

Economic Determinants of Financial Service Accessibility

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Abstract:

This study investigates the influence of economic factors in ensuring access to financial services. Financial service accessibility is assessed using metrics such as the number of bank branches and ATMs per 100,000 people, as well as an index derived from these indicators. Drawing from existing literature, a set of economic variables - namely, employment, inflation, gross domestic savings, remittances, bank credit to deposits, and urbanization - are examined using data from 179 countries over eighteen years spanning from 2004 to 2021, with projections extending to 2023. The findings indicate that employment, remittances, bank credit to deposits, and urbanization exert statistically significant effects on access to financial services. These results are robust across alternative definitions of financial access, subsamples categorized by economic development, and exercises addressing endogeneity concerns.

Keywords: access to finance, economic factors, financial services.

JEL Classification: G21, E44.

Introduction

The accessibility of financial services exhibits significant disparities, particularly pronounced within emerging and developing economies (Beck et al., 2004; Green et al., 2006). Adhering to the stringent parameters presented by Demirgüç-Kunt & Singer (2017), the concept of access to financial services encompasses the possession of either transactional or savings accounts within banks, financial institutions, mobile wallets, or analogous platforms. Despite the straightforward nature of this criterion, a staggering 38%, or roughly two billion individuals globally, are identified as unbanked (Demirgüç-Kunt et al., 2015). Developing nations shoulder a disproportionate burden, with approximately half of their populace lacking access to essential financial services (Green et al., 2006), while in many regions across Africa, fewer than 20% of households possess such access (Beck et al., 2009). Honohan and Beck (2007) identify marked divergences among nations, with Continental Europe boasting financial access for around 90% of its populace, a sharp contrast to Sub-Saharan Africa, where a mere 20% of individuals are encompassed within the financial services umbrella. This disparity emphasizes the imperative for targeted interventions to bridge the gap in financial inclusion on a global scale.

Facilitating enhanced financial access among marginalized populations holds the potential to mitigate income inequality (Galor & Moav, 2004). This assertion finds theoretical grounding in earlier works by Galor and Zeira (1993) and Banerjee and Newman (1993), which underscore the pivotal role of equitable access to financial services through financial development. Empirical validation of this theoretical framework is provided by the World Bank (2008) and Claessens & Perotti (2007), who highlight the significant contribution of financial access to the developmental trajectory of nations. While existing literature extensively explores the nexus among financial sector development, access to financial services, and economic growth, e.g., Levine (2005), Bell & Rousseau (2001), Ang and McKibbin (2007), inequality in access to financial services is still prevalent among countries of different economies. Consequently, there arises a pressing need to investigate this issue from an alternative perspective, focusing on the economic factors influencing financial access in a cross-country context. However, the literature in this domain remains relatively scant, necessitating further scholarly inquiry into this neglected but important aspect.

This study aims to discern the economic determinants that influence access to financial services through a comprehensive cross-country analysis. Access to finance is measured alternatively through the density of bank

branches and ATMs per 100,000 individuals, as well as an index constructed based on these two proxies. Based on existing literature, a selected number of economic variables, namely employment, inflation, gross domestic savings, remittance, bank credit to deposits, and urbanization, is investigated using sample data from 179 countries for a period of eighteen years (2004-2021), including forecasts until 2023. The results suggest that employment, remittance, bank credit to deposits, and urbanization have a statistically significant influence on access to financial services. On average, these baseline findings withstand rigorous robustness tests, encompassing alternative definitions of financial access, subsamples stratified by economic development, and endogeneity correction exercises. When examining the number of ATMs as a separate indicator of financial access, this study finds statistically significant results across all the selected economic variables, suggesting a stronger effect through ATMs when compared to the number of bank branches. Likewise, when comparing subsets of developed and developing countries, the latter supports all the hypothesized economic relationships, indicating that the selected economic variables exert greater influence in less developed contexts. Endogeneity concerns are addressed through the application of the System Generalized Method of Moments, yielding results consistent with the baseline findings.

This research is structured into six segments, beginning with the introduction. Section 2 provides an overview of pertinent literature and theoretical foundations. The methodology segment in Section 3 explains the variables, data, and empirical models employed in this study. Section 4 presents the results of the analysis. Section 5 discusses the econometric findings and offers policy recommendations. Section 6 concludes this research by offering a summary of the key findings, discussing limitations, and proposing directions for future research in this specific domain.

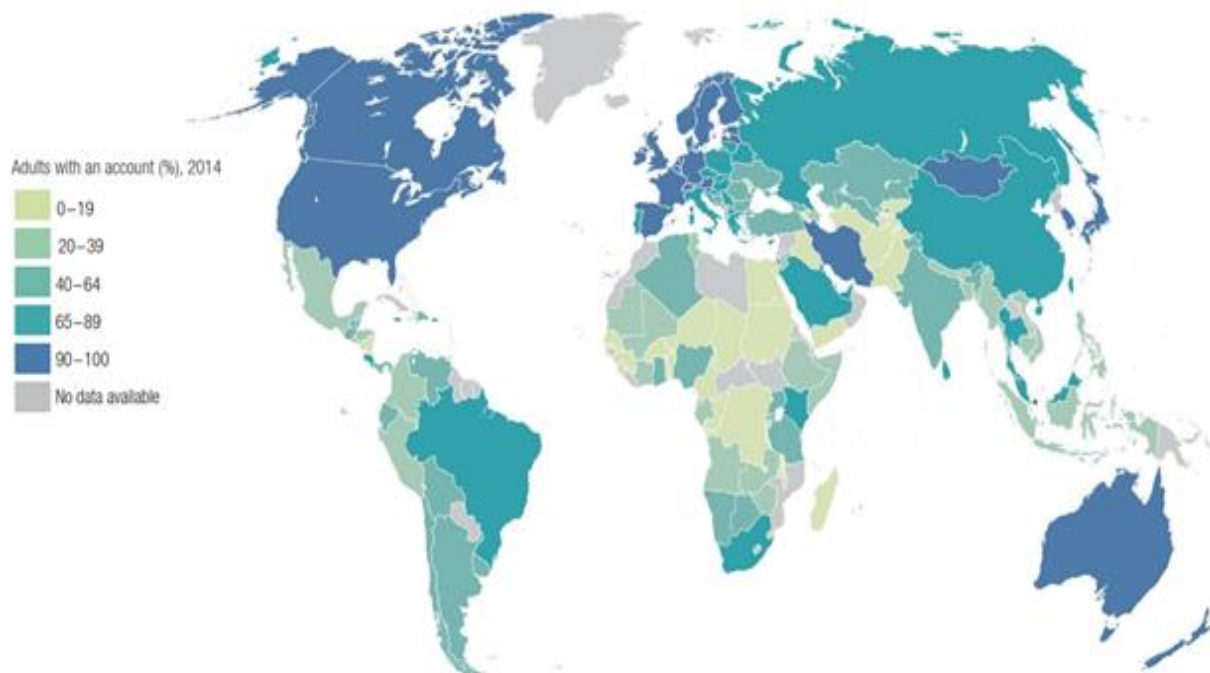
1. Literature Review

Addressing impediments within financial markets such as disparities in transaction costs and information imbalances stands out as a crucial step toward financial progress (Beck & Demirgüç-Kunt, 2006; Karlan & Morduch, 2010; Buera et al., 2011), ultimately aiming for equitable financial access for all. A study conducted in Mexican towns experiencing rapid expansion of bank branches reveals evidence that improved financial accessibility contributes to sustained business operations, heightened incomes, and increased employment opportunities, particularly for marginalized communities (Bruhn & Love, 2014). Sahay et al. (2015) associate equality, growth, and stability with increased access to finance. Moreover, the development of the financial sector not only stimulates economic growth but also serves as a potent tool in alleviating poverty, as highlighted by Beck and Demirgüç-Kunt (2008) and Beck et al. (2007).

From a theoretical perspective, expanding the reach of financial services can yield promising outcomes. Beck et al. (2007) conclude that well-developed financial systems have the potential to reduce poverty headcounts (individuals living below \$1 per day). Their cross-country analysis reveals that financial access can account for a significant portion (approximately 30%) of the variation in poverty levels. Enhanced financial access has both direct and indirect impacts on impoverished households and excluded micro-entrepreneurs (Giné and Townsend, 2004; Green et al., 2006; Roy & Wheeler, 2006; Odhiambo, 2009; Imai et al., 2010). Financial inclusion also plays a catalytic role in driving economic development (Chibba, 2009; Demirgüç-Kunt & Levine, 2009; Sarma & Pais, 2011; Cull et al., 2014) as Beck & Demirgüç-Kunt (2008) conclude that the lack of access to financial services inhibits capital formation. Consequently, unrealized investment opportunities resulting from inadequate financial access constrain growth potential and perpetuate income inequality (Banerjee & Newman, 1993; Galor & Zeira, 1993). Despite the significant developmental impact of financial inclusion, there remains acute inequality in access to financial services, as illustrated by global bank account penetration depicted in Figure 1 below (next page).

Approximately half of the global impoverished and female demographic remains excluded from financial services, a trend observed across major geographical regions (James et al., 2016). The majority of adults in Asia and Africa lack access to financial services, including in rural areas where more than half of the population is unbanked (Demirgüç-Kunt & Klapper, 2012b; Chaia et al., 2013). Numerous factors contribute to this stark inequality in financial access. Non-structural factors such as discrimination, physical distance from financial institutions, illiteracy, high minimum balance requirements, and service fees are some major impediments (Demirgüç-Kunt & Klapper, 2012a; Demirgüç-Kunt et al., 2013). The absence of collateral and stable income streams often renders the poor ineligible for credit services (Beck & Demirgüç-Kunt, 2008). Additionally, individuals with creditworthiness may also remain unbanked, as financial institutions may deem loan requests too small to generate sufficient profit (Johnston Jr. & Morduch, 2008).

Figure 1. Inequality in financial access



Source: Global Findex Database (Demirgüç-Kunt et al., 2015)

Despite the abundance of empirical research and policy papers focusing on the attributes of financial sectors while analyzing financial access, the literature falls short in analyzing the economic factors contributing to equitable financial outreach. Limited research has been conducted to investigate the economic determinants of access to finance, however, in a more country-specific manner such as in India (Laha et al., 2011; Singh & Singh Kondan, 2011; Kumar, 2013), Africa (Akudugu, 2013; Zins & Weill, 2016), Bangladesh (Siddik et al., 2015), and Mexico (Pena et al., 2014). Prior research spanning multiple countries tends to be either focused on specific regions, such as sub-Saharan Africa (Honohan & King, 2012), or lacks exclusive emphasis on economic factors, as demonstrated by Arora (2014). To address this void in existing literature, this study investigates the influence of selected economic variables on financial access using a comprehensive global sample.

2. Research Methodology

2.1. Access to Finance

To measure access to financial services, the number of bank branches has been a popular proxy in academic literature. Beck et al. (2010) study the period of deregulation of bank branches in the USA in the 80s and 90s and conclude that eliminating restrictions on bank branching is both statistically and economically significant across states in explaining income inequality. In rural India, the number of bank branches (used as a proxy for access to finance) is found significant in reducing poverty and increasing output (Burgess et al., 2005). Empirical cross-country results reveal that more access to banks' branches is negatively associated with income inequality (Mookerjee & Kalipioni, 2010; Shahbaz & Islam, 2011).

Similarly, a plethora of research in inclusive finance and financial development adopts the availability of automated teller machines (ATM) as an indicator of financial inclusion. The number of ATMs available within a geographic range or for a certain population has been pivotal in studies explaining development (Sarma & Pais, 2011), measuring inclusion globally (Demirgüç-Kunt & Klapper, 2012a) and in Africa (Demirgüç-Kunt & Klapper, 2012b), assessing financial access in cross-country environment, finding financial inclusion issues for central banks (Mehrotra & Yetman, 2015), relating financial inclusion for developing economies (Sharma & Kukreja, 2013), explaining determinants of inclusive finance (Kumar, 2013), and investigating impact of access to finance on monetary policy (Mbutor & Uba, 2013).

Following related literature, this study uses the number of bank branches and ATMs per 100,000 people as a proxy for financial access. Furthermore, a financial access index is constructed by assigning equal weights to the number of bank branches and ATMs.

2.2. Explanatory Variables

Employment

A good employment scenario in an economy enables people to be more financially active, driving the need for financial inclusion (Fuller & Mellor, 2008). Considering varying levels of stability and health of credit providers, research findings provided evidence that more employment promotes enhanced access to finance (Chodorow-Reich, 2013). Thus, the following hypothesis can be made:

H1: Employment is positively related to access to financial services.

Inflation

Through an economic lens, high inflation leads to reduced monetary value, less financial activity, and less domestic savings available in the real sense (Boyd et al., 2001). As a repercussion, increased inequality in financial services is the most likely outcome followed by rising inflationary pressure.

H2: Inflation has a negative association with access to financial services.

Gross domestic savings

As per established economic theory, savings have a significant positive association with economic growth (Anoruo & Ahmad, 2001). More savings would provide an urge to the people to find trustworthy safe houses and investment opportunities for those savings (Friedline, 2012). Therefore, the perfect blend of increasing gross domestic savings and banks' business motives would result in enhanced access to finance. Consequently, the following hypothesis can be formed:

H3: Gross domestic saving has a positive association with access to financial services.

Remittance

The rise in international remittance, as a result of a bulky migration stream, has contributed to increased demand for money transfer and payment services (Giuliano & Ruiz-Arranz, 2009). Reena et al. (2006) suggest that increased remittance can pull unbanked customers into the formal financial channel. Hence, the following hypothesis can be made:

H4: Remittance has a positive association with access to financial services.

Banks' credit to deposit

Access to loans has a significant influence on stimulating investment in education, health, and business (Demirgüç-Kunt and Singer, 2017). Increased banks' credit activities can put more unbanked people into the formal financial channels (Demirgüç-Kunt & Klapper, 2013). Therefore, the following hypothesis can be assumed:

H5: Banks' credit to deposit ratio has a positive association with access to financial services.

Urbanization

When economies are growing, the most likely scenario is that the cities and industries will grow alongside them (Liddle & Messinis, 2015). As a direct impact, high urban growth generates more income and more jobs for the citizens due to progress in sectors such as education, health, and the like (Bloom et al., 2008). Thus, the following hypothesis can be assumed:

H6: Urbanization has a positive association with access to financial services.

This study includes the time required for banking contracts (Demirgüç-Kunt & Klapper, 2012a), the cost of business start-up procedures (Beck, 2007), and the banking system's stability (Porteous, 2006) as the control variables due to their potential influence on access to finance.

Data related to financial access, i.e., the number of bank branches and automated teller machines, is gathered from the Global Financial Development Database. The World Development Indicators database provides data on the economic and control variables used in this study's analysis. The initial sample includes data on 182 countries. Countries with missing data on bank branches or automated teller machines are excluded. The final sample contains data on 179 countries for a period of eighteen years from 2004 to 2021, with forecasts extending to 2023. Analyses of this study are limited to this timeframe due to data unavailability. Variables are winsorized, where applicable, at 1% and 99% levels to deal with outliers.

2.3. Model Specification

This study employs fixed effects methodology to control for time-invariant and country-specific unobserved variables, e.g., differences in economic systems, culture, and corruption, that may influence the level of financial access. Equations (1) – (6) below show this research's linear regression models with time (τ_t) and country (α_j) fixed effects. $\varepsilon_{j,t}$ is the error term. Subscripts j and t refer to countries and years, respectively. Table 1 below provides definitions and corresponding notations of this study's variables.

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{Employment}_{j,t} + \beta_2 \text{TBC}_{j,t} + \beta_3 \text{CBS}_{j,t} + \beta_4 \text{Zscore}_{j,t} + \tau_t + \alpha_j + \varepsilon_{j,t} \quad (1)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{Inflation}_{j,t} + \beta_2 \text{TBC}_{j,t} + \beta_3 \text{CBS}_{j,t} + \beta_4 \text{Zscore}_{j,t} + \tau_t + \alpha_j + \varepsilon_{j,t} \quad (2)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{GDS}_{j,t} + \beta_2 \text{TBC}_{j,t} + \beta_3 \text{CBS}_{j,t} + \beta_4 \text{Zscore}_{j,t} + \tau_t + \alpha_j + \varepsilon_{j,t} \quad (3)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{Remittance}_{j,t} + \beta_2 \text{TBC}_{j,t} + \beta_3 \text{CBS}_{j,t} + \beta_4 \text{Zscore}_{j,t} + \tau_t + \alpha_j + \varepsilon_{j,t} \quad (4)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{BCD}_{j,t} + \beta_2 \text{TBC}_{j,t} + \beta_3 \text{CBS}_{j,t} + \beta_4 \text{Zscore}_{j,t} + \tau_t + \alpha_j + \varepsilon_{j,t} \quad (5)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{Urban}_{j,t} + \beta_2 \text{TBC}_{j,t} + \beta_3 \text{CBS}_{j,t} + \beta_4 \text{Zscore}_{j,t} + \tau_t + \alpha_j + \varepsilon_{j,t} \quad (6)$$

Table 1. Variables' definition

Variable	Notation	Definition
Financial access index	AccessIndex	Access to finance index constructed using the number of bank branches and ATMs per 100,000 people
Bank branch	Branch	Commercial bank branches per 100,000 adults.
Automated teller machine	ATM	Number of ATMs per 100,000 adults.
Employment	Employment	Employment-to-population ratio
Inflation	Inflation	Consumer prices (annual %)
Gross domestic savings	GDS	Gross domestic savings (% of GDP)
Remittance	Remittance	Personal remittances received (% of GDP)
Bank credit to deposits	BCD	Bank credit to bank deposits (%)
Urbanization	Urban	Urban population (% of total population)
Time for banking contract	TBC	Time required to enforce a contract (days)
Cost of business start-up	CBS	Cost of business start-up procedures (% of GNI per capita)
Banking system stability	Zscore	Z-Score of the country's banking system

3. Research Results

3.1. Descriptive statistics

Table 2 provides the summary statistics of this study's variables of interest. All values are within the expected range of the respective variables. Gross domestic savings is calculated as a percentage of the gross domestic product. Thus, a negative minimum value here signifies that the overall economy is expending more income than it generates, leading to a reduction in national wealth. The negative minimum value in inflation indicates falling prices in the respective economy.

Table 2. Summary statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Financial access index	2,731	30.63	23.86	2.87	74.74
Bank branch	2,731	17.37	12.85	2.54	41.50
Automated teller machine	2,732	43.05	37.10	2.26	115.48
Employment	2,624	56.05	11.23	22.13	87.49
Inflation	2,732	4.55	5.16	-1.93	29.51
Gross domestic savings	2,424	20.79	16.40	-24.96	64.57
Remittance	2,631	3.61	4.12	0.10	12.29
Bank credit to deposits	2,604	92.36	44.99	16.56	370.90
Urbanization	2,732	58.06	23.09	9.14	100.00

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Time for banking contract	1,895	628.27	294.59	120.00	1800.00
Cost of business start-up	2,359	35.87	64.68	0.10	910.00
Banking system stability	2,288	16.41	9.45	0.02	66.63

Note: This table reports summary statistics for variables of interest based on yearly data from 2004 to 2021.

A correlation matrix is constructed to account for possible collinearity issues between the explanatory variables. No perfect or excessively high collinearity is observed. The correlation between urbanization and remittance is the highest (-0.63). Variance Inflation Factors are also calculated (unreported) where no variable has a value greater than five, confirming the absence of the multicollinearity concern.

Table 3. Correlation

	Employment	Inflation	GDS	Remittance	BCD	Urban	TBC	CBS
Inflation	0.06							
GDS	0.21	-0.14						
Remittance	-0.26	0.08	-0.63					
BCD	0.07	-0.12	0.09	-0.16				
Urban	-0.06	-0.29	0.50	-0.32	0.19			
TBC	-0.13	0.04	-0.06	0.03	-0.19	-0.14		
CBS	0.19	0.21	-0.17	0.07	-0.30	-0.35	0.14	
Zscore	-0.10	-0.05	0.01	0.19	-0.10	0.07	0.00	-0.05

Note: This table reports correlations among variables of interest based on yearly data from 2004 to 2021.

3.2. Regression Results

Table 4 presents the regression results of Equations (1) – (6) where columns (1) – (6) represent each Equation consecutively. An additional model is also estimated that includes all the explanatory variables in a single regression equation. Column (7) exhibits the results of the additional model. The results show that four out of the six selected economic variables are positively related to access to finance. The coefficients of these four variables, i.e., employment, remittance, bank credit to deposits, and urbanization, are statistically significant at the 1% and 5% levels. The findings remain consistent in the additional model in column (7) as well. The large coefficient values, ranging from 0.074 to 0.497, indicate the notable strength of association between this study's selected economic variables and financial access. The results also have economic significance. For example, an increase in employment can influence a 1.62% positive change in financial access. Likewise, remittance, bank credit to deposits, and urbanization can increase access to finance by 1.07%, 0.2%, and 1.37% respectively. Column (8) presents projections extending up to the year 2023 by employing linear forecasting techniques. The forecasted results are in line with the baseline findings.

Table 4. Economic factors influencing financial access

	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Employment	0.497*** (0.077)						0.475*** (0.084)	0.477*** (0.084)
Inflation		-0.050 (0.038)					-0.053 (0.046)	-0.043 (0.043)
Gross domestic savings			0.021 (0.030)				-0.019 (0.032)	-0.017 (0.031)
Remittance				0.332** (0.149)			0.477*** (0.159)	0.440*** (0.156)
Bank credit to deposits					0.074*** (0.009)		0.077*** (0.009)	0.076*** (0.009)

	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Urbanization						0.421***	0.308**	0.316**
						(0.118)	(0.125)	(0.125)
Time for banking contract	-0.002	-0.004**	-0.005**	-0.005**	-0.002	-0.003	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Cost of business start-up	0.006*	0.010***	0.011***	0.011***	0.014***	0.011***	0.013***	0.013***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Banking system stability	-0.253***	-0.249***	-0.300***	-0.241***	-0.228***	-0.244***	-0.266***	-0.267***
	(0.047)	(0.048)	(0.053)	(0.048)	(0.047)	(0.047)	(0.053)	(0.053)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.328	0.307	0.319	0.306	0.357	0.313	0.390	0.389
Observations	2731	2731	2731	2731	2731	2731	2731	3204
No. of countries	179	179	179	179	179	179	179	179

Note: This table shows the relationship between economic factors and access to finance. Access to finance is measured through an index constructed using the weighted average of the number of bank branches and automated teller machines. The explanatory variables of interest are employment, inflation, gross domestic savings, remittance, bank credit to deposits, and urbanization. The rest are control variables. The variables are defined in Table 1. The numbers in parentheses are standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively. The results are obtained using the linear fixed-effect estimation of Equations (1)-(6) with 18 years of data from 2004 to 2021. Column (7) shows the results of an additional model that includes all the explanatory variables in a single regression equation. Employing linear forecasting techniques, column (8) shows projections extending up to the year 2023.

3.2.1. Robustness test - Bank branch vs Automated teller machine

The baseline analyses in this study utilize an index of financial access constructed based on the number of bank branches and automated teller machines (ATM) per 100,000 people. While the index assigns equal weights to bank branches and ATMs, the underlying mechanism of financial access can be fundamentally different in these two components. Additionally, this study's economic variables of interest can have different relationships or extent of influence for bank branches and ATMs. To examine these possibilities and assess if the main findings remain consistent, a robustness test is conducted by using bank branches and ATMs as separate measures of financial access.

Panel A of Table 05 presents the results of bank branches. The findings mostly corroborate the baseline results, except that remittance lacks statistical significance and gross domestic savings shows a negative and statistically significant coefficient. The negative relationship of gross domestic savings is opposite to the hypothesized relationship (H3) in section 2.2. Panel B shows the results where the number of ATMs is used as the definition of access to finance. The coefficients of all the economic variables are statistically significant at the 1% and 5% levels. All the coefficients' signs are also in line with the hypothesized relationships discussed in section 2.2. The variables exhibit a greater degree of influence than the number of bank branches and the financial access index. Moreover, the model fit, as indicated by the R-squared values, across all the columns is noticeably higher with ATMs than those of bank branches in Panel A. Columns (7) and (14) exhibit the findings of a supplementary model incorporating all explanatory variables within a single regression equation, with further projections extending to 2023. The projected outcomes align with the overall findings, except for inflation and gross domestic savings in Panel B.

Table 5. Economic factors influencing financial access. Bank branch vs ATM

Panel A - Bank branch							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Employment	0.077*						0.115***
	(0.039)						(0.042)
Inflation		0.012					0.015
		(0.019)					(0.022)
Gross domestic savings			-0.033**				-0.029*
			(0.015)				(0.016)
Remittance				0.078			0.118
				(0.076)			(0.079)
Bank credit to deposits					0.053***		0.051***
					(0.004)		(0.005)
Urbanization						0.322***	0.238***
						(0.059)	(0.063)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.093	0.091	0.098	0.092	0.177	0.110	0.201
Observations	2731	2731	2731	2731	2731	2731	3204
No. of countries	179	179	179	179	179	179	179
Panel B – ATM							
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Employment	0.878***						0.844***
	(0.129)						(0.143)
Inflation		-0.144**					-0.112
		(0.065)					(0.073)
Gross domestic savings			0.091*				0.024
			(0.050)				(0.053)
Remittance				0.435*			0.609**
				(0.251)			(0.267)
Bank credit to deposits					0.090***		0.095***
					(0.015)		(0.016)
Urbanization						0.520***	0.417*
						(0.199)	(0.213)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.399	0.381	0.395	0.378	0.410	0.382	0.441
Observations	2732	2732	2732	2732	2732	2732	3204
No. of countries	179	179	179	179	179	179	179

Note: This table shows the relationship between economic factors and access to finance. Access to finance is measured alternatively through the number of bank branches and automated teller machines. The explanatory variables of interest are employment, inflation, gross domestic savings, remittance, bank credit to deposits, and urbanization. The variables are defined in Table 1. The numbers in parentheses are standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively. The results are obtained using the linear fixed-effect estimation of Equations (1)-(6) with 18 years of data from 2004 to 2021. Columns (7) and (14) show the results of an additional model that includes all the explanatory variables in a single regression equation. Additionally, these columns present projections extending up to the year 2023 by employing linear forecasting techniques.

3.2.2. Robustness Test - Developed vs Developing Countries

The country-level heterogeneity in terms of overall development can be instrumental in explaining the inequality in financial access. The relationships of this study's selected economic variables with financial access can differ based on the levels of development. To uncover the potential role country-level development may have in access to finance, the baseline analyses are repeated with the subsamples of developed and developing countries. The classification of developed and developing countries is adopted from the World Economic Situation and Prospects report by the United Nations¹. According to this classification, 36 countries of this study's sample fall into the category of developed countries. The rest of the 143 countries are categorized as developing countries.

Table 6 presents the results where Panel A includes results on the developed country sub-sample. The findings for developed countries are consistent with the baseline results, except for Urbanization. Employment, gross domestic savings, remittance, and bank credit to deposits have positive coefficients that are statistically significant at the 1% and 5% levels. However, Urbanization appears to have a strongly negative relationship with financial access in the developed country's context. Panel B shows the results relating to the developing countries. All the economic variables show statistically significant results. Notably, these results validate all the hypotheses formed in section 2.2. Comparing Panel A and B, the developing countries sub-sample depicts a better model fit as indicated by the R squared values, which are also the largest among all the models tested so far. Columns (7) and (14) present the results of an additional model integrating all explanatory variables into one regression equation, along with projections extending to 2023. These forecasts generally correspond to the main conclusions of this robustness test.

Table 6. Economic factors influencing financial access. Developed vs Developing countries

Panel A – Developed countries							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Employment	0.550***						0.178
	(0.123)						(0.128)
Inflation		0.006					-0.200
		(0.151)					(0.149)
Gross domestic savings			0.203**				0.322***
			(0.100)				(0.100)
Remittance				0.871**			0.644
				(0.407)			(0.393)
Bank credit to deposits					0.062***		0.081***
					(0.013)		(0.014)
Urbanization						-1.399***	-1.286***
						(0.275)	(0.274)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time and country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.335	0.297	0.305	0.306	0.327	0.346	0.436
Observations	392	392	392	392	392	392	464
No. of countries	36	36	36	36	36	36	36
Panel B – Developing countries							
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Employment	0.248***						0.148
	(0.089)						(0.103)
Inflation		-0.099***					-0.070
		(0.037)					(0.044)
Gross domestic savings			0.052*				0.014
			(0.029)				(0.032)

¹ "World Economic Situation and Prospects," United Nations: available at https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020_Annex.pdf

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Remittance				0.316** (0.148)			0.424*** (0.160)
Bank credit to deposits					0.044*** (0.011)		0.046*** (0.012)
Urbanization						0.450*** (0.123)	0.344** (0.137)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time and country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (within)	0.459	0.460	0.482	0.457	0.473	0.463	0.501
Observations	2340	2340	2340	2340	2340	2340	2626
No. of countries	143	143	143	143	143	143	143

Note: This table shows the relationship between economic factors and access to finance in the contexts of developed and developing countries. Access to finance is measured through an index constructed using the weighted average of the number of bank branches and automated teller machines. The explanatory variables of interest are employment, inflation, gross domestic savings, remittance, bank credit to deposits, and urbanization. The variables are defined in Table 1. The numbers in parentheses are standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively. The results are obtained using the linear fixed-effect estimation of Equations (1)-(7) with 18 years of data from 2004 to 2021. Columns (7) and (14) show the results of an additional model that includes all the explanatory variables in a single regression equation. Additionally, these columns present projections extending up to the year 2023 by employing linear forecasting techniques.

3.2.3. Endogeneity Correction

In regression-based research, endogeneity is a common issue since explanatory variables included in regression models cannot always perfectly explain changes in the outcome variable of interest (Wooldridge, 2015). While fixed effects methodology is in place, Equations (1) – (6) can still encounter endogeneity issues due to biases from time-varying omitted variables, e.g., changes in the political stability of sample countries across time. Furthermore, there can be simultaneity or reverse causality concerns.

This study hypothesizes that economic variables drive financial access. However, extant literature presents a debate about what comes first: financial inclusion or economic growth, i.e. the direction of the relationship. There are two schools of literature in this scenario, one supporting that financial inclusion drives economic growth (Chibba, 2009; Demirgüç-Kunt & Levine, 2009; Bruhn and Love, 2014; Cull et al., 2014) and the other suggesting the opposite (Honohan, 2004; Shan, 2005; Shan & Jianhong, 2006; Apergis et al., 2007). Also, the nature of financial access can be dynamic such that the previous period's state of access can influence changes in the current period's condition. To deal with these issues, Equations (1) – (6) are modified with the lagged dependent variable in dynamic model specifications as follows:

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{AccessIndex}_{j,t-1} + \beta_2 \text{Employment}_{j,t} + \beta_3 \text{TBC}_{j,t} + \beta_4 \text{CBS}_{j,t} + \beta_5 \text{Zscore}_{j,t} + \varepsilon_{j,t} \quad (7)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{AccessIndex}_{j,t-1} + \beta_2 \text{Inflation}_{j,t} + \beta_3 \text{TBC}_{j,t} + \beta_4 \text{CBS}_{j,t} + \beta_5 \text{Zscore}_{j,t} + \varepsilon_{j,t} \quad (8)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{AccessIndex}_{j,t-1} + \beta_2 \text{GDS}_{j,t} + \beta_3 \text{TBC}_{j,t} + \beta_4 \text{CBS}_{j,t} + \beta_5 \text{Zscore}_{j,t} + \varepsilon_{j,t} \quad (9)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{AccessIndex}_{j,t-1} + \beta_2 \text{Remittance}_{j,t} + \beta_3 \text{TBC}_{j,t} + \beta_4 \text{CBS}_{j,t} + \beta_5 \text{Zscore}_{j,t} + \varepsilon_{j,t} \quad (10)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{AccessIndex}_{j,t-1} + \beta_2 \text{BCD}_{j,t} + \beta_3 \text{TBC}_{j,t} + \beta_4 \text{CBS}_{j,t} + \beta_5 \text{Zscore}_{j,t} + \varepsilon_{j,t} \quad (11)$$

$$\text{AccessIndex}_{j,t} = \beta_0 + \beta_1 \text{AccessIndex}_{j,t-1} + \beta_2 \text{Urban}_{j,t} + \beta_3 \text{TBC}_{j,t} + \beta_4 \text{CBS}_{j,t} + \beta_5 \text{Zscore}_{j,t} + \varepsilon_{j,t} \quad (12)$$

Here, $\text{AccessIndex}_{j,t-1}$ is the level of financial access in country j at time $t - 1$. The error term $\varepsilon_{j,t}$ consists of two components v_j and $\mu_{j,t}$ indicating fixed effects and idiosyncratic shocks, respectively. Other notations and subscripts are explained in section 2.3.

Since conventional techniques will not be appropriate for dynamic panel data, Equations (7) – (12) are estimated based on the Generalized Method of Moments (GMM). This estimation technique treats endogeneity issues due to bias caused by omitted variables, simultaneity, and reverse causality. This study employs the System GMM estimator by Blundell & Bond (1998) in one step. System GMM is an extension of the Difference GMM (Arellano & Bond, 1991), specifically designed for dynamic panel data models, that incorporates both levels and first-differences of the equations in the moment conditions. Table 7 presents the results of Equations (7) – (12).

The lagged dependent variable is statistically significant at the 1% level, which confirms persistence in financial access. The results of the economic variables are consistent with the baseline findings, except for remittance. Coefficients of employment, bank credit to deposits, and urbanization show statistical significance at the 1% and 5% levels. The assumption of no residual autocorrelation is validated using the AR(1) and AR(2) tests proposed by Arellano & Bond (1991). Except for the AR(2) test in column (3), results of the AR(1) and AR(2) tests confirm that the residuals derived from the differenced equation exhibit correlation in the first order, but not in the second order. Non-rejection of the null hypothesis in the Hansen test confirms the validity of the instrument matrix, i.e., over-identifying restrictions, in all the models.

Table 7. Economic factors influencing financial access. System Generalized Method of Moments (GMM)

	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index	Financial access index
	(1)	(2)	(3)	(4)	(5)	(6)
L1.Financial access index	0.781*** (0.132)	0.800*** (0.115)	0.926*** (0.070)	0.713*** (0.087)	0.953*** (0.041)	1.037*** (0.033)
Employment	0.400*** (0.106)					
Inflation		-0.014 (0.118)				
Gross domestic savings			0.043 (0.038)			
Remittance				-0.856 (0.596)		
Bank credit to deposits					0.082*** (0.022)	
Urbanization						0.075** (0.030)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
AR(1): p-value	0.028	0.017	0.001	0.040	0.002	0.001
AR(2): p-value	0.285	0.133	0.072	0.236	0.258	0.165
Hansen test: p-value	0.361	0.436	0.249	0.148	0.550	0.113
No. of instruments	9	9	9	25	9	64
Observations	2731	2731	2731	2731	2731	2731
No. of countries	179	179	179	179	179	179

Note: This table shows the relationship between economic factors and access to finance. Access to finance is measured through an index constructed using the weighted average of the number of bank branches and automated teller machines. *L1.Financial access index* denotes the one-period lagged values of the financial access index. The explanatory variables of interest are employment, inflation, gross domestic savings, remittance, bank credit to deposits, and urbanization. The variables are defined in Table 1. The numbers in parentheses are standard errors. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively. The results are obtained using the one-step System GMM estimation of Equations (7)-(12) with 18 years of data from 2004 to 2021.

4. Discussion

On average, findings from the econometric analyses corroborate with the hypothesized relationships for most of the variables of interest. The results support that more employment positively influences financial access (H1), which is in line with the existing literature (Cottarelli et al., 2005; Chodorow-Reich, 2013). With a larger portion of the population earning regular incomes, there is a subsequent increase in the number of individuals eligible for various financial services such as banking, loans, and investment opportunities (Fuller and Mellor, 2008). The expansion of the workforce creates a ripple effect, generating more consumers who can actively participate in the formal financial sector.

As for the case of inflation, the hypothesis (H2) that increased inflation has a negative association with access to financial services is not supported in the baseline analysis. This finding is contrary to existing literature, e.g., Boyd et al. (2001), which establishes an adverse link between inflation and financial access. Similarly, the hypothesis (H3) related to the positive relationship between gross domestic saving and greater financial access is unsupported in most analyses. Other variables may play a role in shaping the connection between savings and financial accessibility, possibly indicating an indirect correlation or a non-linear relationship as found by Emará and Kasa (2021). Factors such as illiteracy, lack of awareness, and trust issues could be cited as examples, potentially

discouraging individuals from actively pursuing financial products (Cohen & Nelson, 2011; Demirgüç-Kunt & Klapper, 2013; Allen et al., 2016). Nevertheless, support for hypotheses H2 and H3 emerges when the number of ATMs is employed as the metric for financial access. Results with developing countries sub-sample also mirror these findings. Thus, the validity of the hypotheses regarding inflation and gross domestic savings appears contingent upon the specific definition of financial access and within the context of developing countries.

Regarding remittances, the findings affirm that remittance has the potential to draw unbanked customers into the formal financial sector, thereby enhancing financial inclusion. Current literature documents that the surge in global remittance leads to an increased need for financial transfer and payment services (Giuliano and Ruiz-Arranz, 2009), which can attract individuals without access to banking services into the formal financial sector (Reena et al., 2006; Aggarwal et al., 2011). The outcomes of this study validate the pervasive impact of remittances in both developed and developing nations when analyzed independently. However, when comparing bank branches and ATMs, remittances exhibit a positive association with financial access solely in the case of the latter. The convenience offered by modern ATMs, providing a majority of transaction-related services, likely contributes to these findings. Additionally, the increased utilization of online banking and card transactions may also play a role in this observed relationship.

The hypothesis concerning banks' credit to deposit scenario and financial access is supported consistently throughout all analyses. This specific finding reveals analogous results in both developed and developing nations. Likewise, the results of this hypothesis are comparable when assessing access to finance through the number of bank branches and ATMs. The pertinent scholarly works suggest that increased lending has the potential to encourage investments in sectors such as business, education, and health (Demirgüç-Kunt and Singer, 2017). As a result, lending initiatives play a crucial role in incorporating a greater number of unbanked individuals into established financial systems (Demirgüç-Kunt and Klapper, 2013), contributing to the alleviation of disparities in financial inclusion.

Finally, this study's findings support the notion that urbanization has a positive association with access to financial services. This aligns with established literature, indicating that substantial urban growth leads to increased income and employment opportunities for citizens (Bloom et al., 2008). As more people migrate to cities in search of employment opportunities and improved living standards, there is a growing demand for banking and financial services. The proximity of financial infrastructure in urban areas makes it more convenient for individuals to access banking services, credit facilities, and investment opportunities, contributing to the overall increase in financial inclusion.

In general, this research provides empirical evidence suggesting that policymakers should take into account the relationship between access to financial services and key economic indicators, such as employment, remittances, bank credit to deposits, and urbanization. The specific economic context (developed or developing) and the primary means of financial access (bank branches or ATMs) should be considered while designing relevant policies based on inflation and gross domestic savings. Policymakers need to recognize that focusing on these economic variables may not yield an immediate surge in financial access, as economic and financial attributes typically exhibit slow responses in the real world. Depending on country-specific economic characteristics, certain policy implementations and efforts should be prioritized over others to attain swifter and substantial growth in financial services accessibility.

Conclusion

Access to financial services has a significant role in the development process of any nation. Nonetheless, it is unfortunate that such access remains unequal, especially in less developed countries. Existing research tends to prioritize characteristics of the financial sector when explaining differences in financial access across countries, overlooking the potentially important influence of economic attributes. This cross-country research identifies a list of economic factors, namely employment, inflation, gross domestic savings, remittance, bank credit to deposits, and urbanization, based on existing literature and analyses their influence on access to financial services. Among the selected economic variables, the findings indicate that employment, remittance, bank credit to deposits, and urbanization exert a positive influence on access to financial services. In alternative tests involving different definitions of financial access, this study finds significant results suggesting a greater influence of all the selected economic factors on financial access through the number of ATMs rather than bank branches. Similarly, these economic factors demonstrate more influence in developing countries compared to their developed counterparts.

This research has several limitations. Most data points of this study's variables are missing before 2004. Some countries are excluded due to inconsistent data. Although data related to financial depth are available for large time series of most countries, data for variables representing access to finance are still not adequate. Such scarcity did not allow more variables, e.g. people with an account in banks or mobile financial services, to be added

to the financial access index to make it more robust. Further studies in this area can be carried out with a larger sample size by including additional countries to have more generalizable findings. Similarly, other important economic variables, possibly explaining financial access, can be investigated with different model specifications. Given the availability of data, a more comprehensive financial access index can be formed and tested to recommend wide-ranging policy guidelines for ensuring equality in financial opportunities.

Credit Authorship Contribution Statement

Md Jahir Uddin Palas, is the sole author of this paper. Palas, M.J.U. formulated the initial idea, collected and analyzed the data, designed the methodology, acquired resources, developed software, and drafted and edited the manuscript.

Conflict of Interest Statement

The author declares that this research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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