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Table of Contents

1 **Fathi ABID, Nader NAIFAR**
The application of Copulas in pricing dependent Credit Derivatives Instruments 65

2 **Anca Mădălina BOGDAN**
The Evolution of Final Financial Results in Time 75

3 **Cristiana Luminiţa BOGDĂNOIU**
Risk Taking in Economical – Financial Activity 79

4 **Mădălina CONSTANTINESCU**
Knowledge Management through the Lens of Innovation and Labour Productivity in a Knowledge Based Economy 85

5 **Ivan O. KITOV, Oleg I. KITOV**
Long-Term Linear Trends in Consumer Price Indices 101

6 **Eric LANGLAIS**
On Insurance Contract Design for Low Probability Events 113

7 **Petrişor MILITARU**
English Influences in Romanian Business Vocabulary 121

8 **Rajesh K. PILLANIA**
State-of-art of Indian Competitiveness 127

9 **Alexandre REPKINE**
ICT Penetration and Aggregate Production Efficiency: Empirical Evidence for a Cross-Section of Fifty Countries 137

10 **Alaa M. RIAD, Ahmed E. HASSAN, Qusay F. HASSAN**
Leveraging SOA in Banking Systems' Integration 145

11 **Laura ŞTEFĂNESCU, Laura UNGUREANU, Ion Viorel MATEI**
Reengineering as an Efficient Solution to Redesign Activities and Processes of an Enterprise 157

12 **Loredana VĂCĂRESCU HOBEANU**
The Competence – The Increase Factor of the Professional Competition 163

THE APPLICATION OF COPULAS IN PRICING DEPENDENT CREDIT DERIVATIVES INSTRUMENTS

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Abstract:
The aim of this paper is to use copulas functions to capture the different structures of dependency when we deal with portfolios of dependent credit risks and a basket of credit derivatives. We first present the well-known result for the pricing of default risk, when there is only one defaultable firm. After that, we expose the structure of dependency with copulas in pricing dependent credit derivatives. Many studies suggest the inadequacy of multinormal distribution and then the failure of methods based on linear correlation for measuring the structure of dependency. Finally, we use Monte Carlo simulations for pricing Collateralized debt obligation (CDO) with Gaussian an Student copulas.

Key-Words: default risk, credit derivatives, CDO, copulas functions, Monte Carlo simulations.

JEL Classification: C15, G12

1. Introduction

Credit derivatives transactions are an increasingly important feature of modern financial markets. They provide an efficient means of hedging and separating credit risk from other market variables without jeopardizing relationships with borrowers. There are many different types of credit derivatives contracts. Most of them involve a fixed payment by the protection buyer to the protection seller. In return, the protection buyer receives a payment that is contingent upon the credit event[1] (Bankruptcy, failure to pay…). When we dealing with credit derivatives and a portfolio of credit risky assets, default correlation is crucial. Also, for both the internal control and regulatory reporting, the financial industries are required to hold capital methodology, with respect to default correlation between different credits. However, most of existing credit risk models cannot be applied to analyze multiple defaults and default correlation. In a structural approach, one needs as given the dynamics of firm's asset value.

A default occurs when the assets values are insufficient to cover liabilities. Kealhofer [20] shows that the firm's default risk can be derived from the behavior of the firm's asset value and the level of its obligations. The joint probability of default is the likelihood of both firms' market asset values being below their respective default barrier in the same time. To determine this probability, it must know the market value of asset values of each firms, their asset volatilities and essentially, default correlation presented by correlation between the firm's market asset values which are easily observable. Gersbach & Lipponer [12] explain that correlations of default risks depend on the correlations of asset returns which are assumed to be log normally distributed. The default correlations are affected by macro-economic risks. The default correlations are obtained with linear correlation coefficient between asset values. Zhou [29] provide a first passage time model for calculating default correlation and joint default probability which based on firm specific information. Default is triggered when the value of the firm hits a deterministic default boundary following Black & Cox [1]. Giesecke [13] provide a structural model of correlated multi-firms default with incomplete information concerning the default barrier (asset level) at which a firm is liquidated and therefore, the default is an

[1] A list of credit events are presented by the international swaps and derivatives associations in the "2003 ISDA credit derivatives definitions".

unpredictable event. Stochastic dependence between default events is presented through correlated asset values (common macro-economic factors or *macro- correlation*) and correlated default barrier (direct linkages between firms or *micro-correlation*). Davis & Lo [4] introduce a contagion model to capture the risk concentration in a portfolio of defaultable securities. They suppose that default of an issuer in a particular sector may trigger off defaults of other issuers in the same sector by an "*infection*" mechanism. The basic idea is that bonds i may default directly or may be "infected" by default of another bond j. Jeanblanc et al [18] discuss dependence mechanisms in a credit ratings-based framework. They proposed a multivariate Markov model for simulating the dynamics of correlated credit ratings of multiple firms because the Markov models do no account for default correlation when we dealing with a portfolio of credit risk. The rating changes across firms because the credit worthiness of issuers depends on a common set of economic factor. The model proposed is an extension of Jarrow, Lando and Turnbull [17]. Hull & White [15] develop an approach of modeling default correlation. They consider a variable describing the credit worthiness of company referred as "credit index". They select correlated diffusion processes for the credit indices of the different firms and determine the default barrier of each company such that the company defaults of the credit indices reach default barrier. These indices start at zero and follow correlated wiener processes. Reduced form models can incorporate correlations between defaults by allowing hazard rates to be stochastic and correlated with macroeconomic variables.

However, more accurate and flexible approach is offered by Copula functions. The main potential advantage of copulas is the separation between marginal and the dependency because (in finance) the former are often understood and modelled in detail but dependency is almost interpreted as meaning Pearson's correlation, which isn't always appropriate. . Embrechts et al [5] show the necessity to leave the Gaussian world since the normal joint distribution cannot catch some key futures of the dependence like the tail dependence and the classic correlation coefficient is only adapted for assessing linear dependence and can lead to a very strong underestimation of the real incurred risk. Then, the multivariate normal distribution is not a good model for the joint distribution of many economic variables. Many dependency measures have been proposed according to concepts such as concordance, quadrant dependency, etc. In the case of two random variables, structure of dependency can have a long variety of forms according to some specifications. Most popular examples are based on the concept of concordance and discordance which are scale invariant measures such as Kendall's tau and the Spearman's rho. More recently, the introduction of the theory of copulas in finance by Embrechts et al [6] has had a great impact in the study of dependence of random variables. In this paper, we use Archimedean copulas to model dependency between credit default swap prices and stock return volatility in view of the construction of bivariate distributions based on that dependency structure. Volatility is a statistical measure of the tendency of a market or security to rise or fall sharply within a short period of time. Volatile markets are characterized by wide price fluctuations and heavy trading. They are caused by things like company news, a recommendation from a well known analyst or unexpected earnings results. Mashal & Naldi [22] present a methodology for estimation, simulation and pricing of multiname credit derivatives. The dependence structure is modelled by a t-copula. Sircar and Zariphopoulou [26] study the impact of risk aversion on the valuation of basket credit derivatives. They use the technology of utility-indifference pricing in intensity based models of default risk.

In our paper, we use copulas functions to capture structures of dependency when we deal with portfolios of dependent credit risks and a CDO. The remainder of this paper is organised as follows: section two describes some mathematical background about the concept of copula and its properties. In section three, we illustrate different methods of parameters estimation of copula. Section four describes a methodology for pricing CDO instruments with Monte Carlo simulations and copulas functions. Section five concludes the paper.

2. Copulas functions

The theory of copula dates back to Sklar [27]. The copula function links the univariate margins with their full multivariate distribution. It presents a useful tool when modelling non Gaussian data since the Pearson's correlation coefficient is adapted for linear dependence and normal distribution.

Using a copula approach, we can model the different relationships that can exist in different ranges of behavior. For n uniform random variables $u_1, u_2, ..., u_n$, the joint distribution function C is defined as:

$$C(u_1, u_2, ..., u_n, \theta) = Pr[U_1 \le u_1, U_2 \le u_2, ..., U_n \le u_n] \quad (1)$$

where θ the dependence parameter.

As we only need the concept of copulas for two dimensions, we present the following definition:

A copula function is the restriction to $[0,1]^2$ of a continuous bivariate distribution function whose margins are uniform on $[0,1]$. A (bivariate) copula is a function $C : [0,1]^2 \to [0,1]$ which satisfies the boundary conditions:

$$C(t,0) = C(0,t) = 0 \text{ and } C(t,1) = C(1,t) = t \text{ for } t \in [0,1]. \quad (2)$$

Theorem 1: Let F be a multivariate n-dimensional distribution function with marginals $F_1,\ldots,F_n$.

Then it exists a copula such that $F(x_1,\ldots,x_n) = C(F_1(x_1),\ldots,F_n(x_n))$; $(x_1,\ldots,x_n \in \Re)$.

If the marginal distributions $F_1,\ldots,F_n$ are continuous, then C is unique.

By definition, applying the cumulative distribution function (CDF) to a random variable (r.v.) results in a r.v. that is uniform on the interval [0, 1]. Let X a random variable with continuous distribution function F_X, $F_X(X)$ is uniformly distributed on the interval [0,1]. This result is known as the probability integral transformation theorem and present many statistical procedures. With this result in hand, we may introduce the copula using basic statistical theory. In particular, the copula C for (X,Y) is just the joint distribution function for the random couple $F_X(X)$, $F_Y(Y)$ provided F_X and F_Y are continuous.

The previous representation is called canonical representation of the distribution. Thus, copulas link joint distribution functions to their margins. Then, in continuous distribution, the problem of obtaining the joint distribution has reduced to selecting the appropriate copula. We can build multidimensional distributions with different marginals. Numerous copulas can be found in the literature (see Nelson [24] and Joe [19]).

Clayton copula: This family proposed by Clayton [3] is the following:

$$\text{Let } \Phi(t) = \frac{\left(t^{-\theta} - 1\right)}{\theta} \text{ with } \theta \in [-1, \infty)/\{0\}, \text{ then } C_\theta^{clayton}(u,v) = \max\left[\left(u^{-\theta} + v^{-\theta} - 1\right)^{-\frac{1}{\theta}}, 0\right] \quad (3)$$

where $\Phi(t)$ is the generator function. θ expresses the degree of dependence among the marginal components. To illustrate the range of bivariate behaviour that can be represented by Clayton copula, consider the figure 1:

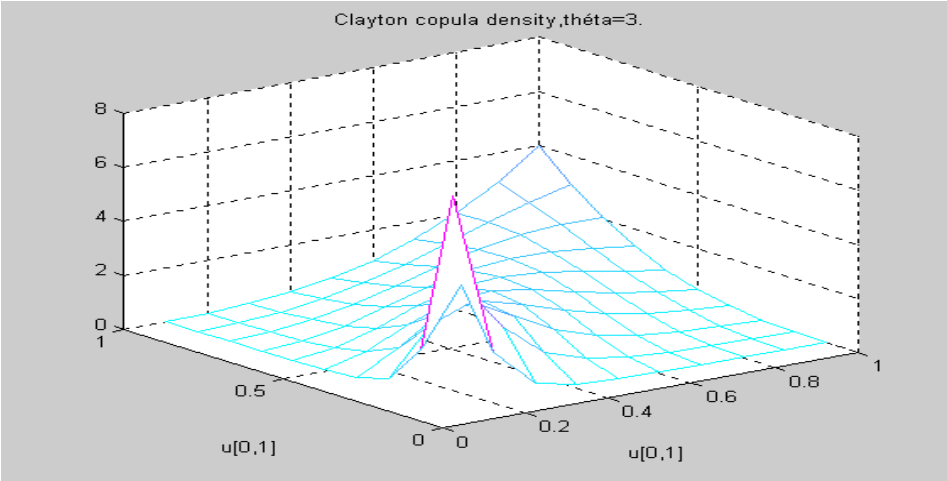

Figure 1. Clayton copula density

Gumbel Copula: This family proposed by Gumbel [14] is the following:

Let $\Phi(t)=(-\ln t)^{\theta}$, with $\theta \geq 1$.

$$C_{\theta}^{Gumbel}(u,v)=\exp\left(-\left[(-\ln u)^{\theta}+(-\ln v)^{\theta}\right]^{\frac{1}{\theta}}\right);0\leq u,v\leq 1 \quad . \tag{4}$$

Where $\theta \in [1,\infty)$ controls the degree of dependence between u and v.

The range of bivariate behaviour that can be represented by Gumbel copula is illustrated as follow:

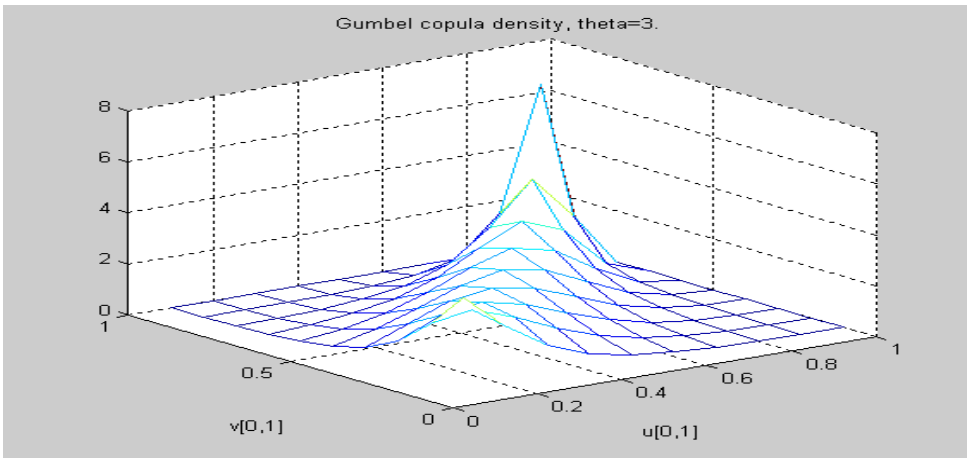

Figure 2. Gumbel copula density

Frank copula: This family is proposed by Frank [7] as follows:

Let $\Phi(t)=-\ln\dfrac{-e^{-\theta t}-1}{e^{-\theta}-1}$ with

$$C_{\theta}^{Frank}(u,v)=-\frac{1}{\theta}\ln\left(1+\frac{\left(e^{-\theta u}-1\right)\left(e^{-\theta v}-1\right)}{\left(e^{-\theta}-1\right)}\right). \tag{5}$$

The range of bivariate behaviour that can be represented by Frank copula is illustrated as follow:

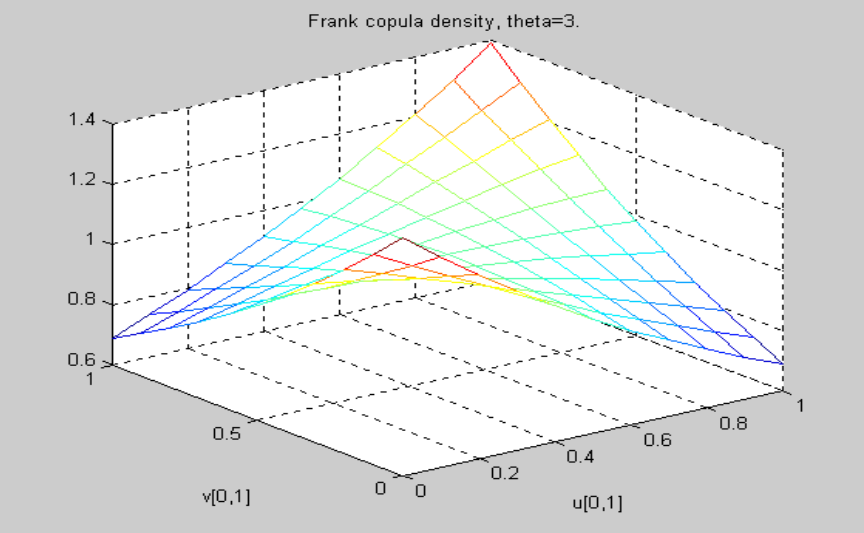

Figure 3. Frank copula density

Gaussian copula: Let $X_1,...,X_n$ be random variables which are standard normal distributed with means $\mu_1,...,\mu_n$, standard deviations $\sigma_1,...,\sigma_n$ and correlation matrix Σ. Then, the distribution function $C_\Sigma(u_1,...,u_n)$ of the random variables $U_i = \Phi\left(\frac{X_i - \mu_i}{\sigma_i}\right), i \in \{1,...,n\}$ is a Gaussian copula with correlation matrix Σ. $\Phi(.)$ denotes the cumulative univariate standard normal distribution function.

The Gaussian copula can be written as:

$$C_\Sigma(u_1,...,u_n) = \frac{1}{(2\pi)^{\frac{n}{2}}\sqrt{\det\Sigma}} \int_{-\infty}^{\Phi^{-1}(u_1)} ... \int_{-\infty}^{\Phi^{-1}(u_n)} \exp\left(-\frac{1}{2}(\vec{v}-\vec{\mu})^T \Sigma^{-1}(\vec{v}-\vec{\mu})\right) dv_1...dv_n \quad (6)$$

With Φ^{-1} is the inverse of the standard univariate Gaussian distribution function.

By differentiating the precedent equation with respect to $u_1,...,u_n$, we obtain the density of the Gaussian copula:

$$C_\Sigma(u_1,...,u_n) = \frac{1}{\sqrt{\det\Sigma}} \exp\left(-\frac{1}{2}(v_1,...,v_n)\left(\sum^{-1} - 1\right)\begin{pmatrix} v_1 \\ . \\ . \\ . \\ v_n \end{pmatrix}\right); \quad (7)$$

With $v_i = \Phi^{-1}(u_i), i \in \{1,...,n\}$.

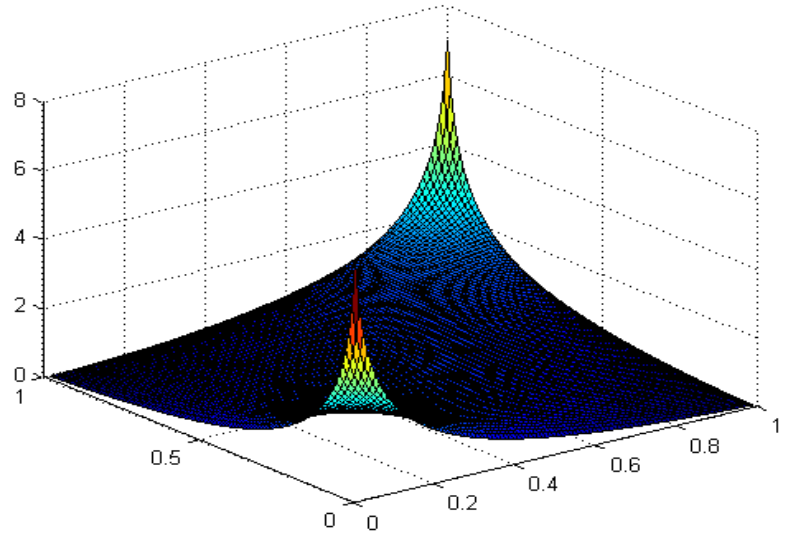

Figure 4. Gaussian copula density

Student copula: The t-student copula with the correlation matrix Σ and ν degrees of freedom is presented as follow:

$$C_{\nu,\Sigma}(u_1,...,u_n) = \int_{-\infty}^{t_\nu^{-1}(u_1)} \cdots \int_{-\infty}^{t_\nu^{-1}(u_n)} k_{\nu,\Sigma}\left(1+\frac{1}{\nu}\left(\vec{v}-\vec{u}\right)^T \sum^{-1}\left(\vec{v}-\vec{u}\right)\right)^{-\frac{\nu+n}{2}} dv_1...dv_2 \quad (8)$$

With:

$$k_{\nu,\Sigma} = \frac{\Gamma\left(\frac{\nu+n}{2}\right)}{\Gamma\left(\frac{\nu}{2}\right)\sqrt{(\Pi\nu)^n \det(\Sigma)}} \quad (9)$$

In terms of the appropriate choice for the number of degrees of freedom, it is often necessary to carry out some statistical tests with historical data to ascertain how fat we require the tails to be, Galiani [8] use an Exact Maximum Likelihood Method (EML). Other woks explain how to calibrate t-student copula to real market data (Mashal and Zeevi [21], Romano [25], Meneguzzo and Vecchiato [23]…). The difference between Gaussian copulas and the t-Student copulas can be described with the concept of tail dependence. If a bivariate copula $C(u,v)$ such as:

$$\lim_{u\to 1}\frac{1+C(u,u)-2u}{1-u} = \lambda_U > 0,$$

Then C has upper tail dependence with parameter λ_U. If:

$$\lim_{u\to 0}\frac{C(u,u)}{u} = \lambda_L > 0$$

Then C has lower tail dependence with parameter λ_L

3. Copulas parameters estimations

In this section, we will discuss nonparametric (Genest & Rivest [10]), parametric (Likelihood) and semi-parametric (Genest et al [11]) methods of estimating Archimedean copula parameters.

Genest & Rivest [10] suggested a nonparametric method for estimating the dependence function of a pair of random variables under the assumption that their uniform representation is Archimedean. Their method relies on the estimation of the univariate distribution function associated with the probability integral transformation and requires complete data. The best fitting Archimedean model is the one whose probability integral transformation distribution is the closest to its empirical estimate.

The bivariate probability integral transformation of (X, Y) with joint distribution function H is defined as $V = H(X,Y)$. It is not generally true that the distribution function K of V is uniform on [0,1] even if H is continuous. Similarly, K does not characterize H since K does not contain any information about the marginals F_X and F_Y.

The problem of specifying a probability model for independent observations $(x_1,y_1),\ldots,(x_n,y_n)$ from a bivariate non normal distribution function H(X,Y) can be simplified by expressing H in terms of its marginals F_X and F_Y and its associated dependence function C.

Then, Archimedean copulas are characterized by the stochastic behaviour of the random variate $V = H(X,Y)$. The univariate distribution function is defined as:

$K(v) = \Pr[H(X,Y) \le v] = \Pr[C\{F_X(X), F_Y(Y)\} \le v]$ on the interval (0,1). The estimation of K can be accomplished in two steps: they construct the empirical bivariate distribution $H_n(X,Y)$ and they compute $H_n(x_i, y_i)$ for $i = 1,\ldots,n.$ and use those pseudo observations to construct one-dimensional empirical distribution function for K.

The Archimedean copula presents an appealing property: each copula has an analytical expression that links its parameters to its related Kendall tau. Here, we present the important theorem in the theory of Archimedean copula (Genest & MacKay, [9]):

Theorem: Let (X,Y) be a pair of random variables whose distribution H is of the form

$\left[C_\Phi(x,y) = \Phi^{-1}\{\Phi(x) + \Phi(y)\}\right]$ for some Φ, then: $\tau = 4\int_0^1 \frac{\Phi(t)}{\Phi'(t)}dt + 1$.

Then, we can estimate the parameter from the parametric copula using a relationship between the Kendall's τ and the Archimedean copula.

Genest et al [11] proposed a semi-parametric procedure for estimating the dependence parameters in a family of multivariate distributions when one does not want to specify any parametric model to describe the marginal distribution. This procedure consists of transforming the marginal observations into uniformly distributed vectors using the empirical distribution function. Then, the copula parameters are estimated by maximisation of a Pseudo log-likelihood function.

When nonparametric estimates are contemplated for the marginals, inference about the dependence parameter must be margin free. We have given a random sample $\{(X_{1k},\ldots,X_{pk}): k = 1,\ldots,n\}$, from distribution $F_\alpha(x_1,\ldots,x_p) = C_\varepsilon\{F_1(x_1),\ldots,F_p(x_p)\}$. In the construction of the likelihood function, we will be interested to the parametric representation of the copula, specifically, the copula density. The procedure consists of selecting the parameter value $\hat{\alpha}_n$ that maximises the pseudo log-likelihood: $L(\alpha) = \sum_{k=1}^{n} \log\left[c_\alpha\{F_{1n}(X_{1k}),\ldots,F_{pn}(X_{pk})\}\right]$ in which c_α is the copula density and F_{in} is the rescaled empirical distribution function given by: $F_{in}(x) = \frac{1}{n+1}\sum_{j=1}^{n} 1(X_{ij} \le x)$ for any $1 \le i \le p$.

Genest et al [11] examined the statistical properties of the proposed estimator. It is shown that it is consistent, asymptotically normal and fully efficient at independence.

4. Pricing Collateralized Debt Obligation

Following the classification of Tavakoli [28], a CDO is backed by portfolios of assets that may include a combination of bonds, loans, securitised receivables, asset-backed securities, tranches of other CDO's, or credit derivatives referencing any of the former. Some market practitioners define a CDO as being backed by a portfolio including only bonds. A Collateralized loan obligation (CLO) is a type of CDO that is backed by a portfolio of loans. A Collateralized bond obligation (CBO) is a type of CDO that is backed by a portfolio of bonds issued by a variety of corporate or sovereign obligors. The development of structured credit derivatives leads to the emergence of synthetic Collaterized Debt Obligations which transfer the risk of a pool of single-name Credit Default Swaps. This realizes an exposure to a variety of names.

Suppose that the total CDO notional is 100 millions and during the lifetime of CDO some debts in the collateral portfolio might default. At maturity, if the total default loss is less than 10 millions,

only the equity tranche is affected. If the total losse is between 10 and 30 millions, the equity tranche does not get the principal back and the mezzanine gets only part of it. If the loss is more than 30 millions than the equity and mezzanine do not get anything back and senior tranche gets is left.

We present a methodology for pricing CDO with Monte Carlo simulations and Gaussian and student copulas. Consider an homogeneous CDO with n obligors with nominal amount A_i and recovery rate R_i with i= 1, 2,…,n, (assumed deterministic), maturity T years and we assume constant risk free interest rate. The total value of the portfolio is $V_T = \sum_{i=1}^{n} A_i$ and $L_i = (1 - R_i) A_i$ will denote the loss given default for the i^{th} credit. Let τ_i be the default time of the i^{th} name and $N_i(t) = \sum_{i=1}^{n} I_{\{\tau_i \le t\}}$ be the counting process which jumps from 0 to 1 at default time of name i. let $L(t)$ will denote the cumulative loss on the collateral portfolio at time t: $L(t) = \sum_{i=1}^{n} L_i N_i(t)$. The tranche [a, b] suffers a loss at time t if $a\%V_T < L(t) \le b\%V_T$, where $a\%$ and $b\%$ are respectively lower and upper bound. Suppose that $a\%V_t = a'$ and $b\%V_t = b'$, then, the tranche loss :

$$L_{a',b'}(t) = \left[L(t) - a'\right] I_{\{L(t) \in [a',b']\}} + (b' - a') I_{\{L(t) \in [b',V_t]\}} \quad (10)$$

Using Monte Carlo simulation, the estimation of tranche loss becomes a straightforward task. According to Galiani [8], Pricing a CDO using Monte Carlo simulation involves creating sample paths of correlated default times. These default times are used to calculate the payments on two legs and value each leg. The first is the present value of tranche losses triggered by credit events during the CDO lifetime and is called default leg [DL] and the second is the present value of the premium payments weighted by the outstanding capital (original tranche amount minus accumulated losses) and is called premium leg [PL]. The fair spread of CDO can be computed by dividing the present value of the default leg $E[DL]$ through the present value of the premium leg $E[PL]$: $S = \frac{E[DL]}{E[PL]}$ (11)

The K[th] default leg can be computed as: $DL^k = \sum_{i=1}^{n} e^{-r\tau_i^k} L_{a,b}(\tau_i^k)$ where r are the free risk interest rate and $\{\tau_1^k, \tau_2^k, ..., \tau_N^k\}$ the sequence of default times with K[th] iteration of a Monte Carlo simulation. The accumulated loss is given by:

$$\Im^k(t) = (1 - R) \sum_{i=1}^{n} I_{\{\tau_i^k < t\}}. \quad (12)$$

The premium leg is paid over the outstanding capital in the tranche. If during the lifetime of the CDO the tranche is wiped out, there are no more premium payments:

$$PL^k = N \sum_{j=1}^{w} \delta_j e^{-rt_j} \min\left\{\max\left[b - \Im^k(t_j), 0\right], b - a\right\} \quad (13)$$

Where $\{t_1, ..., t_w\}$ are the premium payment dates with frequency δ_j.

Table 1 presents fair spread of a homogeneous CDO with Monte Carlo simulation. Standard errors of estimates are less than 1 basis point.

Table 1. Fair spread of an homogeneous CDO with $h = 0.06$, recovery rate R=0.4, correlation coefficient rho=0.4, 50,000 iterations and Degree of freedom(DoF= 10)

Tranche	Spread (basis point) (Gaussian copula)	Spread (basis point) (Student copulas)
0% à 10% (Equity)	2952,4	3172.895
10% à 30% (Mezzanine)	779.3024	762.065
30% à 100 % (Senior)	43.4713	30.210

Hull & White [16] find that the double Student-t copula model with the same heavy tailed distributions for systematic and idiosyncratic risk performs very well in market price fitting. Burtschell et al. [2] report that the double Student-t copula model has very good calibration features to the CDO market in comparison to other models like t-Student copulas.

5. Conclusion

The aim of this paper is to to use copulas functions to capture the different structures of dependency when we deal with portfolios of dependent credit risks and a basket of credit derivatives. The key idea of modelling correlated default is the usage of copulas functions. The valuation models are set up with Gaussian and Student copulas. We use Monte Carlo method for simulating the default times, with which multi-name credit derivatives can be priced. The advantage of Monte-Carlo is its simplicity and generality. Its main drawbacks, however, are the quality of the convergence, especially when one computes sensitivities. A good convergence is particularly hard to achieve for credit products since default events are usually rare, and probabilities in the tail of the distribution are difficult to estimate.

Furthermore, the Gaussian distribution has thin tails compared to other distributions. As we are concerned of default events that are by nature tail events, we use distributions with fat tails such as the Student distribution and we find that this change in assumption changes our results.

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THE EVOLUTION OF FINAL FINANCIAL RESULTS IN TIME

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Abstract

The auditor's knowing and understanding of the respective economic segment, the detailed analysis of the relations between income and results on account of time, motivate us to use the method of extrapolation and include it in the auditing procedures.

Key words: dispersion cloud, extrapolation, harmonization point.

JEL Classification: A12, M41, M42

1. Introduction

In our opinion, the relevancy of financial audit records is significantly influenced by the quality and thoroughness of the activity carried on by the financial auditor or, in other words, by the independence and accuracy of his conclusions.

Market dynamics, economic conjuncture is elements witch can rapidly influence financial results, which require financial auditors to determine exact information regarding the future evolution of the patrimonial entity and regarding bankruptcy risk.

We think that these aspects can hardly be noticed by means of the calculation and the analyses of all financial ratios of the patrimonial entity, since this method takes a rather long period time.

Thus, by using the method of extrapolation, we have rapidly found out some tendencies depending on time. When using *the method of extrapolation as a procedure of financial audit*, we recommend its usage for patrimonial entities which have their financial statements drawn up according to the provisions of the International Standards of Accounting, in order to elaborate predictive studies for prolonging the past tendencies of variables. The most spectacular aspect encountered by us when using the above-mentioned visualizing the impact had by harmonizing accounting with the International Standards of Accounting represents method.

The analysis of the evolution of certain parameters in time is also made by using the extrapolation method, which implies the study of the dependence between the two variables whose level changes in time. In this case, the model of the function, which approximates the trend, is usually illustrated by a correlogramme (dispersion cloud Figure nr.1.). On the OX axis we represent time, and on the OY axis the final financial results.

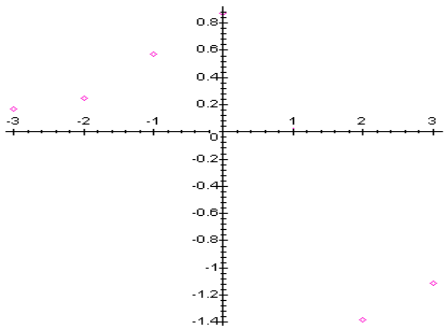

Figure 1. The dispersion cloud of the relation between the final financial results and time.

In this case we can use a curvilinear extrapolation function: $f(x) = ax^2+bx+c$. In order to determine the parameters a, b and c, we use the data of the following table:

Table 1. Numeric data for studying the evolution of the relation between financial results and time

Years	Results (x)	Time (t)	t^2	t^3	t^4	tx	t^2x
1999	0,170	-3	9	27	81	-0,510	1,530
2000	0,250	-2	4	8	16	-0,500	1,000
2001	0,570	-1	1	1	1	-0,570	0,570
2002	0,870	0	0	0	0	0	0
2003	0,033	1	1	1	1	0,033	0,033
2004	-1,380	2	4	8	16	-2,760	-5,520
2005	-1,110	3	9	27	81	-3,330	-9,990
Σ	**-0,597**	**0**	**28**	**72**	**196**	**-7,637**	**-12,443**

According to the specific formulae, we find a = 0,244; b = – 0,536 and c = – 0,907 and the evolution of the financial results in time will be determined by using the equation of the curve:

$x(t) = 0{,}244\ t^2 - 0{,}536\ t - 0{,}907$.

Representing graphically what we have previously exposed, we obtain the following parabola:

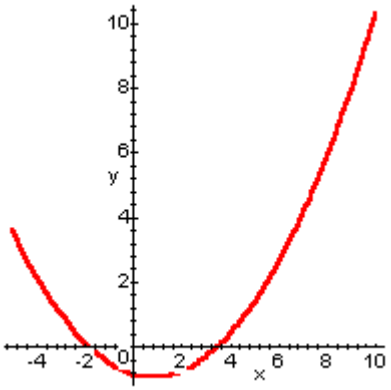

Figure 2. The parabola, which illustrates the harmonization point by representing the evolution of the final financial results in time

For example, if in 2005 the final financial results are -1,11 m.u.[1], we replace the data in the equation of the curve and we obtain for 2006:

$x_{2006} = 0{,}244 * 16 - 0{,}536 * 4 - 0{,}907 = 0{,}85$ u.m.

In conclusion, the results recorded in the financial accounts in 2006 follow an increasing and positive trend.

2. The evolution of the income in time

In order to determine the dependence between income and time, we shall use the regressive function $y = ax + b$. because we notice a linear, increasing evolution (Figure nr.3). This line shows the relation between the couples of observations by minimalizing the distance between the points (x_i, y_i) corresponding to the couple and the points $(x_i, ax_i + b)$ corresponding to the regressive straight line. On the OX axis we represent the time and on the OY axis the incomes.

[1] m.u. – monetary units representing by a thousand of billion

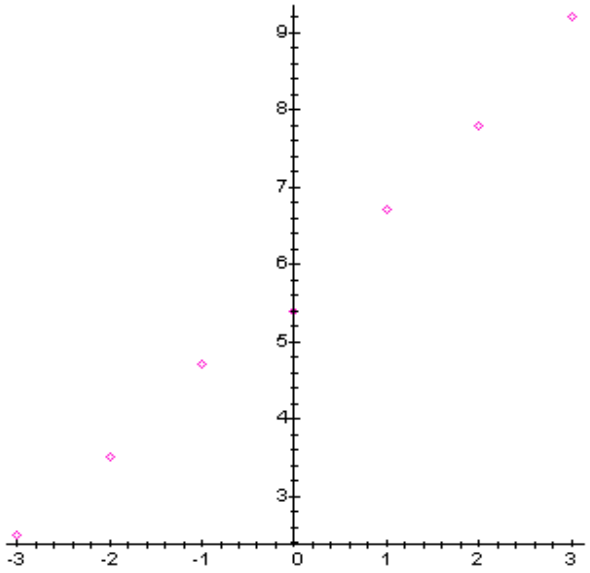

Figure 3. The dispersion cloud income-time

In order to determine the parameters a and b we use the data from the following table:

Table 2. Numeric data for studying the evolution of income-time relation

Year	Income (y)	Time (t)	t^2	ty
1999	2,1	-3	9	-6,3
2000	2,5	-2	4	-5,0
2001	3,5	-1	1	-3,5
2002	4,7	0	0	0
2003	5,4	1	1	5,4
2004	6,7	2	4	13,4
2005	7,8	3	9	23,4
Σ	**32,7**	**0**	**28**	**27,4**

Since we have considered a linear relation between the two variables, we use the formulae

$$a = \frac{\sum x_i t_i}{\sum t_i^2}$$

$b = \frac{\sum x_i}{n}$, thus determine $a = 0{,}978$, b = 4,67 and the evolution of the income in time is rendered by the equation of the straight line:

$y = 0{,}978t + 4{,}67$.

Thus if, in 2005 the income was $y = 7{,}8$ m.u., according to this study, in year 2006, the income will be:

$y_{2006} = 0{,}978 * 4 + 4{,}67 = 8{,}58$ m.u.

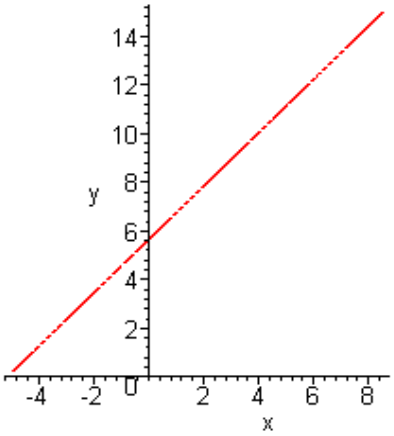

Figure 4. The graphic representation of the found regressive straight line

3. Conclusions

The increasing trend of the income depending on time proves that the firm, the object of our study will maintain this trend in the future too.

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RISK TAKING IN ECONOMICAL – FINANCIAL ACTIVITY

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Abstract:

Any economic activity is carry on in risks conditions, these risks being more and less serious, more and less well- known, easiest and hardest to avoid.

Before starting any tipe of activity it's enforce an identification and evaluation of risks who can appear, their elimination and reduction as much as it can, accepting just these risks who affect in small mesure the firm activity. The insufficient knowledge of risk, it wrong evaluation, the missing of an adecvated protection against this, will affect directly the final result of carry on activity.

In economical-financial activity, risk is a component of any activity, being found in daily agenda of companies' managers. In any moment the managers have to know which is and how is the risk, and if this risk it isn't bigger than profit. The unexpected modifications in evolution of interest rate, of exchange risk or of price of one product not only affect the financial results of one firm, but it can determine even her failure. As a matter of fact, the financial decisions imply incertitude. The financial decisions are taken in consideration by the cashflows stipulated by the future contracts, which are uncertain excellently. So, the risk is an uncertain component of financial decisions. It's not surprising that an important function of financial system is the allocation of risk regarding to interest rate evolution, acts price, exchange rate or the price of certain goods etc. As a matter of fact, also the production process is influentated by a series of generating factors of risks, risks which can be found in the process of projection and implementation of the new high technology, as well as the joining of production factors which means the organisation of work, production and leading.

Keywords: risks, financial decisions, risk evaluation

JEL Classification: D81, G00

1. Introduction

In the last time, in our country, were registered radicals changes in many plans: social, informational, cultural, politic and economic. Within the framework of these mutations, were produced essentials economic changes, which situate the enterprise in the first plan of development ansamble of Romanian society.

In the market economy, the entire experience of the enterprise is tie by risk, because the present and the future results are been under the influence of some unexpected events.

An enterprise with rentability, solvable, who has a coerent and adaptable financial situation at changes, theoretical doesn't presents risk, but, with all these, and she can be expose to risk, because it must abide permanently a certain grade of incertitude generated by the economic and financial medium where it's unfold her activity.

The risk of an enterprise is always tie by the future, reason for whatit is appreciate in a subjective way, especially as the dates regarding to this cant't be considered sure informations. But, at one time, the risk must be evaluated, either by the factors from enterprise interior, or from the outside factors, being a customary component in the substantiation of strategical decisions. The analyse of an enterprise risk have a complex character, being the result of the accumulated impact of all the implicated risks in her activity. Also, the risk can be broach in a different manner, from the enterprise point of view or from the investors and creditors position.

Irrespective of the treatment manner, risk can be broach from the economic and finanical point of view, starting from the disociation of economic capital and financial capital.

2. Risk and incertitude in economic theory

In specialized literature are made distinction between *incertitude* and *risk* concept. Making a short history regarding the economic importance of those two concepts, the economist Franck H.

Knight, in his paper *Risk, uncertainly and profit* [2], make for the first time the distinction between risk and incertitude, analysing the risk and the incertitude from the perspective of profit and spirit of enterprise of a competitive system.

The classic economic theory support that in a world of perfect competition, where all the economic agents have complete informations, they will take decisions of acquisition/production that will go to null profits. But, in reality, the economic agents can register profits or losses as a result of the fact that they haven't perfect informations about the future. In this way, the relation between risk and incertitude is not a simple relation, but a complex one. Unlike the risk, the incertitude is describe like the situation in which the policy-maker can't identify all, not even one from the posible events to be produced and so much the less to can estimate the probability of their production, having the mathematic semnification of an incomplete definite variable. The incertitude suppose the vague anticipation of some elements so that it can't done not one prevision regarding what it's happening; in the incertitude definition one single think is uncertain: *nothing is not sure or unforeseeable.*

In certitude conditions, the firm and the investition are not under the influence of one risk, being known the efects generated by the production of an event and their impact at the results level of future activity.

In financial theory, the risk notion it's used, first of all, like representing the dispersion distribution (root mean square deviation) of rate of return adequated to investments.

The risk essence is given by the incapacity of firm to provide exactly the future results that will be obtained after the investment was made. Risk represents that factor of probability that can be associate with a posible result when the decision factor knows all the future possible effects of the taken decision. Incertitude appears when the decision factor knows all the future possible effects, but it can't associate them, from different reasons, not even one probability factor to posible result. Incertitude is more drastic than risk and results, from many cases, from the absence of information, the precarious quality of this or as a result of certain defections of policy-maker informational system.

Irrespective of the used method of analyse, the risk can't be eliminated totally, always remaining a certain irreducible level of certitude. This think, also, must be taken into consideration in the chosing of investments project, of one financial product or his derivates. The incertitude grade of one business is given from those risks who can't be identifies from the transnational firm at one moment, while the grade of risk is given from identifies risks.

The risk is a multidimensional concept whose level can't be reduced at one element, at one number. Important for every firm is to determinate an acceptable level of investitional risk which is willing to assum' it. The acceptable level of the risk refers to the maxim risk which the investor is willing to assum' it: is necessary to be certain the getting of one minimum advantageousness who justifies the costs of operation. Doesn't exist an unique acceptable level, but this is different depending on the concrete conditions of every economic activities or of the investments and the attitude given the risk of policy-maker.

3. Risk typology

The risk is a social, economic, political, natural category with the origin in the incertitude of engedering or no of damage [7]. The risks can take to base some causes, as: the economic conjuncture; the specific of enterprise activity; the quality of management; the quality of the relations with the business partners etc.

The risk represent one of the most vague and evasive concepts. In specialized literature devoted to enterprise problems doesn't exist a very definite clasification of risks. So, regarding at global level depending on how is localized the risk, exists three categories of risks:

a. macroeconomic risk is the evolution result in a certain way of the conditions of business environment in which is the investment localized;

b. sectorial risk (of business) – The economist M. Porter consider that an important factor who determine the firm advantageousness is the sector in which it's develop the activity, which at his turn is dependent from political, understructure, legislative, etc.

c. microeconomic risk – is determinated from endogenous factors, specific to the sector of activity, to the firm and to his proper project and from the insufficient correlation between the activity peculiarities and the enforced limits in general framework of host country.

With the view of the analyse and the evaluation, the risks are classified according to the next criterion:

I. According to origin are: risks from inside the firm: economic risks or exploitation risks, financial risks, bankruptcy risks; risks from outside the firm.

II. According to risk nature: the individual risk of one project, of one business action; the market risk; banking risk; evaluation risk; liquidity risk; fraud risk, operational or functional risks; technical risks; juristic risks; human and speculation risks; other risks.

Exploitation risk is the risk which appears because of the result sensibility at the modifications of exploitation conditions. Depending on factors nature which contributes at the engendering of certain tipes of risks, the exploitation risks are classified in this way:

a. determinated risks by the factors of the production process. In this way, risks can be classified as: labour power risks; risks regarding the used technologies and equipments refers to the losses produced because of depreciation and obsolescence overfulfilled from technical and technological point of view, which. If this are used for a long time, are going to the bankruptcy risk; risks regarding the staple, materials and combustible/energy, which generate provision, storage, transport and unbinding risks; provision risk; storage risk; unbinding risk; transport risk is meet in foreign trade; risks regarding the union of production factorswhich means the organisation of work, production and of management.

b. the risk of production factors administration which aim at the risks from the assurance of provision, quality and quantity, of structure and of time.

c. the risk with extensive and intensive usage; extensive usage regards the time losses, and the intensive usage regards the productivity and the assurance of a high technology, corroborated with the pursuit of the investments plan.

d. efficiency risk which suppose the pursuit of the effects in corelation with the efforts.

e. technical risks occur for the moment of negociation and administration of one operation or tranzaction. The essence, in technical risks case, is given by the staff quality, the reliability of undestructure (documenattion, informatics, dates transmision) and by the prompt verification at different levels of execution.

f. fraud risk – in the activity of the firm or of the corporation can appear losses determinated by the fact that the staff firm, clients and third persons are trying to take advange of some deficiencies from organizatoric, personnel and security point of view.

g. firm risk is the result of one incompatible between the propre characteristics of certain firm and the demands of organization, coordination, control involved by the unrolling of some business with differents partners from the inside or outside of the origine country frontiers.

h. project risk.

The evaluation of exploitation risk has as starting point the model of breakeven materialized intwo components [1]:

a. calculating the rate which exprime directly the expoitation risk (RPR)

$RPR = \frac{CA_{PR}}{CA_{real}} x100$, where CA – rate of turnover

If this rate is bigger, the risk will be bigger and reverse.

b. calculating the security index (IS), which emphasis the security margin which that the firm dispose:

$$Is = \frac{CA_{real} \quad CA_{PR}}{CA_{real}}$$

The security margin is bigger if the idex is bigger.

The evaluation of exploitation risk it can be done also with the help of certain "position indicatory" given the breakeven. This indicator is express both in absolute sizes (α), and in relative sizes (α').

- absolute sizes: α = CAreala –CAPR

▪ relative sizes: $\alpha' = \frac{CA_{real} \quad CA_{PR}}{CA_{PR}}$

The position indicatory is also known as absolute flexibility [6]. This indicatory is given by the firm capacity to modificate and to accustom the production at the market demands. It's wished for that indicatory to be as big as possible, for making evident a high flexibility of a firm, also a reduced exploitation risk.

The flexibility grade is dependent on the firm technical potential, on this state and quality, on the human potential and on the firm organizational structure.

The position indicatory in relative size, also named the *volatility coefficient*, register big values when the risk is minimum. It has the same informational value as the absolute indicatory.

From the speciality studies realised in countries with functional [9] market economy are estimating that the firms' situation in comparison with the breakeven appears as:

▪ instable, when the real rate of turnover is at least 10% over the breakeven;
▪ relative stable, when the real rate of turnover is with 20% over the critical point;
▪ confortable, when the real rate of turnover exceed the critical point with over 20%.

Financial risks are those risks generated by the way in which the firm activity is financed, taking in consideration the sensibility of the result at the changes of financing conditions. The transnational firms are much more exposed to financial risk than those national, them developing the majority of transactions in foreign coin. Because of the frequent fluctuations which the coins of some countries are registering them in comparison with the national coin, often exist the risk as an obtain gain to be transformed in loss. Usually, firms are follow a weak coin when realise the investment, following to be favourite a strong coin at the profits allocation.

Depending on the risk nature in this group of financial risks are been distinguished the next tipes of risks:

a. rate of interest which act not only in creditor case, but also in the firms case which are not dispose from sufficient propre resources for the development of a investments project and so they are obliged to go to banking credits. For the taken credits, the firm will must anticipate which will be the ulterior evolution of rate of interest because an eventual grow of this will increase the costs of loan stock and implicit will grow the investments costs. To reduce the materialization possibility of this risk, the investor firm will must to known very well the factors which determine the banking interest (rate of inflation, general economic situation, etc.).

b. financiang risk is the risk generated by the cost of the investitional capital. Firms can realize the investment either from propre resources, or can add these resources with the loan resources. The materialization of this risk depends by the structure of used capital. The structure of the necessary capital for the investment are been establishe depending on the firm dimension, grade of obligation, assets structure, grow rhythm of investor firm.

c. liquidity risk interval when a firm can't unroll a big transaction at a certain moment of time or when the respective firm is not capable to obtain founds to pay the assessed obligations.

d. audit risk is that residual risk which result after the wrong formulated recommendations and the conclusions issued from those who make the audit.

Financial activity, in his many segments is sticken by unforeseen situation, by the restrictive elements as evolution, often unexpected, depending directly on the economic agents. The impact of numerous factors (market, competition, time factor, inflation, exchange rate, interests, commissions, human factor and not in the last row the firm culture) make as the financial decision to become from many times a decision in risk conditions. The administration activity of the financial risk is parcel of the planificatiopn process and financial control, submissive to tactical and strategic decisions of firm continuous adaptation at the conditions from inside or outside, darkling in continuous change. The evaluation of risk is a component part of the operational process and it must to identify and analyse the internal and external factors which can affect negatively the economic agent objectives.

Internal factors can be, for example, the nature of firm activities, the personnel qualification, major changes in organization or emploiers efficiency, and the external factors can be: the variation of economic, legislative conditions or the changes occurred in technology.

The apparition zones of financial risk inclusive the associated effects to this are (figure 1):

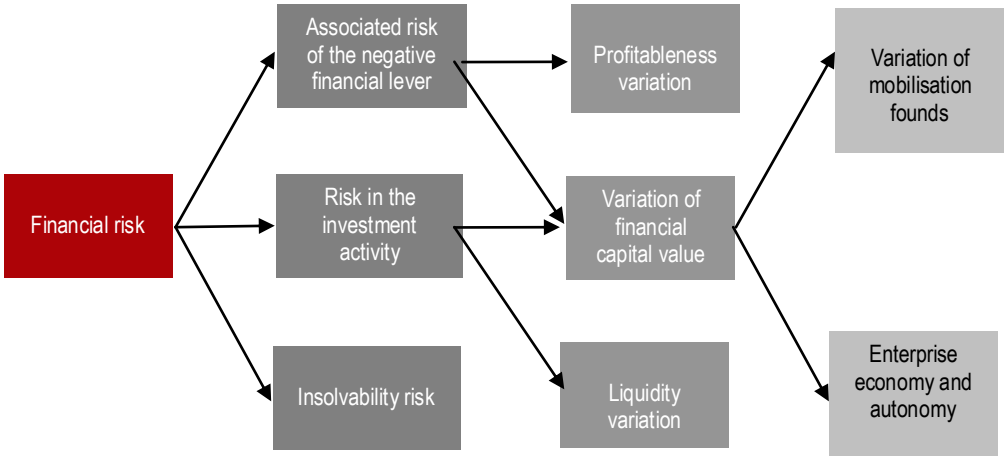

Figure 1. Financial risk and the associated effects to this

Source: Master's degree thesys Dorina Ofrescu, *Analiza riscurilor în activitatea întreprinderii şi strategii de prevenire,* Bucharest, 2006, p.62

Risks evaluations must to cover the entire series of risk from the inside the firm, that's why it's necessary to work at all hierarchical levels, especially to those superior. The risks evaluation is a preoccupation both to internal auditors, which is realised conformably to them proffesional standards, and to internal control, for offer some performant services for management.

4. The risk prevention strategies in enterprise activity

The strategy define the courses and the ways which allow to the entreprise making progress to essential objectives: the harmonious development and the rigorous coupling with the actual and future medium (see figure 2). A key point for the strategical success is the capacity to fast change of plans and structures. Therefore, if the gestion is the art of efficiency, the strategy is the art of effectiveness.

A strategy may to respond to many characteristics [4]:

- the strategy has always in view, explicitly and implicitly, the realization of some well precised purposes, specificated as missions and objectives;
- the strategy vise the future periods from the firm life, mostly three – five years.
- the strategy sphere of coverage is the organization in her ansamble – mostly – or important parts of them;
- the strategy content reduce oneself to essential elements, just been concentrate on the major evolutions of the firm, even if these represent or no changes confronted by the previous period;
- strategy is a result of explicit or implicit negotiation of firm which came in contact with different internal or external factors;

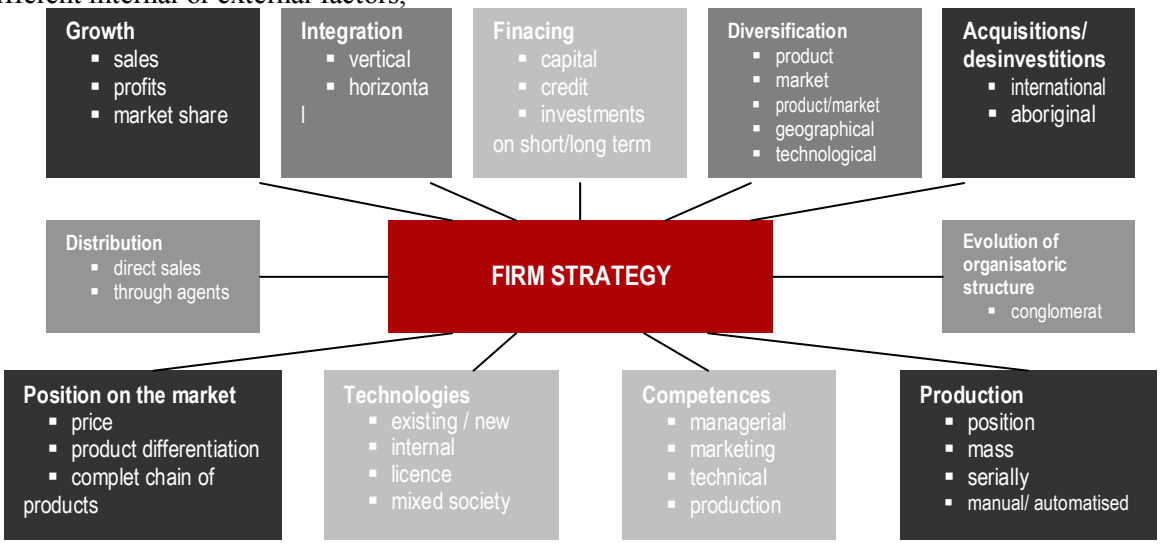

Figure 2. Strategic mechanism [8]

The success implementation of a strategy necessited to take in consideration the enterprise or business specificity, respective the context in which it's putting in application, because, depending on the enterprise dimension, the missions complexity, the used technology type, the grade of incertitude associate to the environment and the action necessity of rapidity, the organizatoric structures and the control will be different. Also, it must to take in view that the scop of structural, culturale, resources, etc. adaptations, depend, at them turn, on the scop of strategic change.

The principal types of functional strategies which are elaborated at one firm level are:

a. functional strategies in production domain which has as object the decisions orientation regarding the fundamental nature of the firm management system, the position and the projection of facilities, as well as the planification process on short term;

b. functional strategies in the domain of research – development which follow, in essence: the options in fundamental and applicative research; the adopted strategies against the competitors (offensive or deffensive), which determine the orientation to a certain tip of research (technologic inovation and products development, acquisitions of new technologies etc.), disponible founds and them use on different themes etc.;

c. functional strategies in financial –accounting domain

d. functional strategies in marketing domain. In these strategies, the accent in on four components, as product, market, price and promovation;

e. functional strategies in personnel domain.

Measured by her development, the firm include a more and more number of market strategies, ordered and incorporated in a global competitive strategy. The choosing of a certain strategy makes part from the firm strategical option to preserve the competitive advantage from which it disposes and to assure to this the viability in internal and international competition.

The analyse of theory and practice of contemporane market of economy make obvious an apreciable tipological variety of strategies which sketch the way through which firms can assure it the mission achievement and the adaptation on change.

Through strategy is sketching the evolution trajectory of the firm for a relative long period.

The value and the strategies application don't represent a purpose, but a major managerial instrument to make profesional the management aand to grow the firm competitivity.

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KNOWLEDGE MANAGEMENT THROUGH THE LENS OF INNOVATION AND LABOUR PRODUCTIVITY IN A KNOWLEDGE BASED ECONOMY

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Abstract:
The 21st century brings along the recognition for the necessity to understand and measure the activity of knowledge management, for which reason organizations and system organizations, together with decisional governmental factors, do their best in order to develop policies that would promote these benefits. Knowledge management (KM) implies any activity regarding the capture and the diffusion of knowledge within the organization. In our study we analyze the impacts and dimensions of KM upon the innovation and labour productivity within the organization, and how KM affects the firm's innovative performance. A key component of knowledge management is to provide access to stored knowledge components to improve decision making and to facilitate knowledge acquisition by the user.

Keywords: knowledge-based economy, knowledge management, knowledge, explicit and implicit knowledge, innovation, productivity, diffusion of knowledge.

JEL Classification: A12, D24, L60, N0, O31, O32

1. Introduction

Innovation is built on collective knowledge sharing activities of, especially, tacit knowledge [Howells (1996); Nonaka *et al.* (1995, 2000); Gibbons (1994)]. Dialogue and frequent interaction between different individuals or groups forms the basis for knowledge recombination and creation of innovation. Due to this interaction, relationships and perspectives are shared between employees creating a cooperative atmosphere useful for the transfer of tacit knowledge [Gold *et al.* (2001)]. At this point, KM gains importance: it is seen as a managerial tool which can promote the knowledge creating and sharing processes essential for innovation. Theoretical approaches, as well as implementation strategies of KM, concentrate a lot on IT related issues [Swan *et al.* (1999); Nonaka *et al.* (2000, pp. 6), Alavi *et al.* (2001)]. However, knowledge sharing activities cannot be enhanced by IT networks alone. KM is rather an organizational device, a problem-solving tool, which increases knowledge exploration and knowledge exploitation success of firms [Swan *et al.* (1999, pp. 264]. Hence, there is a need for a shift towards organizational and personnel issues in KM [Carter *et al.* (2001)].

2. The new model of the organization in a knowledge-based economy

In the past decades, there has been a (re)birth of the principles and practices related to education, development, and learning. With the advancement of technology and the increasing complexities of the marketplace, executives began to realize that learning no longer could be isolated to the classroom. A new *community of practice* merged to focus on the learning organization. Ray Sata (1987) and CEO of Analog Devices, in a *Sloan Management Review* article described the business implications: "… an organization's capacity to learn as their only sustainable competitive advantage – especially in knowledge-intensive industries". An entire new way to view the innovation process was born.

One way to show the relationship between these key elements of modern management is presented in Figure 1. Managers need to focus on *knowledge* as the evolution from data and information. This provides a way to describe the *content* that needs to be managed. The second focus is on *innovation* as the process. However, in this regard we are framing the process from the movement of ideas rather than the advance of technology *per se*. The *methodology*, which is the real-time *learning*, is the only way to increase the content level of knowledge and ensure business results through the full innovation process. The increasing spiral represents an accumulation of value

throughout the process if both domains (*i.e.* content and process) are managed simultaneously. Anything less is a suboptimal strategy.

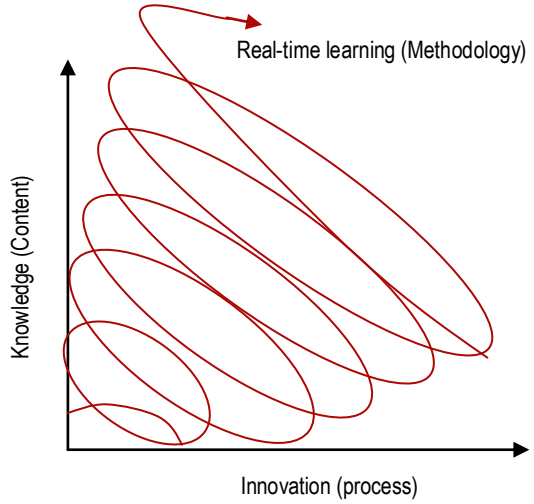

Figure 1. Integrated Focus: Knowledge and Innovation

Current market conditions are likely to intensify over the next decade. Organizations must develop new ways to incentivize, capture, and utilize new ideas expeditiously. The intangibles must become measurable in both qualitative and quantitative terms. The answers are unlikely to be found in current practice. In fact, the most superior benchmarking capabilities of best practices – even in knowledge management (KM) – can provide only signals of direction as companies try to gauge their proximity to the norms of best-in-class.

Internal knowledge of the firm refers to product and process specifications and capabilities, technology capabilities, inter-operability, reconfigurations, organisational culture, employee skill sets and leadership. The external knowledge refers to the knowledge of markets, competitors, technological trends, changing consumer preferences and others. It also refers to the knowledge present in other players in the marketplace and other collaboration mode acquires the knowledge for its own use [Ştefănescu and Ştefănescu (2008)].

The globalization appears when the companies, the regions, the nations and the continents are in the permanent competition in the attraction of investments, the thing that depends in a great measure on the conditions which influence the competition in the businesses. The competition in the businesses, at its turn, bases more and more on the capacity of answering promptly at the clients' needs. This thing means the control of a big volume of knowledge through the medium of the utilization of the information technology [Rodrigues (2002)]. Of course, the knowledge itself is not a new concept; it always is the base of the human activity. That what appears as the novelty is the rhythm in which it creates, it accumulates and it is diffused, in an economy and in a society based on a new scientific paradigm. The conditions of work and life were redefined, the markets and the institutions got a new form after the new rules and the possibilities of information exchange. More, the knowledge becomes not only the incomes source for the population, the businesses and the nations, but it also becomes a primary source of differentiation between these. In other words, although the knowledge is the key of the rising competition, it can also bear at a regress of the social cohesion and at a discrepancy more and more bigger between the regions, the countries and the continents.

And now the knowledge is the key source, the human factor, which materializes a big part from the knowledge, this gets a terrain more and more bigger. This thing does not lead towards a capital question: in what measure cans the well trained human source counter-balance with the European populations in the continuous process of ageing?

The European leaders already have recognized that the transition towards a knowledge-based economy also implies a fundamental exchange, and that all the provocations that Europe meets must be reformulated in the light of this terror.

3. Knowledge as strategic point

From the beginning of the 70s, the most advanced economies of the world passed through a process of structural exchange, passing from the industrial economy based on the work, with the capital resources and the creation, the diffusion and the exploitation of the new knowledge. One from the main features of this exchange is the structural intension of the research activities. In the rising *knowledge-based economy*, which is also named the *learning economy*, the economical increasing depends more on the investment in the information, what bears to the increasing of the production capacity, than the traditional factors of production [Lundvall and Jonhson (1994)]. With the other words, the knowledge brings with itself the other types of investments [Abramovitz and David (1996)]. Within the production function, where the knowledge becomes the basal factor, the human resources and the professional abilities play a more important role. The human factor is the key element in the creation of new knowledge and in the dissemination and their assimilation in the big sectors of the industrial, commercial and social life.

Process of generating information/ knowledge in the market

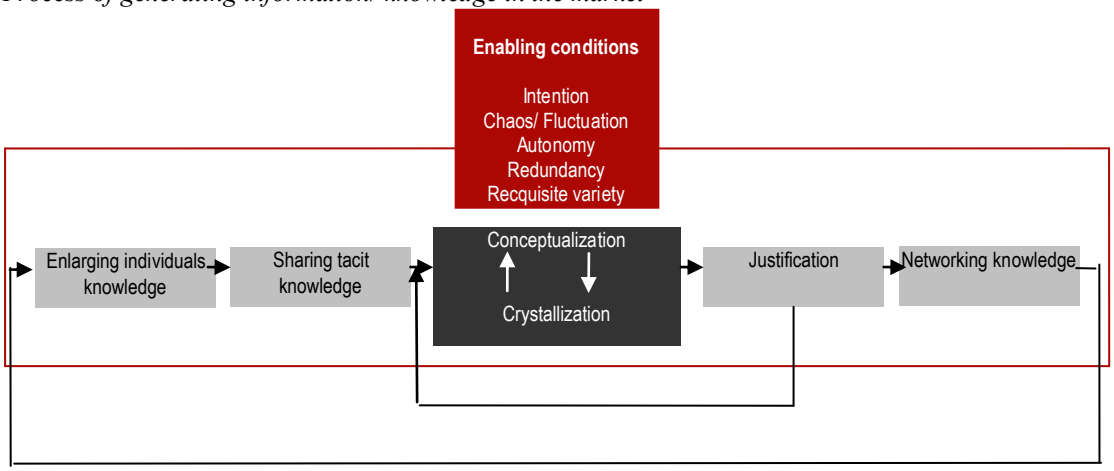

Figure 2. Organizational Knowledge Creation Process

Organizations play a critical role in mobilizing tacit knowledge held by individuals and provide the forum for a "spiral of knowledge" creation through socialization, combination, externalization, and internalization. As knowledge emerges as an ever more important feature of advanced industrial development, it is necessary to pay increased attention to the processes by which it is created and the assessment of its quality and value both to the organization and society.

The new elements of knowledge were however the source of the big economical progress in the past. The importance of the knowledge for the economical increasing was recognized in the speciality works from the last two centuries. The economists, as the historians always were conscious of the importance of the accumulation of the necessary knowledge for the rise on long term (see the classical operas Marx and Schumpeter). Abramovitz and David (1996) say that the importance of the intangible investment increased in a considerable way in the perspective. In the second half of the 19th century, the rise of the physical resources on the worked hour counted for the two thirds from the rise of the work productivity, and at the end of the 20th century represented only a fifth from this.

What is new is the movement of the production and of the knowledge dissemination. In the production process, in the accumulation in the infusion of the knowledge a fundamental exchange happens, and this thing had the more bigger implications than the technical or economical implications. Without being exhaustive, we could describe the **transition process towards a knowledge-based economy** from three points of view [Lundvall (2001), pp. 45 – 60; Rodrigues (2002), pp. 1 – 27; Soete (2002), pp. 28 – 53; Viginier (2002)]: the impact of the new key technologies on the process of creation, the diffusion and the exploitation of new knowledge and implicitly on the economical rise, the intensification in the production, the diffusion and in the implementation of the technological organizational and institutional innovations; the rising impact on all the aspects of the society.

■ **The impact of the new key technologies**

The new technologies and their crowned of success diffusion had a decisive impact on the economy and on the society. The three new technologies are staying at the base of the transition process towards a knowledge-based economy now. Essentially, there are the Information Technologies and Communications (ITC), which remained still from the 8s0. Recently, the biotechnology demonstrated that it has an increased potential and it had a recognized impact on many fields of the economical and social life. A third key technology of the 21th century is the nanotechnology. These key technologies have the revolutionary qualities. Technically, the key technologies are those which give rise to the new technologies and influence decisively those which already are existent; with the other words they have horizontal effects on many industrial sectors, with the consequences on all the economy. They can be a catalyst for the radical technological progress, which can bear not only at the exhanges in the innovation process of the firms, but they can also have a strong impact on the society. ITC, the bio- and nanotechnology seem to have all the features of the key technologies, namely they can influence strategically the new products, the processes and the employment. Really, ITC has already had an important role, as the basal mean, of collection, of stockage and diffusion of the codified knowledge. With its help the information exchange is made easier, without the temporary or partial compulsions. It increases the efficiency of the knowledge production and it hurries the accumulation of these.

The bio- and nanotechnologies have an horizontal impact on all the industries. They generate the technologies included in a larger gamut of products and of processes, as the semiconductors of nanoscale would be which will revolutionize the information technology.

More, these technologies seem to react more and more one with the other, creating the new fields and the applications as the bioinformation science (*e.g.* IT which helps at the study of the genetic chain) or the nanobiotechnology. Their use more and more often in the diverse technological borders, what makes that the distinction be made harder and the products and the processes be redefined. Therefore, the rising utilization of these technologies changed significantly the perception about the innovation process in the last decade. In fact, many authors classify the innovator capacity less in function of ability of discovering the new technological principles, but in function of ability of exploiting systematically the effects of the new combinations from the cadre of knowledge already existent [David and Foray (1995)]. The access at the knowledge of the already existent artistic works becomes more and more important and helps the innovators that they know the other innovators' work. In the knowledge-based economy, the scientific and technological system evolves towards a structure of the production of the more complex 'socially distributed' knowledge. After how Soete (2002) affirmed the ex system was more based 'on a simple dichotomy between, on the one hand, the wanted learning and the generation of the knowledge (the research labs- the development and the universities) and, on the other hand, between the activities of production and consumption, where the motivation of making was not the accumulation of new knowledge, but the getting of the contrary effects'. In the knowledge-based economy this dichotomy is somewhere destructive.

With the other words, there is a bigger diversity of 'the learning organizations', where the production and the knowledge assimilation become the basal objects [David and Foray (1995), pp. 16 – 38; Smith (2002)]. Moreover, Ştefănescu A. (2008) shows that organizations invest in information technology in an effort to more expeditiously gather and analyze information and to create and share knowledge that can be leveraged for improving performance.

The motivation of this paper is to draw attention to important issues of technology in capturing, codifying and disseminating knowledge throughout the organizations. It reflects the need to store not just different forms of knowledge, but different types of knowledge. However, it should be remembered that an overemphasis on technology might force an organization to concentrate on knowledge storage, rather than knowledge flow. New insights and opportunities are available to organizations if they are able to integrate knowledge across shared and different contexts.

The Internet has enabled the creation of virtual communities, networked through technologies only available just a few years ago. As the Internet is becoming the standard form of collaboration between organizations, the trend of the e-knowledge network looks set to continue. While technology can greatly enhance an organization's knowledge management strategy, it does not necessarily ensure

an organization is managing its resources and capabilities in the right way. However, technology is vital to enable the capturing, indexing, storing and distribution of knowledge across and with other organizations. Knowledge can be viewed in a number of other contexts, it is vital each is addressed if an organization is to improve performance.

a. Successful knowledge strategies depend on whether organizations can link their business strategy to their knowledge requirements. This articulation is vital to allocating resources and capabilities for explicating and leveraging knowledge.

b. The competitive value of knowledge must be addressed to assess areas of weakness. Strategic efforts should be made to close these knowledge gaps to ensure the organization remains competitive. The strategic value of knowledge should be addressed, focusing on the uniqueness of knowledge.

c. Finally, an organization should address the social aspects affecting knowledge initiatives, namely cultural, political and reward systems. Beyond the management roles proposed in the paper, the environment should promote co-operation, innovation and learning for those partaking in knowledge based roles.

Knowledge is more than a fad, it is now at the centre of an organization's strategic thinking. The essence of any knowledge management strategy can be summed up by the following quote, from Drucker [Drucker (1993)] "… *A company's key to success resides not so much in it's work and capital as in the capacity to treat knowledge, corporate knowledge, be it explicit or tacit.*"

■ **Technological, organizational and institutional innovations**

It is clear that the diffusion of a knowledge-based economy represents more than a temporary intensification in the production of technological innovations in some sectors.

A bigger exchange happens in all the sectors of activity, from the manufacture and the agriculture, under the influence of the new technologies. The technological innovations invade all the economical sectors and they change our lives. More, this exchange is not only technological, but includes the institutional and organizational basal innovations, because it reformulates the rules after that the economies, the businesses and the institutions works, because of the new possibilities of changing and of exploiting of the knowledge. The knowledge management becomes a key element of the strategical management, putting into service the relation between the marketing, the research and the production, and modifying the way in which the organization works. Beyond these organizational innovations, the diffusion, during the years 90, of the protection of the intellectual right for the new types of knowledge, was an essential innovation, because it made more attractive the instruments in the products and in the companies of high technology. During the 90s, the offices of European and American patent magnified the concept of invention which is protected by a patent, presenting the new field as the *life sciences*. From 1995, The *Patenting Office* approves inclusively the researches about the genetic chain. During the 90s it was recognized in USA and in a part of Europe, the author right at the software packet (the program of computer without the physical intervention). In the last years, the intellectual protection was extended by the businesses methods [Viginier (2002), pp. 148 – 152].

In USA, it helped and even it stimulated the industries of software and biotechnology, the market of the high-tech actions and the creation of pilot programs by the researchers. In this context, the development of a capital market in USA, which offers the supplementary resources for the investments in the creation and the accumulation of knowledge, became a basal institutional innovation in the 90s, and it shows that the private financial sector is ready to invest in the new activities based on the knowledge.

The last ten-fifteen years were the witnesses of the exchanges of mark in the production process, as: the extensive use of the assisted production technologies on the computer, the advance in the information technologies and communication, the emergence of the new ideas concerning the organization of the firms, the exchanges in the requirements of the abilities which concern the work and in the workers' preferences for the conditions of more flexible work. Starting from this premise, of recent date, the numerous authors formulated a new paradigm of the firm. Some from these concentrated their attention on the technological exchanges, some of them found that the introduction of the new organizational practices represents the main feature of this paradigm of the exchange.

A third group concentrated, first of all, on the exchange which intervened, in the last 20 years, in the demand at the level of the firm for the force of highly qualified work and at same the time on the analysis of the factors which led at this exchange.

Milgrom and Roberts (1990) concentrated their attention on the manufactured, proclaiming the replacement of 'the production of mass by a vision of the flexible firm and by a multi-product vision which is characterized through the quality and the big speed of answer at the conditions of the market, while they use the equipments of advanced technologies and the implications of these for the efficiency and the performance of the firm and of the new form of organization'. The exchanges concerning the techniques of production and of the implication of these for the efficiency and the performance of the firm are the principal subjects of their theoretical analysis.

Lindbeck and Snower (2003) analyze the exchange starting from 'the taylorist organization (characterized by the charges specialization) at the holistic organization (the relation of the posts, the integration of the charges and the learning from the charges)'.

Bresnahan (2003) considers that the relative demand of force of highly qualified work being the departure point of the analysis, considering that the rising use of the complementary systems of the information technology, the placement of the force of highly qualified work within the organization and the innovative products are the motors of the technological exchanges. A central point in all the types of analysis and a common feature of these studies is the existence of the complementarity between the factors which bear at the mutual rise of their impact on the performance of the firm. From the variety of the realized investments in the knowledge field (the education, the software, the research-the development, the training, etc.), the knowledge management (KM) is the least known equally, quantitatively and qualitatively, but also that of the implied costs and of the balance of this in the profit of the organization. The motivation which stayed at the base of this study starts from the imperious need to know more about these new activities based on the knowledge, about the actual state of the KM as the organizational process between the diverse types of companies and sectors, the multitude of methods and instruments which also developed on the economical effects of the actual practices of the KM.

The denomination of knowledge-society is used in the entire world today. This denomination is a abbreviation of the term of knowledge-based society. The knowledge society supposes [Drăgănescu (2001)]: an extension and the thoroughness of the scientifical knowledge and of the truth about the existence; the use and the KM which is existent under the form of the technological and organizational knowledge; the production of new technological knowledge through the innovation; a dissemination without the precedent of the knowledge to all the citizens through the new means, using prevalently the Internet and the electronical book and the use of the learning methods through the electronical procedures (e-learning), the knowledge society has a global character and it is a globalization factor; the knowledge society is fundamentally necessary for assuring a sustainable society ecologically ; the knowledge society represents a new economy in which the innovation process (the capacity to assimilate and to convert the new knowledge for creating the new services and products) becomes determinant.

The innovation, in the knowledge society, follows the improvement of the productivity, not only the classical productivities in rapport with the work and the capital, but also the new productivities in rapport with the energetic resources and the natural materials, with the protection of the environment. Because of that the new economy supposes the encouragement of the creation and of the development of the innovator enterprises with a structure of own knowledge. The alike enterprises can be born through the cooperation between the firms, the universities and the governmental or public institutes of research (inclusively the academic institutes).

There were defined two big classes of vectors of the knowledge society [Drăgănescu (2001)]: the technological vectors; the functional vectors. A vector of the knowledge society is an instrument which transforms the informational society in a knowledge society. For making the first steps in the knowledge society it is necessary the detent of a minimum number of alike vectors. The first alike vector is the creation of an developed Internet which is a technological vector, then the technology of the electronical book (the technological vector) and the knowledge management, (the functional vector with two valences, one for the economical and organizational working of an enterprise, of the

corporations, of the multinationals or of the companies, the other for the moral use of the knowledge in the globalized society). But the number of these vectors of the knowledge society is much bigger, every new vector bringing a step before in the development of this society.

4. Knowledge management for enterprises, organizations, institutions, national and local administrations

One from the first studies of our country regarding the KM was published by Ştefan Iancu (2001). In this study the accent is put on the notion of intellectual capital and of economical, instructable and innovator organization. In the occidental literature [Thomas and Prusak (1998); Koulopoulos, Spinello and Toms (1997); Leonard-Barton (1955); Nonaka and Hirotaka (1995); Thomas (1997)] a series of dedicated volumes to the enterprises and to the knowledge appeared.

The problem of the management in rapport with the knowledge is looked in two ways: as the organization management which is preoccupied of the utilization and of the integration of the different types of knowledge; as the proper knowledge management. In fact, these aspects must normally joint in a general vision about the organization and the knowledge management.

The specialty literature abounds in the definitions of the KM [Earl and Scott (1999), pp. 29 – 38.]. The most referred definition of the KM is in our opinion the definition given by the Knowledge Management Practices Survey in accordance with which, '…the knowledge management implies any systematical activity regarding the capture and the diffusion of the knowledge by the organization…' Another assimilated definition of the KM concept would be that this represents the conceptualization of an organization as integrated system of the knowledge, and the effective management of the organization uses the respective knowledge.

The information refers to the knowledge and the innovation processes and at the artifacts which tolerate them.

In this definition, the accent is put on the organization management which must in fact include KM, too. The anterior definition avoids, it is recognized, not only the KM, but especially the extremely delicate problem of the knowledge measurement. The diverse authors present the considerations about the different aspects of the KM in the largest meaning of the notion or only from one from the two mentioned points of view before. Thus, C. Grayson shows in every organization there are the hidden knowledge tanks which are not known and which must be knowledge minings, captured, organized and transferred for contributing at the rise of the value, of the profit an of the efficiency. Ravindranath Madhavan and Rajiv Grover (1998) give attention to the KM for the *development of new products* (DNP). The DNP management must put the accent on the processes of the cognitive groups and not on the social processes, for using the tacit knowledge of the members and for becoming interesting firstly for the members of the group. The group needs a leader who constitutes such a group. Lucy Marshall (1997) shows that the KM refers to the control and the utilization of the intellectual capital in an organization. The author affirms clearly that not information, but the knowledge is the biggest asset of a institution. He recommends that an institution have a Chief Knowledge Officer. This must count on the intranet of the institution for assuring the discovery and the creation of knowledge in the institution.

For Romania, the phenomena and the processes which happen on the international plan, contouring the transition from the industrial society at a new type of society, represents a chance, that of the integration in the process of transition from the industrial society at the knowledge society, without running over all the preliminary stages. The Romanian reconstruction can determine the fundamental mutation which stays at the base of this transition: the mutation from the specific institutional centre of the industrial society (the enterprise) at the institutional centre of the knowledge society, the school and the research institutes, which does not act 'from outside' of the productive system, but as the endogenous factors of the production process.

5. Knowledge management and its role within the innovation and productivity

■ Innovation management (IM) and knowledge management (KM)

The consequence of the three big tendencies, the comprehensive analysis of the KM must take in consideration the KM importance for the innovation process. First of all, in an unquestionable way, the innovation capacity is the major precondition for resisting to the pressure of the competition, and the

companies became more efficient, increasing the speed of propagation of the innovations and the maximization of the achievement of their innovative potential. Secondly, the knowledge economies relieve the importance that the knowledge has in these economies, as moreover the rising impact that the innovation has. As a consequence, the strategical management, and especially the operative management uses more and more the KM instruments. Thirdly, the companies become more and more limited when they must provide the input for the innovation, especially on the resulted innovation from the research and the own development. This fact led at the increasing of the demand and the absorption of the knowledge which are come from the external sources of the company and their integration in the company. These three tendencies make the connection with KM and IM, the sensible fields, if not the indispensable fields of the firms of the 21th century.

■ **Knowledge management and innovation**

Our general presumption is that KM increases knowledge work performance and by this the innovative success of firms. This consideration is based on the *resource-based view* (RBV) of the firm (Barney, 1991; Wernerfelt, 1984, Rumelt, 1984). The RBV views idiosyncratic resources as main source of competitive advantage. Since firms are not equally able to generate valuable and embedded resources out of their assets, they perform heterogeneously. In his definition, Barney (1991) emphasizes organizational processes as a resource and particularly discusses information processing systems as factor of competitive advantage. Following this, we view KM as resource which directly increases the success of firm's innovative activities and by this causes heterogeneity amongst firms. This presumption is made explicit for the innovation success of firm *i* being dependent on her innovation resources, her innovation cooperations and her knowledge management.

Table 1. The enhanced exploitation of innovation through KM at organizational level

Hypothesis based on the empirical literature	Action at organizational level	Empirical studies and revised literature
Knowledge Management and Innovation		
$InnoSuccess_i = f(InnoResources_i, InnoCooperation_i, KnowledgeManagement_i)$	*KM directly improves the innovation success of firms*	Recent empirical work treating KM as resource in the sense of the RBV sustains the direct impact of KM on firms' innovation success. This positive impact is shown by Liao *et al.* (2006) who suppose that KM makes firms more receptive to innovation opportunities. Huergo (2006), by using a production function model, hints to the positive influence of technology management on the generation of both product and process innovation in Spanish manufacturing firms. In a qualitative study Gold *et al.* (2001) find evidence for the organizational effectiveness of different KM tools. Due to an OECD initiative several countries conducted surveys on KM, amongst them Germany [Edler, (2003)], France [Kremp *et al.* (2003)] and Canada [Earl *et al.* (2003)]. They find similar positive impact of KM on innovation propensity.
Knowledge Management and internal innovation assets		
$InnoSuccess_i = f(InnoResources_i \times KnowledgeManagement_i, InnoCooperation_i)$	*KM improves the exploitation of existing internal resources leading to an increased innovation success.*	If we want to know, which impact KM has on the firm, how it enhances innovation in detail, there is a need to look closer on the firm assets involved in the knowledge recombination process and especially addressed by KM. We suppose to discover KM impact in the successful exploitation of a firm's innovation resources. Hence, we expect KM to act as "meta-resource" behind a firms' resources. We define meta-resources as idiosyncratic organizational resources of a firm, which yield the inherent potential to increase the effectiveness of use of existing resources in a firm. This view can be related to the discussion of dynamic capabilities of firms [Eisenhardt *et al.* (2002)], defined by Teece *et al.* (1997) as *"the firm's*

Hypothesis based on the empirical literature	Action at organizational level	Empirical studies and revised literature
		ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." By calling the capabilities dynamic Teece *et al.* (1997, pp. 515) refer to the ability to renew competences in order to adapt to changing business developments. These facilities are labelled capabilities because " … *the term emphasizes the key role of strategic management in appropriately adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment*". The pure accumulation of technology assets alone does not make the market successor, since there may still be a lack of useful capabilities. The key is to implement a management that coordinates and deploys internal and external competencies effectively (Teece *et al.*, 1997). Ray *et al.* (2004) claim that resources per se can only be source of competitive advantage if they are applied, if "something is done with them". The resources have to be exploited through business processes in order to be used more efficiently. This, however, is to be seen only as possibility, because not all assets can become valuable scarce resources by exploitation [Ray *et al.* (2004); Porter (1991)]. Hence, KM can be seen as firm process improving capability or as meta-resource. Drawing on the notion of KM as part of a meta-structure behind all valuable, rare and hard-to-imitate resources, we assume that KM affects the assets deployed in the innovation process itself. We assume KM to leverage the internal innovation assets of firms
Knowledge Management, absorptive capacity, and external innovation assets		
$InnoSuccess_i = f(InnoCooperation_i \times KnowledgeManagement_i, InnoResources_i)$	*KM improves the absorptive capacity of firms leading to an increased innovation success.*	Since Cohen *et al.* (1990) the firms' capacity to value external information, to assimilate and commercialize it, is labelled absorptive capacity. In order to achieve an effective integration of external knowledge there is a need for an advanced system of knowledge processing. The conception of such a system, called absorptive organizational capacity [Cohen *et al.* (1990)], has gained increased attention and has inspired studies on knowledge management [see for example Coombs *et al.* (1998); Caloghirou *et al.* (2004); Lenox *et al.* (2004); Yang (2005)]. Different studies following Cohen *et al.* (1990) consider those organizational aspects of absorptive capacity. Kogut *et al.* (1992) propose that the existing knowledge stock cannot be regarded separately from its level of organization, or the firm's combination capabilities. Van den Bosch *et al.* (1999) suggest organizational aspects as vital determinants of absorptive capacity. They consider the organizational form and the combination capability as important elements of a firms' absorptive capacity, which itself is viewed as co-evolving with the knowledge environment [Van den Bosch *et al.* (1999)]. Regarding the special case of interfirm R&D cooperation, Schmidt (2005), by using data from the "Mannheim Innovation Panel", finds evidence for the relevance of knowledge management to improve absorption of external knowledge. An elaborated human resource and

Hypothesis based on the empirical literature	Action at organizational level	Empirical studies and revised literature
		knowledge management is confirmed to improve a firm's absorptive capacity, counted as realized R&D cooperations of firms. R&D cooperation contributes to a large extent to the innovative success of firms [Barringer *et al.* (2000); Hakansson *et al.* (1988); Powell *et al.* (1996)]. To successfully exploit R&D cooperation, there is a need for organizational capabilities especially addressing the leveraging of interfirm relationships [Lorenzoni *et al.* (1999)]. The ability to organize R&D cooperation, to prevent of "inventing the wheel twice" or to successfully integrate external knowledge affects also the benefit out of R&D cooperation.

Thus, a firm undertaking R&D cooperation faces two challenges: first, to recognize the needed valuable external knowledge out of R&D cooperation and second, to successfully manage, integrate and commercialize R&D cooperation and new ideas developed. Taking into account that firms with KM capabilities can better organize such cooperation, we hereof expect a positive effect on innovation success.

As the international statistics show, the diffusion of the KM practices are far to be complete in the range of the innovation firms or of the firms which have the patents, which moreover are more advanced than the non-innovative or non-patented firms (see the table 2) [Brelade (2002)]. This fact makes us to try to estimate the specific impact of the introduction of the KM practices in the performance of the innovative firm, observing the factors and the features of the firm. For evaluating the innovative performance, we can use four variables: the inclination towards the innovation, the intensity of the innovation (of the product), the inclination towards the patent and the intensity of the patent. The first two indicators show if the firm 'introduced in the period submitted to the analysis the new or significant improved products', and if yes, 'the part of profit which comes from the new or significant improved products from the total of the firm profit from the current year.' The other two variables, defined in a similar way show if the firm 'has the valid patented products at the end of the current year', and if yes, 'the part of profit protected by the patents in the obtained profit total in the current year'. The medium inclination towards the innovation and the medium inclination towards the patent are 35 % and respectively 20%, while the medium intensity of the innovation (of the product) is 15%, for the innovative firms, and the medium intensity of the patent of 30% for the firms which have the patents from the EU countries.

Table 2. The diffusion of the KM practices, in accordance with the adaptation of the new management methods at the research-the development and the innovations in the main firms of the European Union, in the year 2004.

Firms	% firms	% from the firms which					KM Intensity
		diffused the knowledge culture	adopted the policies for keeping the personnel	made the alliances for the acquisitions in the knowledge field	adopted the policies in the KM field	adopted at least one from the four policies	
Firms Total		28	27	23	17	45	0,9
Firms which make the research-the development	30%	45	42	39	28	71	1,6
Firms which do not make the research-the development	70%	20	20	15	12	34	0,7
Firms which adopt the innovations	34%	41	42	38	26	68	1,5
Firms which do not adopt the innovations	66%	19	19	14	12	34	0,7
Firms which have the patents	20%	40	39	35	26	62	1,4
Firms which do not have the patents	80%	25	24	20	15	41	0,8
Firms which adopt the new management methods	21%	51	47	42	29	76	1,7

Firms which did not adopt the new management methods	79%	21	21	17	14	37	0,7
Innovative Firms from which:							
- they use the Internet and TIC for distributing the information	28%	62	56	51	39	82	2,1
- they do not use the Internet and TIC for distributing the information	68%	37	36	34	21	63	1,3

Source: *SESSI, CIS3 Survey.*

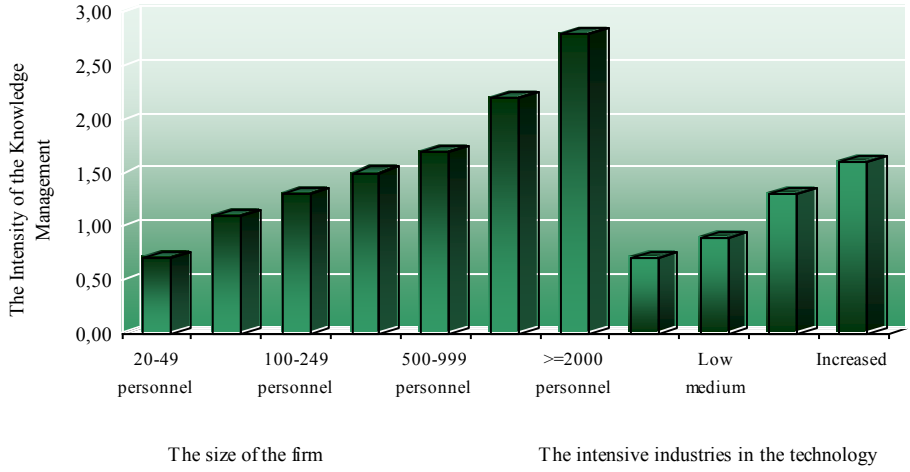

Figure 3. The KM intensity, after the size and the intensive industries in the technology in the EU countries, in the year 2005

The KM intensity is equal with zero when the firm does not implement either one from the four practices of the KM, and 1,2,3 or respectively 4, when the firm implements at least one, two, three and respectively all the four practices of the KM. The classification of the industry from the point of view of the technology intensity bases principally on the report between the research - the development and the industrial production. For the firms with over 2.000 wage workers, the KM intensity is 2,7; The firms which have the highly intensive industries have a KM intensity of 1,6.

Source: *SESSI, CIS3 Survey.*

The fact that the variables the patents intensity and the innovation can be known only by the innovative firms and by the firms which have the patents constitute a selection source, which result in the estimations, if we estimated separately the intensity of the relations, from the relations which result from the inclination towards the innovation and the inclination towards the patents. These estimated impacts of the KM policies on the firm performance are important, and the more since these are cumulative. These do not have a overwhelming importance of weather that we can conclude that they are a necessary evil ("*ils sont trop beaux pour être vrais*"), having to be overvalued and the unspecified model. A duplication of the medium expenses ith the research-the development at the rate of the wages, which is 1,7% for the innovative firms and 2% for those which have the patents, they will increase the innovation intensity at only 1,2%. A potential cause for these estimations, with the more reduced amplitude can be that in the place of the size of the flux of the expenses with the research-the development. The estimated impacts of the implementation of the new management methods are statistically significant and equally substantial, having the same impacts as those of evidence field that the firms which belong to a group aspire to have more and more patents, while the lower firms aspire to become more and more innovative, not founding a specific impact in the utilization of the Internet and of the Information Technology and Communication (ITC) for the acquisition and the diffusion of the information. As there was to expect, the impact of the firm and particularly, concerning the impact of the size on the inclination towards the patent and on the intensity.

■ **Knowledge management and productivity**

Also, concentrating on the innovative performances of the firm, it is important that we investigate if the adaptation of the KM practices has a specific impact, equally a statistic and economical impact, on the work productivity. Proceeding in this way, we use practically the same models as in the case of the innovations and of the patents, but with two differences. The first difference consists in the fact that we can bet on the specification of the linear regression. This regression can appear as a simple extension of the production function, which is currently used in the econometric studies of the productivity of the research-the development. The second difference consists in the fact that we introduce the physical wage capital as the control variable, this being a variable which measures the productivity differences between the firms. The estimation results and the tests for the productivity are represented graphically in the Figure no. 4. The tests of the four models correspond to the different ways of introduction of the knowledge management in the productivity equation, on the innovation and the patents.

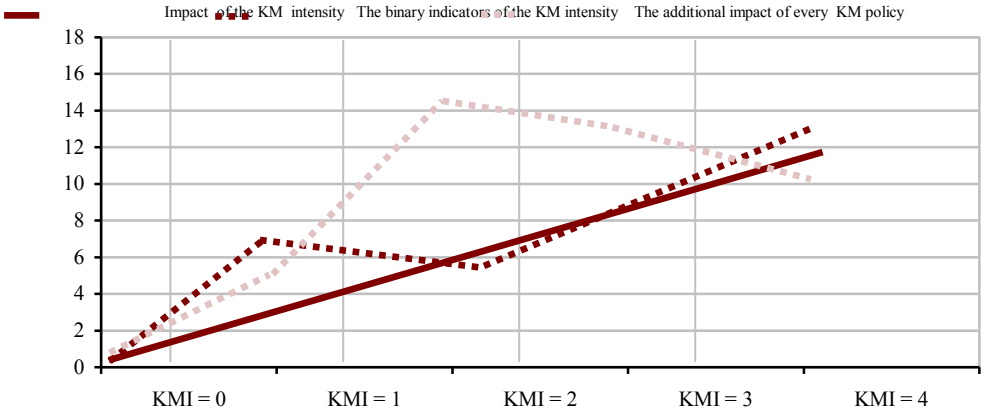

Figure 4. The impacts of the KM practices on the work productivity

The figure no. 4. illustrated the estimated impacts on the adaptation of the KM practices, where: The line which represents the impact of the KM intensity corresponds to a regression which uses the KM as variable, varying from 0 to 4; The line which represents the binary indicators of the KM intensity corresponds to a regression which uses the four binary indicators of the KM intensity, varying sequentially from 0 to 1; The line which represents the additional impact of every KM policy corresponds to the regression which uses the four indicators of the KM varying from 0 to 1 in the following order (irrelevant, moreover): the KM culture (C), the retention policy of the KM (R), the alliance policy of the KM (A), the KM policy (W).

Source: *SESSI, CIS3 Survey*

It is clear that the four policies of the KM do not appear as changeable and they remain only partially cumulative. All these policies being equal, the work productivity is more increased, with 10% for the firms which implement a policy of keeping of the personnel and of the managers (R) towards the firms which do not adopt the such practices and with 5% bigger in the firms which promote a culture of the knowledge diffusion (C) towards the firms which do not practice the such methods. At the opposite pole, in the same equality conditions of the four policies, the work productivity is not statistically different within the firms which declare that they adopted or not an establishment policy of alliances for the knowledge acquisition (A) and a knowledge policy (W).

The estimated elasticities of the intensity of the physical capital and of the research-development intensity, although they have the low levels, are however considered consistent towards the level of the work productivity. Contrarily, towards the innovation of the new productivity methods are insignificant, if not negative.

The diffusion of the four KM policies is much stronger in the big firms and in the intensive industries in the technology, and although these practices appear as being complementary, the firms aspire to adopt them together. The impacts of the KM practices on the firm performance are generally statistical and economical, significant and more and less cumulative, even the industry and the other

important factors as the research –development intensity and the intensity of the physical capital. Less to desire it is the situation in which the four specific practices of the KM are not cumulative, but interchangeable in the appearance, in the case of the innovative performance. In this case, the model on the KM intensity, varying from 0 to 4, for the implemented practices by the firms, represents statistically one from the four individual indicators of the KM.

An explanation can be found in the colinearity (or the big correlation) of these indicators reflected by the complementarity of the KM practices, but also by the subjective nature of such linear indicators, which are the sources of measurement of the errors. Also, the finding of the estimated impacts of the implementation of the new management methods constitutes a problem, which in the large sense they are as big as the impacts of the KM practices on the innovative performances of the firm while the work productivity can be negative, in contrast with the positive significant impacts of the wage workers' retention and of the culture of the diffusion of the KM culture (R and C).

6. Conclusions

In the modern knowledge-based economies, the firms increased the individual and collective knowledge as the major factor of the economical performance. The firms were bigger and their relations with the intensive industries in the technology were stronger, they were in measure to implement the KM policies, as they promoted the culture for the information and the diffusion of the knowledge, motivating the personnel and the managers that they remain in the company, making the partnerships and the fusions for the acquisition of the knowledge, implementing the KM rules. The micro-econometric analysis of the firms from the EU countries confirms that KM contributes significantly at the innovative performance of the firm and at its productivity. The impacts of the adaptation of the four practices if the KM at the performances of the productivity and of the firm innovation do not depend obligatorily on the firm dimension, the industry, the made efforts in the research-the development or the other factors, but they persist at a considerable extension after the observation of these four factors. These four practices are strongly complementary, in the sense that the firms aspire to adopt them, but in the sense that their impacts on the firm performance aspire to be cumulative. The specific impacts of the individual practices are not statistically different of the innovative performance of the firm, measured in the terms of the inclination and of the innovation intensity and of the patents. What seems to count is the number of the different practices of knowledge management that the firms implement, and that we can interpret as the Intensity of the Knowledge Management.

For the work productivity, the adaptation of the incentive policies for the keeping of the personnel and of the managers becomes surely a priority, and the promotion of a culture of the knowledge diffusion, becomes a second priority, while the estimated impacts from the other two policies are not statistically significant.

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LONG-TERM LINEAR TRENDS IN CONSUMER PRICE INDICES

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Abstract

Headline CPI, core CPI and indices for various expenditure categories were analyzed. Long-term linear trends have been found in the difference between the core CPI and the headline CPI in the USA. Duration of these periods is different for positive (18 years) and negative (8 years) trends, and the trends change to opposite during some shorter time intervals of 2 to 4 years.

The difference between the core CPI and the index for energy is similar to that between the core CPI and headline CPI. The index for energy will reach the core CPI in 2008, however. Then, one should not expect further increase in energy price beyond that dictated by the CPI. It is likely that oil price will be falling in absolute terms. The difference between the core CPI and the index for food also has two linear branches after 1980, but the slope of the current trend is weak and the difference will intercept zero line only in 2014. The difference between the core CPI and the housing index is characterized by an almost constant duration of negative and positive branches – approximately 11 years. The current period of negative slope in the difference will approach its turning point in 2008 or 2009 and is characterized by very high volatility. The next trend has to be positive, i.e. the housing index will be growing at a lower rate than the headlining CPI. The difference for the transportation index had a longer period of positive slope – between 1980 and 2004. During this period the difference reached the level of 30 units of index. Currently, a turning period is observed and a negative slope is developing.

The difference related to price indices allows to accurately predicting the evolution of relevant stock market indices.

Key words: CPI, core CPI, expenditure categories, price index, stock market index

JEL Classification: E31, E37, G12

1. Introduction

Consumer price index, CPI (-U), is the most popular measure of the average price increase for consumers (Cecchetti, Chu, Steindel, 2000). Inflation associated with the CPI covers all principal expenditure categories of urban consumers as described by a representative basket of goods and services. This basket is characterized by fixed weights for given expenditure items, which are reconsidered about every ten years. Because of many problems related to the fixed basket, since 2000 the Bureau of Labor Statistics, BLS, relies on the personal consumption expenditures price index, PCEPI, in its official reports to the Congress and long-term inflation projections (FRB of San Francisco, 2003). The PCEPI has adopted a more flexible approach allowing changing weights in the basket, hedonic regression, and introduction of new goods and services. A less volatile measure of the PCE price index is the core PCE price index, which excludes volatile and seasonal food and energy prices. Before 2000, the core CPI (CPI less food and energy) was used for these purposes (Bryan, Cecchetti, 1994). Because of relatively short history of PCEPI measurements we use CPI and its components (including core CPI) in order to reveal long-term trends in corresponding series.

Kitov (2006ab; 2007ab), Kitov, Kitov and Dolinskaya (2007ab) developed an approach which links together inflation (also measured by CPI), unemployment and the change rate of labor force level. Within this framework, severe empirical and theoretical problems experienced by conventional economic concepts, including the New Keynesian Phillips Curve, have been resolved. Natural assumption underlying our concept and associated model consists in the existence of some valid relationship between true values of measured parameters. These true values (of inflation, unemployment and labor force) can not be accurately defined and measured at the current level of overall understanding and availability of technical means.

The principal finding of our previous studies conducted for the USA, Japan, France, Austria, Australia, Germany and Canada consists in the presence of a linear and lagged link between labor force, inflation and unemployment. In some countries, this generalized link can be separated into two independent linear links between inflation and labor force and between unemployment and labor force. These linear dependencies on one variable, obviously, result in the existence of reliable Phillips curves in these countries.

Accurate projections of working age population and labor force participation rates allow predictions of inflation and unemployment at any time horizon. On the other hand, only predictions of average (aggregated) inflation were made. Constituent parts of the overall inflation, as expressed by various expenditure categories (Bauer, Haltom, Peterman, 2004), commodities, goods and services, are driven by their own mechanisms along their own trajectories. Fluctuations in these components of the overall inflation may be very high with the only constrain on the overall inflation value. Therefore, our next natural step consists in analyzing various parts of the CPI and in revealing potential long-term trends. Important feature of our analysis is avoiding fluctuations and measurement noise associated with inflation. Effectively, we prefer to study index itself instead of its time derivative.

The remainder of the paper is organized as follows. Section 1 presents an analysis of the difference between the CPI and core CPI in the USA during the period between 1960 and 2007. In Section 2, we extend the analysis conducted in Section 1 to the differences between the (headline and core) CPI and such expenditure categories as energy, food, housing, transportation, medical care, education and communication, as defined by the BLS. Section 3 concludes.

2. CPI and core CPI

We start our analysis from the CPI and core CPI. There is no unique definition of core CPI inflation (Wynne, 1999). Several proxies are available, however, attempting to reproduce long-term trends in the observed CPI inflation (Clark, 2001). The most popular definition used for political reasons is associated with the headline CPI inflation that excludes the prices of food and energy. These two items are considered as having high volatility, which provides the largest fluctuations of the CPI relative to the core CPI. In some sense, the core CPI should provide the most reliable estimate of inflation trends over longer time horizons, and monthly CPI readings may give misleading signals on the long-term trends (Rich, Steindel, 2005).

The core inflation can be also defined as a moving average, with several years window length, weighted median (Smith, 2004), and as a "trimmed-mean" estimate (Dolmas, 2005). The Federal Reserve Board uses personal consumption expenditures, PCE, for its long-term outlook. Therefore, the PCE is an almost official measure of long-term inflation. Due to a longer period of observations, this paper considers the original measure of core inflation – the core CPI as published by the USA Bureau of Labor Statistics (http://www.bls.gov).

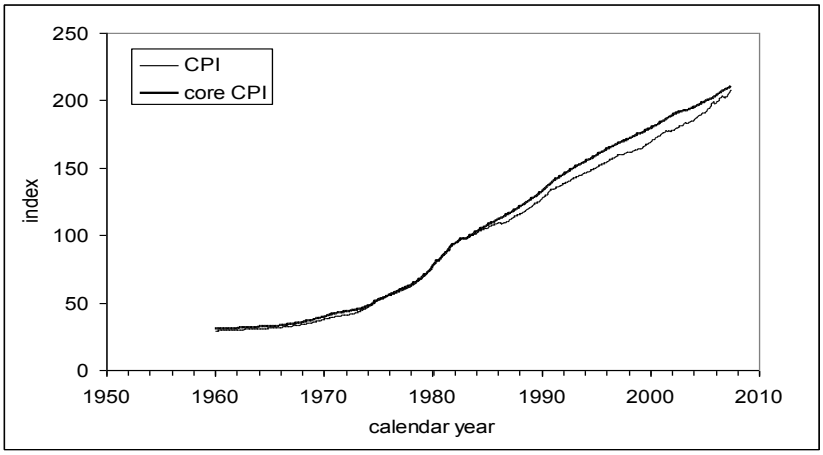

Figure 1. The evolution of headline CPI and core CPI in the USA between 1960 and 2007.

Figure 1 illustrates the evolution of the measured CPI and core CPI in the USA after 1960. Both indices are for all urban customers and seasonally adjusted. By definition, the core CPI is the headline CPI less food and energy. In Figure 1, one can observe that the curves are very close before 1980 - the core CPI practically evolved in sync with the CPI. After 1981, the curves diverge with the core CPI growing faster than the CPI. The gap between the indices opens wider and wider before 2000, and then the curves start to converge. The CPI growth rate has been higher since 2002.
A better view on the periods of the CPI and core CPI divergence and convergence is represented by the difference between these variable, as displayed in Figure 2. The difference is apparently characterized by the presence of three distinct segments of linear trend and two short periods of change in the trends.

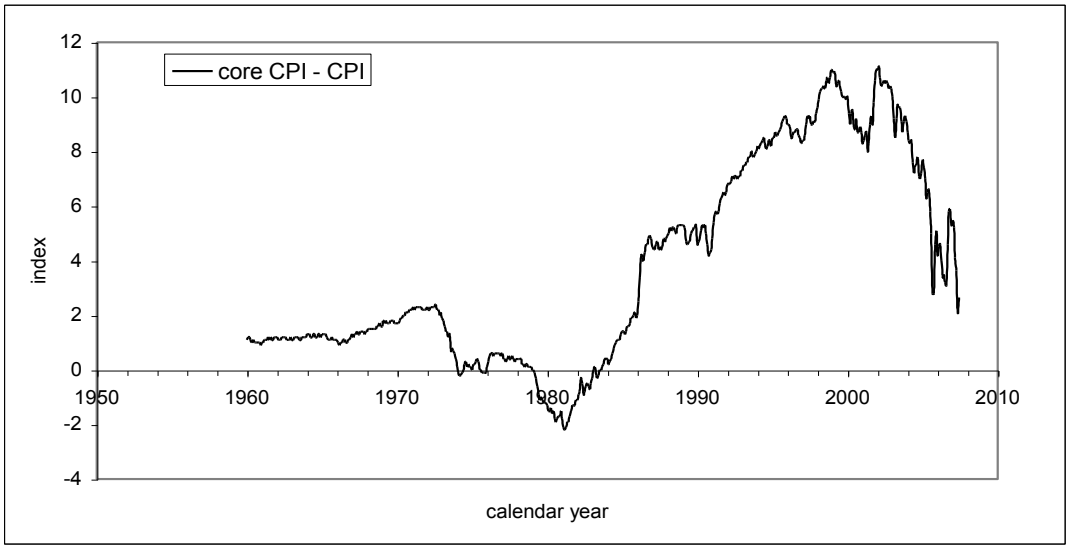

Figure 2. The difference between the core CPI and headline CPI.

Between 1960 and 1978, the difference is relatively stable and varies in a narrow range around +1 unit of index. Between 1979 and 1982, the curve falls to -2 and then suddenly changes its direction from downward to upward one.

Between 1982 and 1999, the core CPI was growing consistently faster and a gap of about 10 units was created through 1999. The curve between 1982 and 1999 is best represented by a straight line with small-amplitude deviations, the latter likely associated with measurement noise. The slope of the linear regression line presented in Figure 3 is -0.7 with R^2=0.96. In other words, during these eighteen years the headline CPI was growing by 0.7 units of index faster than the core CPI.

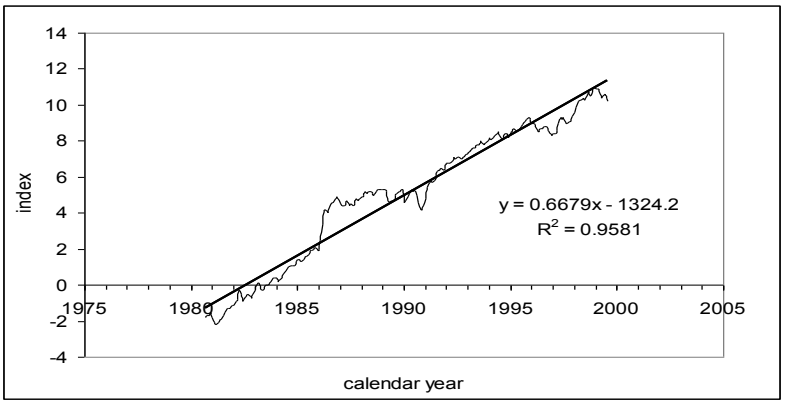

Figure 3. Linear regression of the difference between the core CPI and CPI for the period from 1981 to 1999. *The goodness-of-fit is 0.96, and the slope is 0.67.*

If to assume that the evolution of both indices is driven by independent stochastic process like random walks, then the deviation between the indices would be a stochastic process itself. From Figure 3, it is more reasonable and reliable to assume, however, that there is a tight link between these variables, which provides the observed linear growth of the difference between them. For purely stochastic and independent variables such a linear behavior is highly unlikely. Because the CPI inflation is predefined by the labor force growth rate (Kitov, 2006ab) the evolution of the core CPI is also predefined.

There was another period of high volatility between 1999 and 2003 similar to that observed between 1979 and 1982. The gap reached its peak value two times - in 1999 and in 2003. Since 2003, the gap has been closing in line with a faster growing CPI. Nevertheless, the CPI was consistently above the core CPI, as Figure 1 demonstrates. If to extrapolate the currently observed rate of convergence between the CPI and core CPI, as displayed in Figure 4, one can estimate the intercept time somewhere between 2009 and 2010. This linear trend of convergence is very robust with R^2=0.86, as was the divergence trend between 1982 and 1999. The convergence is faster - approximately 1.6 units of index per year.

What will happen beyond 2010? It is likely that the CPI will "overshoot" the core CPI and will be growing further and further above the core CPI. On the other hand, GDP deflator and CPI will drop below zero level after 2012 (Kitov 2006b; Kitov, Kitov, Dolinskaya, 2007b). This means that the core CPI will be decreasing even faster than CPI and might reach negative zone earlier than in 2012.

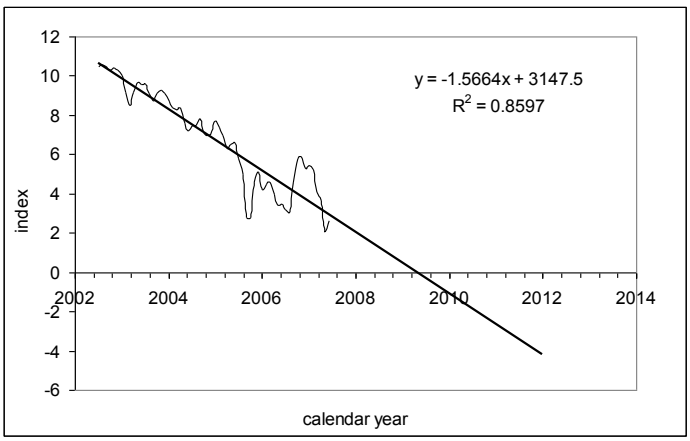

Figure 4. Linear regression of the difference between the core CPI and CPI after 2002. The goodness-of-fit is 0.86, and the tangent is -1.57. An elevated volatility has been observed from 2005.

There are several simple conclusions from the existence of periods of linear trends in the difference between the CPI and core CPI. First, prices for food and energy are driven by some forces effectively independent on those behind other goods and services. Second, there are "structural breaks" in these forces, which define time segments of different length. It is likely that these forces behind all major expenditure categories may have different characteristic periods. Third, having an initial interval for some next period of linear trend in the difference between the CPI and core CPI one can extrapolate the evolution of the index for food and energy at a horizon of about ten years. Forth, there exist some relatively short periods when current linear trends change to opposite ones. These periods are likely characterized by an elevated volatility.

Apparently, the exclusion of food and energy from the core CPI is somewhat artificial. It could be appropriate to exclude one by one major expenditure categories such as housing, transportation, etc., as defined by the BLS.

3. Long-term trends in consumer price indices

Following the approach developed in Section 1 we extend our analysis to the difference between price index related to individual commodities and expenditure categories and the headline (or core) CPI. As shown later on, this approach allows suppressing (or complete exclusion) the changes in the trends in the CPI since individual constituent parts of the CPI move more or less in sync, at least in the

long run. Table 1 provides weights for these individual parts as represented by selected expenditure categories and commodities. For some of the indices in Table 1, mean (annualized monthly) growth rate or inflation, its standard deviation (proxy for volatility), and the ratio of the latter and the former are shown in the brackets.

Table 1. CPI-U by expenditure category and commodity and service group (relative importance)

Expenditure category	Relative importance 2006	Relative importance 1996
All items (CPI-U)	100% (0.036; 0.033; 0.93)	100%
All items less food and energy	77.40% (0.037; 0.027; 0.74)	77.53%
Energy	8.71% (0.041; 0.26; 6.4)	6.70%
Food	13.88% (0.033; 0.035; 1.05)	15.77%
Housing	42.69% (0.037; 0.045; 1.20)	41.35%
Apparel	3.73%	5.52%
Transportation	17.25% (0.034; 0.12; 3.68)	16.95%
Medical care	6.28% (0.058; 0.0335; 0.56)	7.36%
Education and communication	6.03%	-
Other goods and services	3.48%	7.12%

In brackets – mean value of (monthly annualized) inflation readings of corresponding item between January, 1980 and November, 2007; standard deviation (volatility); and the ratio of the latter and former – relative volatility.

As expected, the highest volatility belongs to the index for energy with standard deviation of inflation during the last 25 years of 0.1 (10%) and mean inflation rate of only 4.6%. Relative importance of energy for the CPI is lower than that associated with housing, transportation, and food. At the same time, the price volatility related to food is much lower than that for housing and transportation. Volatility in the core inflation is slightly lower than that in the headline inflation when estimated for the last 25 years.

As found for the difference between the core CPI and the headline CPI, there exist relatively long periods of solid linear trends and shorter periods of the trends' change. In physical terms, such change in state or stationary regime is called bifurcation. In this sense, future trend usually can not be predicted in such bifurcation points. The turning periods are characterized by higher volatility than that associated with the periods of linear trend. The difference between the core and headline CPI is effectively a weighted sum of energy and food prices. Corresponding weights for 2006 and 1996 are presented in Table 1. There was only a slight change in the weights during these 10 years: energy increased its input by 2 percentage points (from 6.7% to 8.7 %) and food decreased its input from 15.8% to 13.9%. As a whole, relative weight of energy plus food practically did not change.

In this Section, we represent the overall input of energy and food as two independent components. Figure 5 displays the difference between the core CPI and the index for energy for the period between 1960 and 2007, as published by the BLS. Before 1980, these two indices had been developing almost in sync with fluctuation around 10 units of price index (both indices are based on 1982-1984=100). Between 1981 and 1999, the difference grew from -10 to almost 80 units. Since 2003, a period of intensive recovery of the energy index has been observed. Qualitatively, one can distinguish three periods of linear trend and three turning periods with higher volatility. The most recent turning period likely started in 2005 and will be possibly extended in 2008.

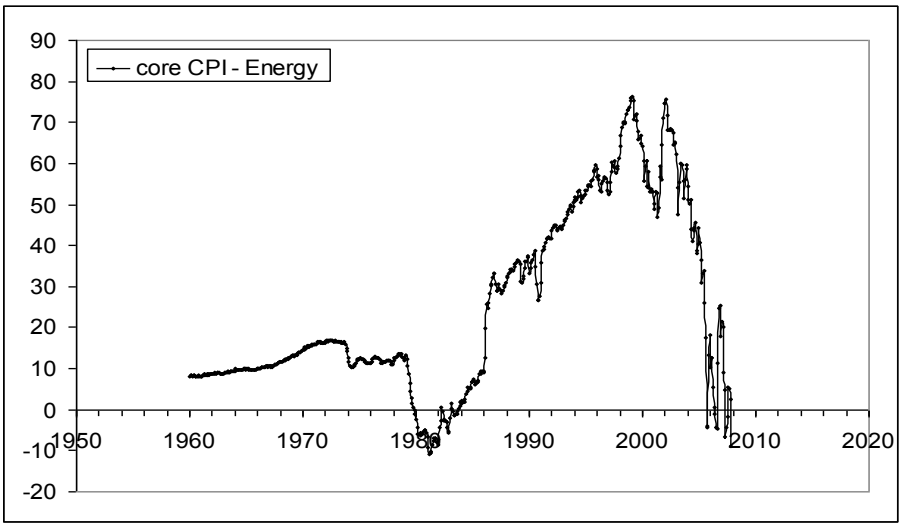

Figure 5. The difference between the core CPI and the index for energy between 1960 and 2007. *(There are three period of linear trend and three turning periods. The most recent turning period likely started in 2005)*

Figure 6 provides a detailed view of the most recent period. The energy index grew much faster than the core CPI. Linear regression gives a slope of -14 for the difference curve. This assumes that the energy index grew by 14 units faster every year than the core CPI. Since August 2005, volatility of the energy price has been at an elevated level and one can likely classify the current period as a period of bifurcation. There is no indication of the direction and slope of the next linear trend, however. At the same time, current (the end of 2007) energy price has likely reached its peak value. We would not expect any further increase in oil price beyond that dictated by overall price increase. Since the duration of the previous two periods of linear trend change was between 3 and 5 years (depending on definition), one can expect the current period will be finished in 2008 or in 2009.

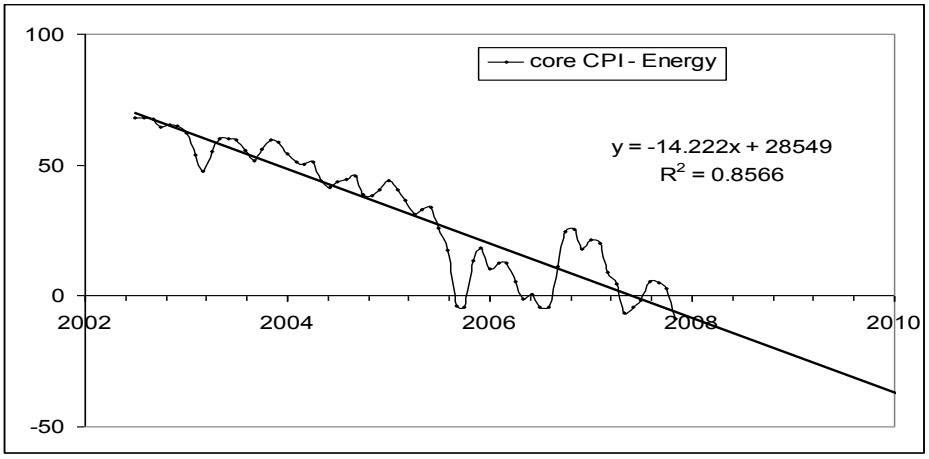

Figure 6. The difference between the core CPI and the energy index between 2002 and 2007.

The most recent turning period started in 2005 with a high increase in corresponding price volatility. There is no indication of the direction of the next linear trend, but the current energy price has likely reached its peak value.

Some important conclusions are straightforward. The growth of the energy index relative to the core CPI is likely defined by some linear mechanisms. These mechanisms include bifurcations when the difference reaches some peak value or intercepts zero line. The reasons behind these bifurcations are not clear, but they are usually several years in length and are accompanied by elevated volatility. The latter property is common for physical processes. The next step is to analyze expenditure categories listed in Table 1.

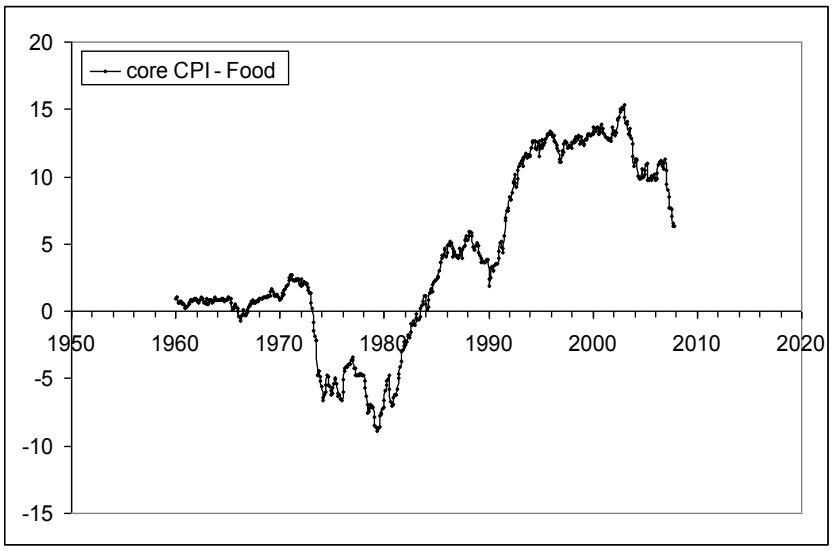

Figure 7. The difference between the core CPI and the index for food between 1960 and 2007. *There are three periods of linear trend and two turning periods. The most recent period of linear trend started in 2003.*

Figure 7 displays the difference between the core CPI and the index for food for the period after 1960. This curve differs from that in Figure 5. The first large change in the difference occurred in 1973 (not in 1979 as for energy) and lasted only 7 years. Around 1980, the difference started to grow from -7.0 to 13.0 in 1996. Between 1996 and 2003, the difference was effectively constant at the level of ~13.5 units of price index, i.e. a lengthy flat segment was observed. After 2003, the difference has been decreasing at a rate of 1.2 units per year, as Figure 8 demonstrates.

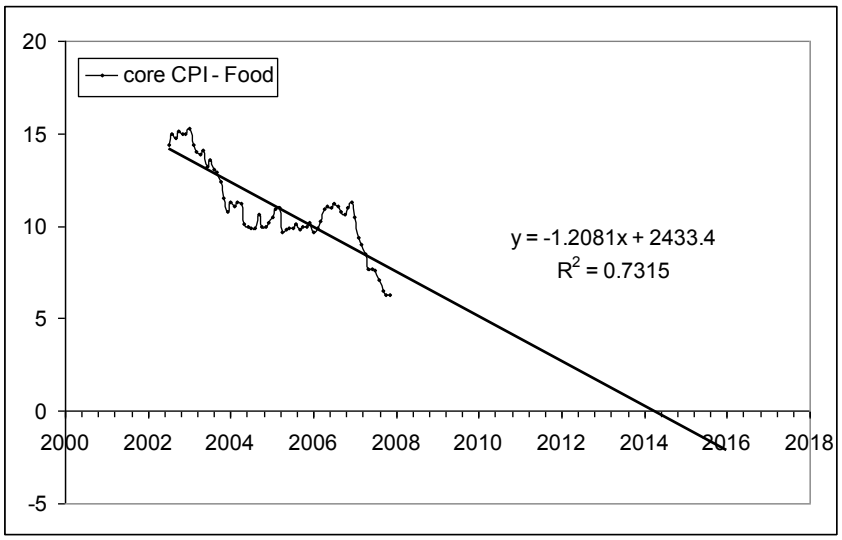

Figure 8. The difference between the core CPI and the food index between 2002 and 2007. *The current period of linear trend will be likely finished in 2014. Since 2003, the food price index has been slowly catching up the core CPI.*

Overall, the difference between the core CPI and the food index was always lower than that between the energy index and the core CPI. The largest difference was only around 14 units. Since 2003, the food price index has been slowly catching up the core CPI. Extrapolating the current linear trend one can estimate the intercept point when the food price index will reach the core CPI. According to Figure 8, this will happen in 2014. Such a behavior differs from that observed for the energy index in terms of timing and amplitude, but the overall behavior distinguishing periods of linear growth and bifurcation is very similar. Therefore, principal mechanisms behind the evolution of

the food price index are similar to those behind the energy index. They are likely not related to the changes in supply pressure induced by good crops and draughts. These mechanisms have to be a part of economic system itself and should be related to relationships between economic agent not to production of goods and services.

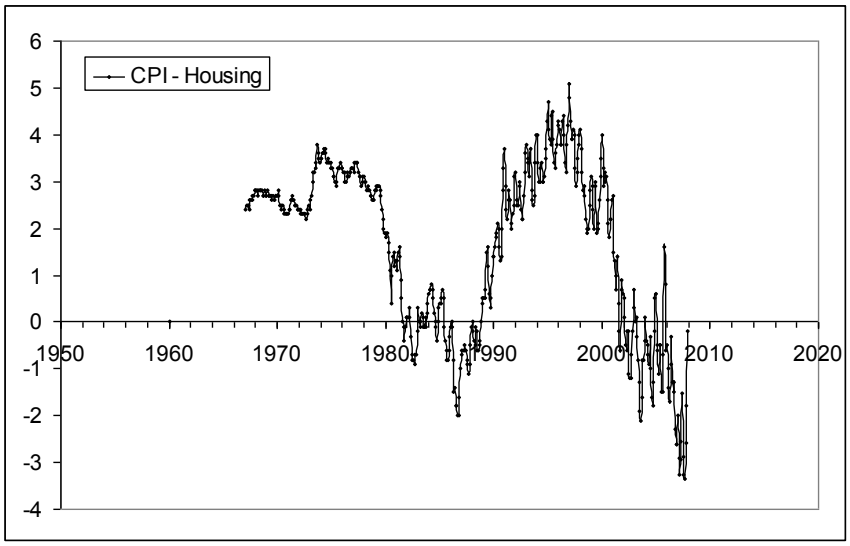

Figure 9. The difference between the headline CPI and the housing index between 1967 and 2007

Notice three periods of practically linear trend and two very short periods of trend change: in 1987 and 1998. The observed linear trend has been practically changing every 11 years. Notice an elevated relative volatility of the difference at higher frequency.

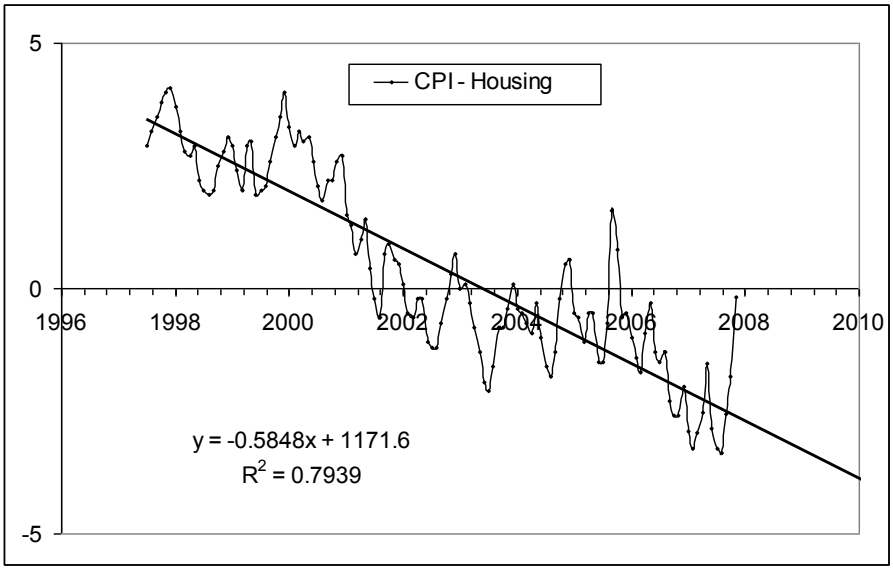

Figure 10. Same as in Figure 9 for the period after 1998

The housing index has been growing faster than the headline CPI. Currently, a period of the trend change is likely observed with the housing index changing to a rate below that associated with the CPI. One can expect that the next 10 years will be poor for the housing market.

Table 1 show that the index for housing has the largest input in the CPI – approximately 43%. Figure 9 displays the difference between seasonally adjusted headline CPI and the housing index for the period after 1967. Figure 10 details the period after 1998. One can conclude that after 2008 the housing index will be likely evolving at a lower rate than that associated with the headline CPI. Currently, we observe a turning period with higher volatility. The difference between the core CPI and the housing index is characterized by an almost constant duration of negative and positive trends – around 11 years. Accordingly, the next linear trend has to be positive.

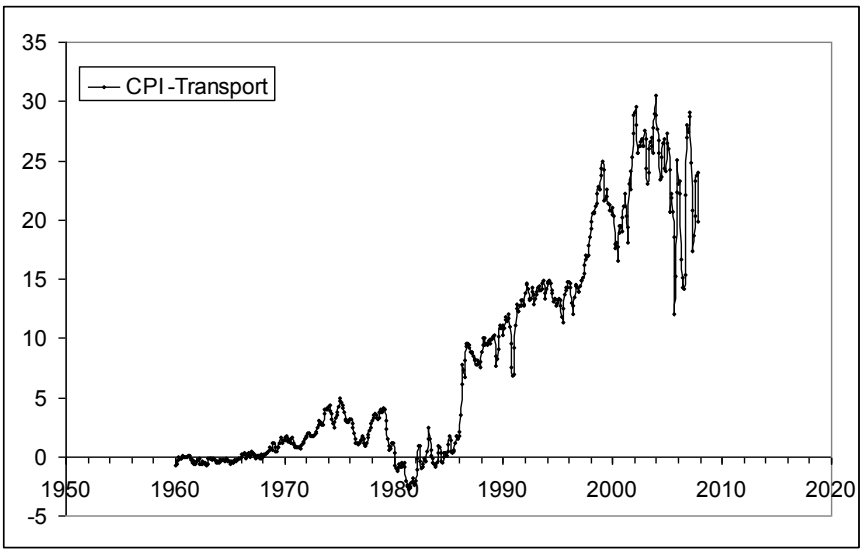

Figure 11. The difference between the CPI and the transportation index between 1960 and 2007.

Notice two clear periods of practically linear trend: between 1960 and 1980; between 1980 and 2000. Currently, a period of turning to a new trend is observed – the transportation index will be growing faster than the CPI. This turn is accompanied by very high volatility

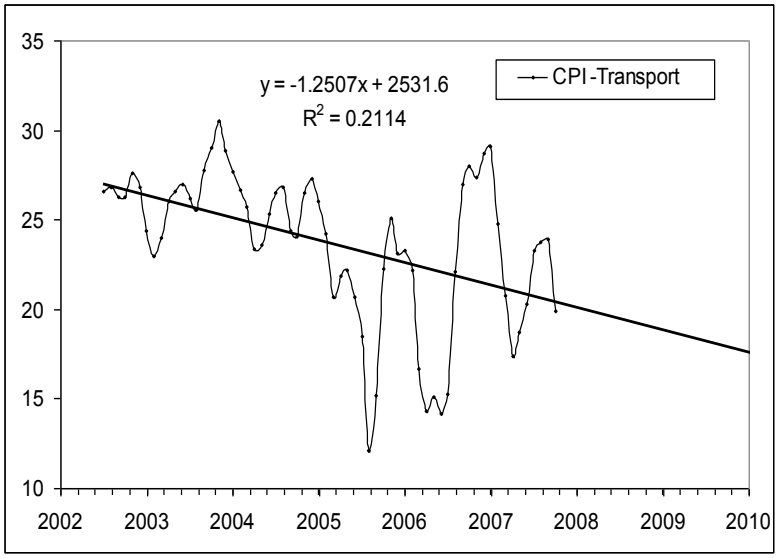

Figure 12. Same as in Figure 11 for the period after 2002.

The transportation index likely started to grow faster than the CPI. New linear trend has not finally developed and more volatility might be expected in the housing expenditure category

The difference for the transportation index had a longer period of positive slope – between 1980 and 2004, as Figure 11 demonstrates. During this period the difference was evolving at a rate of 1.5 units per year and reached the level of 30 units of index. Currently, a turning period is likely observed and a negative slope is developing. The current period is accompanied by an elevated volatility. The slope for the future linear trend, which is estimated as -1.25 units per year in Figure 12, will be possibly changed in near future but will define the duration of the recovery period for the transportation index. In any case, the prices for goods and services related to the index for transportation, as it defined by the BLS, are very likely to be growing faster than the headline CPI.

The index for medical care and the index for education and communication are characterized by the absence of turning points since 1980. The difference for medical care has a solid (-5.9 units per year as estimated in Figure 13 negative slope since 1982. There is no indication of possible turn in the trend. The index for education and communication has a positive trend (+2.2 units per year as

estimated in Figure 14 since its introduction in 1993. Both indices show low volatility over time. Because of the absence of any information on turning points in the past, there is no clear understanding how far these trends can be extrapolated in the future and potential mechanisms, which will break the trends.

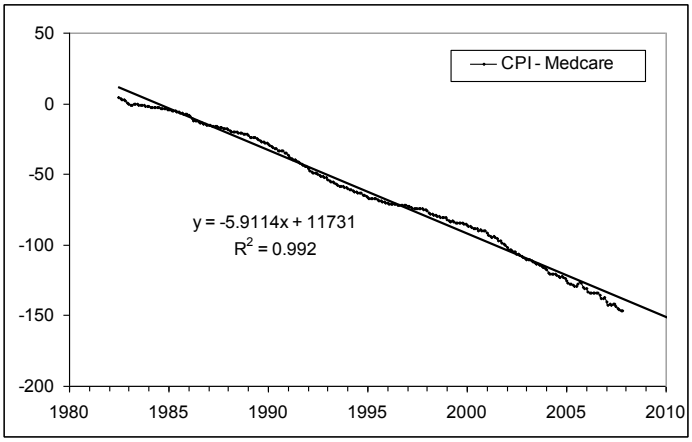

Figure 13. The medical care index has a solid linear trend relative to the CPI since1980

No change in the trend is expected. In average, prices for medical care grow by 6 units of index per year faster than the CPI

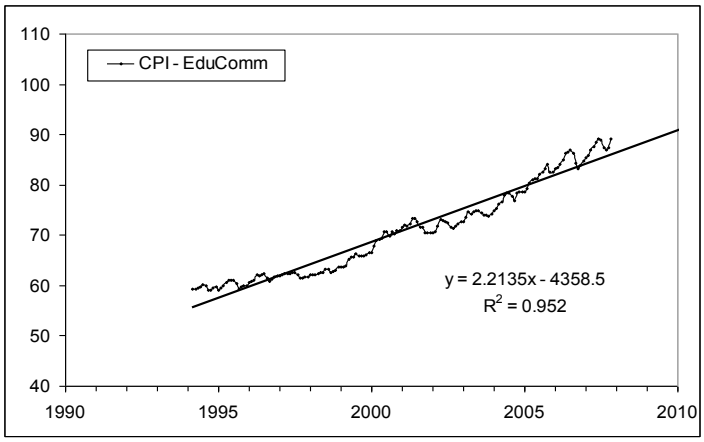

Figure 14. The education and communication index was introduced in 1993 and since then has a solid positive linear trend relative to the CPI

No change in the trend is expected. In average, prices for education and communication grow by 2 units of index per year less than the CPI

4. Conclusion

We have studied the headline CPI, core CPI and indices for some expenditure categories in the USA for the period after 1960. The principal finding of this study is the presence of long-term linear trends in the difference between the core CPI and the headline CPI. These linear trends indicate that price indices for various expenditure categories are driven by some internal economic forces, which produce linear trends for the differences between these indices. Obviously, if some random external shocks to supply and/or demand drive relative prices then these driving forces would result in random differences.

The forces behind the observed price indices define periods of stable and constant annual increment between prices indices for various expenditure categories. For the difference between the core and headline CPI, duration of such periods of linear behavior varies for positive (18 years) and negative (8 years) trends. According to the observed slope in the current trend the headline CPI will reach the level of the core CPI in 2009 and then some new trend should be developed.

The observed linear trends change to some reversed direction during shorter time intervals of 2 to 4 years. These intervals of the turn in linear trends are often associated with an elevated volatility.

Such volatility is a common feature in physical processes related with bifurcation, i.e. when a change in some parametric force causes the stability of equilibrium to change. In our case, bifurcation consists in the change of stable linear trends. In economics, similar changes in trend are usually called "structural breaks". Since the latter term is related to the change in stochastic trends we prefer to use physical term "bifurcation" indicating the change between two stable deterministic trends - stationary regimes.

The difference between the headline (core) CPI and indices for individual expenditure categories such as energy, food, housing and transportation is similar to that between the core CPI and headline CPI. The index for energy will reach the core CPI in 2008, however. Then, one should not expect further increase in energy price beyond that dictated by the headline CPI. It is likely that oil price will be falling in absolute terms.

The difference between the core CPI and the index for food also has two linear branches after 1980, but the slope of the current trend is weak and the difference will intercept zero line only in 2014. Therefore, it is likely that food price will be growing at an somewhat elevated pace.

The difference between the headline CPI and the housing index is characterized by an almost constant duration of negative and positive branches – around 11 years. The current period of negative slope in the difference is closing to its turning point in the next year or two and characterized by higher volatility. The next trend has to be positive, i.e. the housing index will be growing at a lower rate than the headlining CPI.

The difference for the transportation index had a longer period of positive slope – between 1980 and 2004. During this period the difference reached the level of 30 units of index. Currently, a turning period with higher volatility is observed and a negative slope is developing. The slope for the future linear trend will define the duration of the recovery period for the transportation index.

The index for medical care is characterized by a solid negative slope since 1982. No indication of possible turn in the trend is observed. The index for education and communication has a positive trend since its introduction in 1993.

This paper is formally devoted to long-term trends in consumer price indices. The presence of lengthy periods of linear trends allows numerous practical applications. One of the opportunities we have tried is related to stock market indices. Apparently, faster growth in prices for some specific commodities or goods and services might result in an elevated rate of growth associated with relevant stocks. Here, we would not like to dig deeper in various possibilities and thus try only obvious combination: the difference between the headline CPI and the index for transportation and the difference between the DJIA and Dow Jones Transportation Average. Figure 15, where both differences are represented by their twelve-month moving averages, illustrates our general finding. The difference related to the price indices leads that related to stock indices by 2.5 years. One can consider the difference related to the price indices as a good indicator of the future evolution of the DJTA. Transportation related stocks will likely be growing at a rate higher than that associated with the DJIA. We are planning to extend this approach by using different individual indices (both consumer price and stock market) in our next paper.

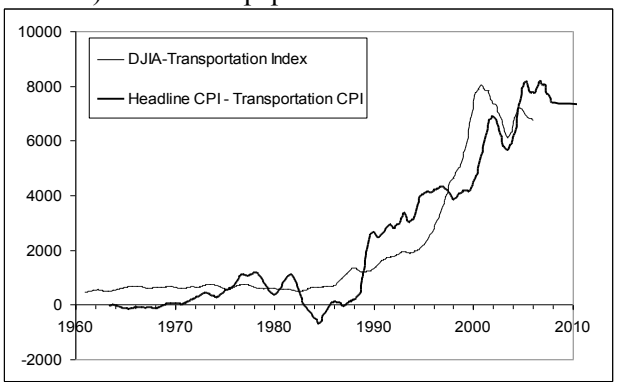

Figure 15. The difference between the headline CPI and the index for transportation (thick line) and the difference between the DJIA and Dow Jones Transportation Average (thin line).

Both differences are represented by MA (12), i.e. twelve-month moving average. The difference related to the price indices is scaled by a factor of 25 and shifted 2.5 years ahead in order to reach visible synchronization. One can consider the difference related to the price indices as a good indicator of the future evolution of the DJTA. Transportation related stocks will likely be growing at a rate higher than that associated with the DJIA

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ON INSURANCE CONTRACT DESIGN FOR LOW PROBABILITY EVENTS

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Abstract:
This paper extends the analysis of insurance contracts design to the case of "low probability events", when there is a probability mass on the "no accident-zero loss"-event. The optimality of the deductible clause is discussed both at the theoretical and empirical levels.

Keywords : Optimal insurance design, low probability events.

JEL Classification Number : D80-D81.

1 Introduction

Since Arrow (1963) is is well known that efficient insurance policies involve deductibles. Raviv (1979) has shown that the result still holds under various assumptions on the shape of the insurer's cost. Karni (1992), Machina (1995) and Carlier, Dana and Shahidi (2003) have shown that it can be extended to several non-expected utility models of choice under risk. The scope of Arrow's theorem has been enlarged by Gollier and Schlesinger (1996) and Vergnaud (1997), who have used stochastic dominance arguments in order to establish the superiority of deductible policies for a broader class of the insured's preferences (see Gollier (2000) for a survey). Finally, the result has also been extended in contexts including multiple risks by Cummins and Mahul (2003), Mahul (1999, 2000a,b), Mahul and Wright (2004), and is the starting point of several studies on the determination of the optimal deductible levels (Schlesinger (1981), Eeckhoudt and Gollier (1999)).

This paper aims first at assessing the robustness of deductible clause to the relaxation of the smoothness assumption of the loss distribution (section 3). Second, it studies the sensibility of the contract to the probability of loss (section 4) and to the other parameters (risk-aversion, insurer's loading factor) of the model. I show, considering that there is a probability-mass on the no accident-no loss state as it is the case for small probability accidental events, that the existence of a variable cost in insurance is still necessary but not sufficient to obtain a positive deductible in the expected utility model. In Arrow's case of constant returns to scale in insurance, sufficiency requires large values for the insurer's marginal cost - *i.e.* a marginal cost higher than a threshold which is increasing in the probability of no accident - which are empirically implausible. Finally, a simple calibration of the model also shows that the optimal deductible displays a lack of sensibility to the probability (mass) of accident, and that large deductibles are still efficient, unless high values for the risk-aversion index are introduced. The next section first describes the model.

2 Model and assumptions

Assume that the initial wealth w_0 of an individual is subject to a loss which is supposed to be a perfectly observable random variable X with a known probability distribution. I introduce a mixed mass and density representation for the distribution of X, whose realizations are taking values on $[0, M]$, with $\Pr ob(X = 0) = p_0 > 0$, and I denote $(1 - p_0) f(t) > 0$ the density on $[0, M]$ such that $\forall x \in [0, M]$:

$$\Pr ob(0 \le X \le x) = (1 - p_0) \int_0^x f(t) dt$$

and $\int_0^M f(t) dt = 1$.

[2] I am grateful to Meglena Jeleva and Sandrine Spaeter for comments on a previous draft of this work. As usual, all remaining errors are mine.

The optimal insurance contract is a vector of transfers $(P;\{I(x),\ \text{for all}\ x\in[0,M]\})$ with P the insurance premium and $I(x)$ the indemnity contingent on the value of the damage, defined as the solution to the maximization problem of the expected utility index of the insured:

$$EU = p_0 u(w_0 - P) + (1-p_0)\int_0^M u(w_0 - P + I(x) - x) f(x)dx$$

given the condition of premium (the insurer's participation constraint):

$$P \geq (1-p_0)\int_0^M (I(x) + c[I(x)]) f(x)dx$$

and taking into account for the non-negativity constraints on the indemnity schedule:

$$I(x) \geq 0, \forall x \in [0,M]$$

where u is the insured's utility, with $u' > 0$ and $u'' < 0$; $c[I(x)]$ is the insurer's cost, with: $c(0) = c_0$, $c'(I) \geq 0$ and $c''(I) \geq 0$.

3 Analysis

The first result is the analogue to theorem 1 in Raviv (1979).

Proposition 1 : *Any efficient indemnity schedule is characterized by a* $D \in [0,M]$ *such that:*

$$(C1):\ I^*(x)\begin{cases} > 0 & \text{if } x > D \\ = 0 & \text{otherwise} \end{cases}$$

with a marginal coverage for all $x > D$ *given by:*

$$(C2):\ I'^*(x) = \left[1 + T^u(w)\frac{c''(I^*(x))}{1 + c'[I^*(x)]}\right]^{-1} \leq 1$$

where: $T^u(w) = -\frac{u'(w)}{u''(w)}$ *is the insured's index of absolute risk tolerance, evaluated at* $w = w_0 - P + I^*(x) - x.$

Proof : Note that due to the monotony assumption on the preferences of both the insurer and the insured, any efficient contract requires a binding participation constraint for the insurer. Denote $\lambda > 0$ its associated shadow price. Denote $\mu(x) \geq 0$ the Lagrange multiplier associated to a constraint of type (3). For any given fixed $P > 0$, the problem may be solved state by state *i.e.* for each value of $x \in [0,M]$; the necessary and sufficient conditions (all functions are well behaved) for optimization are:

$$u'(w_0 - P + I(x) - x) - \lambda(1 + c'[I(x)]) = -\mu(x)$$

with $\mu(x) = 0$ if $I(x) > 0,$ but $\mu(x) \geq 0$ otherwise. Since the LHS in (4) is an increasing and continuous function of x , there exists a unique $D \geq 0$ which is defined by:

$$u'(w_0 - P - D) = \lambda(1 + c'(0))$$

and such that the optimal indemnity schedule is the one in (C1). Differentiating (4) in x in the range where $I(x) > 0$, and rearranging leads to the expression for the marginal coverage (C2). ■

Second order conditions are satisfied since every function is well behaved. The following proposition focuses on the existence of a non trivial deductible.

Proposition 2 : *i) Assume* $p_0 > 0$ *; then: a)* $c' > 0$ *is necessary for efficient contracts to involve a* $D > 0$ *; b) if* $c' = 0$ *, then* $D = 0$ *and the optimal contract provides full insurance of each loss.*

ii) Assume $p_0 = 0$ *; then, any efficient contract contains a strictly positive deductible if and only if* $c' > 0$.

Proof : Integrating condition (4) leads to:

$$\int_0^M \left(u'(w) - \lambda(1 + c'[I^*(x)])\right) dF(x)$$
$$= -\int_0^M \mu(x) dF(x)$$

The maximization of (1) under (2) with respect to P gives:

$$p_0 u'(w_0 - P) + (1 - p_0) \int_0^M u'(w) dF(x) = \lambda$$

Hence, condition (5) may also be written as:

$$\int_0^M \mu(x) dF(x)$$
$$= p_0 \left[u'(w_0 - P) - \int_0^M u'(w) dF(x) \right]$$
$$+ \lambda \int_0^M c'[I^*(x)] dF(x)$$

i) Assume that the optimal policy contains a strict deductible $D > 0$ with a coinsurance arrangement above D such that according to proposition 1: $I(x) - x < 0$, and with $\mu(x) \geq 0$ for x smaller than D . By concavity of u, we thus have for all $x \in]0, M]$:

$$u'(w_0 - P) \leq u'(w_0 - P + I(x) - x)$$

and integrating both sides yields:

$$\left[u'(w_0 - P) - \int_0^M u'(w) dF(x) \right] < 0$$

a) As a result, it must be that $c' > 0$ in order that the RHS of (7) be positive. However, this is not sufficient: sufficiency requires either that the insurance premium entails a cost in terms of welfare high enough (see $\lambda > 0$ in (6)) or that the (expected) marginal cost for the insurer be high enough. Otherwise, the RHS is negative, contradicting that $\mu(x) \geq 0$ at least for some x .

b) On the other hand, assume that $c' = 0$; then $I(x) - x < 0$ at least for some x cannot be optimal since it implies that the LHS of (7) takes a negative sign, contradicting that $\mu(x) \geq 0$. In contrast, a policy paying $I(x) = x$ for all x (zero deductible and full reimbursement of all losses) implies that the bracketed term is nil, and thus $\mu(x) = 0$ for all x , such that (7) holds.

ii) is the standard result (see Raviv (1979)), which is straightforward from (7) setting $p_0 = 0$. ■

The following corollary focuses on the specific case of Arrow (1963).

Corollary 3: *Assume that* $c' = \ell = cons\tan t$. *There exists a probability-threshold* $\hat{p} \equiv \frac{\ell}{1+\ell} \in]0,1[$ *such that:*

i) if p_0 *is small enough in the sense that* $p_0 \leq \hat{p}$, *then the optimal deductible is strictly positive.*

ii) if p_0 *is large enough in the sense that* $p_0 > \hat{p}$, *then the optimal deductible may be nil.*

Proof : Using condition (6), condition (5) also writes:

$$(1-p_0)\int_0^M \mu(x)dF(x) = p_0 u'(w_0 - P)$$
$$+\lambda\left[(1-p_0)\int_0^M c'[I^*(x)]dF(x) - p_0\right]$$

and when $c' = \ell = cons\tan t$, the bracketed term reduces to $(1-p_0)\ell - p_0 = \ell - p_0(1+\ell)$.

i) Assume that $\ell - p_0(1+\ell) \geq 0 \Leftrightarrow p_0 \leq \hat{p}$; the RHS in (8) is strictly positive, implying that the LHS in (8) must also be positive at equilibrium: as a result, it exists some values of x for which $\mu(x) > 0$; hence the result that efficient contracts contain a non trivial deductible.

ii) Conversely, assume that:

$$\ell - p_0(1+\ell) < 0 \Leftrightarrow p_0 > \hat{p}$$

Then the RHS in (8) may be either positive or negative, depending on the various parameters of the model and/or the shape of the insured's utility function, and in some cases the deductible may trivially be close to $D = 0$. ■

The intuition of corollary 3 is that p_0 is associated to the no-accident/no-loss event: thus, when p_0 is small enough, the probability to pay the premium and being not compensated by the insurer is small. According to (5), the cost in terms of welfare due to the premium charged is spread among all the states of the nature; moreover, it is easily compensated by the insurance policy even when the coverage is concentrated on the states of the nature where the damage is the higher, since the marginal utility of wealth is the larger in those states. Thus, it is optimal for the insured to accept a positive deductible in order to lower the effective premium and obtain full compensation for the infra-marginal losses over the deductible[1]. In contrast, as p_0 increases, the cost in terms of welfare is focused on the no-accident event and sometimes it may not be compensated by insurance reimbursements unless the damage is paid back to the insured in each state of the nature. Providing almost full insurance would be optimal in such a situation. The argument is close to the one developed

[1] According to (C2), we have $I'^*(x) = 1$ if $x > D$.

by Johnson and alii (1993). However, it is not clear whether this occurs for a reasonable numerical simulation of the expected-utility model, as we will show now.

4 Discussion

Let us focus on the case $c' = \ell = cons\tan t.$

In this case, Arrow's famous theorem establishes that " if a insurance company is willing to offer an insurance policy against loss desired by the (expected-utility) buyer at a premium which depends only on the policy's actuarial value, then the policy chosen by the risk-averting buyer will take the form of of 100 percent coverage above a deductible minimum" (Arrow (1971)). Basically, it is usually recognized that the deductible clause reflects the best possible trade-off between two conflicting objectives implicit to insurance contracting: on the one hand, the promise for the risk-averse insured to obtain, at a reasonable price, the highest possible coverage for the most severe losses he may be facing; on the other, the willingness of the insurer to minimize the transaction costs incurred in its activity, since these costs represent a dead-weight loss on any contract. As a result, risk-averse consumers never purchase insurance against small losses for which the benefits obtained are smaller than the transaction costs incurred to fill these claims. From a practical point of view, the problem of insuring any risk for any risk-averse consumer becomes a simple one, whatever the characteristics (nature) of this risk: the selection of an optimal deductible level. Our results is consistent with this view, but cast some doubt about whether high deductibles are desirable for insuring low probability events, and/or how the deductible is sensible to the probability (mass) of accident.

The first issue is the extent to which $p_0 \le \hat{p}$ may appear as a stringent sufficient condition. Due to a lack of information about the costs structure in different insurance lines, the sufficient condition in corollary 3ii) may be equivalently stated in terms of a threshold value for the marginal cost in insurance: for values of ℓ above a threshold $\tilde{\ell} = \frac{p_0}{1-p_0}$, the deductible policy is still efficient. Sufficiency says now that the larger the probability of no loss the larger the marginal cost incurred by insurer required to obtain a deductible clause. In practice individuals are exposed to very small probability events during their lifetime. The most frequent risks such as affecting both their human and non-human wealth correspond to values for $1-p_0$ smaller than 10^{-3} (in annual rate). It is straightforward to see that for deductible policies to be optimal, it must be that the loading factor be closed to huge values; for an example, take $1-p_0 = 1/4000$, then $\tilde{\ell} = 3999$. Such huge values are empirically unlikely.

Finally, let us consider as an illustrative example the following calibration of the model. Assume that X is uniformly distributed on $[0, M]$ with $f(t) = \frac{1}{M}$ and suppose that the insured/consumer displays constant relative risk aversion, with $u(w) = -\frac{1}{1-\theta} w^{1-\theta}$. We assume that $w = 300000$ and $M = 250000$.

In the next tables, we display the results of the simulation for the sensibility of both the premium (based on the variable cost of the insurer[2] *i.e.* up to the fixed-cost of the insurer, due to the lack of information on c_0) and the deductible to: the probability p_0 , the risk-aversion parameter θ and marginal cost (loading factor) ℓ .

To begin with, we consider the influence of the probability of no accident.

[2] The value of the premium charged by the insurer is given by:
$P = (1+\ell)\left(\frac{1-p_0}{M}\right)\left(\frac{M^2+D^2}{2} - M.D\right) + c_0.$

Table 1. Sensibility to p_0
($\theta = 2; \ell = 10\%$)

p_0	$P - c_0$	D
$1 - \frac{1}{400}$	306,38	13982
$1 - \frac{1}{500}$	245,11	13978
$1 - \frac{1}{600}$	204,26	13975
$1 - \frac{1}{4000}$	30,642	13963
$1 - \frac{1}{5000}$	24,514	13963
$1 - \frac{1}{6000}$	20,428	13963

Table 1 shows that the premium charged by the insurer is far more sensible to the risk of accident (P decreases with p_0) than the deductible: D decreases with p_0 but as the probability of no-accident becomes enough large, D is almost constant.

The value $\theta = 2$ is generally seen as a reasonable one for the relative risk-aversion index. However, several studies (see for example Mehra and Prescott (1985), Kocherlakota (1990)) have provided arguments that larger values of θ may be plausible, at least useful, to provide the solutions to several empirical puzzles in the area of consumer's behavior on financial markets. Table 2 considers cases where $\theta \geq 2$:

Table 2. Sensibility to θ
($p_0 = 1 - \frac{1}{4000}; \ell = 10\%$)

θ	$P - c_0$	D
2	30,642	13963
3	31,843	9382
4	32,460	7064
10	33,596	2849

Table 2 shows now in contrast to table 1, that the deductible is more sensible to the insured's risk-aversion index than the premium. P increases with θ and D decreases with θ - however, the increase in the premium is smaller than the decrease in the deductible, in the sense than doubling θ allows to divide the deductible by almost a factor 2, while the increase in the premium is quite moderate. Moreover, it appears that the expected-utility model cannot explain that small deductibles may be desirable, unless we consider the opportunity of a large risk-aversion index.

Table 3. Sensibility to ℓ
($p_0 = 1 - \frac{1}{4000}; \theta = 2$)

ℓ	$P - c_0$	D
10%	30,642	13963
20%	30,067	26143
30%	29,521	36888

The last issue is the influence of the loading factor, which has a key role in Arrow's analysis. The last table focuses on the relationship between the insurer's (constant) marginal cost and the optimal insurance contract. Table 3 shows that the increase in the loading factor (insurer's marginal

cost) affects more the deductible than the premium charged by the insurer. Multiplying the loading factor requires almost doubling the deductible level.

5 Conclusion

Despite the attractiveness of Arrow's theorem and the generalizations afforded, it is well known that it does not match so easily empirical findings. Both experimental evidences and data on effective insurance purchases show that consumers do not like (large) deductibles. Johnson and ali (1993) argued that the even assumption according to which the insurance premium is perceived as a segregate loss actually implies that expected utility-based models are not able to explain why consumers actually reject deductible. The argument is as follows. Consider a risk with a small probability of occurrence and a large probability of no loss; for the consumer, the no accident-no loss state is perceived as a segregate state: it is associated to a segregate cost, the insurance premium, implying a high loss of welfare since it is not compensated by the payment of an indemnity. Hence, to compensate this cost, the insured will accept any contract which yields sufficiently high expected benefits in case of loss through the payment of the indemnity. It can be the case that it is obtained only through coinsurance contracts, associated to an admissible premium - based on expected costs which are not excessive for the insurer *as compared* to the small probability of loss. In words, the efficient design of insurance contracts for low probability events reflects a trade-off between two dead weight losses: the premium paid by the insured and the transactions costs incured by the insurer. On the other hand, Chichilnisky (2000) argued that the expected utility functional displays insensitivity to small-probabilities events, and thus is not an appropriate tool to analyze decision problems with small probability events (emerging from environmental risks or more generally from catastrophic risks).

To summarize, our findings are in some sense more conservative: the expected-utility model predicts that the deductible displays a weak sensibility to the probability (mass) of accident but a more significant sensibility to the loading factor in insurance and/or to the risk-aversion index of the insured. We also find that in order to rationalize small deductible levels, we need large values of the (relative) risk-aversion index, a result consistent with previous findings on financial markets.

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ENGLISH INFLUENCES IN ROMANIAN BUSINESS VOCABULARY

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Abstract:

Our language reflects directly and ceaseless all changes that take place in a community, at the economical level, political, administrative, technical or informational. For this reason, our language creates new words with its own resources: derivation, composition, lexical family and borrowing. Usually, a language borrows from that foreign language that produces the innovation in a specific domain.

If in the 19th century, the source of Romanian borrowings was literary Latin and neo-Romanics languages, especially French and Italian, and in some domains of techniques Romanian borrowed more from German, nowadays, the principal origin of borrowings is English. As we can easy check up Romanian borrows more words from English especially in domains like informatics, business, management, marketing, but also in fashion, music, showbiz and even in Romanian argotic language.

From this point of view, barrowings (or loanwords) are a necessity of a language to cover a notion or concept that didn't exist before and the Romanian language cannot create a correspondent to cover that meaning. Business language became daily language based on situations which arise daily in ordinary businesses from Monday to Friday. Words like manager, staff, credit card, design, advertising, agreement, show-room had entered in our usual vocabulary. We will analyze the importance of loanwords, their classifications and their correct use in Romanian language.

Keywords: loanwords, Business English, Romanian language, Anglicisation, linguistic globalisation.

JEL Classification: A12, M21

I. Introduction to Business English. Definition and Its Main Characteristics

Business English is English especially related to international commerce. It is well- known that Business English is a subfield within English language learning and teaching, that includes i) face-to-face communication, ii) giving a presentation, iii) writing communication, iv) different forms of intercultural communication and or paralinguistic features.

Communications skills or face-to-face communication includes general recommendations for improving communications skills or gives solutions to barriers to everyday communication by studying thoroughly communicating effectively, using appropriate English, using your voice effectively, non-verbal communications, interpersonal communications, phone skills, etc.

By giving a presentation you must understand the structure of a presentation, the art of convincing and the importance of the role plays. We must also take into consideration that a businessman must know the characteristics of different type of interview, like being interviewed by the media, exit interviews, general guidelines for conducting interviews, interviewing for a job, interviewing job candidates.

In general, modern theories on writing instruction focus on the process of writing-the practices experienced writers typically use as they craft texts. The process-approach to writing focuses on methods for generating, drafting, revising, and polishing a piece of writing. As inexperienced writers become better versed in these steps and the various strategies they entail, they become more aware of textual and syntactic possibilities and how they help to achieve meaning. Particularly, in Business English, writing communication includes many kinds of letters, e-mails, memorandums, short and long rapports, concise, cleat and convincing style and common errors in English.

Intercultural communication refers to behavioural characteristics or body-language elements which are manifested in our way of being. Apart from words, there are many other devices that also help indicate and support meaning: paralinguistic features such as intonation, emphasis, volume and pace; non-verbal norms such as physical distance, touch and eye contact and cultural features, for example ways of indicating agreement, of being polite.

Business English became a specific element of English language learning and teaching; for example, the teachers' organisation IATEFL has a special interest group called BESIG. Many non-

native English speakers study the subject with the goal of doing business with English-speaking countries, or with companies located outside the Anglosphere but which nonetheless use English as a *shared language* or *lingua franca*. Much of the English communication that takes place within business circles all over the world occurs between non-native speakers. In cases such as these the object of the exercise is efficient and effective communication. The strict rules of grammar are in such cases largely ignored, when, for example, a stressed negotiator's only goal is to reach an agreement as quickly as possible. Business communication encompasses a variety of topics, including marketing, branding, customer relations, consumer behaviour, advertising, public relations, media relations, corporate communication, community engagement, research and measurement, reputation management, interpersonal communication, employee engagement, online communication and event management.

Electronic Business, or e-Business, may be defined broadly as any business process that relies on an automated information system. Today, this is mostly done with Web-based technologies. The term "e-Business" was coined by Lou Gerstner, Chief Executive Officer (CEO) of IBM.

Electronic business methods enable companies to link their internal and external data processing systems more efficiently and flexibly, to work more closely with suppliers and partners, and to better satisfy the needs and expectations of their customers.

In practice, e-business is more than just e-commerce. While e-business refers to more strategic focus with an emphasis on the functions that occur using electronic capabilities, e-commerce is a subset of an overall e-business strategy. E-commerce seeks to add revenue streams using the World Wide Web or the Internet to build and enhance relationships with clients and partners and to improve efficiency using the Empty Vessel strategy. Often, e-commerce involves the application of knowledge management systems.

E-business involves business processes spanning the entire value chain: electronic purchasing and supply chain management, processing orders electronically, handling customer service, and cooperating with business partners. Special technical standards for e-business facilitate the exchange of data between companies. E-business software solutions allow the integration of intra and inter firm business processes. E-business can be conducted using the Web, the Internet, intranets, extranets, or some combination of these.

E-Business abounds, but the secret to profits continues to elude many of them. Until now, E-biz expert Michael Gendron turns the tide as he explains that the emergence of technology demands a change in the way management views and thinks about business -not just in the way it employs business technologies. Michael Gendron shows to managers how to use technologies to maximize their potential by thinking of their businesses in entirely new ways. There are myriad benefits to be gained from new technologies, but that's where typical management thinking stops. To have a true e-commerce mindset one must ask: What things must we do to earn these benefits? How must we rethink our businesses? What, in fact, are we trying to accomplish? Creating the new E-business company: innovative strategies for real-world applications give managers the tools to find the answers for their organizations. Powerful, practical, and insightful, it illustrates how a conversion to e-commerce thinking boosts bottom line benefits--in real time.

So, the Business Communication message is conveyed through various **channels of communication**, including the Internet; print Publications, radio, television, ambient, outdoor, and **word of mouth**. Business communication is a common topic included in the curricula of the Masters of Business Administration (MBA) program of many universities. There are several methods of business communication, including: *web based communication* - for better and improved communication, anytime anywhere; *e-mails* - which provide an instantaneous medium of written communication worldwide; *reports* - important in documenting the activities of any department; *presentations* - very popular method of communication in all types of organizations, usually involving audiovisual material, like copies of reports, or material prepared in Microsoft PowerPoint or Adobe Flash*; telephoned meetings*, which allow for long distance oral communication; *forum boards*, which allow people to instantly post information at a centralized location; and face to face meetings, which are personal and should be succeeded by a written follow-up.

This is the reason why the Indian linguist Braj B. Kachru has created the theory of the "expanding circle"[1]; at the base of this theory is the idea of three concentric circles of the language. The first circle is "inner circle" and it represents the traditional bases of English, and most, but not all, of the speakers are white (the United Kingdom, the United States, English Canada and South Africa, Australia, New Zealand, Ireland, Malta, and some of Caribbean territories).

The total number of English speakers in the inner circle is as high as 380 million, of who some 120 million are outside the United States. The United Kingdom, the USA, Australia, New Zealand and partly South Africa, Canada and the Anglophone Caribbean belong to the inner circle that is 'norm-providing'. That means that English language norms are developed in these countries - English is the first language there. The second circle is also called the "outer circle", which includes countries where English is not an official language, but is important for historical reasons (e.g. the British Empire) and plays a part in the nation's institutions. This circle includes India, Nigeria, the Philippines, Bangladesh, Pakistan, Malaysia, Tanzania, Kenya, non-Anglophone South Africa and Canada etc. The total number of English speakers in the outer circle is estimated to range from 150 million to 300 million.

Virtually all these people are non-white. To the outer circle - which is 'norm-receiving' - belong countries like Nigeria, India, Bangladesh, Kenya, the Philippines or Tanzania. The third circle is the "expanding circle" encompasses those countries where English plays no historical or governmental role, but where it is nevertheless widely used as a foreign language or lingua franca. This includes much of the rest of the world's population: China, Russia, Japan, most of Europe, Korea, Egypt, Indonesia, etc. The total in this expanding circle is the most difficult to estimate, especially because English may be employed for specific, limited purposes. The estimates of these users range from 100 million to one billion. Here too, the majority is non-white. The outer circle is seen as 'norm-developing,' because it is this circle where most of the creative potential of lingua franca-English is to be found.

Romania as we can see is part the "expanding circle", because it integrated in countries where English plays no historical or governmental role, but where it is nevertheless widely used as a lingua franca.

As a conclusion to this introductory part of our work we understand that Business English, as part of English language learning and teaching, became in time also a fundamental form of *business communication*, meaning part of the communication used to promote a product, service, or organization; relay information within the business; or deal with legal and similar issues. So, Business English has at least two fundamental components a). the linguistic component or communicational component and b). the business component or the economical component.

Both these two components implies the correct use of the English language and the correct use of business language, which means that we a psychological-linguistic component and a social-economic component that will help us to understand easily the complexity and the dynamic which characterises the relation between Business English and Romanian vocabulary. Business English means different things to different people. For some, it focuses on vocabulary and topics used in the worlds of business, trade, finance, and international relations. For others it refers to the communication skills used in the workplace, and focuses on the language and skills needed for typical business communication such as presentations, negotiations, meetings, small talk, socializing, correspondence, report writing, and so on. In both of these cases it can be taught to native speakers of English, for example, high school students preparing to enter the job market.

Business English can also be a form of international English.

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[1] For more details on the theory of the "expanding circle" see *The Handbook of World Englishes* by Braj B. Kachru, Yamuna Kachru, Cecil L. Nelson, Blackwell Publishing, 2006. *The Handbook of World Englishes* is a collection of newly commissioned articles focusing on selected critical dimensions and case studies of the theoretical, ideological, applied and pedagogical issues related to English as it is spoken around the world. Braj B. Kachru is Center for Advanced Study Emeritus Professor of Linguistics and Jubilee Professor of Liberal Arts and Sciences at the University of Illinois at Urbana-Champaign. He is co-founder and co-editor of the journal World Englishes, published by Blackwell.

2. From Linguistic Globalisation to Anglicisation

Our language reflects directly and ceaseless all changes that take place in a community, at the economical level, political, administrative, technical or informational. For this reason, our language creates new words with its own resources: derivation, composition, lexical family and borrowing. Usually, a language borrows from that foreign language that produces the innovation in a specific domain.

If in the 19th century, the source of Romanian borrowings was literary Latin and neo-Romanics languages, especially French and Italian, and in some domains of techniques Romanian borrowed more from German, nowadays, the principal origin of borrowings is English. As we can easy check up Romanian borrows more words from English especially in domains like informatics, business, management, marketing, but also in fashion, music, showbiz and even in Romanian argotic language. As a rule, Business English is used by persons that already have an intermediate level of English language and they work in management or they are implied in daily communication of international business medium.

A vocabulary is a set of words known to a person or other entity, or that are part of a specific language. The vocabulary of a person is defined either as the set of all words that are understood by that person or the set of all words likely to be used by that person when constructing new sentences. The richness of a person's vocabulary is popularly thought to be a reflection of intelligence or level of education. But, richness of a person's vocabulary sustains popularly thought to be a reflection of his capacity to communicate with his business partners and to understand its ideas and possibilities.

A vocabulary of a language has many ways of multiplying its own words: derivation, compositions, lexical family and borrowing from other languages.

A loanword (or loan word) is a word directly taken into one language from another with little or no translation. By contrast, a calque or loan translation is a related concept whereby it is the meaning or idiom that is borrowed rather than the lexical item itself. The word loanword itself is a calque of the German *Lehnwort*. Loanwords can also be called *borrowings*.

Romanian language barrowed a lor of words from different domains: business, IT, shopping, music, electronics, fashion, showbiz and even in argotic part of the language. Many Romanian linguistics, like Mioara Avram[2], Theodor Hristea, Ilinca Costantinescu, Ileana Busuioc and Cristina Călăraşu are talking about *the linguistic globalisation* and *Anglicisation*. But these two concepts that have been more and more frequently used in various researches are different. Thus, linguistic globalisation is seen as a consequence of modern economic worldwide inter-dependency, economic trend that needs a sole means of communication; the choice of English language to fulfil this role is the result of a combination of historical circumstances. From the linguistic perspective, the phenomenon reaches certain issues of bilingualism, seen as an individual phenomenon, and not as a collective one. The second concept – *Anglicisation*, although having a clear tendency of internationalisation, is a phenomenon that results from the evolution of one language or another and is included in the 'linguistic influence' phenomenon.

We will try to find the words from Business English that became familiar to Romanians and their significance in the process of barrowing words.

Firstly, we will notice that there are more kinds of borrowings:

1. the necessary borrowings (loanwords);

2. the unnecessary borrowings.

Lexical borrowings or loanwords are a necessity of a language to cover a notion or concept that didn't exist before and the Romanian language cannot create a correspondent to cover that meaning. Sometimes a borrowing may never become nativized and occasionally the loan word will actually affect the borrowing language itself. Researchers measured the degree of a loan word's integration into the language by frequency of use, native synonymy replacement (i.e., existing words in the L1 will be replaced by the new loan words with similar meanings), morphophonemic/syntactic integration (adapting to the sound and grammar systems of the L1), and speaker acceptability. There are two types

[2] See the essay of Mioara Avram entitled *Anglicismele în limba română actuală*, in Conferinţele Academiei Române, Ciclul Limba română şi relaţiile ei cu Istoria şi Cultura românilor, Bucureşti, 1997.

of loan words. The first type is phonologically similar in the donor language form and the borrowing language form. This 'transliterated' loan word is used in the borrowing language with the closest possible sound and the closest possible meaning to the original word. This final type of borrowing is cited by Haugen who points out that the native word has no phonological similarities to the foreign word. These arguably do not constitute true loan words, and will not be considered here.

Necessary borraowings (loanwords)	
Business field	antitrust, briefing, broker, business, cash and carry, consulting, direct marketing, establishment, internet banking, trust, job, job full-time, part-time job, leasing, low cost, management, mass-market, promoter, PR, retail, tour-operator, team building , team, meeting, voucher, discount, salesman, leasing, show-room,
IT&C	computer, network, hard, hardware, software, web, mouse, CD ROM, Internet, click, CD, DVD, user, panel, web-page, icon, skin, shortcut, playlist, online, offline, spam, attachment, blog, gadgets, software, e-mail,
Modă	modeling, styling, shopping, fancy, sexy, eye-liner, lip gloss, make-up artist, hair stylist, fitness, club, web club
Advertising	trademark, spot, creative director, web designer, design, banner, brand, brand awareness, brand equity

For example, we take the word *brand*. In Merriam-Webster dictionary, the word *brand* has five meanings. The fourth meaning is "a class of goods identified by name as the product of a single firm or manufacturer". Incredible, Eric E. Schmidt, Chief Executive Officer of Google, says in an interview that "the notion brand is wrong understood even by the most important marketing companies"[3]. So this word is a necessary borrowing.

Unnecessary borrowings are stylistic, euphemistic, fancy borrowings. Unnecessary borrowings overlap with Romanian equivalents.

Unnecessary BORRAOWINGS	
Business field	manager (director), workshop (seminar), advertising (publicitate)
Mass media	panel (tema de discuţie), press release (comunicat de presă)
Termeni din sport	goalkeeper, poll position, draft at (jucător transferat), under 20 (junior)
Modă	fashion, top (bustieră),
Termeni culinari	ham (şuncă), toast (pâine prăjită), barbecue (grătar)
IT	a da delete (a şterge), a printa (a tipări), a da install (a instala), a restarta (a reporni)

There are also Romanian business magazines that have English name: SMART financial (www.smartfinancial.ro), Wall-Street (www.wall-street.ro), Business-edu (www.business-edu.ro), Pont.web (www.pontweb.ro).

3.Conclusion

The language change which results from language contact can be examined on many levels, one of which is the phenomenon of borrowing, or the use of a lexical item in language.

The borrowings are consequently spoken and understood by younger interlocutors and speakers who study English, and ideas of a loan word's integration into Romanian varies accordingly. The process of borrowing is one of the most frequent ways of acquiring new words, and speakers of all languages do it. One of the initial reasons for borrowing is when one language has a semantic "gap" in its lexicon (i.e. when there is no existing word in the language with the same meaning as the loan) and needs to borrow a term to express the necessary idea or concept. Sociolinguistic reasons for borrowing include using foreign terms as is generally the case, building a sense of speaker identity, because borrowing is a result of language contact and thus a result of culture contact. The socioeconomic status of the speakers has been shown to be a determinant factor of borrowing rates, in both the type of

[3] See the interview taken by Dragoş Dragomirescu, Chief Executive Officer of Creativebynature™ (http://www.creativebynature.ro) that is a creative agency specialized in web design and branding.

words and the quantity of words. The process by which a foreign word becomes a loan word is gradual. True loan words are typically regarded as phonologically, morphologically, and grammatically integrated into the host language. We can recognize two levels of borrowing: 'pure' borrowing, where the word retains all its native features, and 'adjusted' borrowing, where the word adapts to the structural criteria of the host language. Different linguists, like Bloomfield (1933) and Olmsted (1986), distinguish between three levels of linguistic integration: words used but retaining foreign phonology, words partially integrated into the borrowing language, and words fully integrated and indistinguishable. Complex motivations lie behind the form a loan word takes in the borrowing language, and such motivations are based on the patterns of word formation in both the donor and borrowing languages.

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STATE – OF – ART OF INDIAN COMPETITIVENESS

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Abstract

Competitiveness makes or mars performance of firms, industries, nations in the current hyper competitive global market. India is one of the fastest growing economies of the world in recent years. One after another study, is projecting that India would be a leading economy in 21st century. This research work is an attempt to study the competitiveness of India. It looks at both macro and micro aspects. To have a macro perspective, it studies the performance of Indian economy in two prominent indices of competitiveness. India has improved its rankings in the competitiveness indices. To have a micro perspective, it undertakes a literature review on the subject in Indian context. The findings are mixed and the firms, industry and the country need to put in efforts for improving its competitiveness. The findings are mixed on the impact of liberalisation on competitiveness. It identifies government level issues and firm level issues for competitiveness.

Key words: India, competitiveness, liberalization, globalization, global competitiveness.

JEL Classification: C43, F02, F43, O11, O12

1. Introduction

The international business scenario has witnessed privatisation, liberlisation and globalization changes in the last part of 20th century. These changes has made the global economy increasingly hyper competitive. The new age of competition is distinct because of the dramatic increase in competitive actions and reactions between the firms. (Grimm et al, 2006).Competitiveness has become a major focus area of firms and countries across the globe (Porter, 1980, 1985, 1986, 1990, Momaya, 2001, WEF, 2005, 2006, 2007, IMD, 2005, 2006, Pillania, 2007).

India is one of the fastest emerging economies. It is projected to be one of the top three economies along with USA and China by 2050 (Goldman Sachs, 2003).As the economy grows further and tries to maintain the recent high growth rates, the issues of competitiveness needs to be addressed. This research work is an attempt to study the competitiveness of India taking into consideration both macro and micro perspectives.

This research work is divided into four sections including this introductory part. The second section focuses on the macro perspective and studies the international competitiveness in terms of rankings. The third section undertakes a literature review to identify the issues in competitiveness. The last section provides possible future directions for research besides the conclusion part.

2. Indian competitiveness: global standing

Globally there are two leading competitiveness research centers World Economic Forum with Michael Porter and Institute of Management Development (IMD).These centers comes out with an annual competitiveness ranking of countries. This section of the study focuses on studying these two reports over the years to evaluate Indian competitiveness among the world economies.

Global Competitiveness Rankings (World Economic Forum): The Global Competitiveness Rankings given by World Economic Forum has two major components namely Growth Competitiveness Index and Business Competitiveness Index.

Growth Competitiveness Index

India improved its ranking from 1999 to 2006 which means she became more competitive. But its performance declined in 2003 and improved again in 2004, 2005 and 2006.This improvement is because of the improvement in the Technology Index. The Macroeconomic Environment Index did not change whereas the Public Institution Index deteriorated during the period.

Table 1. Growth Competitiveness Index

Year	1999	2000	2001	2002	2003	2004	2005	2006
India	51	48	57	48	56	55	50	43
Total number of countries	58	59	75	80	102	104	117	125

Source: Porter et al, *The Global Competitiveness Report, World Economic Forum,* Geneva, 2000, 01, 02, 03-04, 04-05, 05-06, 06-07.

The Growth Competitiveness Index has three components, namely, Macroeconomic Environment, Public Institutions, and Technology. Indian ranking on the three components is shown in Table 2. The table corroborates that Indian macroeconomic environment kept fluctuating and has deteriorated over the years. It can be observed from the table India climbed up thereby implying that the public institutions performed well. The table 2 corroborates that India climbed down in technology index rankings thereby implying that it did not performed well in technology.

Table 2. Indian Ranking in the Components of the Growth Competitiveness Index

Year Index	2002	2003	2004	2005	2006
Macroeconomic Environment Index	18	52	52	50	88
Public Institutions Index	59	55	53	52	34
Technology Index	57	64	63	55	62
Total Number of Countries	80	102	104	117	125

Source: Porter et al, *The Global Competitiveness Report, World Economic Forum,* Geneva, 2000, 01, 02, 03-04, 04-05,05-06,06-07.

Business Competitiveness Index (BCI)*

The Business Competitiveness Index Table for 1998-2006 demonstrates that Indian rank improved over the years which means it became more competitive. The name of the index was initially Current Competitiveness Index (CCI) than changed to Microeconomic Competitiveness Index (MCI) and finally to Business Competitive Index (BCI). Interestingly the components of the index have not undergone any changes.

Table 3. Business Competitiveness Index (BCI)

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006
India	44	42	37	36	37	37	30	31	27
Total number of countries	58	58	59	75	80	101	104	117	125

Source: Porter et al, *The Global Competitiveness Report, World Economic Forum,* Geneva, 2000, 01, 02, 03-04, 04-05,05-06,06-07.

The Business Competitiveness Index has two components, namely, Company Operations and Strategy; and Quality of National Business Environment. Indian performance on these two components is shown in table 4. It can be inferred from the table that India climbed up in Company Operations and Strategy rankings implying that their company operations and strategy improved over the years. Similarly, it can be inferred from the table that India climbed up in Quality of National Business Environment rankings implying that the quality of national business environment improved during this period.

Table 4. Indian Ranking in the Components of the Business Competitiveness Index

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006
Company Operations and Strategy	50	48	40	-	40	40	33	30	25
Quality of National Business Environment	42	43	37	-	37	36	29	31	27
Total number of countries	58	58	59	75	80	101	104	117	125

Source: Porter et al, *The Global Competitiveness Report, World Economic Forum,* Geneva, 2000, 01, 02, 03-04, 04-05, 05-06, 06-07.

Global Competitiveness Rankings (IMD): The Global Competitiveness Rankings given by IMD is shown in table 5.It clearly shows that India has improved in overall competitiveness rankings as shown in table 8.Even though the total number of countries has increased, India has improved its competitiveness ranking.

Table 5. Global Competitiveness Index (Overall Rankings)

Year	2002	2003	2004	2005	2006
India	41	50	34	39	29
Total number of countries	48	59	60	60	61

Source: *World Competitiveness Yearbook*, IMD, 2003, 2004,2005,2006,2007

The overall ranking has four components namely, Economic Performance, Governance Efficiency, Business Efficiency, and Infrastructure. Indian performance on these components is shown in table 6.India has tremendously moved up in economic performance over the five years time period and has deteriorated in terms of its governance efficiency rankings as shown in the table. Even though the number of countries increased by one fifth, it has gown down in rankings in governance efficiency. The business efficiency rankings have improved over the time period whereas infrastructure continues with a lower ranking and is a major problem with Indian competitiveness. To conclude, Indian business sector and economy is improving in rankings but the governance and infrastructure are issues to be dealt with. Overall, the country has improved its competitiveness ranking.

Table 6. Indian Ranking in the Components of Global Competitiveness Index

Year Component Index	2002	2003	2004	2005	2006
Economic Performance	17	22	12	12	7
Governance Efficiency	34	43	33	39	35
Business Efficiency	41	51	22	23	19
Infrastructure	49	58	57	54	54
Total number of countries	48	59	60	60	61

Source: *World Competitiveness Yearbook*, IMD, 2003, 2004, 2005, 2006, 2007

3. State of indian competitiveness: literature review

CII and WEF (2006) discuss India's competitiveness and try to identify how to become one of the ten best performing economies in next ten years. It debates on who takes the lead role-big business or government. It identifies infrastructure, ICT access and corruption as three key issues to be addressed for increasing Indian competitiveness.

Bhinge (2004) identifies the success factors behind manufacturing success of china and suggests ways for making Indian manufacturing globally competitive. He finds the key drivers for low prices in

China as compared to India as follows: Average Import duties of 13 % as compared to 25% in India, Indirect taxes at 14 % of retail price as compared to 25-30% in India, weighted average cost of capital of 9 % as compared to 11 % in India, reliable power supply, labour productivity higher by 10 -300% , and, margins lower by 4-7 % as compared to India driven by higher competition and lower import duties differentials. This low cost base coupled with lower margins has contributed significantly to lower consumer prices, which lead to a two pronged effect: fueled domestic consumption and made Chinese products more competitive in global markets. A major catalyst for accelerated Chinese growth has been the Special Economic Zones (SEZs), but in India these SEZs barring a few have not contributed much. There are a lot of lessons that can be learned from Chinese experience. The critical policy initiatives necessary to foster Indian manufacturing competitiveness are reduction in import duties, reduction in indirect taxes, infrastructural reforms, labour reforms, local regulation reforms and emphasis on SEZs.

Businessline (2004) discusses the establishment of National Manufacturing Competitiveness Council. The council has been made responsible for delivering the goods on a very wide front-evolving policies and conditions which encourage competitive, sustainable and efficient indigenous creation of value through manufacturing sector-as to make its task daunting. The NMCC is overloaded with officialdom and crowded with representatives from various government departments. The most essential pre-requisite for the NMCC to make a meaningful contribution is to undertake a through inquiry into the problems and possibilities in India's manufacturing sector in conjunction with various industry associations and think tanks. A lot of studies have been done in recent past on manufacturing sector and NMCC should take benefit of that. It could also draw on the expertise of Quality Council whose charter includes promotion of competitiveness as its core objective. In short, NMCC should strive for a synergistic, symbiotic and synchronous strategy pooling resources, talents and ideas rather than getting embroiled in a turf war.

Businessline (2004) interviews V. Krishnamurthy, Chairman, and National Manufacturing Competitiveness Council. The council does not intent to make "a report which will remain in archive but to suggest practical measures to help the government also to implement" them for improving the competitiveness and efficiency of domestic manufacturing sector. USA and UK have found competition council very useful instrument as their economies have considerably benefited by it. For competitiveness four actions are required: at the enterprise level, to go for size, technology absorption; the sector as a whole might require some common testing and processing facilities entailing a lot of investment, which the particular enterprise might not be able to do but it has to be done partly by the government and partly by the industry association; right kind of infrastructure; and, changes in taxation both direct and indirect which is making end products quite expensive. The council will study and suggest measures that may be directed to the government and even to individual enterprises to make them more efficient and identify the common factors. It can also use its influence with government to provide the necessary additional support for industry to become competitive.

Farrell and Zainulbhai (2004) discuss the research done by McKinsey Global Institute. The research indicates that the FDI has had an overwhelming positive impact on India. The introduction of foreign competition in information technology, business process outsourcing and car making has prompted Indian companies to boost productivity and some of them have become global competitors. FDI is still just 0.7 % of GDP and large parts of the economy remain sheltered by high tariffs and restrictions on foreign investment. They suggest that tariffs need to be lowered to an average of ten percent, restrictions on FDI need to be removed and reforms in labour laws are needed to replicate these successes across all sectors. They point out that it is no coincidence that software and outsourcing companies are exempt from labour regulations such as those regarding hours and overtime. India's economy has made real progress but further liberlisation is needed which will also help in poverty reduction, job creation and meeting long term social objectives.

Porter (2004) finds where India stands on competitiveness. India's rankings in the Global Competitiveness Report has improved significantly in last few years; Indian IT cluster has emerged as a leading competitor in the world, transforming the perception of India as a competitor; but at the same time total factor productivity growth rate has slowed; international market success is still dominated by a few sectors ; and, the disproportionate success of the IT cluster is as much an indication of

weaknesses in India's business environment as a metaphor for India overall. He proposes a competitiveness agenda for India which consists of three contexts: Macroeconomic and social context requiring public sector reforms, integration of social and economic policy, and enhancing agriculture competitiveness; Microeconomic business environment requiring removal of barriers to competition, strengthening physical infrastructure, further improvements in financial markets, emphasis on cluster development, and enhancing innovations; and, economic policy-making process requiring collaborative process in economic development, increasing states capacity and incentives to take charge of their own economic competitiveness and increasing role of private sector particularly, trade associations in economic development. Further, reforms in India have the potential to move the country far beyond of what has been achieved in the last decade; the reforms need to be widespread and a new model of joint private-public efforts rather than a government-driven model is required for progress on competitiveness. He concludes India has the best opportunity to improve its economic competitiveness in decades; the country can't afford to squander this opportunity.

FICCI (2003) task force on revival of the Indian manufacturing sector has identified some key macro issues, five to be more specific, affecting Indian manufacturing which need urgent attention. First, is the issue of exit and restructuring. Optimal utilization of resources is of paramount importance to the efficient working of the industry and so need to unlock productive resources and capital from unproductive units and sectors for redeployment to viable units' .Second, is the issue of capital availability. There has been a sharp decline in availability of project finance and it is essential to revive institutional finance & development banking, stock markets have to be made more investor friendly and lowering of lending rates. Third, is the issue of effective synergy between internal and external reforms. Though external sector reforms have opened the global market for the manufactures, the domestic regulations and fiscal reforms needed to be taken care of. Fourth, is the issue of infrastructural reforms. The infrastructure bottlenecks reduce the producers' margin by 5 percent. Power sector, transport sector, municipalities services are major areas of concern. Fifth, is the issue of labour reforms. The global competitiveness report ranks India at 73 out of 75 in terms of labour regulations. Excessive regulation of industrial relations, restrictions on hiring and firing as per optimum needs, and restrictions on relocating a worker even within the plant are major hurdles. Indian manufacturing sector is under-utilised and under–developed as compared to our Asian neighbours like China and Thailand. And if these issues could be shorted out, our manufacturing can be rejuvenated to compete successfully in the global arena.

Tata Services (2003) study the impact of economic reforms on total factor productivity (TFP).TFP growth encompasses the effect of technological progress along with better capacity utilization, improved skills of labour, learning by doing and so on. The study finds that there have been TFP improvements in post reforms period. Indian private sector has outperformed the All-India manufacturing sector on TFP and the top fifty private sector giants have done even better. Post-reforms average annual growth in TFP has been 0.97 percent for the All-India factory sector, 2.56 percent for the private manufacturing sector and 3.46 percent for the top fifty private manufacturing firms. Improvement in TFP has also brought enhancement in partial productivity measures. For example, we find that for the All-India manufacturing sector, labour productivity has increased at an annual average rate of 8.5 percent during post-reforms as compared to 6.5 percent in pre-reforms Higher labour productivity is due to labout rationalization and out put growth whereas higher infusion of capital, coupled with reduction in labour force pushed up capital intensity growth to six percent from 3.3 percent. Growth in capital productivity has declined to 2.7 percent in post-reforms as compared to 3.1 percent in pre-reforms. The real challenge lies ahead in sustaining the productivity and achieving higher growth for which capital restructuring, wage linking, training and development need to be identified and fostered. Above all, a productivity-oriented mind-set has to be developed.

World Economic Forum (2003) discussed the problems and prospects of Indian manufacturing sector at India Economic Summit. Experts appreciated the growth in Indian manufacturing sector over the years .They highlighted the importance of vision and leadership; innovation and R&D; knowledge and technology; quality improvement and quality manpower; integrated process and supply chain management; brand building and customer relationship for competitive success. They lamented lack of infrastructure facilities. Rajeeva Shah, Secretary, Deptt. of Industrial Policy and Promotion, Ministry

of Commerce and Industry outlined an eight-step path for manufacturing to become a global leader: innovation, technology creation and R& D, design creation, productivity improvement, the application of ICT to technology processes, precision manufacturing, micro cost control and maintaining global quality benchmarks.

Accenture (2002) focuses on both macro and micro issues and analyses the key issues impacting competitiveness at firm level, sector level and overall productivity of Indian manufacturing across twelve industry sectors. At the firm-level there is a lack of focus on core organizational capabilities, good governance styles and corporate governance, team building and manpower productivity, good supply chains, infrastructural inputs and consumer, investor and IPR protection. At the intra-sectroal resource allocation, the creation of a large number of small scale and unregistered manufacturing due to preferential policies and artificial market distortions has reduced competitiveness. Preferential policies for small scale, differential policies and pricing, barriers to free internal trade and difficulty of business closure are key issues in market distortions. The pattern of resource allocation across sub-sectors does not reflect India's comparative advantage particularly in labour intensive exports. There are serious structural issues like differential subsidies that hinder the greater assimilation of capital and labour inputs. Industry should adopt more performance oriented and responsive management style, enhance quality focus and customer orientation, benchmark against best in class, exploit global markets, re-engineer core –processes, invest in IT, aggressively consolidate and adopt corporate governance. The large spreads between the best performing and the average industry ROCE suggests that while all firms are impacted by common macro-economic and structural issues, there are firms that are clearly able to outperform. The GOI should go for second generation reforms and invest in infrastructure. There should be political consensus, departmental coordination and people participation. The study says that India's manufacturing industry could substantially impact the country's economic well-being by increasing its growth rate from the current 6 percent to 11 percent by 2006.

Azeez (2002) examines the performance of organized Indian manufacturing sector consisting of eighteen industries, in terms of Economic Capacity Utilisation (ECU) during 1974-98.The ECU is defined as the realization of output at which the short run average total cost is minimized and is estimated using a translog variable cost function ,which is estimated using Zellner's Seemingly Unrelated Regression Estimation(SURE) technique. The analysis reveals that the conventional installed capacity utilization measures underestimate the true economic utilization levels. The Indian manufacturing sector experienced a cyclical pattern of ECU during this period with three distinct phases. Phase one (1974-84) has marked relatively wide fluctuations, phase two (1985-90) shown a roughly stable levels, and phase three (1991-98) shown a resurfacing of a mild variant of the fluctuations witnessed in the phase one. There has not been any significant correspondence between the observed phases of ECU with the corresponding policy changes. The major point emerging from the study is the role of supply and demand side factors in affecting ECU. The author concludes that the impact of reforms per se is not significant though the policy changes may influence supply and demand side factors determining the level of ECU.

Balakrishnan, Pushpangadan and Basu (2002) using information on 3596 listed firms for the period 1988-89 to 1997-98 in each of the industry groups at the two-digit level within manufacturing, investigated whether the radical shift in trade policy resulted in a reduction in market power and/or an improvement in scale efficiency. They estimate a group-wise production function allowing for firm-specific effects using Hall, H. E (1998) methodology with slight modifications. A plausible estimate of market power is obtained and the assumption of constant returns to scale is mostly rejected. They found a less than widespread and non-uniform impact of trade reforms on market structure or improvement in scale efficiency of manufacturing sector. They offer two explanations for an increase in the price-marginal cost ratio since trade reforms. First, they visualize a decrease in the number of domestic firms due to rationalization of industry structure originally seen as the route to an improvement in scale efficiency .With the mark-up inversely related to the number of firms, a decline in its level may be expected to follow. Secondly, outside the mainstream theory of market structure they visualize trade liberlisation setting-off increased rivalry.

CII and World Bank (2002) study 1099 firms across Ten Indian States to analyse the competitiveness of Indian manufacturing and compare with other developing countries in Asia and Latin America. India does well on some macro measures of investment climate(IC) like rule of law and political voice but scores poorly on government /regulatory effectiveness and the quality and quantity of physical infrastructure. Investment climate matters and Manharastra and Gujarat has best IC, Andhra Pradesh, Karnataka and Tamil Nadu has good IC, Delhi and Punjab has medium IC whereas Kerla, UP and W. Bengal has poor IC .The study proves that IC matters and firms located in states that do not foster a good IC perform significantly worse than those in the states that do. Firms operating in the better states show higher factor productivity and better governed states attract greater investment. India may have marginal competitiveness in value added per unit of labour cost, the advantage in terms of profit margin is even smaller and this lead gets eroded by massive disadvantages in power cuts, interest rates, custom delays, infrastructural bottlenecks and to a lesser extent, regulatory hassles. IC is all about governance and not about fiscal concessions and there is a serious need for second generation of structural reforms both at the centre and state levels.

Parameswaran (2002) analyses firm level data of 640 firms from four selected industries namely electrical machinery, electronics, non-electrical machinery and transport equipment in terms of their technical efficiency against the background of economic reforms since 1991.These four industries belong to the segment of capital goods industries that faced greater reduction in trade protection in 1990s and so their analysis assumes significance. He defines technical change as the shift of the best practice production frontier and technical inefficiency change as the movement within the best practice technology. A stochastic frontier production function and an associated inefficiency model are used simultaneously by using maximum likelihood method to measure time varying firm specific technical efficiency. The effect of reforms on technical efficiency varies among industries. The results show that reforms has a positive effect on technical efficiency in all the industries except one but the level of efficiency is lower in post reform period in all the industries. The decline in the level of technical efficiency happened in a context of higher technical progress, identified as the upward shift of the best practice technology in all industries. This indicates that majority of the firms failed to catch up with the shifting frontier technology, resulting in an increase in their inefficiency. The study also finds that firms' involvement in the international trade through export and import of raw materials and technology has a positive effect on technical efficiency.

Choudhary and Dhargawe (2001) stress that innovation is the key to achieve the competitive advantage in the international market. Manufacturing has a significant role to play and it is essential for the industry to grow at a much faster pace if we were to meet the 8-10 percent growth. India's competitive priority as on date lies in quality and structural change which is directed towards manufacturing practices, but emphasis on invention and R& D has gone down since 1997 which is not a good sign in the global scenario. Single factor differentiation can be copied easily and so firms need to have "strategic economies of scope". The manufacturing strategy of most Indian firms is still not addressing certain fundamental issues of global competition like rapid product mix changes, introducing new products based on indigenous R & D, use of process innovation and quality improvement process to reduce cost of operations and consequently price of product. Government initiatives are needed to lower trade tariffs, simplification of tax system, infrastructure development, build global cities and establishments of special economic zones. Corporate initiatives are needed to insert R & D into manufacturing, global brand building, quality management, corporate governance, productivity improvement, cost management, competitive pricing and introduction of IT synergy in the sector.

McKinsey (2001) studied thirteen sectors of Indian economy over a sixteen-month period to find out barriers to productivity and output growth, quantified their impact and extrapolated these findings to the overall economy. There are three main barriers to faster growth. Firstly, the multiplicity of regulations governing product markets restrict competition and best practice which includes inequitable regulation, uneven enforcement, reservation of products for the small-scale enterprises, restrictions on FDI and licensing .Second, unrecognised land market distortions constrain biggest domestic sectors which include unclear ownership, counterproductive taxation, and inflexible zoning, rent & tenancy laws. Third, government widespread ownership of business by government promotes

inefficiency. These three factors inhibit GDP growth by over four percent a year. There are minor barriers to growth like inflexible labour laws and poor transport infrastructure which account for lost growth of only 0.3 percent per annum. Thirteen policy changes like removing reservations on products for SSI, rationalizing taxes and excise, establishing effective and pro-competition regulation, reducing import duties, removing restrictions on foreign investment, reforming property and tenancy laws and undertaking widespread privatisation , if carried over next two to three laws, the economy can grow with projected ten percent annual growth rate, release investment capital worth 5.7 percent of GDP and generate 75 million new jobs outside agriculture sector. Eliminating the productivity barriers would almost double India's growth in labour productivity to eight percent a year over the next ten years.

Mohanty (1998) conducted a survey to better understand Indian managers' perceptions about productivity and the critical factors that have an impact on the improvement of productivity in Indian organizations. He classified the responses according to age, experience, and education.The findings are: An interesting work environment is more important to managers of electrical industries than chemical industries; highly qualified managers perceive the production of quality goods and services as very important; mid-level managers feel that quicker response to requests can enhance productivity. He concludes that strong leadership is required in the pharmaceutical and engineering industries; and, quality of output should be given more weight if the engineering, electrical, and textile industries are to survive.

Key Findings from Literature Review

The literature review identifies the following key issues at two levels namely, government and firms.

Government-Level Issues

1. Need for Second Generation Reforms.
2. Infrastructural bottlenecks.
3. Reallocation of resources for labour –intensive exports
4. Deregulation of products reserved for SSI causing market distortion
5. Focus on EPZs
6. Unrecognized land market distortions
7. Synergy between internal and external reforms

Firm-level Issues

1. Lack of Strategic planning and management styles.
2. Lack of Sound People policies like team building.
3. Lack of Sound corporate governance.
4. IT uses restricted.

Impact of Reforms: The impact of liberlisation and economic reforms is mixed on competitiveness as there are conflicting findings and views as listed below.

1. Tata Services says positive impact on Total Factor Productivity.
2. Azez, CDS, JNU finds non-remarkable impact on Economic Capacity Utilisation.
3. Balakrishnan, CDS, JNU finds impact not widespread on Scale Efficiency.
4. Parameswaran, CDS,JNU finds a positive effect on Technical Efficiency in all the industries except one but the level of efficiency is lower in post reform period in all the industries.

4. Conclusion and directions for future research

Competitiveness is increasing becoming a way of life for firms, industries and nations. Only those firms and industries will be able to survive and perform well in this increasingly hyper competitive world that follows the discipline of competitiveness. Over the past few years India has become one of the fastest growing economies and it needs to embrace competitiveness spirit for maintaining and improving over its recent performance. India has improved its international competitiveness rankings in the recent past. Whereas firms and businesses are improving in international rankings infrastructure and governance are lagging behind. There are various issues at firm level and government level which needs to be addressed to improve the competitiveness. At the

national level, the country needs to go for further reforms and investments in infrastructure whereas at the firm level, there is need for strategic management and better governance practices.

Directions for Future Research: Further research can be carried out on the various issues raised related to government and firms. Cross country comparisons, particularly with other fast emerging economies can provide interesting learning and insights.

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ICT PENETRATION AND AGGREGATE PRODUCTION EFFICIENCY: EMPIRICAL EVIDENCE FOR A CROSS-SECTION OF FIFTY COUNTRIES

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Abstract

This study investigates the impact of telecommunications penetration on the aggregate production efficiency in a large cross-section of fifty countries. We show that higher levels of ICT capital stock penetration increase technical efficiency levels in the aggregate production function. However, depending on the geographical location the effects of ICT penetration are different. Our empirical findings suggest that increasing the per capita telecommunications capital in the form of land line and mobile telephones, computers, Internet access and the like is likely to considerably increase productive efficiency in case of the poorest nations, while in the more developed countries such gains have been largely exhausted. In the end we offer several avenues for more research based on the caveats discovered while working on this study.

Keywords: economic growth, technical efficiency, telecommunications investment

JEL Classification: O3, O4

I. Introduction

Examining how the development of information and telecommunication technologies (ICT) has affected the process of economic growth has been the subject of a significant number of studies including recent contributions by Oliner and Sichel (1994), Schreyer (2000), Dewan and Kraemer (2000) and Jorgenson and Stiroh (2000). Corroborating the initial claim made much earlier in the research by e.g. Jipp (1963) and Hardy (1980), the general conclusion of these studies is that the high extent of telecommunications infrastructure is generally conducive to the high level of economic development.

Along with the empirical evidence in support of the above statement several mechanisms were identified through which telecommunications infrastructure is affecting economic performance. In its essence the telecommunications infrastructure is a social overhead capital that is a cost-effective and timeefficient medium of disseminating and accessing information, in this way producing the market efficiency effect. In other words, more telecommunications infrastructure facilitates the exchange of information between market participants such as buyers and sellers reducing business transaction costs, increasing aggregate productivity and boosting economic performance by improving organizational efficiency. Other indirect effects of telecommunications capital diffusion are related to the telecom's network nature that results in the creation of spillover and externalities effects. Among the most pronounced ones would be the increased arbitrage opportunities and lower search costs.

Recently the research emphasis has shifted away from assessing the direct contribution of ICT sector to economic growth and performance and towards the estimation of telecommunications infrastructure on economic efficiency. In fact, given the relatively small contribution of the ICT sector itself to the GDP and the variety of indirect (externality) effects outlined above, the key benefit of telecommunications investment is likely to be in the area of aggregate productivity and economic efficiency. Studies that have pursued this line of thinking such as Vu (2005) and Barry and Triplett (2000) have demonstrated that the indirect effects of ICT investment on economic performance are by far no less important than the direct ones. For example, Vu (2005) conducts a detailed growth accounting analysis in a cross-section of more than fifty countries and finds that the ICT investment produces a significant impact on economic growth not only as traditional investment, but also as a factor contributing to economic efficiency.

This study applies a *stochastic frontier* approach to estimating the effect of telecommunications penetration on aggregate productive efficiency (Aigner et al., 1977). Using this technique we estimate the global and regional aggregate production functions in order to see how investments into the

telecommunication infrastructure are affecting production efficiency. Since, as discussed above, the network nature of telecommunications infrastructure is crucial to the link between ICT capital and economic performance, it is the ICT capital level *and* accessibility that together are boosting the latter. For that reason our main hypothesis is that the level of ICT penetration measured as the

Methodologically there are two basic ways in which the level of ICT penetration can be estimated. One is to compute it in terms of the physical units such as the number of landline telephones or mobile subscriptions per e.g. 1000 people and the like (the approach chosen e.g. in Thompson and Garbacz, 2007). The advantage of this approach is that the extent of ICT penetration is easily computable, but the price to pay is that the *amount* of telecommunications equipment units per capita says nothing about the *quality* thereof. Simply stated, the difference in quality between a disk dial-up telephone device and a modern multi-functional communicating terminal will not get accounted for when applying the physical units approach.

Measuring the extent of ICT penetration in monetary units makes much more economic sense since the equilibrium market prices represent economic agents' willingness to pay for the products' intrinsic value, so that both quantity and quality are accounted for. However, the estimation problem with this approach is that one cannot deflate telecom investment flows measured in current prices by a CPI, PPI or similarly aggregated price index. Indeed, it is well known that for the past several decades the quality of communications equipment has been rising, while the prices thereof have been falling, so that the price indices in general follow quite a different path compared to the deflators for more conventional commodities. In this study we circumvent this problem by deflating telecommunications investment flows by the rather narrowly defined "equipment and software" GDP component price index so that we are able to obtain monetary estimates of the level of ICT capital stock in our sample.

Overall, this study covers fifty countries over the period of twenty-four years which is the period of rapid development and adoption of ICT technology into most of the world's economies. We find that globally, more ICT penetration increases aggregate production efficiency, but not uniformly so in the geographical sense. Thus, in the most developed economies efficiency benefits of ICT penetration have most likely been exhausted, while in the poorest African nations the potential of telecommunications equipment to boost productive efficiency is most evident. Our results are thus corroborating the idea that more incentives should be given to boosting the ICT investment in the poorest countries.

This paper is organized as follows. Section II presents methodology and the data. Section III presents the results and provides discussion. Section IV concludes.

2. Estimation Methodology and the Data

We start by postulating the basic Cobb-Douglas aggregate production function: $Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta}$, where Y_{it} is output, K_{it} is capital and L_{it} is labor in country i in year t and $A_{it} = A_o D_i e^{\lambda t}$. Technology level A_{it} is a function of global technological level A_0, country-specific characteristic D_i and the global technological time component $e^{\lambda t}$. Taking the logarithm of the above specification, we obtain the following expression for our aggregate production function:

$$\ln Y_{it} = \alpha \ln K_{it} + \beta \ln L_{it} + \lambda \quad (1)$$

The empirical stochastic frontier specification of (1) with the technical inefficiency component will assume the following form:

$$\ln Y_{it} = \alpha \ln K_{it} + \beta \ln L_{it} + \lambda + \varepsilon_{it} \quad (2)$$

where $\varepsilon_{it} = \nu_{it} \quad u_{it}$ is a stochastic term with ν_{it} being standard i.i.d normal and $u_{it} > 0$ distributed as a truncated normal variable and representing the inefficiency of the aggregate growth process. The efficient production frontier corresponding to (2) will be then represented by

$$\ln Y_{it} = \alpha \ln K_{it} + \beta \ln L_{it} + \lambda + \nu_{it} \quad (3)$$

or, equivalently, (2) under the condition that $u_{it} = 0$. Technical efficiency of economic growth will then be given by the ratio of the right hand side of (3) to that of (2).

In this study we hypothesize that higher levels of per capita telecommunications capital stock increases technical efficiency of aggregate production relative to the efficient production frontier. In terms of specification (2) we are expecting to find a negative association between the term u_{it} (representing technical *inefficiency* of aggregate production) and per capita telecommunications capital stock. Using our estimates of (3) we test the hypothesis that $_{it}$ is a decreasing function of $\frac{K_{ICT}}{L}$ where K_{ICT} is the real telecom capital stock.

In order to estimate (3) we need to estimate the levels of conventional and telecommunications equipment capital stock. The data at our disposal come from two sources. The Penn World Table, version 6.2, provides data on real output, labor and investment flows. The International Telecommunications Union world telecommunications database provides us with the total annual investments in telecom defined as capital expenditure in the sector. In either database we do not have the capital stock levels either for the conventional capital or for the telecom capital. For that reason, before estimating (3) empirically we need to estimate stocks of conventional and telecom capital K_{it} and $K_{ICT, it}$, respectively.

We estimate the latter two stocks by employing the perpetual inventory method that allows one to estimate capital stocks as a sum of the past real investment flows weighted by the extent to which these investments depreciate over time.

Assuming the finite useful lifetime of an investment equal to m (equivalent to saying that an asset becomes useless m years after purchase) and a yearly depreciation rate δ, we obtain the following expression for the value of a stock variable S_{it} that is characterized by investment flow I_{it}:

$$S_{it} = \sum_{\tau=0}^{m-1} (1-\delta)^{\tau} I_{t-\tau} \qquad (4)$$

To use (4) for our computation, we assume useful lifetime of conventional investment to be equal to thirty years, while that of the telecom investment to be equal to seven years (see e.g. Fraumeni, 1997 or Vu, 2005). Depreciation rates δ that correspond to these values are 7.5% and 20%, respectively.

We obtain real values of investment flows into the conventional capital by combining the information on real GDP per capita (*rgdpl*), investment share of real GDP per capita (*ki*) and population (*pop*) provided by the Penn World table, version 6.2. Flows of investment into the telecommunications capital are defined by the ITU database as the annual investment in telecom (including mobile service) for acquiring property and plant[1]. Since the deflator for telecommunications investment is not explicitly provided by the ITU database, we employ the National Income and Product Account Tables provided by the U.S. Bureau of Economic Analysis (Table 1.1.4, price index for equipment and software under gross private fixed domestic investment). We then deflate the ITU data on telecom investments in international U.S. dollars by this index.

Having combined the series of real stocks of conventional and telecommunications capital, we then maximize the likelihood function based on the following:

$$\ln Y_{it} = \alpha \ln K_{it} + \beta \ln L_{it} + \lambda + \nu_{it} - u_{it}, u_{it} \geq 0$$
$$\mu(u_{it}) = \delta_1 + \delta_2 \frac{K_{ICT,it}}{I_{it}} \qquad (5)$$

[1] The term investment means the expenditure associated with acquiring the ownership of property (including intellectual and non-tangible property such as computer software) and plant. These include expenditure on initial installations and on additions to existing installations where the usage is expected to be over an extended period of time. Also referred to as capital expenditure. (ITU, Telecom Indicators).

where $\mu(_{uit})$ is the mean of inefficiency term u_{it} conditioned on the level of telecom capital penetration. We avoid running OLS regressions of inefficiency terms u_{it} on the levels of ICT penetration (the so-called two-stage approach) since it is not clear whether the estimated inefficiency terms in (5) are indeed independent.

To complete this section, a few remarks must be made on the scope of the countries and years covered by this study. As mentioned before, the Penn World Table provides the data on output, capital and labor, while the ITU provides the telecommunications investment data. The World Table data normally cover the period from 1950 through 2004, while the ITU data coverage is only from 1975 through 2004 for telecom investment. Since we take the useful lifetime for conventional capital stock to be thirty years, while that of the telecom capital stock to be seven years, the earliest year for which both conventional and telecom capital stocks could be constructed is 1981, which is the beginning year of the sample.

Since the program we used in order to produce our estimations can deal with unbalanced panels, in principle it was possible to include those countries for which some observations were missing. However, in order to keep the panel reasonably balanced we did not include those countries where capital stocks could be calculated for only a few years such as the Eastern European countries and countries of the Former Soviet Union. For that reason, for example, Germany was not included into the sample. As a result, we ended up with fifty countries listed below by their geographical location.

Table 1. The Geographical Coverage

Europe	OECD	Asia	Latin America	Africa
1. Austria	Europe	1. China	1. Brazil	1. Egypt
2. Belgium	and	2. Hong Kong	2. Colombia	2. Kenya
3. Denmark	1. Australia	3. India	3. Costa Rica	3. Morocco
4. France	2. Canada	4. Indonesia	4. Ecuador	4.South Africa
5. Greece	3. Japan	5. Israel	5. El Salvador	5. Zambia
6. Iceland	4. New Zealand	6. Malaysia	6. Jamaica	
7. Ireland	5. United States	7. Philippines	7. Mexico	
8. Italy	6. Turkey	8. Singapore	8. Paraguay	
9. Luxembourg	7. Mexico	9. Sri Lanka	9. Uruguay	
10. Netherlands	8. Korea	10. Taiwan	10. Venezuela	
11. Norway		11.Thailand		
12. Portugal				
13. Spain				
14. Sweden				
15. Switzerland				
16.United Kingdom				

In the next section we present and discuss our empirical results. Section IV concludes.

3. Empirical Results

Table 2 below presents the results of a simultaneous maximum likelihood estimation of the aggregate production function and conditional mean in (5)[2]. It is worthwhile stressing that *negative* values of the estimate for δ_2 (the coefficient for ICT penetration) correspond to the efficiency-enhancing role played by more ICT capital stock per capita. We split our countries into five groups, namely, the OECD, Developed European, Latin American, Developing Asian and African countries. We also present our results for the whole sample. The shares of capital and labor in our estimates of the production function are reasonable exhibiting almost perfect constant returns to scale for the world as a whole, OECD, Europe and Latin American countries. In all six country groups the estimates of δ_2, which measures the impact of ICT penetration on *inefficiency*, comes out negative and statistically significant, which is in line with our expectations, which is that increased levels ICT penetration lead to higher levels of aggregate productive efficiency.

[2] We use the frontier command in Stata to perform this estimation.

We observe great contrast in the value of this coefficient for different groups of countries. Thus, we see that its absolute value is ten times higher in the economically less developed part of the world compared to the countries of OECD or Western Europe. Indeed, according to our results, an additional dollar invested into purchases of ICT capital per individual in the Latin American, developing Asian or African countries increases efficiency by almost ten times as much as it does in the more developed OECD world. That finding is consistent with the observation that, as the country reaches higher levels of economic development, gains of exploiting the positive network externalities provided by the ICT technology, gradually get exhausted. According to our results, greatest efficiency gains from investing more into the ICT equipment are to be reaped in Latin American countries, while lower gains will accrue in developing Asia or African countries. However, since no statistical tests were applied to the difference of δ_2 coefficients in the three groups of countries, we cannot say whether the observed differences in values are due more to the fundamentals or are a mere statistical discrepancy.

Table 2. ICT Penetration and Production Efficiency

	OECD	Europe	Latin America	Developing Asia	Africa	World
Aggregate Production Function: Dependent Variable Ln (Y_{it})						
C	2.16	1.84	5.61	6.30	-4.02	3.20
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln (K_{it})	0.73	0.76	0.64	0.46	0.80	0.65
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln (L_{it})	0.27	0.23	0.36	0.43	0.76	0.33
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Inefficiency Function: Dependent Variable U			$u_{it} = \delta_1 + \delta_2 \frac{K_{ICT,it}}{L_{it}}$			
δ_1	-0.03	0.14	0.37	0.69	0.29	0.26
	(0.002)	(0.017)	(0.000)	(0.000)	(0.000)	(0.000)
$\frac{K_{ICT,it}}{L_{it}}$	-0.003	-0.006	-0.08	-0.03	-0.04	-0.01
	(0.007)	(0.008)	(0.003)	(0.000)	(0.000)	(0.000)
γ	0.24	0.27	0.08	0.58	0.999	0.86
Average Efficiency	96%	93%	90%	75%	58%	80%
Average Efficiency in the WorldSample	87%	86%	78%	73%	70%	80%
Obs	552	352	216	210	120	1098

Note: the coefficient for the $\frac{K_{ICT,it}}{L_{it}}$ variable is entering the **inefficiency** function, so that the **negative** value for this coefficient corresponds to **increased** efficiency. P-values are in parentheses.

It is also interesting to look at the average efficiency levels in our six country groups. As would be rationally expected, the more mature economies of OECD and Western Europe exhibit the highest average efficiencies at 93% and 96%, respectively. Again, no statistical tests are available to test the statistical significance of this difference. However, intuitively, this difference is likely to be the result of Mexico, Turkey and South Korea included in the OECD sample.

Latin American countries in our sample are not much less efficient than the most developed country group at 90%. Quite expectedly, the lowest efficiency levels pertain to the African countries at 58% with the developing Asian countries standing in between at 75%.

One has to exercise caution when interpreting the average efficiency levels since the stochastic frontier approach is based on the existence of a benchmark efficient production frontier *within the sample of the estimated countries*. That is, a high level of average efficiency *per se* does not automatically mean that these same countries will be as efficient in the overall sample. For that reason

we include average efficiency estimates for the sub-groups of countries in the whole sample as well. We observe all of the average efficiency levels drop down in all but one (African) country group compared to the within-subsample estimates, but this fall happens consistently leaving the relative efficiency ranking the same.

In interpreting the estimation results of (5) one can also infer the extent to which the deviation from the deterministic production frontier is random or is due to production inefficiency. Denoting σ_u^2 to be the variance of u_{it} in (5) and σ_v^2 to be the variance of σ_v^2, we can infer the relative importance of inefficiency by computing $\gamma = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_v^2}$. The values of g close to unity are indicative of the prevalence of inefficient production, while the values of the parameter close to zero are a sign that most deviations from the deterministic production frontier are of random nature.

As demonstrated by Table 2, in the more developed European and OECD countries, roughly one-quarter of the deviation from deterministic frontier is due to the inefficient production. In stark contrast is the African estimate of almost unity (0.999) and the developing Asian value of almost 60%. We are puzzled to have estimated the value of γ very low at 0.08 in case of the developing Asian countries. As mentioned before, caution should be exercised when interpreting the efficiency estimation results made in the subsample since the best practice frontier is likely to be different in the overall (world) sample and the Latin American subsample. However, since we are unable to estimate γ in the Latin American subsample *and* in the overall sample, we leave the clarification of this issue to later research. On average we can say that in the more mature economies of OECD and Western Europe deviations from the deterministic frontier are mostly of random nature while those in the developing world are more due to the inefficiencies in production.

In order to check for the robustness of our findings, we run the same type of estimations on the three equal-length sub-periods covering the original period of 1981-2004 where the production function also includes the time trend variable. We also consider three different groups of countries: the OECD countries, the developing countries that include Latin American, developing Asian and African countries, and as before, the world as a whole. The summary of these results is presented in Table 3 below.

Table 3. ICT Penetration and Productive Efficiency in the Three Time Sub- Samples

	1981-1988	1989-1996	1997-2004	1981-2004
OECD				
γ	0.37	0.076*	0.78	0.24
$\frac{K_{ICT,it}}{L_{it}}$	-0.003 (0.278)	0.004*(0.054)	0.003 (0.322)	-0.03 (0.002)
Median Efficiency	94.0%	99.5%	94.8%	97.1%
Developing Countries				
γ	1	0.83*	0.58	0.83
$\frac{K_{ICT,it}}{L_{it}}$	-0.14 (0.000)	-0.31* (0.000)	-0.09 (0.000)	-0.21 (0.000)
Median Efficiency	75.6%	96%	93.4%	94.6%
World				
γ	0.97*	0.83	0.79	0.86
$\frac{K_{ICT,it}}{L_{it}}$	-0.02* (0.000)	-0.12 (0.000)	-0.04 (0.000)	-0.01 (0.000)
Median Efficiency	84.6%	84.7%	83.0%	83.5%

Note: *P-values are in parentheses. * refers to the situation when the process of likelihood maximization failed to converge for a given set of countries and/or time period. In that case the maximization was done for the period excluding the initial year of the sample.*

For the world as a whole, we find the coefficient for ICT capital penetration to retain its negative sign as well as its statistical significance everywhere except for the OECD countries in the eight-year subsamples suggesting most of the efficiency gains due to increased ICT penetration are to be realized in the developing world. We also observe that parameter g is decreasing over time for the world as a whole, suggesting that the world economy's deviations from the best practice production frontier have become relatively more random in nature over the past two decades. Especially in the developing world we observe the same pattern with virtually all of such deviations being due to inefficient production in the beginning of the 1980-s, while in the latest years such inefficiency only accounting for half of the deviations. The group of OECD countries is special in the sense that increasing the level of ICT penetration in these countries does not appear to produce any efficiency gains. We interpret this as being due to the fact that the OECD countries are the world's leading economies where efficiency gains from the ICT investments have been already exhausted. In terms of the median efficiency the world does not undergo any drastic changes staying between 80% and 85% off the best practice production frontier.

The OECD countries are by far the most efficient producers whose efficiency level does not appear to be changing with time. It is only the developing countries that appear to have been increasing their production efficiency levels.

Our empirical results thus lead us to conclude that most of the discussion on the relevance of ICT investment for the aggregate production efficiency should be concentrated on the developing countries of Africa, Latin America and Asia. The discussion in this section would be incomplete without mentioning the limitations and caveats of the approach we have undertaken. First, even if the ICT investment data provided by the ITU are to our knowledge the most comprehensive cross-country dataset on ICT indicators to date, the annual investment flows are not disaggregated into the various kinds of telecommunications investments such as, say, hardware and software. Since the latter two groups have different useful lifetimes, such disaggregation would allow us to be more precise in deflating the reported investment flows in order to obtain real capital stock data. Second, the hedonic price index that we are using is not disaggregated across countries, which reduces the accuracy with which ICT capital stock levels are computed for the individual countries. However, the hedonic price indices provided by the BEA are definitely the second-best solution since the conventional CPI or PPI provided by the ITU and WDI are not capturing the rapid decrease in the price-quality ratio that has occurred in the domain of telecom products over the past two decades. Constructing the country- and product-specific hedonic price deflators for telecommunicationsrelated investment flows is in itself an area of future research.

4. Conclusion

The main idea behind the present study is that the network nature of telecommunications capital and the relatively small contribution of the ICT sector itself to the GDP reveals itself much stronger in the indirect effects on production such as productive efficiency improvements rather than in the direct contribution as one of the production factors. While the direct effect of ICT sector on both economic growth and productive efficiency has been amply explored in the literature, it is exactly the link between productive efficiency improvements and ICT capital stock accumulation that we have focused upon in this study.

In order to capture the network and overhead capital properties of the ICT capital we are measuring the extent of ICT development by the ICT penetration, which is the per-capita ICT capital stock in the country. With this purpose in mind we use hedonic telecom price indices to construct ICT real capital stock levels and combine those levels with the stochastic production frontier framework applying it to the sample of fifty countries over the period of twentyfour years.

Our main result that comes robust across different country samples and time periods is that for the world economy in general and the developing world in particular, increased levels of ICT capital stock per capita are conducive to increased production efficiency. However, more detailed analysis

reveals that most of these gains are to be reaped in the developing countries of Africa, Latin America and developing Asia (in particular, excluding Japan). In contrast, we find that in the world's most developed OECD countries the potential for such gains has been most likely already exhausted since the estimated marginal contributions to productive efficiency of more ICT penetration are either very low or even statistically insignificant in this group of country. Also most deviations in these countries from the best practice frontier are estimated to be of random nature rather than being due to production inefficiencies.

For those reasons we suggest that the focus of future research in the area linking the ICT sector and economic performance be shifted to the developing countries of Asia, Africa and Latin America where the potential of ICT-related efficiency improvement is indeed there. Another important area of research would be the construction of ICT capital-specific hedonic price indices for specific countries. Finally, the causality link between ICT investment and productive efficiency has not been much investigated so far. Indeed, even the existence of a strong positive association between higher levels of ICT penetration or development in general and productive efficiency does not guarantee the existence of causality between the two. On the one hand, more efficient economies might choose to invest more into the ICT sector so that there is a problem of reverse causality. On the other hand, both production efficiency and ICT capital accumulation might be influenced by a third factor such as e.g. improved institutional environment in the country or increase in the level of political stability. The latter is especially relevant for the less developed part of the world.

This study thus presents general results on the positive link between ICT capital stock accumulation and productive efficiency for a comprehensive set of countries and a long time period, which can be a basis for more detailed work in the future along the directions outlined above.

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LEVERAGING SOA IN BANKING SYSTEMS' INTEGRATION

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Abstract

There is no doubt that the systems' integration is one of the most important and complicated tasks in software filed especially for complex applications like banking systems. Complexity in integrating banking systems often comes from continues changes in both technical and business features provided by them to meet customer needs. Banking systems always come from different software vendors which mean using platforms and different design and architecture patterns, and this for sure adds extra complexity for integrating them. Service-oriented architecture (SOA) is a promising method in software filed that aims to build or restructure software systems in a manner that makes their maintenance and integration easier. Agility is the most important goal that should be achieved when building and integrating banking systems. Simply, agility is needed to meet market needs quickly and efficiently and SOA is the way that could provide it.

Keywords: SOA, SOI, P2P Integration, Web Services, and Legacy Code.

JEL Classification: C63, C88, G21

1. Introduction

Recently, banking field has become one of the most complicated branches in software market due to its need for advanced techniques and technologies for building and integrating its systems. Basically, this complication comes from the need to develop various systems/modules to cover different needs, for example, each bank has a need for a branch automation system in order to perform most of daily tasks performed by tellers with their customers such as opening new accounts, transferring funds from one account to another, cash withdrawals and deposits, etc; a need for loan origination system for defining, granting and promoting loans' offers to bank customers; and a need for a core banking system that allows keeping track of all transactions occurring in bank. Such systems can be viewed as silos that consist of set of desperate modules. These modules always use different dialects coming from different software vendors with different implementation technologies, architecture patterns, and hosting platforms, which make it hard to integrate them effectively and efficiently. Also, these siloed modules and systems always encompass redundant functionalities and business processes and this for sure adds extra costs for both implementation and maintenance issues.

On other side, service-oriented architecture (SOA) has emerged as a design and architecture method that aims to allow software vendors to build/wrap different software systems in form of reachable services that could be easily published and accessed by business partners and customers, and hence, exempting different modules and systems from having same functionalities [1]. Basically, three main actors always participate in SOA game, the *service provider*, the *service consumer*, and the *service registry*. Service provider is responsible for building, publishing, and maintaining exposed services; service consumer is responsible for locating services that meet his business/technical needs in order to make use of them; and service registry acts as a broker (database) that allows service provider to register created services with all needed metadata information and instructions that could help service consumers to easily find and use them [2].

The remaining part of this paper is organized as the following. Section 3 presents a business scenario (case-study) for banking systems that need to be integrated in an efficient manner to allow making use of available assets with brief comparison between traditional and SOI methods, and how web services could play a great role in supporting SOI method. Section 3 presents the proposed

architecture for illustrated business scenario. Section 4 illustrates implementation details for presented scenario. Section 5 outlines performance issues for used technique. Section 6 highlights the benefits of used technique. Finally, Section 7 concludes.

2. Problem Definition

Assume that we have the depicted architecture in figure 1 for a bank that has a set of front-end applications and a core banking (*CB*) system that acts as a back-end system for all these applications. Briefly, the front-end applications provide different services and functionalities needed for different bank departments including *customer services*, *internet banking* and *ATM*. All of these functionalities cannot be accomplished in a stand-alone mode without the support of *CB* system that could handle all their requests in order to process them and forward back returned results. Moreover, some of these front-end systems may have access to each other to be able to gather and consolidate some integrated information in order to execute bank processes. For example, assume that the branch automation (*BA*) system needs to access other systems like Loan Origination (*LO*) system and Islamic Banking (*IB*) system. All these systems are n-tier applications that were built recently with contemporary technologies including .NET and J2EE; and they all need to access existing *CB* system to make use of provided services. Available *CB* is a legacy monolithic system built with C language and hosted on UNIX servers. The processing layer of this system is completely built in database as a small set of large and complex stored procedures. Each stored procedure takes a large number of input parameters that ranges from 50 to 250 parameters, and each one can accomplish different tasks according to passed parameters. C language has used to create application interfaces that will be used by end users to pass expected input parameters and display returned result sets. *CB* has been used by the bank over the last 10 years and it has proved that it is an excellent core banking system due to variety of services provided by it including business services (customer management, deposits, foreign exchange, commercial loans, Islamic loans, etc) and technical capabilities (transaction control, auditing, logging, error control, high availability and performance, etc). Many reasons make it impossible for the bank to replace current *CB* with a contemporary one that could be integrated with available systems including mentioned features, high implementation costs, familiarity to end users, and big amount of data (over 3 terabytes) that has been maintained over that period which makes it very hard to be restructured and migrated to another system.

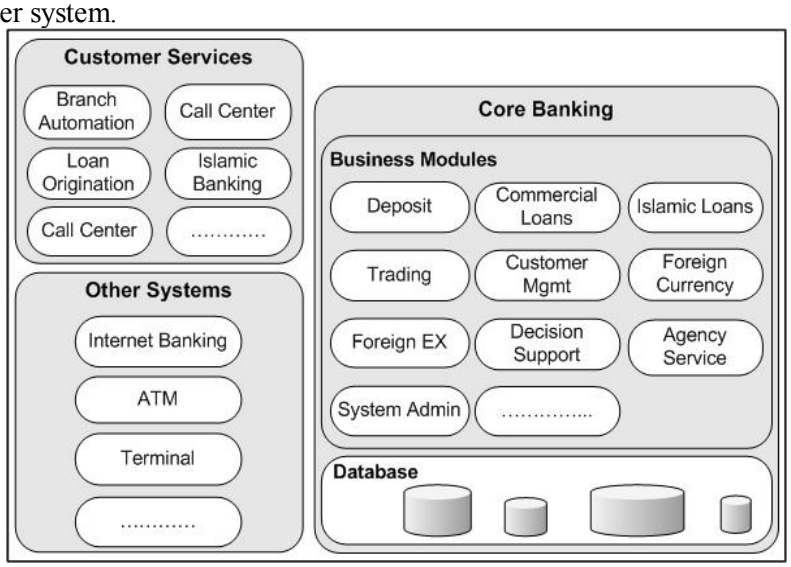

Figure1. Current architecture of bank systems

2.1. Point-to-Point VS. Service-Oriented Integration

Chapter 6 Traditional method that has used for the last two decades for integrating diverse systems together was depending on building a point-to-point (P2P) interface between each two systems leading to a big number of integration interfaces. A simple formula could be used to estimate the number of needed integration interfaces is $n(n-1)/2$ where n is the number of applications to be integrated [3, 4]. Regarding our scenario, the *BA* needs to access functionalities provided by both *LO*

and *IB* systems (and may others in future), and all of them need to have access to functionalities provided by *CB* each according to his needs only. i.e., *BA* needs to access to *Deposit module*; *LO* needs to access *Commercial Loans module*; and the *IB* need to access *Islamic Loans* module, and all of these systems need to have a shared access to common modules like *Foreign Currency* and *Foreign Exchange* modules. To do so with P2P method, we will need to build a specialized interface for each system to be accessed by others, i.e., we will need to build a specialized interface around *LO* and another around *IB* to enable *BA* to access them, and to build set of other interfaces (one for each accessing system) around *CB* to allow each accessing system to reach needed modules. This scenario could get extremely complicated if big number of systems to be integrated comes into play.

Technically, P2P method is totally inflexible because of number of reasons listed as follows:

- **Expensive:** Different development teams should to be constructed to implement needed integration points.
- **Tight-Coupled:** Modifications to any system may need a corresponding modification in integrated systems as well which adds extra costs and efforts for maintenance sake.
- **Slow:** Long time needed for implementing and maintaining different integration points. This long time may prevent organizations from meeting market ever-changing needs in a time-effective manner, which in turn could cause these organizations to lose many business chances.
- **Fragile:** Failure at one integration point may cause failure to all systems connected to it.
- **Chaotic:** Integration chaos appears due to big number of integration points leading to a known problem called "Rats Nests" that may conceivably complicate or even prevent future enhancement and maintenance tasks. Figure 2 illustrates a sample for integration chaos that may be yielded using P2P method especially if the number of participating modules and systems increases.

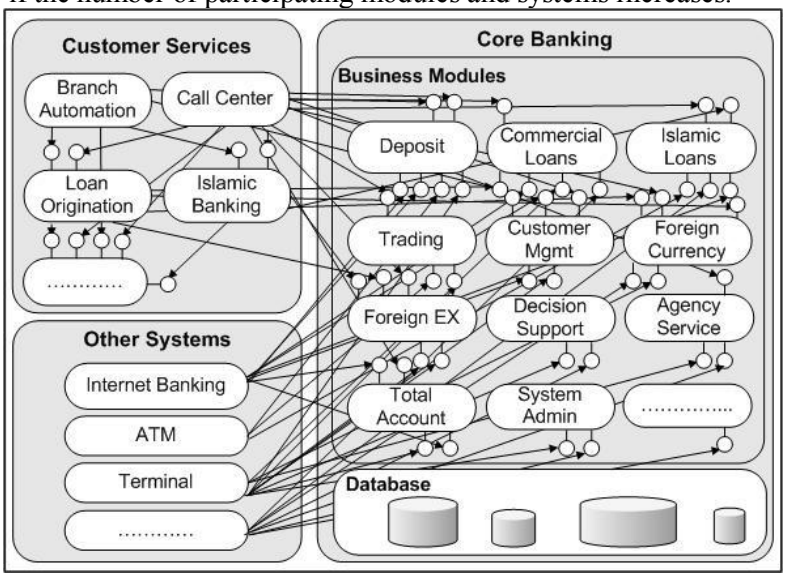

Figure 2. Integration chaos resulting from P2P method

Due to weakness points listed above about P2P method, integration specialists were looking for a dynamic and agile method that could help them to integrate systems together in a more efficient, and cost effective manner.

Service-oriented integration (SOI) is a method that maps SOA features and characteristics with integration needs in order to allow easier and more flexible integration between different systems. Shortly, SOI aims to integrate systems by building services around them and therefore allowing accessibility to their internal functionalities.

2.2. SOI and Web Services

Typically, web services can be considered as the major implementation technology for most of contemporary service-oriented applications. What makes web services the best choice for implementing SOA is the great support it has gained from most software vendors since it has emerged in software market, this support is because web services technology relies on set of standards [5]

including extensible markup language (XML) which is responsible for structuring data passed between participating nodes [6], simple object access protocol (SOAP) which acts as the messaging framework for transferring data requests and responses between service consumers and providers [7], and web service description language (WSDL) which is responsible for providing needed description information about exposed services to allow service consumers to easily bound to them [8]. Also, the service extensions that have emerged few years ago for supporting complicated needs of enterprise solutions have sustained their implementation in different organizations. These new extensions include atomic transactions, business processes, reliable messaging, enhanced security, attachments, delivery notifications, and many others [9].

One note to mention here is, we should know that web services is not the only available option for implementing SOA, as there are many others including message queuing technologies such as Microsoft Message Queues (MSMQ); technologies that allow access to distributed objects such as Remote Method Invocation (RMI) and Common Object Request Broker Architecture (CORBA).

3. Proposed Architecture

Our proposed architecture depends on utilizing SOI and web services to integrate available (contemporary and legacy) systems together. The integration process is divided into two tasks listed as follows:

- Integrating front-end systems together by exposing internal functionalities as set of web services to receive callers' (consumers) requests in order process them and finally forward back providers' responses.
- Integrating front-end systems with back-end system via an integration bus that will act as a single access point for all requests coming from front-end systems.

Figure 3 illustrates the architecture for proposed solution, and the details for implementing this solution are listed in the subsequent sections.

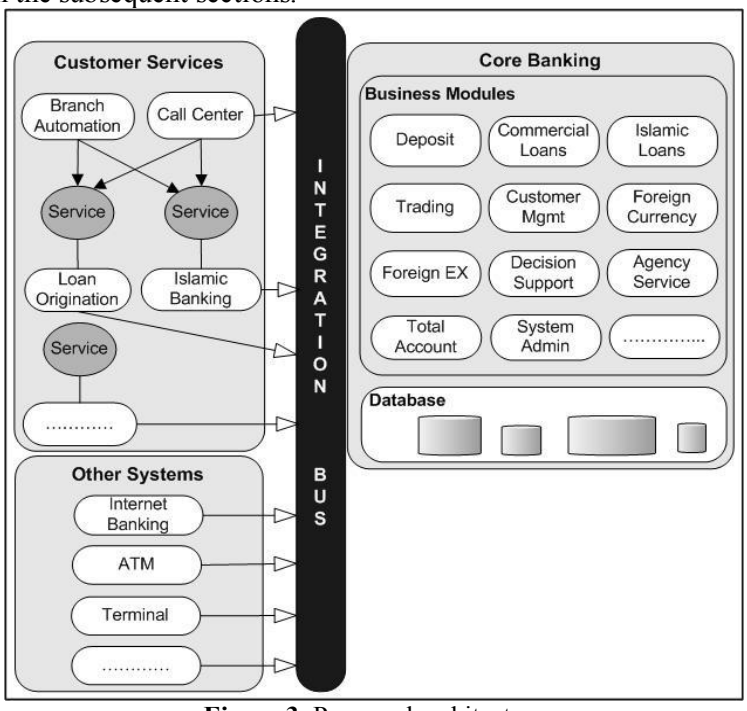

Figure 3. Proposed architecture

4. Approaching SOA

Approaching SOA in integration process does not only mean building set of web services, but it means the way that those web services will be built in to allow maximum number of consumers to make use of them, i.e., which components will be exposed as services, structure of these services, and how the consumers will be able to use them.

Integration details for the aforementioned tasks will be described in subsequent sections.

4.1. Integrating Front-End systems

This task is almost easy because all back-end systems are built with recent technologies (including .NET and J2EE) which heavily depend on contemporary standards and greatly support web services, so, a new layer of web services will be simply layered above business tier in order to interface (expose) needed functionalities for external use. The service layer will be responsible for accepting consumers' requests, mediating them to functions and processes encapsulated in business tier and forwarding back returned result sets. This layer is mainly created for external uses but it may be utilized by internal systems as well. Figure 4 illustrates interaction between different systems and layers with the new web service layer.

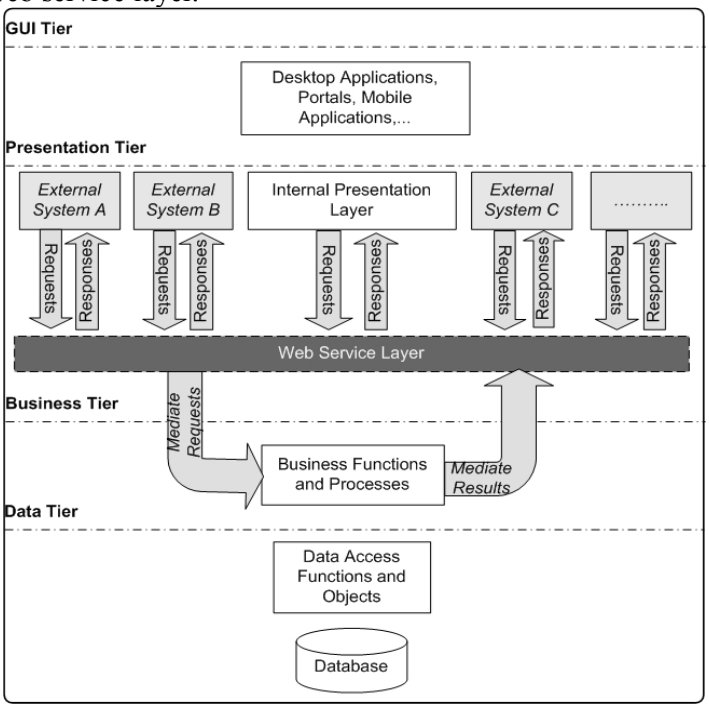

Figure 4. Interaction between systems and web service layer in n-tier architecture

Technically, web service layer should embody different scopes and sizes of services in a layered order to meet different business and technical needs; for example, it should contain simple (basic) services that directly interface/wrap business methods such as *Get_Customer_Address,* as well as composite services that map business processes and workflows (both macro-flows and micro-flows) such as *Loan Approval Cycle* process. Figure 5 illustrates a high level overview for the structure of web service layer.

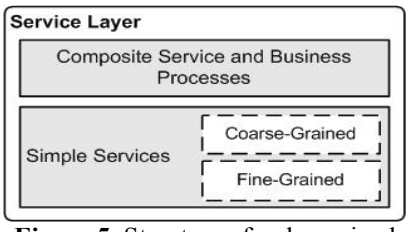

Figure 5. Structure of web service layer

Service-Oriented Analysis and Design (SOAD) methods would be utilized to identify services to be constructed with all related implementation details including the granularity of defined services (coarse-grained vs. fine-grained), and how they will interact with each other [10, 11].

Three notes should be taken into consideration during the execution of this task listed in the following:

- Business processes should be built in a dynamic form to allow easy changing for them without inherent change in underlying structure. One way that could help in achieving this goal is to use orchestration engines that allow integration architects to draw business processes with visual editors rather than hard coding them with traditional programming languages. The used orchestration engines

must highly support latest standards in software market such as Business Process Execution Language for Web Services (BPEL4WS) that allow interoperability between different business partners in a flexible manner.

▪ Web services created in this layer must be generic (as much as possible) in order to avoid P2P chaos, in other words, each service should act as one for all. These generic services will allow different assessors to get needed data for different contexts with the same way, and this would ease the integration and maintenance tasks for both service consumers and providers respectively.

▪ In regard to SOA basic architecture, the constructed services should be registered with all needed guidelines and metadata information in a reachable service registry to allow different business partners to find and use them. Universal Description, Discovery and Integration (UDDI) is one of the most popular examples for available service registration platforms in software market [12]. The popularity of UDDI comes from its dependence on standards that have been set by almost all large software vendors including Microsoft and IBM. UDDI allows easy registration for services with set of search options for finding them. These options include both search engines and APIs that could be used to retrieve all information documents attached with registered services.

4.2. Integrating Front-End and Back-End systems

This is the hardest part in our scenario because of two reasons; firstly, the back-end system is a legacy application that has been built 10 years ago with completely obsolete technologies, secondly, since this system will be accessed from all other systems, so, it should be highly scalable. Scalability in our scenario comes mainly from providing a unified and standardized access method that allows easy integration with other systems with no or little impact on the whole architecture and current systems. To do so, we need to expose legacy code as web services utilizing bottom-up method in SOAD. The constructed service layer will act as a bus through which all requests and responses will pass. The Implementation details for this integration bus are illustrated in coming two subsections.

4.2.1. Wrapping Legacy Code

As mentioned above, all the business logic code related to *CB* system has been built as a set of stored procedures in database layer, and they are interfaced by set of functions and libraries written in c to be used by GUI layer that is responsible for dividing *CB* system into different modules. So, we can directly wrap these stored procedures as a set of services to be exposed and used by different assessors, while leaving current *CB* interfaces that are used by some users as is.

Simply, our solution depends on componentizing current procedures by building a new layer above *CB* database that will be responsible for passing input parameters to stored procedures and receiving returned result set [13, 14]. This new layer will act as a wrapper/mediator that stores large number of predefined schema objects mapped to different requests, and large library of methods that interact with underlying stored procedures. Figure 6 illustrates a sample overview for wrapper layer structure.

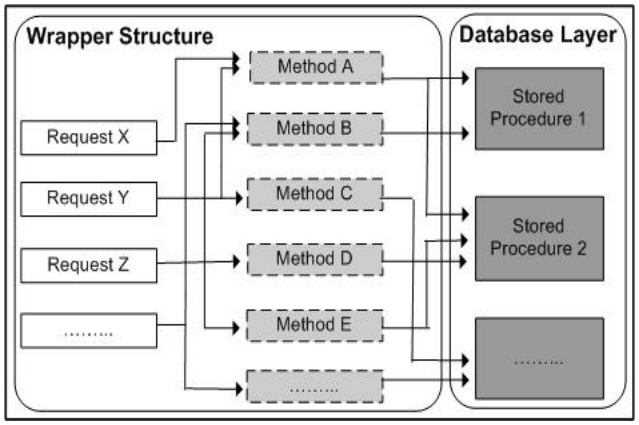

Figure 6. Interaction between wrapper layer and database stored procedures

As depicted in figure 6, there are some simple (scalar) requests that depend on calling only single methods from available methods' library such as *Request X* which calls only *Method A*, whilst,

others aggregate more than one method such as *Request Y* which calls *Method B*, *Method, Method C*, and *Method E*. This aggregation is made by programmers who create the wrapper layer. Also, some of the methods themselves implement only one stored procedure such as *Method B* which implements *Stored Procedure 1*, while others implement more than one stored procedure such as *Method A* which implements *Stored Procedure 1* and *Stored Procedure 2*.

Abstractly, the interaction between front-end systems and this new layer will be in form of XML messages, and each message will be responsible for accomplishing a specific task whatever the size and complexity of that task. For example, there may be a message for getting customer profile according to his ID.

To allow *CB* system to process request messages properly, each request message must encompass request type that will be used to call matching method from available library in wrapper layer which in turn will call corresponding stored procedure(s) with proper set of input parameters extracted from request body itself. Figure 7 illustrates an example for a sample request message on left side and its response message on right side.

Request Message	Response Message
<?xml version = "1.0"?> <Request ID="86C86720-42A0-1069-A2E8-08002B30309D" Date ="1/1/2008 4:30:35 PM"> <CustomerProfile> <CustID>10028160 </CustID> <BankID>10</BankID> <BranchID>2</BranchID> </CustomerProfile> </Request>	<?xml version = "1.0"?> <Response ID="8664DA16-DDA2-42AC-926A-C18F9127C302" Date="1/1/2008 4:30:40 PM" RequestID="86C86720-42A0-1069-A2E8-08002B30309D"> <CustomerProfile> <CustID>10028160</CustID> <CustName>Qusay Fadhel</CustName> <CustStatus>Active</CustStatus> <CustType>V.I.P</CustType> <Address> <Country>Egypt</Country> <City>Cairo</City> <Street>Free Zone, Nasr City</Street> </Address> <BankID>10</BankID> <BankName>HSBC</BankName> <BranchID>2</BranchID> <BranchName>HSBC-Cairo-Al Mohandeseen </BranchName> <Accounts> <Account1> <AccountNumber>00001110012586 </AccountNumber> <AccountType>Checking</AccountType> <AccountStatus>Open</AccountStatus> </Account1> </Accounts> </CustomerProfile> </Response>

Figure 7. Example for Request/Response messages

As depicted in figure 7, the request message is a simple XML request started with *Request* tag that holds set of attributes for all needed information about that request including request ID which is a globally unique identifier (GUID), request time, requesting system and requesting machine IP (for traceability issue). This tag simply tells the *CB* wrapper that it is about receiving a new request from *CustomerProfile* Type. On other side, the response message started with *Response* tag which tells the receiving system that it will receive a response message from *CustomerProfile* type in order to initialize proper message object to hold returned response values for any further processing. Some attributes and metadata information are attached with the response message as well including the response time (for performance measurement issue), response date, and request id that correlates each response message to its originating request message.

Technically, different front-end systems will be responsible for constructing request messages, passing them to the wrapper layer in order to allow it to extract needed information to invoke

appropriate methods and pass input parameters to underlying stored procedures to be processed, and finally, receive returned response messages. To allow efficient integration between front-end systems and wrapped *CB* system, each front-end system should build a new interaction layer (wrapper) on his side as well in order to manage interaction with *CB* system. Clearly, the front-end wrappers will be responsible for constructing request messages in a structure that could be accepted and parsed by *CB* wrapper as well as extracting expected result sets from returned response messages without any contradiction with entire systems logic. Figure 8 illustrates the interaction model between a front-end system and wrapped *CB* system.

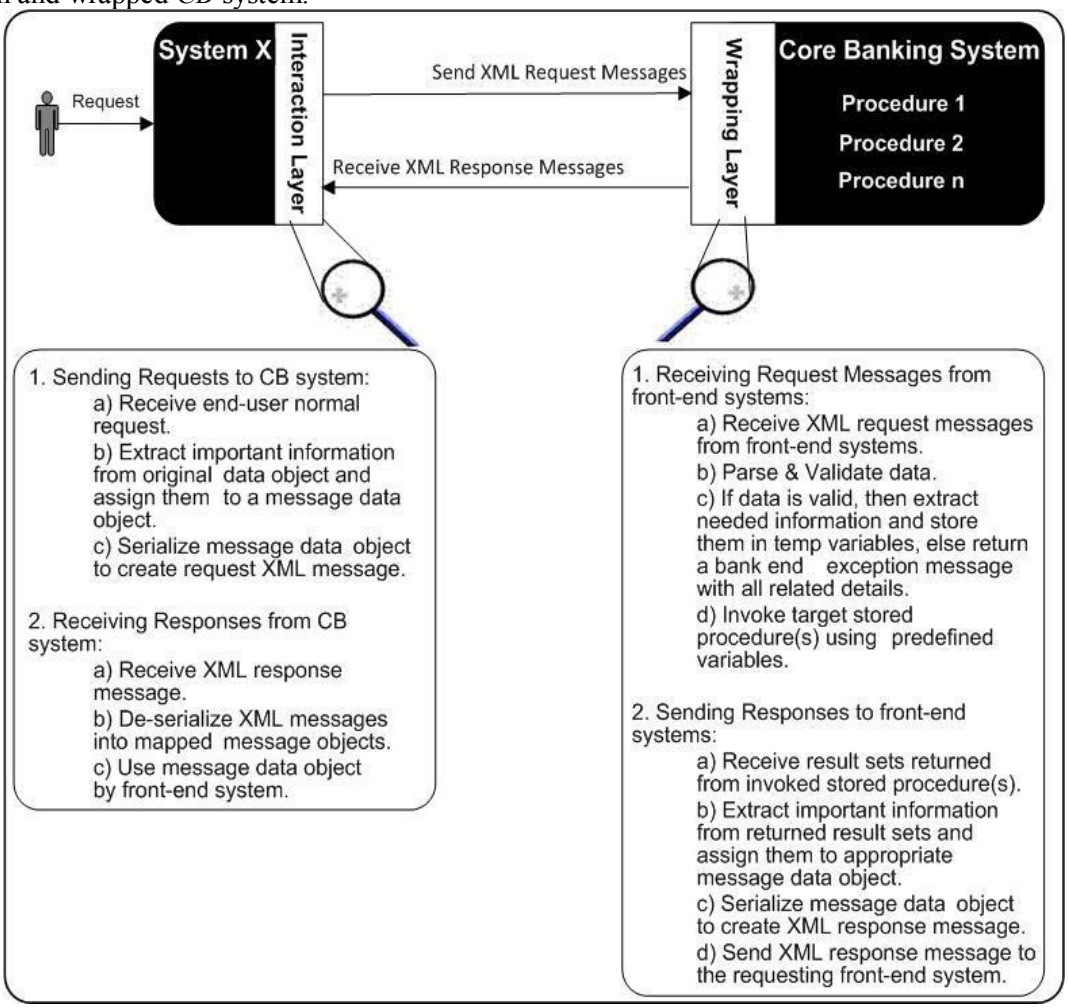

Figure 8. Interaction model between front-end systems and CB system

4.2.2. Building Integration Bus

After wrapping legacy code, we should expose the wrapped logic in a way that allows easy integration with other systems. To do so, we will build a new web service layer that will act as an integration bus that will accept request messages from front-end systems and forward back returned result sets to the requesting systems. This bus will be accessible for both internal and external systems that need to access *CB* system. Simply, this layer will only expose a single method that accepts textual inputs through which all request messages will be passed to underlying *CB* system. Technically, this web method will be responsible for validating received request messages in order to parse them to identify appropriate methods from wrapper layer that can process them. If any mismatches exist between the structure of received request message and expected request structure, the bus will prevent any further processing for that message and it will return a back-end exception to the requesting system indicating the main causes of returned error. Also, new web service specifications including *WS-Coordination* and *WS-Transaction* will be utilized into this layer in order to allow integrating systems to participate in global transactions and processes. For example, assume that the *LO* system

wants to grant a loan to one of his customers through its internal workflow module, and it wants to change the status of the assigned loan to *Granted* on internal system as well as on *CB* system in case of success or to preserve the last reached status on both systems in case of failure.

Apparently, this bus is expected to receive very large number of requests due to the number of integrated systems, thus, a load balancing technique should be utilized in order to handle big number of hits. Simply, web farms could be created to distribute the coming request to more than one site. Also, message queuing service could be leveraged to temporarily store coming requests before processing them by underlying wrapper layer. Underlying processing layer will be responsible for picking available messages from queues according to their priorities or arrival time. Finally, the history of all requests and responses passing through this layer will be logged into a small database attached with bus for future reviews, statistics and reports. Figure 9 illustrates the architecture of service bus and the interaction between its different components.

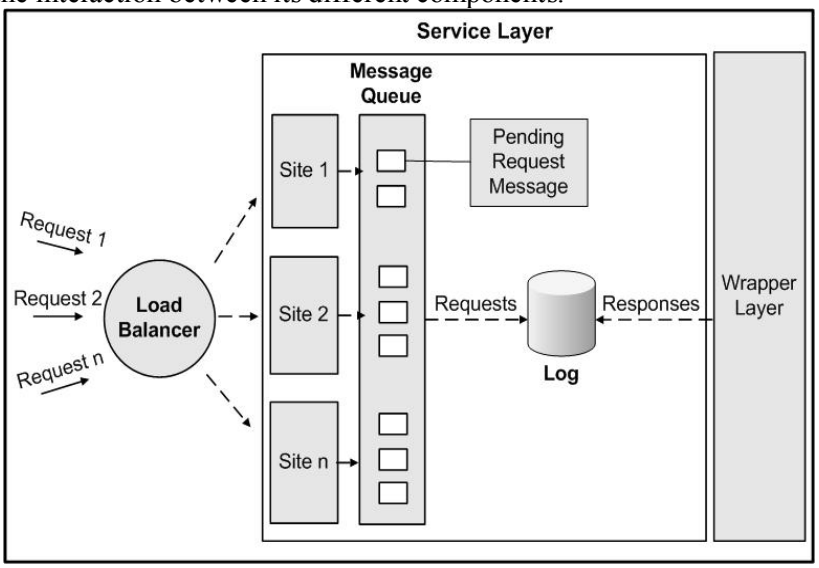

Figure 9. Service Bus Architecture

5. System Performance

Due to high dependence on web services and XML data, this integration architecture slightly suffers from low performance. Leveraging XML has hampered by large data sizes that always clog network and drain hardware resources including RAM, CPU, and storage infrastructure. Many experiments have been conducted to yield the following list of recommended tactics and techniques for enhancing XML performance:

- **Binary XML:** Most of current XML implementations depend on using plain-text format that causes data files to be very large in size. W3C has announced a new representation of XML that depends on formatting data into binary format for more efficient network and hardware utilization [15].
- **Data compression:** Since XML is a text based format, then using traditional compression algorithms such as ZIP/GZIP for compressing data transferring between requestors and responders can get rid of many of bytes of the volume out of data files. To apply compression technique on traveling data, both requestors and responders must understand the used compression algorithm to be able to recognize and use these data. Another way that could make XML files smaller is to avoid long element and attribute names, for example, *<AccountNumber>…</AccountNumber>* tags can be abbreviated to *<AccNo>…</AccNo>* to save 16 bytes (for both opening and closing tags) while still human readable.
- **Break Large Files:** Dividing large and complex data files into smaller pieces (if possible) can deliberately enhance both network and processing performance.
- **Use Better Parsing Techniques:** SAX and DOM are the most popular parsing techniques available in XML market. Many benchmarks on throughput of them have shown that they require slightly long times to parse XML files at different sizes and complexity levels. One way to mitigate parsing problems is to use some more enhanced parsing techniques such as Virtual Token Descriptor

XML (VTD-XML) which depends on "non-extractive" tokenization approach to parse XML files [16]. Using enhanced parsing algorithms and tools could save the needed parsing time which in turn could save the total processing time and resources.

- **Apply Silicon-Based XML Engines:** Many silicon-based engines are available now to handle XML at higher speed. These engines can be embedded into different network and hardware equipments including switches, routers, load balancers, PCI-cards and servers.

6. System Efficiency

Our illustrated architecture offers many advantages over traditional methods for integrating banking systems and they all related to the offered degree of reusing including:

- **High Reusability:** Services created by one system to expose business/technical functionalities may be utilized and used by all other systems and modules that target them. For example, services provided by *LO* system may be used by *BA* system to allow tellers to monitor and deal with customer loans, and it could be used by *Internet Banking* module to allow customers to monitor their loan status by themselves.
- **Leveraging legacy Assets:** As illustrated in our solution, we did not have to get rid of available legacy assets in order to allow integration with contemporary systems (such as *BA*, *IB*, *LO*, …), but rather, SOA methods allowed us to utilize current Core Banking system in a way that saved total costs and efforts that might be needed for developing and testing new Core Banking system.
- **Efficient Integration:** Web services technology allowed us to easily wrap available (legacy and contemporary) systems in a way that enabled other systems to access their internal functionalities. On other hand, other technologies such as CORBA and RPC that have been used for many years may allow service providers to expose their functionalities to be remotely accessed by other systems but with limited capabilities and at higher implementation costs and complexity levels.
- **Avoiding Redundancy:** SOA allowed us to share same systems and functionalities between more requesting systems in a uniform manner rather than cloning and rewriting them over and over again. Such facility could inherently save total implementation time and costs and make overall maintenance tasks easier. In our illustrated scenario, SOA has delegated access to back-end modules to services bus which is now responsible for managing requests and responses passing to and from front-end systems in a centralized and standardized form.
- **Service Sharing rather than Information Sharing:** One of the most popular methods for integrating systems is to share their underlying information and databases by replicating them at each requesting system or by allowing direct access to centralized data stores. This integration method suffers mainly from enforcing each integrating system to build its own logic in order to get needed data in a suitable form as well as data inconsistency that may occur due to using inappropriate updating policy for theses data stores. SOA is a better integration method as it allows data and information owners to turn to be *service providers* who build, enhance, and maintain the logic needed for data sharing in a more holistic form. Building services at different granularity levels and scopes could allow different assessors (at different departments, subsidiaries, or even organizations) to get needed information in a more accepted form without caring about underlying complexities. These services could be easily utilized by workflow engines, portals, terminals and many other access forms at lower costs and complexity levels, and higher efficiency.
- **Easy to define and change Business Processes:** Services built by service providers could be easily orchestrated and choreographed by service consumers in order to define their workflow processes. This process could be accomplished easier by using some tools that allow business analysts and technical developers to draw needed processes by defining the execution order of available web services.
- **High Agility:** The aforementioned advantages with no doubt would inherently offer a great level of agility needed by banks to get their work done efficiently. Benefits of agility would appear in the ability to modify, enhance, and maintain the integrated systems efficiently to meet business requirements. For example, assume that the bank decided to replace the current *CB* system with a modern one. Doing so with SOA methods would exempt the software developers from rewriting their front-end systems to be able get integrated with the new *CB* system. In this case the designed

integration bus will act as a black box for hiding all changes occurring to the underlying system(s), and the software developers will only need to modify the logic of this bus in order to keep integration between available front-end systems and the new *CB* system.

- **Accessibility and Availability:** Created services are highly available and they could be accessed using different access forms including LANs, WANs, and Internet. This availability could easily allow different business partners such as other banks, branches, and departments to have access to some shared data.

7. Conclusion

This paper has introduced the use of SOA in integrating banking systems and how it could play a great role to overcome problems that always emerge when using traditional point-to-point methods.

SOA in this paper has helped us to integrate front-end systems together in an easy manner by exposing their logic in terms of public services. Also, it has allowed us to wrap legacy code presented by back-end systems in order to make use of existing assets. Integration with wrapped back-end system has been accomplished by building a simple service bus around it to act as a single access point for all requests coming from front-end systems.

Web services technology has been utilized to build all needed services as it has presented high success rates in software market due to its dependence on standards, ease of use, and advanced capabilities that it offers for building and integrating enterprise solutions.

Shortly, SOA tends to provide the needed flexibility and agility to meet market ever-changing needs in an effective manner, so, it could be considered as an excellent way for building and integrating almost all complex applications including banking systems.

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REENGINEERING AS AN EFFICIENT SOLUTION TO REDESIGN ACTIVITIES AND PROCESSES OF AN ENTERPRISE

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Abstract:
The paper shows a series of opportunities linked to the technological, human and economical reengineering of activities and technological processes developed in a modern enterprise, adding new dimensions in the efficient development, on the market principles, in argument with the desiderate of the durable development of the society.
Starting with these considerations we designed aspects linked to: business reengineering implementation, stages of this process, accentuating the management methods, delimitation on areas of activity of the effects on reengineering action.

Key words: business reengineering process, reengineering enterprise, models and methods for reengineering project

JEL Classification: C61, C63, O32

1. Introduction

The globalisation of the economy, the accelerated the dynamism of the contemporary world, the passing from an informational society, the increase of the role of the human factor, had as follow up the appearance of some new branches in the area of science, unknown till nowadays, which progress thanks to the attracting of accomplishments from different areas of the contemporary science, especially in the domains of: mathematics, information technology, sociology, psychology, ethics.

A new direction in the contemporary management, studied in the strategically management area is known under the name of reengineering, representing a solution to encompass the difficulties and to the growth of the efficiency of enterprises activities.

The reengineering is included in the arsenal of the top companies in the world, thing that is demonstrated by the statistic data of American company Ernst and Young, which has done research in this area. The most important banks from North America, lately, have allocated 3 billion dollars to implement the reengineering in their branches and subdivisions, 2004-2005. The USA government has conceived more than 200 reengineering projects [2].

The reengineering is quick a large and complex notion. Presently, in the scientific literature, there is a quite a large number of definitions of the reengineering.

Our attention is focused on [1] which defines this concept in this way: "… a complex of measures done by an organisation to transform its internal processes and the control system from a vertical (hierarchical) structure traditional one, to a horizontal structure, interfunctional, built on the basis of the project teams and which has as its purpose to satisfy the customers' demands."

At the same time, a series of researches prefer the term *business reengineering*, while other researchers are willing to discuss about this phenomenon only strictly connect to *business-processes,* that is, they use the term *Business Process Reengineering* (BPR).

2. Models and methods of management used for the reengineering project

The enterprise reengineering describes a new conceptual model for the business activity, which is enabled with a unit of informational techniques and technologies, which the directors and the

managers will have to use in order to redesign the processes and the activities to face the competition on a dynamic market.

To do that thing, the managers must give up to the old notion of how business must be organised and run. They must give up the principles and the operational and organisational principles and procedures that they use currently, and create new ones.

The traditional organisation's approach identifies within itself five interconnected variables: the *targets*, the *structure*, the *tasks*, the *technology* and *human resources*. More, a reengineering project will introduce the sixth element for the model of endogenous variable: the organisational culture.

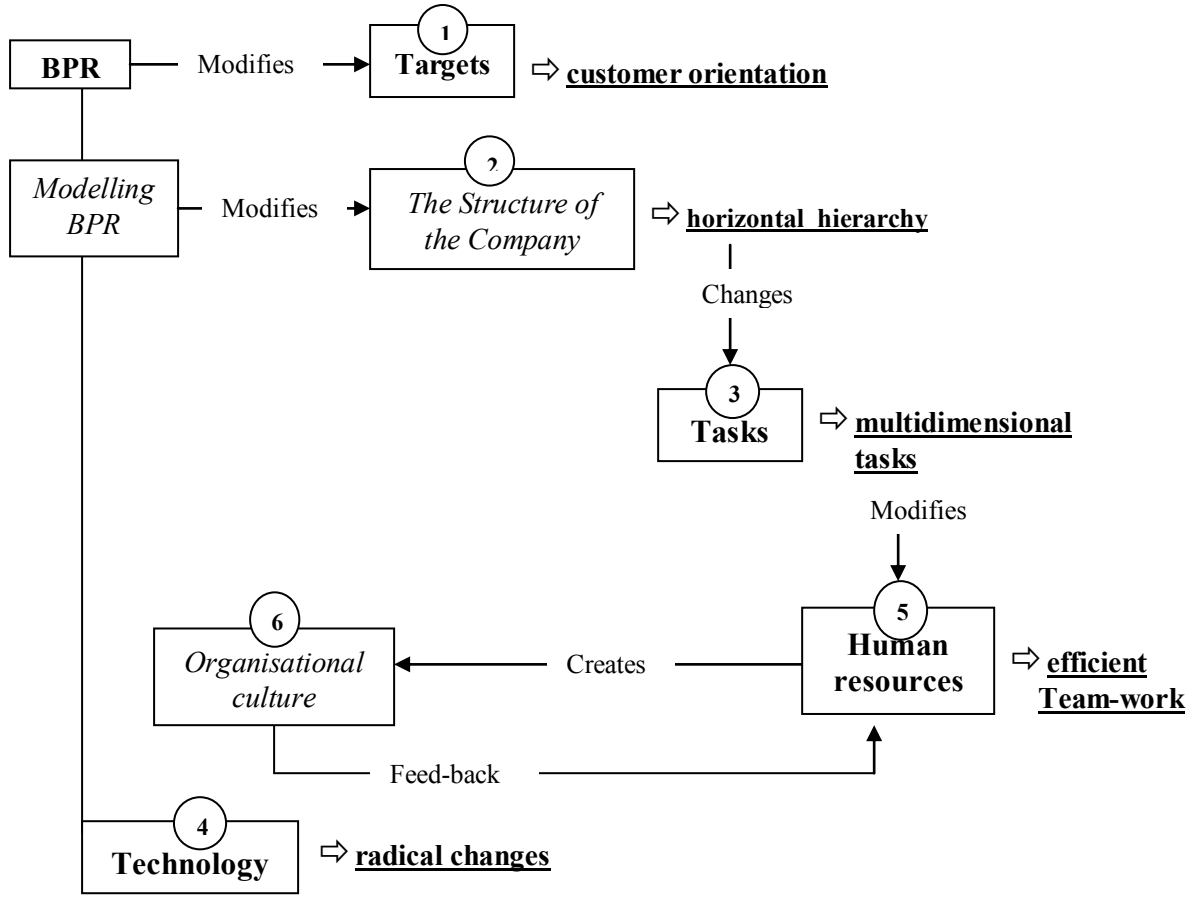

Figure 1. Chain changes for the processes and the activities produced by the endogenous variables

As we have shown in the *Figure 1,* the produce chain changes for the processes and the activities undergoing in the enterprise's organisational structure:

- Business Process Reengineering modifies the main endogenous variable, more precisely - the targets, orienting them towards the customer;
- the Business Process modelling modifies the structure of the company, transforming it from hierarchical into horizontal;
- on its turn, the flat structures changes the organisation's tasks and, in this way, the evolution of tasks is being produced from narrow – specialised ones to the multidimensional one;
- the team-work personnel more efficient due to the own organisational culture, here we can clearly see a feedback, because the collaboration and the team interaction create a certain organisational culture. At the same time, an organisational culture, well-defined, favours the efficient functioning of processes and activities;
- the technology ensures the implement of the radical changes from the enterprise. The continuous development of this endogenous variable crates the premise of the accomplishment of future transformations.

On the basis of the conceptual aspects of the reengineering, exposed in the first part of the paper, we analyse a set of methods and models of management necessary to implement a reengineering project. This step has as its basis a vast study which dealt with the problems with which the Romanian enterprises are being confronted: the majority of the enterprises are not ready for radical changes; a great part of the staff doesn't like the team work, the tendency of the leading personnel to concentrate the efforts on different positions.

The study tracked a number of 18 enterprises having objects of activity and different area of action, grouped in 3 categories, depending on the turnover's level.

Table 1 presents, systematically, the management's models and methods recommended in the accomplishing of the reengineering projects.

Table 1

Management Method or Model	Description
Decision Tree	It determines the prime purpose of actions, chosen from the all possible variances
Analysis upon Paretto principle	It considers the relation 80:20, that is, in the activity process with the first 20% from the time and the resources consumed, they are accomplished 80% from the results quantum.
Gantt's Graphic	It shows the critical line of the project, expressed through the succession of actions, which determines its duration.
Payment Matrix	It chooses the most advantageous variance in the case of multiple ways of alternatives accomplishments.
Method of chained substitutions	It calculates the influences of certain factors upon the turnover through the successive substitution of the effective value of the analysed factor by maintaining the others on the previous level.
The efficient team's profile	It determines the most creative component of the team through the attributive criteria joining, as well as of the team members' number.
Five competitional forces	Model of competitional pressure on which concerns the five forces: - The rivalry between the sellers from the same branch; - The market flooding with substituent - merchandise; - The appearance of the possible competition in the same branch; - The imposition of own conditions by the raw materials suppliers; - The buyers' capacity to exercise competitional pression upon the seller.
Cause – effect analyses	The problem's causes identification through the factors chaining
Values chain	Method to create competitional priority through the optimisation and co-ordination of exogenous relations.
Outsourcing	The reduction of personnel processes' costs, increasing, at the same time, its value, through the transferring of some subdivisions or internal sections of the enterprise, and of all afferent assets in the organisation of a service provider, who proposes to carry out a certain service in a certain amount of time on a recommended price.
Couching	The evaluation of the personnel quality that contributes to the efficient forming of the teams and to the development through self-instruction.

Applying the methods and management model being to accomplish reengineering projects are being done in reciprocal correlation by applying the situational approach and keeping in mind the characteristics that built in every enterprise.

Depending on the specificity of the analysed enterprise to implement a reengineering project, viable solutions will be obtained, which can determine correct decisions to face, successfully, the competition struggle, the changes dynamism and the economy globalisation. In this way the reengineering objective is attained, organisational as efficient solution to redesign the activities and processes of an enterprise.

Further, we present in *Table2*, the conclusions of using three of the methods present in *Table1,* to three different enterprises, subjected to the reengineering process. The *Table2* provides informations relevant to the results obtained after applying the management's methods and models, showing the activities or the processes which can be transformed by the reengineering project.

Table 2

Firm	Management Method	Results: activities and/or processes transformed	Decisions
SC Alfa - commercializes building materials	**Decisional Tree**	▪ the modification of the selling system; ▪ increasing the markets; ▪ the modification of the execution times of services: the reduction of delivery periods, paper concluding time, etc	▪ rehash the types of the commercialized merchandise; ▪ reviewing some contracts with the merchandise suppliers; ▪ automatization of the accounting system; ▪ participation in commercial exhibitions and fairs.
SC Beta – ready-made clothes and textiles production	**Paretto's Diagram**	▪ the modification of the technological process to reduce the rejects to the minimum; ▪ the improvement of the qualitative parameters; ▪ the modifications in the productive personnel configuration;	▪ modernization of the technological process; ▪ superior instruction of the workers; ▪ detailed checking of the technological flux.
SC Gamma – executes building work and assembly	**The five Competitional Forces**	▪ the maintaining under control of the rate: quality/price; ▪ the modification of the customer structure extension on the external market.	▪ the broadening of the assortment of provided services; ▪ the execution on services on types of clients (reliable, less reliable).

Not even a firm can submit all its processes to reengineering, on a high level and simultaneously. Once the management has identified the processes and the activities subject to the reengineering, through specific ways, these are being represented on a process map. The next step is represented by the decision upon those which require reengineering and the order in which these must be approached. Generally, the firms use three criteria which should help them in the foundation of the reengineering decision:

- The disfunctionality criteria: *Which processes are in the most difficulty*?
- The importance criteria: *Which processes have the greatest impact upon the firm's clients*?
- The feasibility criteria: *Which of the enterprise's project are ready for a successful redesign*?

3. Information Technologies – basis of the reengineering

Without the basic changes in the work practice brought by the concept of the enterprise's redesign, the investments will have a relatively small impact. The reengineering means the fundamental rethinking and radical reprojection of business processes, to obtain spectacular improvements of the indexes, today being considered critical in the performances evaluation, such as the cost, the quality, the service and the speed.

The new organisations will be completely different from the present ones, and the way in which they'll buy, produce, sell and deliver products and services will be influenced by the use of informational and communicational technologies. An enterprise which cannot assimilate the new technologies of the processes and activities done on the inside, cannot pass to reengineering.

For instance, the most significant informational technology from enterprise, from the last decade, it's the ERP System (Enterprise Resources Planning), an integrated software which can analyse complete processes or distinctive activities business applied. Depending on the reengineering project stages and on purpose, a wide range of informational technologies can be used [see Table3].

Table 3

Reengineering Stages	Objectives of the Reengineering Stages	Recommended Informational Technologies
1. Identification of the problems	-diagnosis of problems through the statistics analysis method of the data bases; -reflection upon the enterprise's economical - financial situation.	Oracle E-Business Suite, **E**nterprise **R**esource **P**lanning, **E**xecutive **S**upport **S**ystems, **C**ustomer **R**elationship **M**anagement, **T**otal **Q**uality **M**anagement
2. Reverse Reengineering	- studying the processes and the activities that function in an enterprise	Functional-oriented modelling methods: ARIS Toolset, Business Engineer (SAP), Dynamic Enterprise Modeler (BAAN).
3. Direct Reengineering	-making the models of modern organisation of processes and activities	**B**usiness **P**rocess **O**utsourcing, Extended +BPR, BPSimulator, ProcessModel
4. Accomplishing the reengineering project	- establishing the processes and/or the activities which need to be redesigned according to the criteria of disfunctionality, importance and feasibility; - establishing the order of modification.	CASE, RAD, Oracle Designer, ARENA (Process Analyser), Supply Chain Builder, Planning Workbench, programming languages: Visual C++, SIMAN, Visual Basic, LISP, etc.
5. Project Implementation	- stage-project implementation of the project depending on the priorities established; - analysis of accomplishing the pre-established criteria.	Instrumental modalities for monitoring: FileNet systems (for e-documents, imagines and workflow), Performance Process Management

To apply the informal technologies in reengineering requires inductive thinking, that is, the manager's ability to realise, firstly, that there is a solution which a radical impact and then, to look for the problems which could be solved. The real power of the technology isn't given by the fact that it can make the old processes work better, but by the fact that, it allows the enterprise to surpass the old rules and create new working ways – that is passing to reengineering.

4. Conclusions

The necessity of the reengineering is conditioned by the advanced dynamism of the contemporary world, by the endless and essential modification done in the exterior and interior environment belonging to enterprises.

As a title conclusion detached from the ideas expressed in this paper, we consider the reengineering be an efficient solution of redesigned the enterprise's processes and activities. This solution is adopted not only by the prosperous companies but by all the enterprises that want to maintain their competitively. After the reengineering's implementation, the enterprise becomes the object of permanent transformations, there are essential differences between reengineering and improvement, in this way we have in *Table 4:*

Table 4

Parameters	Reengineering	Improvement
▪ Degree of changes	Radical	Increased
▪ Frequency of changes	Once	Continuously or once
▪ Necessary term of Accomplishment	Long Time	Short Time
▪ Direction	Up/Down	Down/Up
▪ Amplitude	Vast, inter-functional	Narrow, function level
▪ Risk	Big	Moderate
▪ Main Method	Information Technologies	Strategic Management
▪ Type of change	Cultural and Structural	Cultural

The research done by the authors delimitates the reengineering as an original type of management, which demands new intellectual resources, but financial too, and it imposes the use of information technologies to create new organisational structures and the conduct of modern methods of administration.

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THE COMPETENCE – THE INCREASE FACTOR OF THE PROFESSIONAL COMPETITION

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Abstract:
The performance cannot be reached without that the human being be competent in his activity field, but there is kept that only if the competence is put in action, it can achieve the real performance.
In the context of the society of information and globalization, the profile of the competences of the future must take into account the new types of organizations which will appear and the new objects which will be established by these in their quality of organizations founded on the knowledge.
The creativeness is necessary for every wage worker which wants to have the power on the performance of his own professional existence, constituting the base of the individual performances.

Key words: professional performance, personal competence, human creativeness, organizations, objects, knowledge.

JEL Classification: J24

1. The professional competence and the individual performance

The individual competence expresses the assembly of the factors and of the conditions which belong to the general organization of the brain and which make it to be able for answering adequately and to comply with more and less optimally the solicitations of the external and internal environment of the body.[1] In fact, the competence represents the comportment possible, while the performance uncovers the real comportment.

The transformation of the possible in the real is, a specific action of the human brain and it is intermediated by three groups of factors:

- the capacity to use efficiently the information system of data and laws, by the resonant composition, as form of superior manifestation of the competence;
- the favoured motivation of positive emotional circuits of the psychical activity;
- the inspirative capacity, that to use efficiently the collaboration between the self-consciousness and the inner space.

The competence is the result of the information and of the storage of the information filtered preliminarily, submitted to the sensory, intellectual, categorized and classified perceptions. The information, the competence and the performance represent a dialectic unit: the information determines the competence; the competence determines the performance and the performance enrichs the information with the new data and with the laws of big intensity. (Figure 1)

Figure 1. The interdependence between the information-competence-performance

2. The occupational competences

At the assurance of the superior competences there is situated a big number of six main groups of specific competences to a large occupational fan: the entrepreneurs, the technologists, the sellers, the managers. The six groups refer to:

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- the action and achievement competences;
- the assistance and services competences;
- the influence competences;
- the managerial competences;
- the cognitive competences;
- the competences for the increasing of the personal efficiency.

Every group of competences manifests in the series of abilities, capacities and of specific comportments.

The action and achievement competences manifest through:

- the motivation of the achievement of the activity, which supposes the preoccupation for the performance in the good conditions of the given activity, respectively for the getting of the excellent results in the performed activity;
- the preoccupation for the maintenance of the order and of the increasing of the quality, so the preoccupation for the reduction of the incertitudes achieving, navigating and controlling the clear and ordered activities;
- the initiative, namely the ability to undertake the actions, to improve the results or to create the opportunities;
- the research of the information consisting in the curiosity and in the wish to acquire the information, in a large and specific way, for being able to attack the background of the problem.

The assistance and services competences suppose:

- the interpersonal understanding manifests through the capacity to perceive and to understand, in a precise way, the thoughts which were not expressed or they were partially expressed, the feelings and the preoccupations of the others and through the capacity to answer adequately.
- the orientation to the satisfaction of the clients means the wish to help or to bring a service to the others, discovering with the satisfaction their needs. In this acceptation 'the colleagues can be the colleagues, too'.

The influence competences, which make themselves felt through:

- the impact and the influence, namely the wish to have a specific effect on the others for understanding them, for persuading them, for influencing them, for impressing them or for obtaining from them the participation to the wished action;
- the understanding of the organization, namely that capacity to understand and to use the political dimension from the inside of the organization;
- the establishment of relations, that means the capacity to build and to maintain the amicable contacts with the people who will contribute at the achievement of the own objects of work.

The managerial competences materialized through the specific capacities concerning:

- the development of the others, which means the capacity to undertake the efficient action for improving the competences of the others;
- the directive, namely the capacity to say to the others about what they must to do and how they must to do in the spirit of the good working of the organization;
- the cooperation and the work in team consisting from the capacity to work in a way of collaboration with the others and to obtain, from the others, the same comportment;
- the management of the team manifested through the capacity of undertaking its role of leader of a team or of a group.

The cognitive competences manifested through:

- the analytical reasoning which consistis in the capacity of understanding the situations and of solving the problems decomposing them in their components elements for analyzing them systematically and logically in all their intimacy;
- the ability to conceptualize, namely to identify the relations between the situations or to discover the hidden problems from the complex situations;
- the specialized expertise through which there is manifested the capacity to use and to develop the speciality knowledge and to offer them to the other persons.

The necessary competences for the increasing of the personal efficiency are identified through:

- the self-control when he is confronted with the situations which generate the emotions or the stress;
- the self-trust when there are the difficult situations, choosing the most convenient solution for the achievement of the tasks;
- the adaptability to the change for working efficiently in the inside of the diversity of situations with the more difficult individualities and with the inhomogeneous groups;
- the adhesion to the organization, adopting the own comportment at the needs, the priorities and at the objects of the organization.

In the performance organizations, for every position from the organizational structure there is elaborated a list of the most important general competences which constitute as premises of the professional performance. To every competence there is built a scale of evaluation of the comportment indicators reported in terms of the action intensity, the impact, the complexity and of time horizon.

3. The competences of the future

The organization of the knowledge, in the context of the information society and of the globalization, imposes that in the future the profile of the competences respect the new types of organizations which will appear and the new objects that these will establish.

On the base of the futurist studies, we synthetize the main competences which are contoured for the managers and for the employees.

Thus, the competences that the managers must prove refer to:

a. the strategical thought manifested through the capacity to understand the fast tendencies of change of the businesses environment, the opportunities of the market, the threats of the competition, the weak points and the strong points of the organization;

b. the piloting of the change, consisting from the capacity to communicate with an attractive vision on the strategy of the organization and to rouse the motivation and the adhesion of the partners for achievement of the innovations and of the organization spirit, as well as from the capacity to allocate and to combine, optimally, the resources of the organizations for being able to achieve the advisable and efficient changes;

c. the relational handling establishing the relations with the complex networks of partners on which it obtain a certain influence, but on which there is not a formal authority: products leaders, clients, undertakers, social partners, government authorities from all the levels (local, regional, national levels), legislators, groups of interest etc.;

d. the achievement of the change, respectively the capacity of piloting of change, necessary for communicating to the employees the necessity of change for the organization and the included competences: the communication power, the formation and the activity of the work group;

e. the adaptability, namely the will and the capacity to change the structures and the management processes when it is necessary, before operating the certain strategical changes in the organization;

f. the interpersonal understanding, which supposes the capacity to understand the signals emitted by the others (the collaborators, the subordinates persons, the partners, the clients etc.) and the attribution of the adequate values of these signals;

g. the allocation of power, which describe through the series of managerial comportments as:

- the distribution (the diffusion) of the information for rousing the interest and the ideas of the colleagues;
- the encouragement of the development of the collaborators;
- the rationally delegation of the responsibilities;
- the positive expression of that is expected from the employees;
- the recommpense of the amelioration of the performance, which makes that the employees fell more able and more motivated for undertaking the new responsibilities;

h. the efficiency of the team, consisting in the manager's capacity to succeed to constitute the diverse groups of persons which must work together and the roles that the members of the team will interpret;

i. the mobility, expressed through the capacity to adapt rapidly at the different regional and international environments for working efficiently in these conditions.

Concerning the employees of the organizations based on knowledge, these will have to possess the competences as:

a. the adaptability, namely the predisposition to consider the change as being more a rousing opportunity than a threat. For example, the adoption of a new technology must be considered as being an opportunity to use the best and the most recent means, apparatuses, instruments and equipments of work;

b. the motivation for researching the information, the veritable enthusiasm for the opportunities to undertake the new technical competences. For example, a secretary who is obliged to learn to use a software program or to achieve the certain accounting activities she must accept with pleasure the deamand to 'improve her activity' and not to regard this demand as a additional obligation. This new competence works further. It goes to 'the interest for the electronical calculator' and the other special technical competences of which any employee and any human being of the information society need. Iti is the impulse for 'the continuous learning', regardless of the reasons, and the new obtained competences will facilitate the change of the actual function/occupation;

c. the motivation of the achievement, which means the impulse for the innovation, generally, but especially for the innovation of 'Kaisen' type[2], for being able to comply with the competition in increasing or, more, for overtaking it;

d. the motivation for the performed activity under the pressure of the terms, which is a combination of adaptability, of motivation of the achievement, of resistence at stress and of employment to the organization. All these allow that the individuals comply with the increased experiences for the achievement of the activities when the time is very short. The motivation is expressed, for the most times, through a formulation of type: 'I work much better under the pressure; this is the impulse which leads me to the good results';

e. the cooperation spirit which manifests through the capacity to work in the interdisciplinary groups with the diverse colleagues: the interpersonal understanding, the adhesion to the organization;

f. the orientation to the clients' gratification , the real wish to help the other persons: the interpersonal understanding, the listening to the clients, the initiative for surmounting the obstacles from the own organization for achieving the clients' exigencies.

4. The creativeness and the performance

4.1. The concept of creativeness

The creativeness is understood as a capacity of the individual to produce the original and useful ideas combining the items which already exist. Accompanied by the innovation, which supposes also the execution of changes in virtue of the original ideas of the creativeness, this, the creativeness, is constituted as a real spring of the professional performance. It is not only the series of attributes and of partial functions, the creativeness represents an assembly of qualities which generates the new.[3]

The speciality researches reached to the conclusion that the disposal of creating exists in the potential state at all the individuals, but this capacity varies from a person to another under the influence of a big diversity of factors, as: intelligence, education, environment, curiosity, motivation, cultural level etc. The employees' professional performance refers to the contribution that these bring to the achievement of the objects of the organization. It represents the achievement grade of the tasks which define the position occupied by the employee.

4.2. The role of the creativeness in the achievement of the performance[4]

The creativeness is necessary not only when something must be innovated, but when an original change must be introduced in an existent situation. The need to create can be determined by the

[2] Kaizen – the scientific methode used in Japan for the development of the creative and innovation aspect of the organization (at the refuge of 'an umbrella'), through the improvement of the quality and of the increasing of the productivity.

[3] Males A., Claude R., *Creativité et methods d'innovation*, Publishing House of fayard-Homme, Paris, 1970

[4] The working after Emilian Radu, *The management of the human resources*, Publishing House of Expert, Bucharest, 1999.

existence of a bad functionality in the performance of the processes or of the activities (so there is a real problem), but also by the wish to make progress, for example, without the real bad functionalities, for consolidating the position in regard to the competition, from the competition spirit.

Three big applicative components of the creativeness are known:

- the creation, the invention, the innovation;
- the resolution of the problems;
- the optimization of what exists.

The creativeness is necessary for any employee who has to achieve at least one of these three missions, but also for those who want to have the power on the performance of their own professional existence, constituting the base of the individual performances. In terms of the circumstances, the creativeness is different:

- artistical or technical;
- intellectual or applied;
- the amelioration or the pure creation;
- the discovery or the search;
- the new idea or the association of two known ideas;
- modest or grand.

The stimulation of the creativeness contributes to the prevention and/or to the resolution of the crises, to the implementation of the changes and it becomes the solution which can manage the reduction efforts of the decalages between the development levels of the certain organizations in contrast with the other organizations.

5. Conclusions:

The management of the performance is a way to obtain the individual results, the group results and the better organizational results, through the understanding and the management of the performance in a established cadre of the planned objects and of the requirements concerning the standards and the competences. It has to the base the conception that when the people know and they understand what it is expected from them and they are in condition to participate to the formulation of the respective expectations, they can and they will act to achieve them.

The performance of the organization is strictly conditioned by the performance of its employees, being represented by the totality of the results and of the comportments in virtue of which there is evaluated the contribution of the individuals and of the groups, having as base of repeating a set of well defined and anticipatorily known criteria.

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