a thorough analysis of the features of the technology for the production of certain types of agricultural products. This makes it necessary and urgent to study the organizational and methodological aspects of the formation of a system for accounting and analytical support of the cost management process in the beet growing industry.

The theoretical section of the article contains an overview of the scientific literature on the problem studied, reflecting the main aspects of managerial cost accounting and product calculation. The next section, discloses the methodology and tools of the ongoing scientific research. After that, the results on the implementation of the decomposition approach to cost accounting in agribusiness organizations are presented. The discussion section reflects the practical importance of the study and provides recommendations. The last section contains conclusions and recommendations.

1. Contribution of the research to the background of field

Because of the conducted scientific research, the authors have developed a theoretical and methodological toolkit, the practical application of which enables to ensure coordination and optimization of costs within the framework of the economic activity of the organization. The authors noted that the management accounting system should be the basis of the business model of each organization. The increment of scientific knowledge consists in using the decomposition approach to the organization and functioning of management accounting in large and medium-sized agrarian formations, in the modification of cost estimation of finished sugar beet products, based on the sugar beet digestion.

In the authors' opinion, these principles should lead management accounting to a qualitatively different level, which is necessary for solving strategic tasks of managing modern business structures and tasks related to the compilation of reports.

2. Goals and research objectives

The goal of the work is to substantiate theoretical provisions and develop methodological provisions on managerial cost accounting in factory beet cultivation, to prepare practical recommendations for constructing a system of accounting and analytical support of managerial processes by the responsibility centers based on the calculation of beet production, with regard to the quality. The algorithm for achieving this goal included solutions for the following tasks:

- to study the essence and characteristics of managerial cost accounting for crop production;
- to determine the impact of sugar beet production technology on the organization of cost accounting;
- to study the current practice of cost accounting and beet product calculation and to identify the priority areas for improving the production cost calculation system by the responsibility centers, taking into account the technological features of the industry.

The methodological, organizational, economic provisions regarding the organization of production cost accounting and the calculation of sugar beet production cost in agricultural organizations of the Russian Federation were the subject of the study.

3. Literature review

The problem of applying new approaches to the organization of management accounting and effective cost management in accounting practice is widely discussed in the Russian economic literature and acquires special relevance in the conditions of the transformational economy.

Professor Paliy, V.F. aptly noted that developments in the field of accounting lag behind objectively arising practical problems. Entropy is growing in the accounting applied in practice; there is a significant lag behind the needs of the post-industrial economy (Paliy and Paliy 2000).

At the present level of market relations, there is a process of active integration of conventional methods of accounting, analysis, rationing, control, and audit into a single accounting and analytical system for obtaining data and processing information, in particular into an accounting and analytical system of production costs (Khromova *et al.* 2017).

Currently, various tools of management processes are widely used. The calculation of costs is one of the cost management tools. It is also the oldest and most frequently used instrument. Nevertheless, these methods are constantly being improved to reflect the current conditions of the business environment. Management accounting replaces conventional methods of calculating costs with more progressive ones (Ponisciakova *et al.* 2015).

The issues of using the most effective tools of managerial cost accounting are realized in two directions. On the one hand, it is necessary to reorient the managerial personnel of the business entity to solving the tasks of the modern economic system. On the other hand, it is necessary to improve the existing and develop new methods of management accounting, including methods for production cost accounting and management and calculation of products (Horuzhy and Katkov 2012). Within the framework of this concept, an information flow will be formed that records objective business information and allows modelling the economy of the business entity as a whole.

With regard to the above, the accounting of production costs should be considered as a process of reflecting the costs and results of the past, current and future production activities of the organization under the existing management model, oriented towards achieving its main objectives. Such a system of accounting will correspond to the main tasks of cost management.

As an information base for management accounting, production cost accounting should ensure that you receive the necessary data on the organization's operations:

- completeness and timeliness of the production costs recording;
- creation of a database for calculating the cost of production, works, services, valuation of inventories, results of activities of the responsibility centers and the organization as a whole;
- control over the rational use of resources in conditions of their scarcity (Govdya and Degaltseva 2015).

Taking into account the modern world paradigm of accounting and financial reporting development, the business model of the organization, formed based on the decomposition approach application should be the main object of management accounting.

The scientific research of Plotnikov and Plotnikova (2014) in the field of business accounting is a bright example; the authors suggest understanding it as the information system of the business model about the processes of value creation and value increment, reflecting the measurement of changes in the performance of organizations (Plotnikov and Plotnikova 2014).

Thus, modern management accounting should provide the company's top management with data on the status of the business model of the organization, be able to recognize and evaluate emerging risks, and to identify the types of activities that the organization can do in the future. The solution of these tasks involves the analysis of information and the identification of ways to create business value, the assessment of prospects, focusing on risks, expenses and costs, as well as on the cost potential of these prospects (Vakhrushina 2014).

4. Analysis of researches

In recent decades, the role of management accounting as a tool for effective management of organizations has increased significantly. This determines the interest of many scholars in conducting research and evaluating various management accounting techniques in terms of effectiveness of their application in various economic formations (Anderson and Dekker 2014).

Some researchers argue that when certain conditions of the business environment change, the role of management accounting changes (Hopper *et al.* 2017). Abo-Alazm (2013) adheres a similar opinion, summarizing that the development of production technologies, increasing competition, enhance the role of companies' management accounting system in achieving their competitive advantages.

At the same time, conventional methods of management accounting are not always able to satisfy the demands of users of accounting information (Miller and Power 2013). Modern economic conditions assume the process of active integration of conventional tools of accounting, analysis, and control into a comprehensive accounting and analytical system for data accumulation and processing. In this case, the techniques of functional

and cost analysis, benchmarking, and target-costing system are used more widely, the value chain is analyzed, and the costs of manufactured products quality are taken into account (Fullerton *et al.* 2013, Bebeşelea 2015).

Modern studies in the management accounting development indicate that the emergence of additional cash flows is closely correlated with a wider and more active implementation of cost management methods (Narayanan and Smith 2013). This is especially relevant in the context of the global financial crisis.

Active integration of progressive management techniques into the existing systems determines the prerequisites for defining the process of calculating the cost of production as the main principle of organizing economic work (Anderson and Dekker 2014).

This determines the great importance of scientifically substantiated calculation in assessing the implementation of the set plans for the level of prime cost, pricing, profitability, economic efficiency of innovation processes and the organization activities as a whole (Revellino and Mouritsen 2015). A competent approach in the use of materials obtained because of cost-accounting calculations facilitates the search and mobilization of in-house reserves, decision-making by the level of concentration, specialization, intensification of production, and the improvement of economic relations at the micro level (Van der Stede 2017).

Forward costing is a necessary process in the management of the organization and one of the most significant aspects of the management accounting system of the agribusiness organizations (Daly and Skaife 2016). A retrospective analysis of the costing systems showed that their main goal was to estimate the stocks of finished goods, work in progress at the beginning and at the end of the reporting period and identify the profit, while not providing the organization management with the opportunity to use this information for management purposes. At the present stage, these systems are more balanced and include a wide range of tools for implementing managerial functions and tasks (Bouwens and Steens 2016).

The "accounting revolution" of the recent 10-15 years can be understood as the qualitative transition from historical cost accounting to fair value accounting (Müller 2014).

It is obvious that management accounting in the short term should become the most important input channel of data necessary for the preparation of reporting on sustainable development, and integrated reporting, as well as their reliable information base. According to foreign colleagues, there is a long-standing need to clarify the essence, purpose, and content of modern management accounting, including cost accounting.

5. Scientific hypothesis and research methodology

The scientific hypothesis of the study is based on the assumption that the most effective management of agricultural production costs, accurate and operative prime cost formation requires applying a decomposition approach to build a management accounting system by financial responsibility centers, as well as the modernization of the existing methods of cost accounting and forward costing based on the quality of the output products.

As part of the agro-industrial complex of the Russian Federation, the sugar beet sub-complex occupies one of the primary positions. Effective interaction of all participants in the agro-industrial complex determines the effectiveness of the functioning of this industry.

When studying the aggregate of agricultural organizations, the authors used the method of statistical groupings. This method allows defining qualitatively homogeneous populations, studying the structure of the populations and the changes occurring in them, and it solves the problems of studying the existing links and dependencies.

To carry out the scientific research, 168 large and medium beet growing agricultural organizations were selected. Small enterprises and family-operated (private) farms were excluded from the sampling population, since they have anomalous values of grouping indices.

The indicators of concentration, specialization, and intensification of sugar beet production were singled out as attributes by which the population of the survey targets was ranked. At the next stage of the study, intervals of values of the changeable subject were determined. The minimum value of the attribute in the interval was the lower interval limit, and its maximum value was the upper limit. To sum up, the groups of the organizations with maximum values of the cost effectiveness indicator of sugar beet production were identified.

The application of the described method of scientific research resulted in formulating the following conclusions.

The concentration of sugar beet production, which is characterized by bunching-up of land resources, productive facilities, capital goods and determines the parameters of economic efficiency, was one of the studied attributes. The grouping of agricultural organizations by planting acreage of this crop makes it possible to determine the trend in the change in the production profitability, depending on the level of its concentration (Table 1).

Table 1. Economic efficiency of sugar beet production in accordance with the level of its concentration in agricultural organizations of the Russian Federation

Groups of objects according to sugar beet acreage, ha	Number of objects in group	Planting acreage on average/object, ha	Beet yield/1 ha, cwt	Cost of production/1 cwt, RUB	Labor input per 1 cwt, man-hour	Margin per 1 ha of beet acreage, RUB	Product profitability, %
below 500	76	257	490	108.6	0.10	7328	25.80
from 501 to 1000	58	722	496	102.6	0.08	14248	55.41
1001 and above	34	1444	502	94.8	0.05	17878	56.22
Total and on average	168	658	498	100.1	0.06	14636	50.65

With the increase in the sugar beet planting acreage, there has been observed an increase in the profitability of production from 25.80% in the first group to 56.22% in the third one. Larger-scale enterprises have greater opportunities for concentrating material and technical resources, which makes it possible to conduct cultural operations within recommended timeframes and to use modern technology to produce agricultural crops. The developed correlation-regression model has allowed one to identify the ultimate level of sugar beet crop concentration for economic subjects of the study set. For the Krasnodar Territory, the sugar beet farm acreage allotment in one organization amounts to 1,520 ha. An increase in the concentration of crops over 1,520 hectares leads to a decrease in the efficiency of production, the resources spent do not yield project profitability.

The research findings allow one to summarize that deepening of the production concentration creates favorable conditions for the most rational use of mechanical equipment, which contributes to an increase in labor efficiency, a reduction of production costs, and, as a result, a growth of production profitability.

Concentration of production in agricultural organizations is closely related to the degree of their specialization. The key indicator reflecting this level is the commodity output composition.

Studying the indicator of the farms' specialization in the study set by percentage of the proceeds from sugar beet sales in the total sales revenue in the horticultural sector, one has drawn a conclusion that the efficiency of sugar beet growing production increases with the growth of its share in the commodity output composition (Table 2).

Table 2. Economic efficiency of beet growing production as per the level of its specialization in agricultural organizations of the Russian Federation

Groups of objects according to the share of sugar beet in the composition of commodity output, %	No of objects in a group	The share of sugar beet in the composition of commodity output, %	Beet yield per 1 ha, cwt	Cost of production per 1 cwt, RUB	Labor input per 1 cwt, man-hour	Margin per 1 ha of beet acreage, RUB	Product profitability, %
up to 9	76	6	465	109.3	0.07	4,983	29.48
from 10 to 20	36	16	495	99.5	0.05	11,576	42.02
21 and more	56	32	527	93.5	0.06	24,537	61.49
Total and on average	168	16	498	100.1	0.06	14,636	50.65

The results show that in the organizations belonging in the third group, the cultivation of sugar beets is most effective, which is confirmed by the level of profitability of 61.49%. The specialization of sugar beet growing in the Krasnodar Territory is reasonable in view of a reduction in production costs when growing sugar beet with a simultaneous increase in their payback.

Production intensification is an integrated indicator that reflects the results of socio-economic processes aimed at increasing the output of products, improving their quality, reducing production costs through the introduction of new technologies, cultivars of crops, and other measures that are an integral part of the scientific and technological progress.

Grouping the totality of agricultural organizations by the level of production costs per hectare of sugar beet acreage has made it possible to identify the relationship between a change in this indicator and the efficiency of crop production (Table 3).

Table 3. Economic efficiency of beet growing production as per the level of its intensification in agricultural organizations of Russian Federation

Groups of objects according to costs per hectare of sugar beet crops, RUB thous.	Number of objects in group	Cost per hectare in group average, RUB thous.	Beet yield per 1 ha, cwt	Cost of production per 1 cwt, RUB	Labor input per 1 cwt, man-hour	Margin per 1 ha of beet acreage, RUB	Product profitability, %
up 40	54	33.38	467	71.4	0.06	20,898	109.09
from 41 to 50	44	44.42	497	89.3	0.07	22,562	75.36
51 and more	70	64.83	520	124.6	0.06	5,854	16.49
Total and on average	168	49.85	498	100.1	0.06	14,636	50.65

The research findings indicate that the maximum economic efficiency of beet production is achieved when the production cost level reaches 40,000 RUB per hectare of crops. Application of various measures and means to intensify the sugar beet sub-complex is required to improve the quality of raw materials for industrial processing and the development of new intensive technologies for the production of crops. The expediency to increase the costs of production resources in the cultivation of crops should be estimated from the point of view of the national economic approach to their use. This circumstance, in turn, influences the formation of a system of accounting and cost management in this industry.

6. Research tools

The application of the statistical grouping method has made it possible to define a range of agricultural organizations with the maximum economic efficiency of sugar beet production. Within the framework of the study set, 33 organizations were selected with indicators of the maximum efficiency of sugar beet production, comparable in size, level of specialization, and production intensification. After that, a research of the management organizational structure of these objects was carried out in order to identify the potential for decomposition formation of a managerial accounting system.

The current structure makes it possible to perform general and specific management functions, ensures the most acceptable vertical and horizontal relationships. Evaluation of the organizational structure effectiveness of an enterprise is a key aspect when making managerial decisions, allowing one to ascertain the degree of development of the existing system.

In addition, in the course of the research, the specifics of the accounting process structure and the application practice of management accounting tools were studied. OJSC V. I. Chapayev Breeding Cattle Farm was singled out of this group as one with the system of management accounting most typical in the practice of Russian enterprises.

7.Results

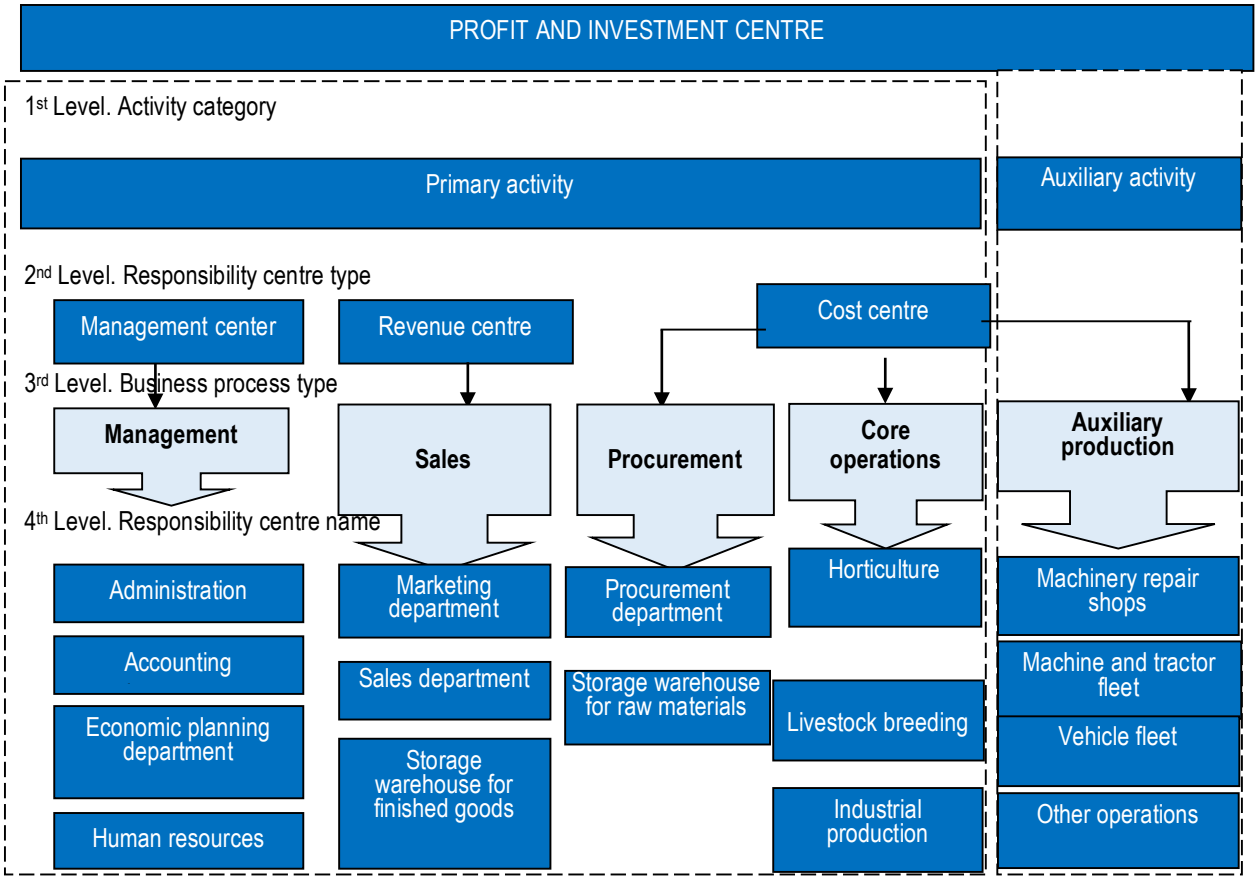
In the modern economic paradigm, the key task of an organization's management is to develop a strategy for its economic development. At the same time, the role of management accounting increases. It becomes an indispensable subsystem of managing an economic entity, corresponding to the selected strategic direction of development, and contributing to a consolidation of the personnel's role in decision-making. This determines the relevance of decentralized control mechanism in an enterprise, assuming delegation of the respective authorities and responsibilities between different levels of the hierarchy.

Decomposition formation of a managerial accounting system based on the business processes carried out in agro-industrial complex organizations

The decentralized management system of an economic entity presupposes the implementation of a management accounting methodology based on monitoring the results of the responsibility centers operation. This system has the following advantages: business segment managers have a large array of information about the conditions of activity on the ground; the staff performance becomes as motivated as possible due to a display of their own initiative; the degree of individual accountability of responsibility center employees for achieving a specified production result is increased (Drury 2012).

In this regard, the authors have proposed a decomposition approach to the organization of managerial accounting system in beet growing organizations, which would increase their operational efficiency. At the same time, an optimal relationship of 'costs for the system organization – the operational effect of the system' has been maintained (Figure 1).

Figure 1. Decomposition of responsibility centers in organizations of the agro-industrial complex



Classification of cost centers in agricultural organizations

The proposed grouping of cost centers and responsibility centers in agricultural organizations is presented in Table 4.

Table 4. Recommended classification of cost centers in organizations of the agro-industrial complex

Business process type	Type of responsibility center and cost center	Business account and sub-account	Responsibility centers and cost centers coding
Primary activity type			
Management process	Administration	26	01.01
	Accounting department	26	01.02
	Economic department	26	01.03
	HR department	26	01.04
Sales process	Marketing department	44	02.01
	Sales department	44	02.02
	Products storage facility	44	02.03
Procurement process	Procurement department	26	03.01
	Raw materials storage facility	26	03.02
Core production process	Horticulture	20.1	04.01
	- center # 1	-	04.01.1
	- rice cultivation	-	04.01.1.1
	- sugar beet cultivation	-	04.01.1.2
	- center # 2	-	04.01.2
	Livestock breeding	20.2	04.02
	- beef farming center	-	04.02.1
	- dairy breeding center	-	04.02.2
	- sheep breeding center		
	Industrial production	20.3	04.03
	- flour manufacture	-	04.03.1

Business process type	Type of responsibility center and cost center	Business account and sub-account	Responsibility centers and cost centers coding
	- milk processing department	-	04.03.2
	- bakery	-	04.03.3
Auxiliary activity			
Auxiliary production process	Repair shops	23.1	05.01
	Machine and tractor fleet	23.3	05.02
	Freight and passenger vehicle	23.4	05.03
	Electrical department	23.5	05.04
	Water service	23.6	05.05

8.Cost accounting methodology for sugar beet subject to the level of its quality by responsibility centers

Quality management of the agricultural products that are raw material for industrial processing requires availability of relevant information on their main quality characteristics. Managerial accounting is to form and accumulate these data for active implementation of the quality management system in an organization and appropriate executive decision-making (Govdya and Degaltseva 2015).

The proposed production cost accounting methodology provides for the allocation of production costs when growing sugar beet to responsibility centers taking the products in terms of their basic sugar content as an object (Table 5).

Table 5. Allocation of costs for sugar beet production subject to its quality at OJSC V. I. Chapayev Breeding Cattle Farm, Krasnodar Territory

INDICATOR	Responsibility center					Total and average
	Center# 1	Center# 2	Center# 3	Center# 4	Center# 5	
After cleaning gross weight, cwt	62,381.00	109,525.00	79,214.00	82,792.00	148,077.00	481,989.00
Sugariness, %	14.07	15.92	15.11	15.34	16.35	15.36
Standard weight with quality account, cwt	57,149	113,518	77,925	75,776	157,621	481,989.00
Actual expenses of responsibility center, RUB	8,251,924	14,488,258	10,478,638	10,951,946	19,588,019	63,758,786.00
Actual cost per ton of sugar beet by responsibility center, RUB						
- current methodology	-	-	-	-	-	132.28
- proposed methodology with quality account	144.39	127.63	134.08	131.05	124.27	132.28
Actual production costs, RUB	8,674,556	14,886,879	10,914,259	11,371,530	19,910,864	65,758,089.00
Actual manufacturing cost per cwt of sugar beet, RUB						
- current methodology	-	-	-	-	-	136.43
- proposed methodology with quality account	151.79	131.14	140.06	150.07	126.32	136.43

The efficiency analysis of the sugar beet production and processing in the organization under consideration is presented in Table 6.

Table 6. Calculation of the sugar beet production profitability by responsibility centers at OJSC V. I. Chapayev Breeding Cattle Farm, the Krasnodar Territory

INDICATOR	Responsibility center					Total and average
	Center# 1	Center# 2	Center# 3	Center# 4	Center# 5	
Gross weight of realized sugar beet, cwt	20,542.00	54,672.00	24,096.00	16,559.00	30,654.00	146,523.00
Sugariness, %	14.07	15.92	15.11	15.34	16.35	15.36
Actual cost per cwt of sugar beet by responsibility center, RUB						
- current methodology	-	-	-	-	-	132.28
- proposed methodology with quality account	144.39	127.63	134.08	131.05	124.27	132.28
Notional selling price per cwt of sugar beet, RUB	-	-	-	-	-	182.00

- current methodology						
- proposed methodology with quality account	166.71	188.64	179.04	181.76	193.73	182.00
Conditional profitability of sugar beet production, %						
- current methodology	-	-	-	-	-	37.59
- proposed methodology with quality account	15.46	47.80	33.53	38.71	55.89	37.59

Table 7. Calculation of the profitability of sugar produced from customer-supplied raw materials by OJSC V. I. Chapayev Breeding Cattle Farm, the Krasnodar Territory

INDICATOR	Responsibility center					Total and average
	Center# 1	Center# 2	Center# 3	Center# 4	Center# 5	
Gross weight of sugar beet sent over to processing, cwt	41,839.00	54,853.00	55,118.00	66,233.00	117,423.00	335,466.00
Grain grinding payment, %	30	30	30	30	30	30
Gross weight of sugar beet belonging to the farming enterprise, cwt	29,287.00	38,397.00	38,583.00	46,363.00	82,196.00	234,826.00
Storage loss of sugar beet, %	2.44	2.44	2.44	2.44	2.44	2.44
Gross weight of sugar beet getting into processing, cwt	28,573.00	37,460.00	37,641.00	45,232.00	80,191.00	229,096.00
Sugariness, %	14.07	15.92	15.11	15.34	16.35	15.36
Sugar loss during processing, %	2.96	2.96	2.96	2.96	2.96	2.96
Sugar recovery, %	11.11	12.96	12.15	12.38	13.39	12.40
Conditional sugar recovery, cwt	3,174.00	4,855.00	4,573.00	5,600.00	10,738.00	28,408.00
Selling price per cwt of sugar, RUB	1,902.00	1,902.00	1,902.00	1,902.00	1,902.00	1,902.00
Actual cost per cwt of sugar beet by a responsibility center, RUB						
- current methodology	-	-	-	-	-	132.28
- proposed methodology with quality account	144.39	127.63	134.08	131.05	124.27	132.28
Actual processing service cost per cwt of sugar beet, RUB						
- current methodology	-	-	-	-	-	58.11
- proposed methodology with quality account	63.43	56.07	58.90	57.57	54.59	58.11
Conditional profitability (unprofitability) of sugar manufacture, %						
- current methodology	-	-	-	-	-	21.76
- proposed methodology with quality account	-1.58	29.90	15.91	9.37	37.84	21.76

9. Discussion

Decentralization of management is a qualitative basis for the formation of an effective cost management system assuming the delegation of authority to managers of different levels (Bhimani *et al.* 2015). In this regard, decomposition of the responsibility centers of agricultural organizations based on costs localization in the responsibility centers and cost centers allows one to create the most transparent and informative system possible. Decomposition of financial responsibility centers is determined by specific features of the activity of a particular economic entity, its goals, objectives, and planned indicators (Bhimani *et al.* 2015).

The current study assumes the definition of an agricultural organization as a profit and investment center. The efficiency of a profit center operation is characterized by indicators of its turnover, selling prices, fixed and variable costs. The result of a center's activity is estimated by the profit indicator. The activity of an investment center is aimed at ensuring a return on capital and investments.

Henceforth, decomposition of responsibility centers is represented by an organization's business profile (the primary or an auxiliary activity); types of responsibility centers (cost, revenue, management centers); by the types of business processes carried out (management, supply, sales, primary, and auxiliary production).

The structure proposed by the authors makes it possible to specify the main functions of responsibility centers in beet-raising organizations and to organize a system of accounting and cost management without violating the hierarchical links between different levels of management while ensuring the effective functioning of the system of accounting and analytical procurement of production activities.

The developed decomposition of responsibility centers involves allocation of cost centers. This circumstance is due to the possibility to manufacture several types of products by the production units of an organization. The management accounting system that provides for localization of costs by cost centers and by calculation items will allow one to obtain the most objective information for making effective management decisions.

When organizing this system, the authors have proposed to use the elements of financial accounting and the data coding system as a basis to ensure that a single information field is maintained in order to minimize the number of errors.

The use of coding in managerial accounting makes it possible to identify unambiguously various accounting objects by all participants in the planning, control, analysis, and incentive process. The number of classifiers is determined by an organization independently and takes into account special aspects of the activity and its own needs. As and when required, a multi-level code system is used for appropriate specification of accounting objects.

The system of codes developed by the authors is based on the application of analytical business accounts numbering. The following symbols define a responsibility center in accordance with the business processes in an organization, as well as the sequence numbers of the cost centers in the structure of each center. This classifier can be supplemented based on a need and a priority level.

Decentralization of an organization's management system necessitates the application of transfer pricing. This mechanism allows coordinating the activities of responsibility centers; establish development trends and a motivation system for employees of these centers.

The transfer pricing system is a powerful tool for managing the activities of an organization and allows one to assess the economic effect of each responsibility center operation.

Transfer pricing occurs at the level of profit and investment center and, in some cases, at the level of cost centers (Bouwens and Steens 2016). At the same time, they must take into account qualitative characteristics of the products sold to justify their profitability in economic terms (Sansing 2014). In beet-raising organizations, it is expedient to determine transfer prices based on the level of sugar beet sugariness.

Sugariness is the main indicator characterizing the quality level of sugar beet. It determines the level of sugar content in root crops. The organization of management accounting by responsibility centers taking into consideration this indicator will allow one to enhance the analytical functions of accounting and to create a more reliable system of accounting and analytical procurement of the cost management process (Table 5).

The mean value of this indicator within the organization under consideration (15.36%) is deemed base sugariness. When dividing the total amount of expenses by the total output of basic conditions, a product unit cost is determined given its quality. The current methodology does not provide for determining the product cost within the allocated responsibility centers and assesses it only on the organizational level as a whole. Thus, the cost value of a unit of the estimated product is RUB 132.28 per cwt.

The proposed methodology provides information on the production cost of sugar beet for each responsibility center. The ceiling level of production cost, marked # 1 in the horticultural unit, is due to the lowest level of sugar content in the product, that is, 14.07%. Studies show that an increase in the value of the main quality parameter of sugar beet leads to a reduction in the production cost level per unit of output. Thus, the minimum production cost level is marked # 5 in the horticultural unit and amounts to 124.27 rubles. At the same time, this responsibility center has achieved the sugariness level of 16.35%, which is the best result within the research organization.

Thus, the production cost level of beet growing is highly correlated to the sugar content in the harvested root crops.

Profitability is the main generalizing indicator of the economic efficiency of production. It is necessary to evaluate this indicator for decision making in the field of planning, investing, and assessing the performance of responsibility centers. The proposed methodology provides for the application of transfer pricing in determining the price of sugar beet sales with different quality levels. Calculation of transfer product prices based on market rates seems to be the most appropriate (Table 6).

In unit # 5 of OJSC V. I. Chapayev Breeding Cattle Farm, the sugar beet sale price adopts the maximum value of 193.73 rubles, which is the result of achieving the best production results in the field of quality of the raw materials produced. The lowest price is established in the center of responsibility that has achieved the minimal sugariness of sugar beet. The specified dynamics defines a direct relationship between the level of product quality and its production profitability.

When assessing the participation of each financial responsibility center in attainment of profits from processing raw materials on tolling terms, it is necessary to take into account the level of raw material quality (Table 7).

Processing of the produced sugar beet on a give-and-take basis provides for establishment of a grain grinding payment rate, that is, the volume of raw materials a sugar plant retains as payment for its services. In processing plants of the region, this fee is charged at the amount of 30%. In the course of the study, sugar beet storage losses (2.44%) and the average level of sugar processing losses (2.96%) have been defined. Based on the actual level of sugar beet sugariness and the values indicated, a conditional sugar recovery has been calculated.

The maximum recovery of finished derivative product has been noted in the horticultural unit # 5 that has ensured the maximum sugar content in the beet. The conditional sugar recovery in this center of responsibility is 13.19% of the total amount of products that have been recycled. The minimum sugar recovery has been recorded in the center # 1 (11.11%).

This dynamic determines a change in the level of profitability of sugar production for each responsibility center. The highest level of sugar beet processing efficiency has been recorded in unit # 5 with the maximum quality level of the produced raw materials. In unit # 1, the sugar beet processing has been unprofitable because of its poor quality.

The proposed organizational and methodological aspects of cost accounting and calculation of sugar beet production cost by responsibility centers based on an assessment of the level of sugariness make it possible to determine the effectiveness of each responsibility center of an organization, to assess the contribution of each of them to the profit generation of the economic entity and to monitor the detected deviations. These measures increase the effectiveness of the cost management system and compile information necessary for decision-making.

Practical significance of the research findings lies in development and adaptation of the improved methodology for estimating the finished products of the beet industry based on their qualitative characteristics accounting. Practical implementation of the developed provisions will allow one to obtain more reliable information taking into consideration industry specific practices and user needs, which is necessary to exercise effectively internal control over the production costs in sugar beet production. This will facilitate the efficiency of accounting and enhance the competitiveness of products and the profitability of beet-sowing organizations.

Conclusion

One of the topical issues of methodology and practice of modern accounting is the calculation concept of management accounting formation and development in organizations of various industry affiliations. Many theoretical and practical aspects of organizing management accounting of costs and product calculation in Russian and international practice have been presented in broad terms, without taking into account the peculiarities of the beet industry. The great scientific and practical importance and insufficient elaboration of the methodology for managerial cost accounting formation in relation to this industry necessitate the findings of the conducted scientific research.

In the process of the research, decomposition of responsibility centers in agricultural organizations has been developed, which allows one to organize the system of management accounting by responsibility centers without breaking hierarchical relations between different levels of management; it facilitates delegation of powers to organizational units and strengthens the role of personnel in making managerial decisions.

Based on the results obtained, the authors have proposed a classification of cost centers and responsibility centers for beet-sowing organizations using a coding system that allows for more effective monitoring of operating results of internal structural units. These measures allow economic entities to introduce into their practice the methodology for organizing the management accounting of production costs and the calculation of industrial beet-growing products based on evaluation of sugar beet sugariness within the selected segments of business processes.

The findings of the scientific research are partially used in accounting activities of Russian agricultural organizations and are proposed for further implementation.

In the course of the study, the authors have defined application constraints of the results obtained. When considering the methodological aspects of management cost accounting and calculation of sugar beet growing products, the authors studied only an array of medium and large agricultural organizations. To strengthen the empirical part of the study, it is possible to carry out an analysis of the totality of farms of all categories.

As questions for future research, it should be noted that the issues of integration of the proposed system for beet production calculation and various accounting and cost management systems (standard-cost, direct-costing, target-costing, *etc*.) should be considered, since this information would be valuable for practical users when establishing and implementing the managerial accounting system in the organization.

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Analysis and Forecast of Prices of the Housing Market

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Abstract:

Instability in the real estate market in the Republic of Kazakhstan has exacerbated the need for short-and medium-term forecasts of housing prices.

Unfortunately, the results of the forecasts do not fully satisfy experts and consumers and therefore the further development of forecasting methods is an urgent and important task for real estate market analysts. The basis of the price forecast in the real estate market is usually the analysis of the dynamics of processes in the past periods of time. The author identifies stable trends that have been manifested in the past and for which there are grounds to assume that they will continue in the future. As the main tools for such forecasts are usually used methods of time series analysis, developed in the framework of the traditional methodology of random processes. But this analysis and the methods of forecasting based on it are usually used in a situation of calm market development and non-changing forecast background.

However, in the context of unstable economic processes such methods of forecasting real estate prices will not give accurate forecasts for the long term. In this regard this article proposes a new technique based on multivariate correlation and regression analysis to predict real estate prices.

Keywords: housing market; real estate; price; oil; exchange rate; mortgage lending; forecasting.

JEL Classification: C1; C4; C5.

Introduction

The strengthening of negative trends in the global economy and the increased risks in the real estate market have caused in recent years increased interest of market participants in the strategic and medium-term forecasting. At present the analysis and forecasting of the housing market dynamics is becoming increasingly popular among professional participants of the real estate market: domestic, foreign investors, valuation companies, banks and government agencies.

Increased interest in the housing market in Astana and Almaty is associated with the rapid development of these cities. According to our estimates currently a record volume of new housing is being built in Astana – only about 2.9 million square meters of housing in 102 residential complexes of which 90% of the declared terms of commissioning fall on 2018 year.

In addition to private developers the state is beginning to play an increasingly important role in the formation of the housing market. Every year within the framework of the regional development program (the old name – "Affordable housing – 2020") about 1.3 million square meters of housing are built in Kazakhstan which is 18% of the total housing construction in the country.

1. Research background

Within 10 years of implementation of the state program of development of housing construction ("Affordable housing" 2005-2007) in the country managed to increase construction volumes from 0.1 to 0.4 sqm per person a year. It earned a number of support programs for various categories of citizens, including gaining popularity among

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the population of Zhilstroysberbank. Despite the achievements the poor development of market regulation concepts based on the market forecast especially the regulatory and planned nature of the analysis lead to problems in the implementation of social housing. Thus in low-income regions large volumes of housing remain unclaimed due to the low solvency of the population and in fast – growing regions with high incomes there is a high deficit of social housing.

Therefore, the results of the development forecasts of the Kazakhstan real estate market taking into account all its parameters should become a mandatory reference point for all its professional participants.

When forecasting the performance of the Kazakhstan market there are difficulties that the observed crisis phenomena caused by the imbalance of supply and demand in various markets of goods and services, extend to other areas through the interconnection of the economic system (Gromov and Gromova 2016). From the point of view of the probability of obtaining accurate forecast values this period is characterized by increased uncertainty when it is difficult to predict the subsequent behaviour of certain market indicators and the conclusion is made on the basis of a comprehensive analysis of the variation of various factors affecting the value of the predicted indicator (Sihimbaev and Shatskaya 2016).

In addition to high macroeconomic instability the problems of modeling and forecasting of the real estate market in Kazakhstan are associated with high information closeness and imperfection of the legislative system (Sternik and Sternik 2014). That in turn leads to the widespread use of little formalized, intuitive forecasting methods based on heuristic analysis of experts on market trends (Sihimbaev and Kumisbekova 2015). In cases where the cost of housing is projected using quantitative methods it is often based on extrapolation and the determination of the projected values of real estate prices by extending the trend observed in the past (Sternik 2011).The practice of the authors of forecasting methods based on trend equations (for example linear or polynomial trend) has shown that these methods have a high prognostic ability only in the conditions of stable market processes but even with a small error of forecasts, have a high probability of error in the case of trend changes (Leifer and Grishin 2009). In addition, extrapolation methods in constantly changing economic conditions including the housing market, do not justify themselves also because the change in real estate prices is affected by other market indicators, both internal and external (Shatskaya and Yemelina 2015). As a result, to improve the quality of approximation of the model to the actual data of the period of retrospection the authors decided to include in the forecast model several explanatory factors in our opinion characterizing the housing market in Kazakhstan (Yemelina and Shatskaya 2016).

First of all, the demand in the housing market is due to the level of welfare of the population which in the course of 2017 in the Republic of Kazakhstan remains at a low level. The decline in effective demand in the housing market leads to a decline in real estate prices (Sihimbaev Tsyganov 2015).

The growth rate of per capita income is only in the first approximation characterized by the growth rate of effective demand of the population in the housing market. It is known that real estate is purchased not for current income but for savings however the increase in the growth rate of current income reduces the propensity of the population to save and the decline – increases and thus leads to a fall in the solvent demand in the housing market.

It is also clear that the effective demand depends on the volume of money supply in the country, the rate of inflation, on additional (above income) injection of money into the market through lending to the buyer (primarily mortgage), on factors such as the overflow of investment capital into the housing market and the transformation of real estate into an instrument for their preservation and multiplication as well as a variety of psychological, irrational factors (public statements and the actions of the representative and legislative authorities, public distrust of the public authorities financial policy, the aggravation of the situation before the elections at various levels and the expectation of changes in economic policy), *etc*. However, in the model adopted the value of nominal incomes since they are measured in monetary units. While real income is expressed in relative terms. In our opinion nominal incomes of the population are a direct factor of effective demand in the housing market.

Another important factor affecting the formation of prices in the housing market in Kazakhstan is the volume of mortgage lending (Apenova 2017). Mortgage lending in our conditions is highly correlated with real estate prices. Insufficient supply of credit resources from banks leads to a decrease in demand for housing which in turn can lead to a decrease in real estate prices. With the help of mortgage on the market is made about 45% of all transactions in the primary market more than 50% so this figure also strongly affects the dynamics of prices (Shatskaya 2017).

Despite the ban on the nomination of real estate prices in foreign currency, the pricing in the secondary market is still tied to the dollar equivalent (Shatskaya and Yemelina 2015). For this reason, the dynamics of housing prices both KZT and dollar strongly correlates with fluctuations in exchange rates. According to our calculations the correlation coefficient in the first case is 0.81, in the second – 0.54.

The real estate sector is one of the most sensitive sectors which clearly reflect the overall economic condition of the country as well as its residents. The positive change in the economy of Kazakhstan of course has continued to stabilize prices in the world commodity markets. That in turn will contribute to the stabilization of prices in the housing market in Kazakhstan. It is known that the share of raw material revenues in the country's GDP is more than 70%, because of this; the impact of this factor on economic growth is difficult to overestimate. For several years we have been monitoring the dynamics of real estate prices and oil prices on a regular basis. The results of this monitoring show that these indicators are closely linked; the correlation coefficient is about 0.7.

The relationship between the indicators is indirect and is expressed in an increase/decrease in the money supply in the country which in turn causes the volume of effective demand in the form of income and mortgage lending. It has also been observed that the rise/fall in oil prices is reflected in prices with a time lag (on average 6-8 months).

In addition, the price of oil affects the exchange rate of the national currency against the US dollar. There is a direct link between the indicators – the growth of oil prices leads to the strengthening of the national currency and the weakening of the dollar, and Vice versa. Since the Kazakh real estate market is still denominated in US dollars these factors are decisive in the medium - and long-term dynamics of prices.

2. Methodology

The forecasted model of housing prices is based on the multi-factor regression equation. At the first stage of forecasting we chose the most significant factors affecting the real estate market. It:

- nominal income (X_1, KZT);
- the volume of mortgage lending (X_2, million KZT);
- the world price of oil (X_3, USD/ Barr);
- US dollar rate to KZT (X_4, KZT/USD).

The resulting feature is the average price in the market of apartments (Y, KZT/1 m^2). We took the value of the price in the KZT equivalent because the correlation coefficient between the tenge prices and the exchange rate is higher.

According to the average monthly data for the period from January 2012 to December 2017a correlation analysis was performed and pair correlation coefficients were obtained which determine the close relationship between the variables. The following matrix of pair correlation coefficients was obtained (Table 1):

Table 1. Matrix of pair correlation coefficients

	Y	X_1	X_2	X_3	X_4
Y	1				
X_1	0,93	1			
X_2	0,86	0,67	1		
X_3	0,68	0,47	0,41	1	
X_4	0,81	0,62	0,70	0,18	1

Source: compiled by authors

Thus, of the considered factors the greatest influence on the formation of housing prices have nominal incomes (r_(yx_1)=0,93) and mortgage lending (r_(yx_2)=0,86), to a lesser extent, world oil prices (r_(yx_3)=0,64) and the dollar (r_(yx_4)=0,81).

Regression models describing the relationship between the features were constructed for the cities of Astana and Almaty. As a result of the approximation of the data by the least square method the following regression equations were obtained:

- for Astana city:

$$Y = 633979{,}2 - 0{,}774X_1 - 0{,}746X_2 - 4283{,}07X_3 + 551{,}996X_4 \quad (1)$$

That is, with an increase in the nominal income of Astana residents by 10 thousand tenge, the average price of apartments in Astana will fall by 7740 KZT/1 m^2. Increase in mortgage lending in Astana by 1 billion tenge will lead to a decrease in housing prices by 746 KZT/1 m^2. The growth of world oil prices by $ 1/ Barr may lead to a decrease in average prices in the housing market in Astana by 4283 KZT /1 m^2. The growth of the dollar by 1 tenge per dollar in Kazakhstan contributes to the increase in housing prices by an average of 552 KZT/1 m^2 with unchanged values of other factors.

- for Almaty city:

$$Y = 568872 - 2{,}711X_1 + 0{,}009X_2 - 523{,}6X_3 + 623{,}122X_4. \quad (2)$$

According to the presented model, with an increase in nominal incomes of Almaty residents by 10 thousand tenge the average price of apartments in Almaty will fall by 27110 KZT per m^2. Increase in mortgage lending in Almaty by 1 billion tenge will lead to an increase in housing prices by 9 KZT per m^2. The growth of world oil prices by $ 1 per Barr may lead to a decrease in average prices in the housing market in Almaty by 523.6 KZT per m^2. The growth of the dollar by 1 tenge per dollar in Kazakhstan contributes to an increase in the price of housing in Almaty by an average of 623 KZT /1 m^2 at constant values of other factors.

The regression equations are statistically significant since the observed values of the Fisher test significantly exceed its critical value at the significance level of 0.05 (for Astana $F_{obs} = 339{,}4 > F_{cr} = 2{,}78$ (3); for Almaty $F_{obs} = 12{,}86 > F_{cr} = 2{,}78$ (4)), therefore, the models adequately describe the relationship between the variables and can be used for further analysis.

The constructed models under the given conditions make it possible to predict with high accuracy the prices in the housing market in Astana and Almaty in future. To do this it is necessary to predict the values of the factors.

3. Forecasting of nominal income of residents of Astana and Almaty cities

The dynamics of changes in nominal incomes of the population shows a steady growth with a pronounced seasonality (Figure 1).

Taking into account the observed trend, an additive trend-seasonal model was used to predict this indicator:

$$Y = T + S + E \quad (5)$$

where: T – the trend component; S – seasonal component; E – random component.

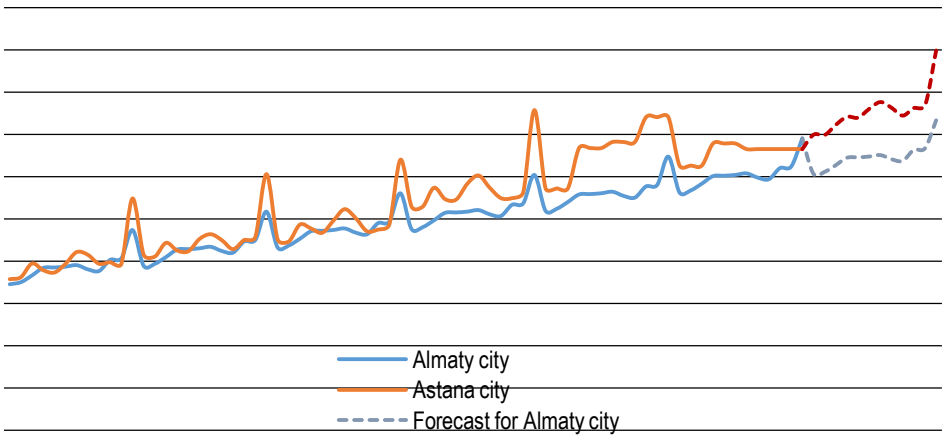
In the process of building a trend-seasonal model, the authors have done the following steps:

- alignment of the initial series by the moving average method for the time series of the monthly dynamics.
- calculation of seasonal component values *S* by the formula:

$$S_i = \overline{S}_i - k \quad (6)$$

where: $\overline{S}_i$ - average values of the seasonal component for each month for all years,

Figure 1. Dynamics and forecast of nominal income, January 2012 - December 2018, in KZT



Source: compiled by the authors according to the http://stat.gov.kz/

$k = \frac{\sum \bar{s}_i}{12}$ – correcting coefficient (7)

- Removing the seasonal component from the series source levels and obtaining aligned data:

$$T + E = Y - S \quad (8)$$

- Analytical level alignment: $(T + E)$ and calculation of values T using the obtained trend equation.
- The construction of the forecast taking into account seasonal variations (Table 1).

Table 1. Forecast of nominal income of residents of Astana and Almaty for 2018

PERIOD	Nominal income of residents	
	Astana city	Almaty city
January 2018	139,793.8	121,147.7
February 2018	139,619.2	122,128.1
March 2018	144,443.1	125,325.9
April 2018	148,273.2	128,868.8
May 2018	147,878.5	129,065.0
June 2018	152,041.5	129,443.0
July 2018	155,262.9	130153.0
August 2018	152,544.3	128,183.7
September 2018	148,828.2	127,392.0
October 2018	152,467.4	132,673.4
November 2018	153,605.8	133,369.7
December 2018	179,650.5	146,726.8

Source: estimated and compiled by the authors

The calculation of the forecast showed that the average annual level of nominal income in Astana in 2018 will be 151,201 KZT, and the average monthly growth rate of nominal income of the population – 2.4% per month or 7.2% per year (December 2018 to December 2017). In Almaty the average annual level of nominal income in 2018 is projected at the level of 129,540 KZT, the forecast of the average monthly growth rate will be 1.8% per month or 6.3% per year. As the dynamics shows the average monthly growth rate of mortgage volumes in Kazakhstan in 2016 was 0.3% per month and 0.6% in 2017. On the basis of such rather restrained forecasts from banks it can be concluded that the current trends in the mortgage market.

4. Forecasting of nominal income of residents of Astana and Almaty cities

To find the forecast values of mortgage lending in Astana and Almaty until the end of 2018 the method of extrapolation was used that is the extension of the future trend observed in the past.

To describe the trend, we have built linear trends (Figure 2, Figure 3) and the method of least squares obtained the following equations:

- for Astana city

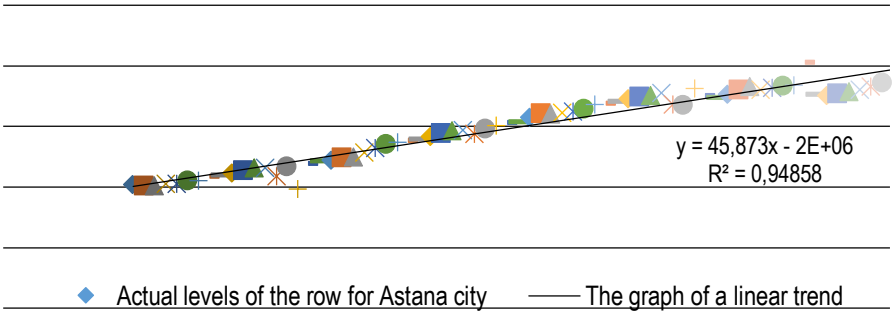
$$y_t = 99177{,}15 + 1396{,}208t, \quad R^2 = 0{,}95. \tag{10}$$

- for Almaty city

$$y_t = 242964{,}4 + 692{,}657t, \quad R^2 = 0{,}86. \tag{11}$$

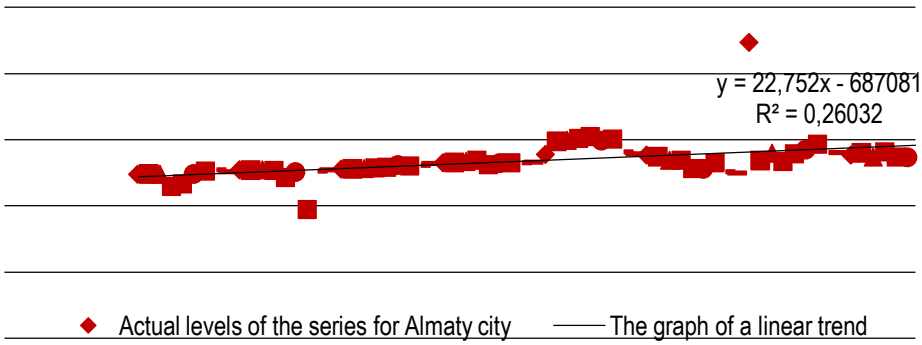
The coefficients of determination R^2 indicate the high accuracy of the models describing the dynamics of the time series.

Figure 2. Dynamics of volumes of mortgage lending in Astana, January 2012- December 2017, in million KZT



Source: compiled by the authors according to the National Bank of Kazakhstan

Figure 3. Dynamics of volumes of mortgage lending in Almaty, Kazakhstan, January 2012- December 2017, in million KZT



Source: compiled by the authors according to the National Bank of Kazakhstan

According to the trend equations we determine the forecast values of mortgage lending in the cities of Astana and Almaty by substituting the corresponding values of the time parameter into the equations (Table 2).

Table 2. Forecast of the volume of mortgage lending in Astana and Almaty in 2018

PERIOD	Nominal income of residents	
	Astana city	Almaty city
January 2018	201,100.4	293,528.4
February 2018	202,496.6	294,221.1
March 2018	203,892.8	294,913.7
April 2018	205,289.0	295,606.4
May 2018	206,685.2	296,299.0
June 2018	208,081.4	296,991.7
July 2018	209,477.6	297,684.4
August 2018	210,873.8	298,377.0
September 2018	212,270.0	299,069.7
October 2018	213,666.2	299,762.3
November 2018	215,062.4	300,455.0
December 2018	216,458.6	301,147.6

Source: estimated and compiled by the authors

Based on the calculation results we obtain the average monthly volume of mortgage lending in 2018 in Astana 208.78 billion KZT with a growth rate of 0.7% per month, in Almaty 297.34 billion KZT with a growth rate of 0.23% per month.

5. Forecasting of world oil price for 2018 year

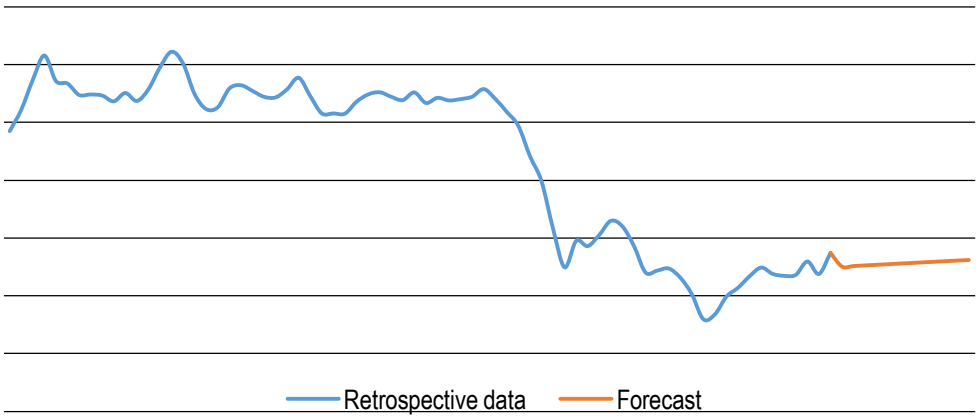
Since the dynamics of world oil prices does not have a trend (Figure 4) the basis for predicting oil prices was the linear adaptive model of R. Brown

$$y_t = \hat{a}_0 + \hat{a}_1 t \quad (12)$$

Using the first five points of the time series, we estimated the values of a_0 and a_1 parameters of the model using the least squares method for the linear model. Got the equation:

$$y_t = 109{,}46 + 0{,}0963t \quad (13)$$

Figure 4. Dynamics of world oil prices January 2012 - December 2017 (USD/Barr)



Source: Compiled by the authors according to the Information portal on personal investments and finance

The smoothing parameter was chosen equal toα=0,2 then the discount rate isβ=1-α=1-0,2=0,8. The initial conditions of exponential means are determined by the formulas:

$$S_0^{(1)} = a_{0(0)} - \frac{\beta}{\alpha} a_{1(0)} = 109{,}46 - \frac{0{,}8}{0{,}2} \cdot 0{,}0963 = 109{,}07 \quad (14)$$

$$S_0^{(2)} = a_{0(0)} - \frac{2\beta}{\alpha} a_{1(0)} = 109{,}46 - \frac{2 \cdot 0{,}8}{0{,}2} \cdot 0{,}0963 = 108{,}69 \quad (15)$$

Calculated the values of exponential averages for the following periods by formulas:

$$S_t^{(1)} = \alpha \cdot y_t + \beta \cdot S_{t-1}^{(1)} \quad (16)$$

$$S_t^{(2)} = \alpha \cdot S_t^{(1)} + \beta \cdot S_{t-1}^{(2)}. \quad (17)$$

Adjusted the parameters of the model:

$$a_{0(t)} = 2S_t^{(1)} - S_t^{(2)} \quad (18)$$

$$a_{1(t)} = \frac{\alpha}{\beta}\left(S_t^{(1)} - S_t^{(2)}\right) \quad (19)$$

Using the presented formulas, we obtained a model with adjusted parameters:

$$\hat{y} = 49{,}9 + 0{,}211\tau, \quad \tau = 1, 2, \quad (20)$$

Using this formula, we calculated the forecast values of world oil prices until December 2017 (Table 3). Thus the forecast of world oil prices by the end of 2018 according to our calculations will correspond to the value of $ 52/Barr. That is the increase will be 0.4%.

6. Forecasting of exchange rate of KZT to USD by 2018

The logarithmic trend equation obtained by the least squares method has the following form

$$y_t = 361{,}54 - 11{,}63 \ln t, R^2 = 0{,}71 \quad (21)$$

The model's forecast exchange rate values (Table 3) show a gradual decline to 325 KZT per USD by the end of 2018 which corresponds to 2.7% per year. However, it should be noted that the forecasts will be justified only if there are no sharp changes in the world economy in general and in Kazakhstan in particular.

Table 3. The forecast of world oil prices and the exchange rate of KZT to USD in Kazakhstan to 2018

Period	World oil prices	KZT to USD exchange rate
January 2018	50,1	332
February 2018	50,3	331
March 2018	50,5	330
April 2018	50,7	329
May 2018	50,9	329
June 2018	51,2	328
July 2018	51,4	327
August 2018	51,6	327
September 2018	51,8	326
October 2018	52,0	326
November 2018	52,2	325
December 2018	52,4	325

Source: estimated and compiled by the authors

Conclusion

As a result of applying our proposed prediction methods were obtained projected values for 2018 indicators characterizing changes in the real estate markets in the cities of Astana and Almaty: the nominal income of residents, the volume of mortgage lending, world oil prices and the exchange rate of the national currency against the USD. Based on the multivariate regression equations presented above we calculated predicted values of housing prices in KZT and USD terms (Table 4).

Table 4. Housing prices forecast in Astana and Almaty for 2018

Period	Astana city		Almaty city	
	KZT	USD	KZT	USD
January 2018	344.301	1.037	423.537	1.291
February 2018	342.014	1.033	420.238	1.284
March 2018	335.893	1.018	410.963	1.254
April 2018	330.570	1.006	400.785	1.221
May 2018	328.539	1.002	399.709	1.221
June 2018	323.006	988	398.166	1.219
July 2018	318.221	977	395.745	1.214
August 2018	318.048	977	400.608	1.236
September 2018	318.663	980	402.297	1.245
October 2018	313.603	967	387.536	1.194
November 2018	310.491	959	385.221	1.188
December 2018	288.125	901	348.593	1.054

Source: Estimated and compiled by the authors

Thus the situation in the real estate market will develop according to the scenario proposed by us if in Kazakhstan in 2018 the trends of 2017 will continue and there will be no significant changes in the economy of the country which is not excluded. That is the average KZT price for housing in Astana will fall by 17%, and will be 288125 KZT in December 2018, in Almaty the average KZT price will fall only by 6% and will be in December 2018, 397783 KZT. If talking about USD terms the decline in property prices by the end of 2018 Astana will occur at 13% compared to the same period in 2017 and will match $900 per 1 sq. m. In the city of Almaty is also observed negative dynamics, *i.e.* the decline will be 5% and by the end of 2018 for 1 sq. m of living space will offer just over $1,000.

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