# Financial Inclusion and Economic Growth: Evidence from Developing Countries

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# Abstract

The paper focuses on the relationship between economic growth and financial inclusion in developing countries. In order to do this, we first realize a simple endogenous growth model in which the role of the financial sector is to provide sources of investment to included population. The model indicates that the consumption could be the main channel through financial inclusion contributes to growth. Nevertheless, the contribution of financial inclusion to growth requires a certain level of financial development in developing countries. Then, the empirical estimation realized using Generalized Method of Moments (GMM) with 57 countries over the period 2007-2017, evaluates impacts of traditional and mobile inclusion growth. The results confirm the positive impact of financial inclusion on growth. For formal inclusion, estimators reveal that the financial system deposits contributes to growth in developing countries. Concerning mobile inclusion, we note that active mobile money account has a higher positive impact on growth than that of traditional inclusion.



**Keywords:** Endogenous growth, Financial development, Financial inclusion, Telecoms, GMM system, Developing Countries

**JEL Classification Numbers:** O16, O30, O40, G21, G23, C23

# 1 Introduction

The development of an economy refers to all the technical, social and cultural transformations that accompany the growth of production. In others words, economic development is a set of positive evolution in structural changes of a country.

In line with neoclassical vision, we support fact that access to finance is essential for financing the transition of economy to the level of development to which it aspires. Schumpeter (1982) argued that this link is reflected in the impact of bank credit on economic growth. He points out early that "financial services such as savings mobilization, project evaluation, risk management, advice to managers of industrial and commercial companies, supervision and simplified settlement of domestic and international transactions... are essential for technological innovation and development". King and Levine (1993) reinterpret Schumpeter's idea by emphasizing the importance of innovation through the pace of capital accumulation and factor productivity. From this point of view, financial systems would make it possible, on the one side, to channel savings towards more productive uses and, on the other side, to diversify the various risks associated with productive activity. Levine (2005) pushes the reflection on causality by underlining the existence of a coevolution of finance and growth. In his view, the financial system would be able to provide different services at different steps of economic development, as the system would have to evolve if growth was to continue.

In doing so, while it is clear that economic development requires access to finance, it is worth noting that the flexibility available to developing countries to finance development is limited. Indeed, following the Monterrey Consensus on financing for development in 2002, the structure of development financing policy will evolve with particular attention to the mobilization of internal and external resources. Resource mobilization policy now takes into account the increase in private financing flows such as remittances and Foreign Direct Investments. The challenge is therefore to propose new means of financing to countries with financial systems underdeveloped and which must also face the failure to respect the promises of foreign donors.

Developing countries will from then on face a difficult challenge in raising additional funds, as their public finances are based on inefficient tax systems. This inefficiency is mainly due to the commitment of developing countries to a tax transition following trade liberalization policies. The tariff liberalization that began in the 1990s certainly partly explains the decline in resources, particularly for low-income countries (Baunsgaard and Keen, 2010). Indeed, because of the relatively high revenues they generate in developing countries, customs duties have come to be seen as an instrument of tax mobilization rather than an instrument of trade policy. In doing so, with the opening up of trade, these countries must renounce the application of this tax and at the same time renounce its revenues, as this tax is a form of trade protection. All other things being equal, the Government must find a new tax instrument with a strong capacity to mobilize to compensate for this loss of revenue. To do this, VAT is generally advanced to play this role in these countries. Chambas (2005) argues that the central instrument of this tax transition is VAT. However, up to now, VAT is poorly applied in some developing countries [1], significantly affecting the level of revenues generated by the latter. In addition, for Chambas, significant obstacles will have to be overcome when it comes to African countries' commitment to a "second generation transition" to direct taxation, which will succeed the "first generation tax transition" that these countries are currently undergoing.

In this context, the new challenge in financing development would lie in the private sphere. This includes financial inclusion. Financial inclusion is defined as the provision of low cost basic financial and banking services to all agents of the economy, the latter having on average a utility in these services offered.

Since 2010, more than 55 countries have made commitments to financial inclusion and have launched or are developing a national and regional strategy[2]. Financial inclusion has been identified as an enabler for some objectives[3] of the 17 Sustainable Development

[1] Lack of understanding of the mechanism by which VAT operates, which takes the form of a sales tax that increases the consumer's tax burden relatively and reduces revenues

[2] World Bank offers governments technical assistance to achieve their financial inclusion objectives

[3] Financial Inclusion contributes to the poverty elimination, the reduction of gender inequalities, the reduction of hunger and then some more

Goals adopted by the United Nations in September 2015 until 2030. The World Bank Group is committed to financial inclusion through the Universal Financial Access 2020 initiative. The objective of this initiative is to ensure that everyone in the world has a current account to deposit money but also to send and receive payments.

From the above, it is clear that in recent years, politics has changed the direction of the financial system. The focus has shifted from financial development to financial inclusion (Johnson and Arnold, 2012). This recent orientation explains the fact that there is little empirical work available on the impact of financial inclusion on economic growth that has been discussed and received considerable attention. Most of the empirical work has focused on developed economies and has left little literature in this area to the developing economy. According to Park and Mercado (2015) , financial inclusion in the developing economy is only at an early stage.

In doing so, the purpose of this paper is twofold. As a first step, it will provide an economic analysis on the role of financial inclusion in economic growth in some developing countries that are relatively well advanced in the financial inclusion process. This contributes to the enrichment of the literature linking financial inclusion and growth in developing countries.

In a second step, we will try to highlight the major involvement of telecommunications operators in the progress of the inclusion process in these countries. Already, the use of telecommunications services requires that agents have mobile phones in order to make and receive calls, send SMS and MMS. Mobile phones have seen remarkable innovations in recent years, notably the invention of the smartphone. So, with their different functionalities, these phones are attributed impacts on economic aggregates, one of the main channels of which is financial inclusion. Indeed, Mihasonirina and Kangni (2011) highlight the pioneering role of mobile phones in economic growth. Based on panel data, the authors succeed in proving that financial inclusion is one of the ways in which mobile phone diffusion contributes to growth in developing countries.

Then, for some years now, telecommunications companies have been providing microfinance and remittance services, particularly in African countries. One example is M-Pesa, a microfinance and money transfer system launched by the Vodafone group in

Kenya and Tanzania. Services thus enable individuals excluded from the traditional financial system to benefit from basic financial services such as deposits and money transfers.

To achieve the objectives, the rest of the paper will follow the following plan. In section 1, we present the existing literature encompassing the various theoretical and empirical analyses of the role of financial inclusion in economic growth. In section 2, we will discuss the theoretical modelling of the relationship between finance and economic development by carrying out a simulation that takes into account the features of developing countries. Section 3 describes the data, the econometric model and the results obtained. Finally, I conclude with Section 4.

# 2 Literature Review

## 2.1 Theoretical Studies

From a theoretical point of view, the literature deals more with the impact of financial development than with the impact of financial inclusion on economic growth. It generally emerges that financial development has a positive impact on the level of growth. Schumpeter (1982) seminal work highlights a positive effect of the financial system on growth. In his vision, the financial sector through its services while facilitating the accessibility of capital formation encourages financial innovation, investment and efficiency. This encourages capital accumulation and strengthens competition between banks, which leads to an improvement in banking productivity, which in turn would lead to an improvement in the productivity of economy as a whole. We can therefore observe a development of financial system that generates economic growth. In a follow up to Schumpeter's work, Goldsmith (1969) examines the influence that finance, the combination of markets and intermediaries operating in an economy, would have on economic growth. First, he concludes that there is a positive correlation between the size of the financial intermediary sector and the quality of financial functions performed by the financial sector. Second, the size of intermediaries relative to the size of the economy

increases as countries develop. Goldsmith materializes this fact through a graph showing a positive correlation between financial development and the level of economic activity. In doing so, Goldsmith is particularly keen to affirm his reluctance to draw causal links in the absence of data.

In this context, King and Levine (1993) attempt to provide some answers as to whether there are causal links between financial development and growth. For the latter ones, the banking sector, as a major financial intermediary, has strong long-term growth and productivity through capital accumulation. However, theory makes it difficult to conclude that the financial system simply and automatically responds to economic activity, or that financial development is an unimportant addition to the process of economic growth (Levine, 2005). Levine reveals the likely existence of a coevolution between the financial system and the economic growth.

A developed financial system contributes to growth through broad access to funds. But developed financial systems also have the particularity of excluding low-income groups due to lack of solvency. Kablana and Chhikara (2013) point out in this regard that in order to promote growth, the financial system must introduce valuation techniques and mechanisms for collecting and sharing information, allowing it to finance even the marginal activities of companies or individuals, generating in this way productive activities. Ji et al.(2014) using a tractable micro-founded general equilibrium model with heterogeneous agents show that different dimensions of financial deepening (reach, depth, efficiency) have a differential impact on GDP growth and income inequality in developing countries. According to the latter, the specific characteristics of countries also play a role in the level of impact. Karpowicz (2016), based on Ji's model and using data on Colombia, concludes that the effect of financial inclusion on growth and inequality depends on the financial friction on which it is decided to act. She distinguishes three categories of financial frictions namely participation costs (access), borrowing constraints (depth) and intermediation efficiency. For example, her simulations suggest that a reduction in collateral constraints promises higher growth while income inequalities are reduced by measures that reduce the financial participation costs. Nevertheless, she stresses that some measures may involve compromises that need to be closely monitored.

## 2.2 Empirical Background

In this second part of the literary analysis, we find the empirical work of authors who present a positive or negative impact of financial inclusion on growth. The majority of empirical analyses underlines that access to all banking and financial services at lower costs leads financial inclusion to have a positive effect on the level of growth of an economy. The work focuses on panel data and time series.

### 2.2.1 Positive Impact

Mihasonirina and Kangni (2011) are among the first to have highlighted the impact that financial inclusion could have on economic growth using panel data. Indeed, the authors argue not only that financial inclusion has a positive impact on growth but that a good financial sector also has a positive effect on economic growth. To arrive at these results, the authors use the GMM estimator method on a panel of 44 developing African countries. It is supported that GMM estimates can be sensitive to normalizations of the model or parameters. But authors tested the robustness of their results and got satisfied results, checking the sensitivity. Using the same method, Inoue and Hamori (2016) are able to establish a positive relationship between financial inclusion and growth levels for 37 Sub-Saharan African countries. In their work, a country's level of inclusion is measured by the number of commercial bank branches in the country. Thus, Inoue and Mamori show that the number of commercial bank branches has a positive impact on the logarithm of real GDP per capita. Other panel models are used to identify positive relationship between financial inclusion and growth. This is the case of Sethi and Acharya (2018) who used a dynamic and fully modified OLS. In their study, financial inclusion is measured through a three-dimensional composite index of banking services. They find a positive link for 31 countries, both developed and developing, and conclude that financial inclusion encourages growth for the countries studied.

As mentioned above, time series models could be used to identify the positive impact that financial inclusion could have on a country's level of growth. The article by Migap et al.( 2015), reveals that financial inclusion has an impact on indices and indicators of inclusive growth in Nigeria. Inclusive growth differs from basic growth in that it creates economic opportunities along with ensuring equal access to them. Indeed, with inclusive growth the benefits of growth are equitably shared among the population. The financial inclusion contributes to inclusive growth to the extent that financial inclusion improves the living conditions of the most vulnerable populations. Financial inclusion plays a decisive role in improving the livelihoods of poor farmers and rural non-farm enterprises (Dev, 2006).

Ghosh (2011) focuses on the impact of financial coverage on the level of per capita growth. For the latter, there is a positive impact with a different magnitude depending on the scope considered. In the case of India, it proves that an improvement in the demographic financial scope has a significant and high impact on growth relative to an improvement in geographical scope that has a lesser effect.

Angadi (2003) as for him discusses theoretical issues and examines data on the existence of a direct and symbolic relationship between sound and efficient infrastructure, financial stability and economic development. He concludes that a sound financial infrastructure is a major incentive for development. In his approach, financial infrastructure is understood through the financial system, the legal system, accounting standards and the payment and settlement system.

In this context, just as it has been discussed for the relationship between financial development and economic growth, the question arises as to whether there would not be a link of simultaneity between financial inclusion and economic growth. The recent study by Kim et al. (2018) highlights a mutual causality between financial inclusion and economic growth. Their work shows that a high level of financial inclusion is essential to generate growth, especially in countries with high fragility. To reach these conclusions, the authors use GMMs on a panel of 55 countries of the Organization for Islamic Cooperation over the period 1990-2013. Just before Kim et al. (2018) , there is Pradhan et al. (2017) who are doing original work on the mutual relationship that would exist between broadband penetration, financial development and economic growth. They identify the

long-term presence of a Granger causality of financial development on both economic growth and broadband penetration. In addition, their results reveal the existence of a two-way causality from growth to broadband penetration in the long term. However, Sharma, (2016) looking at financial inclusion through the number of deposit/loan account and using a Vector Auto-Regression model and a Granger causality test, identifies in the case of India an unidirectional effect between the number of deposit/loan accounts and GDP per capita, and second a bi-directional causality between geographical scope and economic development. Using a distributed lag autoregressive model and an error correction model, Lenka and Sharma (2017) find a positive long-term and short-term impact of financial inclusion on Indian growth. Their analysis suggests a unidirectional causality between financial inclusion and economic growth, the latter ranging from inclusion to growth.

Once the existence of a positive causal relationship between financial inclusion and economic growth could be identified, some authors tried to identify the channels through which this causality could be transmitted. For Mihasonirina and Kangni (2011), financial inclusion would itself serve as a transmission channel for the positive realization between mobile phones and economic growth. Swamy (2014), for his part, underlines the importance of the gender dimension as a means of transmitting the financial sector to economic growth. It shows that the financial inclusion of women has a relatively higher positive impact on the economy than that of men. This means that women use the finances to which they have access in order to improve the well-being of the family and contribute to a significant increase in the level of household savings.

However, there are a relatively smaller number of empirical studies that point to a negative impact of financial inclusion on economic growth. Indeed, the main argument of these studies is that a significant impact of inclusion on growth requires a certain level of financial development beforehand. Thus, in the presence of a fragile financial system, insufficient financial instruments and inappropriate policies; the effect of inclusion on growth is not significant.

### 2.2.2 Negative Impact

Although banks and stock markets are able to promote economic growth, the effects of commercial banks are more powerful (Arestis et al., 2018). Except that this promotion of growth is only possible if a level of financial development is achieved. Arestis et al. (2018), based on time series over 5 developed economies, argues that the relationship between financial deepening and growth tends to be exaggerated by panel studies. The financial deepening is calculated by the domestic credit to the sector of private as a percentage of GDP in their studies.

Naceur and Ghazouani (2007) detect a negative effect of the banking development index of 11 MENA[4] countries on their growth level. This result is the consequence of underdeveloped financial systems in the MENA region. The authors argue that these financial systems need to strengthen their financial environment and to improve the functioning of the banking sector. Following the latter ones, a good deal of work has been done in the MENA region to highlight the negative impact that financial development or financial inclusion could have on economic growth. According to Pearce (2011), even if the structure of the region's financial systems as it stands allows the region to benefit from an increase in productivity and efficiency, its inability to provide services for disadvantaged groups[5] means that a financial inclusion process will not have the expected effects. The explanation lies in the fact that people are not interested in the instruments offered by the banking system. Barajas et al. (2016), find that the beneficial effect of financial deepening on economic growth across regions is generally less in oil-exporting countries, low-income countries and countries in the MENA region. They demonstrate that these various effects could be the result of differences in the application of regulation and supervision and in the ability to provide widespread access to financial services. Bhattarai (2015) also indicates that although the over-financing has reduced the level of growth in some developed countries with high financial development ratios, a more prudent financial

[4] Middle East and North Africa
[5] Poor people, women, disabled person

deepening has supported higher economic growth in emerging economies.

# 3 Theoretical Model

We consider an economy with a constant population, the labor supply being equal to the active population. The labor force is standardized to the unit. It is assumed that there is a financial sector whose role is to provide sources of investment to the population. The idea is that this financial sector would be able to make available to individuals wishing to invest, resources mainly derived from total savings. Within the economy, there is a trade-off between the activity of intermediation and the production of goods and services. Nevertheless, individuals must belong to the financial system to be able to access the financial services.

The Cobb-Douglas production function is written as follows:

$$Y_t = A(\bar{K}_t)K_t^{\alpha}(n_t(1-r_t)L)^{1-\alpha} \qquad 0 \leq \alpha \leq 1 \tag{1}$$

where $Y_t$ is the level of production at time t, $K_t$ the level of capital used and L the amount of labor. $A(\bar{K}_t)$ represents technical progress as a function of the average capital stock per unit of production $K_t$, $n_t$ the proportion of individuals included in the financial system, $r_t$ the proportion of labor used in the financial sector. We assume that the externality to the production process is as follows:

$$A(\bar{K}_t) = A\bar{K}_t^{1-\alpha} \tag{2}$$

A being a constant parameter of the production technology. Knowing that the amount of work has been normalized per unit, we obtain a per capita production function of the following form:

$$y_t = A\bar{k}_t^{1-\alpha}k_t^{\alpha}(n_t(1-r_t))^{1-\alpha} \tag{3}$$

$r_t$ can be seen as an indicator of financial development, reflecting changes in the size of the financial sector. We also assume a full use of the mobilized $r_t$ proportion. As for $n_t$, it is an indicator of the inclusive nature of the financial system. It reflects the proportion of the population not working in the financial sector who have made the choice to use the financial services provided. In order to ensure that this inclusiveness is only the result of the public's interest in services, we assume a zero collateral value (solvency).

We are placed in a continuous framework with an instant utility function of the agents represented by:

$$U(c_t) = \frac{c_t^{1-\sigma}-1}{1-\sigma} \qquad \sigma \neq 1 \tag{4}$$

Where $c_t$ represents the household's level of consumption and $\sigma$ the risk aversion coefficient which is found to be positive ($\sigma > 0$). We also choose this utility function to ensure that we obtain a stationary growth path.

The representative household with perfect expectations maximizes the following inter-temporal utility function:

$$V_0 = \int_0^{+\infty} e^{(-\rho t)} U(c_t) dt \tag{5}$$

$\rho$ the discount rate reflects the preferences of the representative individual. An exponential discount is chosen for reasons of simplicity and also to avoid cases of temporal inconsistencies, knowing that the rationality hypothesis of the agents has already been made. Indeed, a decreasing factor proposed for example by hyperbolic or quasi-hyperbolic discounts (Pollak, 1968), can lead to a reversal of preferences according to the horizon (Strotz, 1955). In this perspective, the individual will have to face problems of temporal incoherence.

Drawing on the pioneering work of Pagano (2001), the level of investment is

defined as essentially a function of a part of the savings of $S_t$.

$$I_t = \Phi(r_t)S_t \tag{6}$$

$\Phi(r_t)$represents the technology used to transform savings into productive investment.

$$\Phi(r_t) = \frac{1}{\theta} r_t^{\theta} \qquad 0 < \theta < 1 \tag{7}$$

Savings transformation technology is an increasing function of the level of resources mobilized by the financial sector.

Let the equation reflecting the dynamics of capital accumulation be as follows:

$$\dot{k}_t = I_t - \delta k_t \tag{8}$$

where $\delta$ represents the rate of capital depreciation. Using equation (6) and (7), (8) becomes

$$\dot{k}_t = \frac{1}{\theta} r_t^{\theta} [A \bar{k}_t^{1-\alpha} k_t^{\alpha} (n_t(1 - r_t))^{1-\alpha} - c_t] - \delta k_t \tag{9}$$

The representative agent maximization program is as follows:

$$\begin{cases} \max\limits_{(c_t, n, r)} & V_0 = \int_0^{+\infty} \frac{c_t^{1-\sigma} - 1}{1-\sigma} e^{(-\rho t)} dt \\ \text{subject to} & \dot{k}_t = \frac{1}{\theta} r_t^{\theta} [A \bar{k}_t^{1-\alpha} k_t^{\alpha} (n_t(1 - r_t))^{1-\alpha} - c_t] - \delta k_t \end{cases} \tag{10}$$

The current Hamiltonian associated with this program is written:

$$H_c \equiv \frac{c_t^{1-\sigma} - 1}{1-\sigma} + \mu_t [\frac{1}{\theta} r_t^{\theta} [A \bar{k}_t^{1-\alpha} k_t^{\alpha} (n_t(1 - r_t))^{1-\alpha} - c_t] - \delta k_t] \tag{11}$$

The first order conditions are:

$$\begin{cases} \bullet \frac{\partial H_c}{\partial c} = c_t^{-\sigma} - \mu_t \frac{1}{\theta} r_t^{\theta} = 0 \\ \bullet \frac{\partial H_c}{\partial n} = \mu_t [\frac{(1-\alpha)}{\theta} r_t^{\theta} [A \bar{k}_t^{1-\alpha} k_t^{\alpha} n_t^{-\alpha} (1-r_t)^{1-\alpha}]] = 0 \\ \bullet \frac{\partial H_c}{\partial r} = r_t^{\theta-1} [A \bar{k}_t^{1-\alpha} k_t^{\alpha} (n_t(1-r_t))^{1-\alpha} - c_t] - \frac{(1-\alpha)}{\theta} r_t^{\theta} A \bar{k}_t^{1-\alpha} k_t^{\alpha} n_t^{1-\alpha} (1-r_t)^{-\alpha} = 0 \\ \bullet \dot{\mu}_t = \rho \mu_t - \mu_t [\frac{1}{\theta} \alpha r_t^{\theta} [A \bar{k}_t^{1-\alpha} k_t^{\alpha-1} (n_t(1-r_t))^{1-\alpha}] - \delta] \end{cases}$$

The condition of transversality that results from this program is: $\lim_{t\to\infty} \mu_t k_t e^{(-\rho t)} = 0$

By differentiating the first condition in relation to time we obtain:

$$\frac{\dot{\mu}_t}{\mu_t} = -\sigma \frac{\dot{c}_t}{c_t} - \theta \frac{\dot{r}_t}{r_t} \tag{12}$$

From the second to last condition we deduce the following equality:

$$r_t^{\theta-1} [A \bar{k}_t^{1-\alpha} k_t^{\alpha} (n_t(1-r_t))^{1-\alpha} - c_t] = \frac{(1-\alpha)}{\theta} r_t^{\theta} A \bar{k}_t^{1-\alpha} k_t^{\alpha} n_t^{1-\alpha} (1-r_t)^{-\alpha} \tag{13}$$

Using last condition and equation (12), we determine the Keynes-Ramsey equation indicating a stationary growth rate of consumption:

$$\frac{\dot{c}_t}{c_t} = \frac{1}{\sigma} [\frac{\alpha}{\theta} A \bar{k}_t^{1-\alpha} k_t^{\alpha-1} (n_t(1-r_t))^{1-\alpha} r_t^{\theta} - \delta - \rho - \theta \frac{\dot{r}_t}{r_t}] \tag{14}$$

Note that at equilibrium, the average capital stock per capita equals the capital level per capita ($\bar{k}_t = k_t$). Moreover, in a steady state, the growth rates and the share of labor used by the financial sector are constant. Taking these facts into account, we have the growth rate of consumption which becomes:

$$\frac{\dot{c}_t}{c_t} = \frac{1}{\sigma}[\frac{\alpha}{\theta}A(n_t(1-r_t))^{1-\alpha}r_t^{\theta} - \delta - \rho] \quad (15)$$

In order to determine the growth rate of capital accumulation, we rewrite the equation (13) which becomes at equilibrium:

$$\frac{c_t}{k_t} = A(n_t(1-r_t))^{1-\alpha} - \frac{1-\alpha}{\theta}r_t A n_t^{1-\alpha}(1-r_t)^{-\alpha} \quad (16)$$

From equation (9) and equation (16), we deduce the rate of capital accumulation per capita, which therefore constitutes a second formulation of the stationary growth rate:

$$\frac{\dot{k}_t}{k_t} = \frac{1}{\theta^2}A(1-\alpha)n_t^{1-\alpha}(1-r_t)^{-\alpha}r_t^{1+\theta} - \delta \quad (17)$$

Two variables of interest are financial inclusion and financial development. In the long term, $r_t$ has a direct positive impact on the growth rate of the economy, while $n_t$ has an amplifying effect. Indeed, the impact of the financial sector on the level of growth comes beforehand from the use of financial services that encourage productive investment. Financial development would therefore be related to each economy, the consumption habits of agents and cultures. Once the financial system is able to provide the services that the population needs, thus promoting growth, the level of this positive impact on growth will depend on the number of people who use it. The higher this number, the higher the growth rate will be.

Simulations are performed with following parameter values: $\sigma = 0.7$, $\theta = 0.7$, $\alpha = 0.5$, $\rho = 0.05$, $\delta = 0.6$ and A=0.5. However, the qualitative properties of the model don't depend on these values. Simulations aim to capture the long-term association between growth, financial development and inclusion.

Figure 1 shows the long-term relationship between consumption growth, financial development and financial inclusion. Taken separately, as Eggoh and Villieu (2013), we note a non-linearity of the relationship between financial development and growth rate.

The graph describes an inverted U-shaped association, thus emphasizing the presence of a threshold effect. This association is more pronounced with a higher level of inclusion. From agents' consumption perspective, financial development would be desirable up to certain threshold. Past this threshold, the individuals included will tend to prefer services rather than consumer goods. As for the inclusion level, we notice an increase relationship between the proportion of individuals included and the rate of growth in consumption. The dynamic is steadily increasing with a slight slowdown from the beginning. This growing trend simply reflects the fact that the value of operations made by new users is on average higher than the average value prior to their arrival. This may be due to the fact that people benefit greatly from the service. For the combined effect of financial development and financial inclusion on the rate of growth of consumption growth, we therefore highlight a long-term reversal effect.

Figure 2 reflects the long-term relationship between growth in capital accumulation, financial development and the financial inclusion. We see that the proportion of individuals included has no direct impact on the rate of capital growth. The latter only amplifies the impact that the level of financial development could have on the growth rate. It should also be noted that the level of financial development has a positive impact on the rate of capital growth. The slope of this positive relationship is even higher as the proportion of individuals included increases its maximum level to 1.

Generally, we note that the contribution of financial inclusion to growth requires a certain level of financial development. Ganti and Acharya (2017) speak about a financial tripod whose three legs are financial literacy, financial architecture and financial inclusion. Of these legs, financial literacy and financial architecture determine financial inclusion[6].

Thus, to achieve a total financial inclusion contributing to long term growth, it's necessary to set up financial policies regulating the financial literacy and architecture.

[6] To illustrate, Ganti and Acharya point out that "While financial inclusion works from the supply side of access to financial services, financial literacy improves on demand for it only"

# 4 Empirical Evidence

## 4.1 Data

The study is working with a panel of 57 developing countries for the period 2007-2017. Mobile money services really started in developing countries in the 2007s, thus dictating our study period. The countries included in the database come from Africa, Latin America, Eastern Europe and Oceania. The data were retrieved from the Penn World Table (pwt) 9.1, the Financial development and structure database designed by Beck et al, the ICT regulatory tracker and the database of the World Bank.

Table 1 provides the countries included in the sample.

## 4.2 Model Specification

In this part, we will conduct an empirical analysis that only highlights the potential impact of financial inclusion on economic growth. Indeed, financial inclusion and financial development appear highly correlated, so much so financial development is sometimes used as a broader indicator of financial inclusion (Mihasonirina and Kangni, 2011). In doing so, in the presence of financial inclusion, financial development is not included in model. In addition, knowing the countries constituting our database, we making the assumption that these countries have on average the same level of financial development. So the focus will mainly be on financial inclusion's contribution to growth.

We seek to present separately the contributions of two financial agents. These are Commercial Banks and Telecoms. In fact, these two agents are the main actors in the financial inclusion process in developing countries. Commercial Banks are essentially financial institutions that materialize the formal financial system of any country and they are the main providers of deposit, savings and credit services. Telecoms by definition are establishments providing telecommunications services. They have only begun to take an

interest in the financial sector in recent years and have been successful in it. The services provided by Telecoms are money transfers, micro-financing and deposits. Nevertheless, money transfer remain the service most used by the population.

For empirical analysis, following Waverman et al. (2005), we use a dynamic panel model to study the relationship between financial inclusion and economic growth. Our endogenous model can be defined as follows:

$$\gamma_{i,t} = \alpha y_{i,t-1} + \beta_{10} X_{i,t} + \beta_{11} X_{i,t-1} + \Gamma Z_{i,t} + \eta_i + \mu_{i,t} \quad (18)$$

where i and t respectively represent individual and time indices, $\gamma_{i,t}$ the economic growth , $y_{i,t-1}$ the initial level of GDP per capita, $X_{i,t}$ the financial inclusion variable whose first-lag $X_{i,t-1}$ is also a regressor, $Z_{i,t}$ the matrix of control variables, $\eta_i$ a country-specific fixed effect and $\mu_{i,t}$ the error term in the equation.

To estimate our dynamic panel model, we use the panel dynamic generalized method of moment (GMM) estimator proposed by Blundell and Bond (1998).The GMM estimator in the system, combines the first difference equations with the level equations. One advantage of this methodology is that it controls for endogeneity biases related to financial inclusion indicators and other control variables. Indeed, with first difference estimator we eliminate individual specific effects and by integrating the level equations we obtain unbiased results in finite samples when the instruments are weak. The instruments in the first difference equation are expressed in levels, and vice versa. We also choose this model because of our time dimension that not long. For example, we can't run Dynamic Ordinary Least Square (DOLS) or Pooled Mean Group (PMG) which need more than fifteen years.

Economic growth is captured through the logarithm of the country's GDP per capita growth rate. The financial inclusion is measured by two variables which are the logarithm of the financial system deposits to GDP and the logarithm[7] of active mobile

[7] All these variables are expressed in logarithms to provide an elasticity analysis

money account.The first one captures the level of Commercial Banks formal inclusion[8] and the second expresses the mobile inclusion.

Concerning active mobile money account, based on the GSMA's State of the Industry Report on Mobile Money of 2018, we have identified three determinants for the number of active mobile money accounts. These are the number of mobile subscriptions; access to electricity[9] and enabling regulation which has a tangible influence on the adoption and use of mobile money services. Thus by using mobile subscriptions, access to electricity and regulation we build a synthetic index with PCA[10], this index allowing us to measure the number of active mobile money accounts.

Population growth rate, inflation rate, openness rate and government expenditures labor are our four control variables. Table 2 indicates the summary statistics of variables

## 4.3 Results

Table 3 presents the results of the impact of financial inclusion on economic growth, particularly the impact of the inclusion of the traditional and mobile financial sectors. The first column reports the baseline growth model. The signs of control variables are broadly consistent with theoretical predictions.The negative and significant coefficient of initial GDP per capita verifies the convergence hypothesis. In addition, as shown by past studies, without a sufficiently sustained pace of technical progress population growth negatively affects the product per capita growth (Blanchet, 2001). The results of the baseline regression also suggest that government expenditure favors growth while. By the way, the inflation rate capturing macroeconomics instability impacts positively growth. Indeed, inflation damages growth only above a certain threshold which depends mainly on the structure of the economy.

In column 2, we introduced the traditional finance inclusion variable in the baseline model. In doing so, it is noted that an increase in the level of inclusion measured

[8] It would have been better to use depositors to avoid the formal inclusion overestimation knowing that an individual can make more than one deposit. We use deposits than number of depositors because of missing data for some countries of our sample
[9] Population use mobile money to pay electricity and water bills
[10] Principal Components Analysis

by the financial system deposits to GDP leads to an increase in GDP per capita. Then, in column 3 the first-order lag is introduced in addition to traditional finance inclusion variable. We include the first-order lag in the specification in order to judge the impact of advancing the financial inclusion process on growth. Then, we find that if traditional finance inclusion still has a positive impact on growth, its lag has a negative impact. These results reflect the fact that improved access to financial services increases growth. Indeed, including individuals in the system generally leads to productive investment. This translates into an increase in GDP per capita. A better access to deposit ensures that everyone can access financial services and generates monetary opportunities that are allocated to the most profitable projects. Formal financial inclusion generates growth through the creation of opportunities for individuals excluded from the system.

For mobile inclusion, following the same procedure as for traditional inclusion, the estimates of the model are presented in columns 4 and 5 respectively.

There is a positive impact of the mobile inclusion on GDP per capita growth.The rise of mobile finance creates opportunities for individuals and businesses that have been excluded from the formal banking system. Mobile finance improves living conditions by offering financial services such as transactions accounts, credit and insurances. Nevertheless, mobile inclusion coefficients on growth are higher than that of the formal finance. This is due to the use that people have of mobile money accounts in these developing countries. Indeed, with the facilities implemented by new technologies, people can use their mobile money account to make low-cost bill payments, tuition fees [11], money transfers in rural areas and large disbursements. Also, main financial services proposed by Telecoms are accessible to the entire population, the cost of access being the price of the telephone chip, which happens to be low. There is therefore no cost to create a mobile account for money transfers and other financial services. Populations benefit greatly from services and there are still individuals with often high financial potential[12] who do not use services.

[11] Bill and tuition fees are mainly consisting of electricity bill, water bill, medical emergencies, school and university fees
[12] We are referring to individuals who may regularly make large financial transfers

## 4.4 Robustness Test

To test the robustness of our results, we conducted estimates to check the sensitivity of the coefficients on financial inclusion. Table 4 shows forecasts for formal and mobile inclusion by changing our interest variables. The traditional inclusion is captured by two new variables, namely the deposit money bank to GDP and the private credit by deposit money banks to GDP. Columns 1 and 2 present results with the deposit money bank while columns 3 and 4 show those of the private credit by deposit money banks. From the latter, traditional finance coefficients stay significant, positive for the variable and negative for its lag.

Concerning the mobile inclusion, I change in columns 5 and 6 our index by the mobile cellular subscriptions. Mobile inclusion still have a positive impact on growth and an improvement of financial access increases growth.

We also test the stability of the financial inclusion coefficient to the sample composition. Based on the country's geographical area, we were able to classify our countries into two groups: Africa and Other[13]. We strictly run regression on the sample of African countries.

In doing so, table 5 presents the impact of the financial inclusion on growth in African countries. Formal financial inclusion contributes to growth in African countries except that the elasticity is less than that obtained without restriction of the sample. Even though the coefficient on the lag of formal inclusion retains its negative sign, we can't surely affirm that improved access to traditional finance has increased economic growth in African because this coefficient is not significant (column 3).

When we take a look on mobile inclusion in Africa, results seem interesting in that they reveal not only that improved access to traditional finance has increased growth, but also that mobile inclusion has an elasticity high (column 5) than that general elasticity

[13] Countries belonging to Other's group are from Asia, Europe, Latin America, Middle East and North Africa

obtained from table 3. This result underlines the fact that mobile inclusion appears like a real growth issue for African countries. Nevertheless, it should be noted that the mobile inclusion has also for Africa higher positive impact on growth than those of traditional inclusion.

Thus, these results reveal a certain heterogeneity between countries according to their geographical area. Therefore, the coefficients estimated for the entire sample must be carefully interpreted. Indeed, as demonstrated by the theoretical model presented above, the benefits of financial inclusion do not have the same magnitude. This magnitude depends on country-specific factors such as the level of financial development to which the population aspires. So, to the extent that the data allow, it would be useful to take these specific factors into account.

# 5 Conclusion

This paper investigates the impact of financial inclusion on economic growth in developing countries. To reach this, we realize both theoretical and empirical analyses. Focusing on a growth model for financial sector, this paper argues that consumption could be one of the channels through which financial inclusion contributes to growth. Nevertheless, the magnitude of financial inclusion impact on economic growth depends on the level of financial development. Concerning empirical analysis, considering a panel of 57 developing countries during 2007-2017, we distinguish impact of formal inclusion and mobile inclusion on growth with the GMM estimator in system. Concerning formal inclusion, the results of the estimations reveal that financial system deposits contributes to economic growth in developing countries. As for mobile inclusion, measured by the number of active mobile money accounts, being confronted with an inaccessible data we constructed an index based on the determinants of active accounts. The GMM estimators present a positive impact of mobile inclusion on growth.

The findings of this paper underline the important role of telecommunications companies in the financial inclusion process for developing countries. We also note that

mobile inclusion contributes more to growth than formal inclusion. Policies in developing countries should encourage telecommunications companies to invest and to promote this activity of financial inclusion. Reflections could focus on the regulation of this sector. Indeed, restrictive regulatory frameworks can negatively affect activity expansion to the extent that restrictive regulation raises costs for consumers and limits the roll out of new services. According to GSMA, 2018 regulatory developments appeared encouraging at first glance, yet their layers of complexity reveal increasingly restrictive requirements. To illustrate, the telecommunication sector, which is already one of the highest taxed in Sub-Saharan Africa, witnessed in 2018 the introduction of taxes on mobile money transactions throughout the region. This new tax feeds debates in regards to the impact it could have on mobile inclusion.

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# Appendices

Figure 1: **Relation between Financial Growth, Financial Inclusion and Consumption Growth**

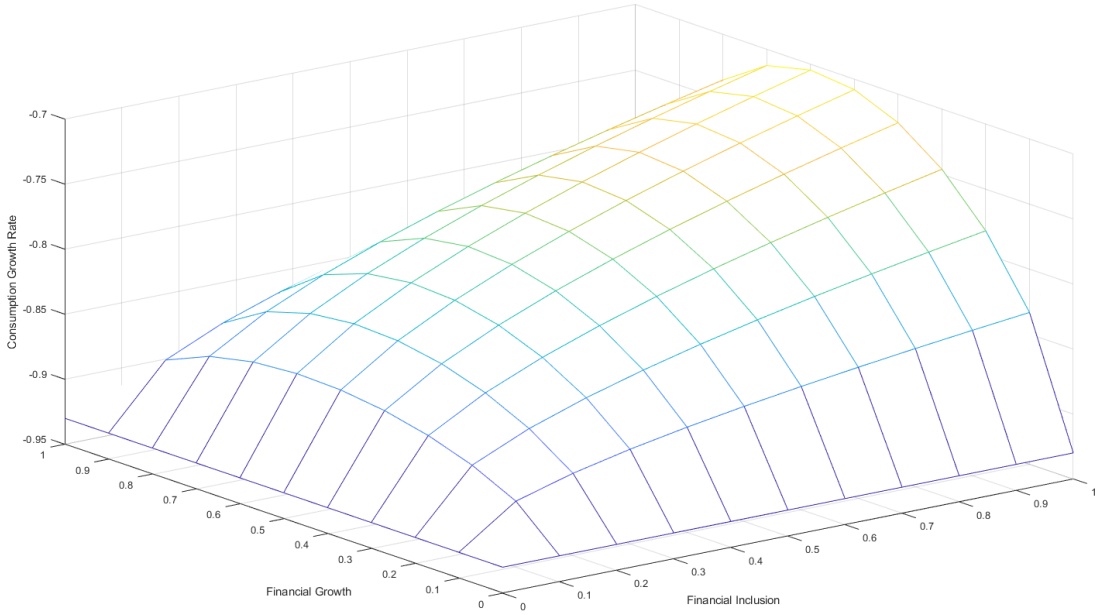

Figure 2: **Relation between Financial Growth, Financial Inclusion and Capital Growth**

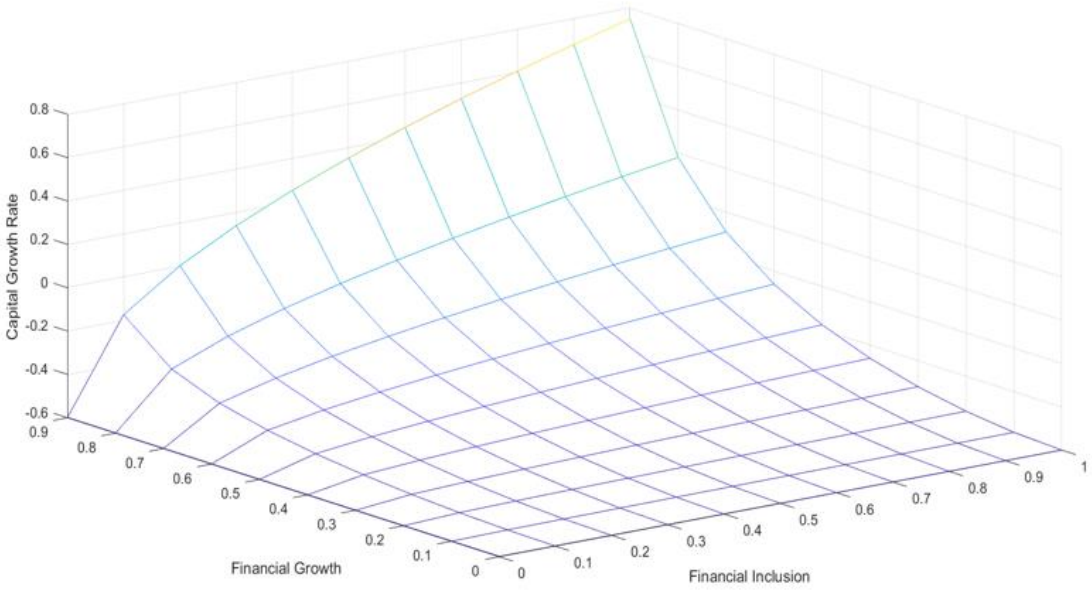

Figure 3: **Correlation between Formal Inclusion and Economic Growth**

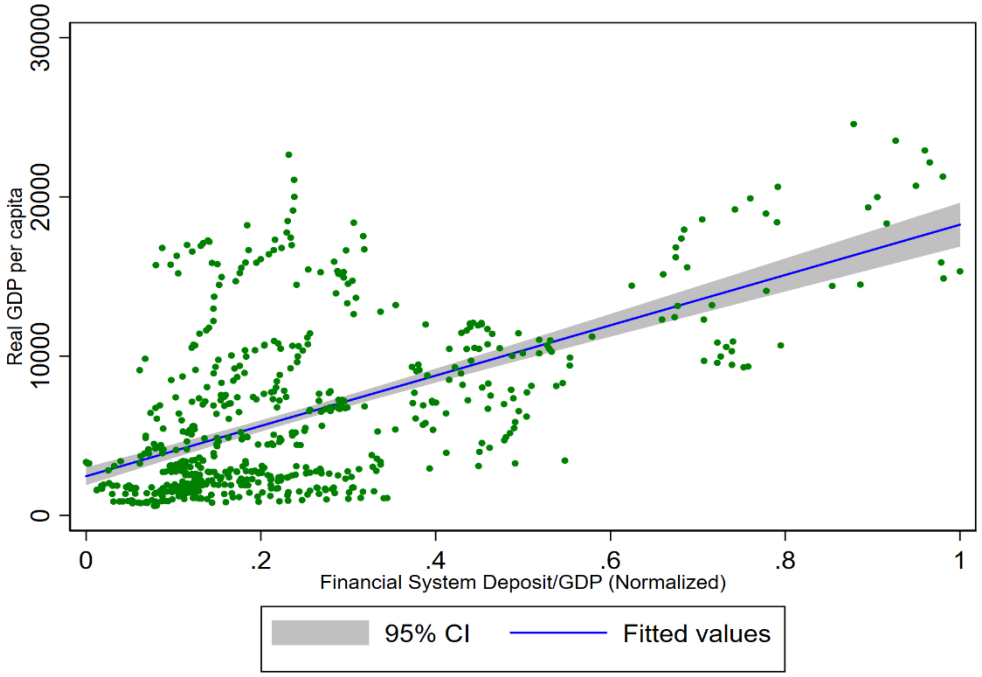


Figure 4: **Correlation between Mobile Inclusion and Economic Growth**

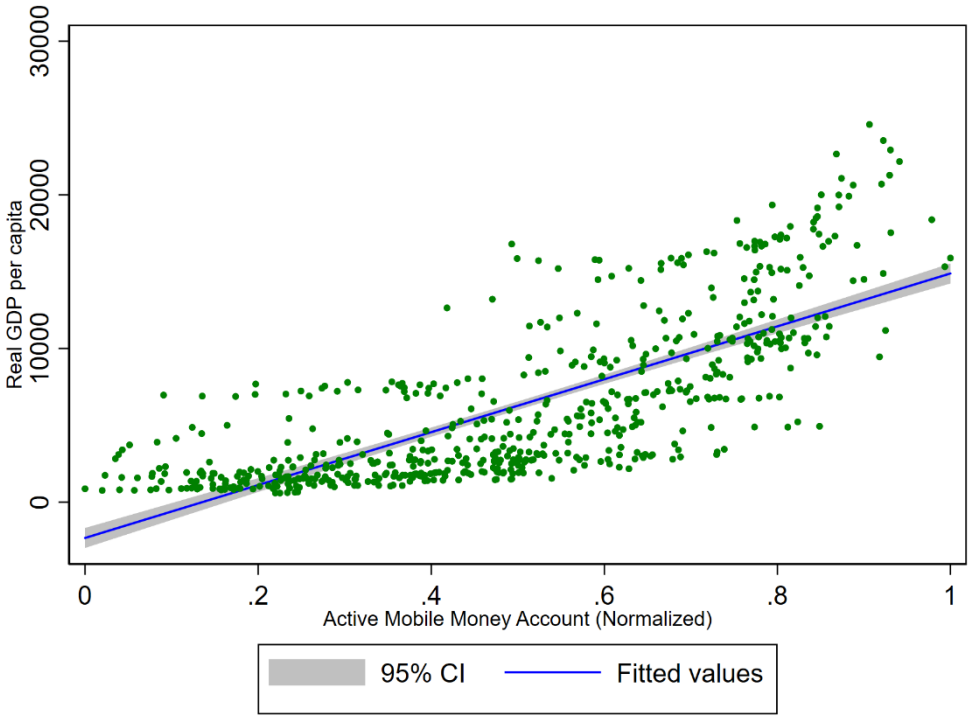

Figure 5: **Trends in Active Mobile Money Account and Financial System Deposit**

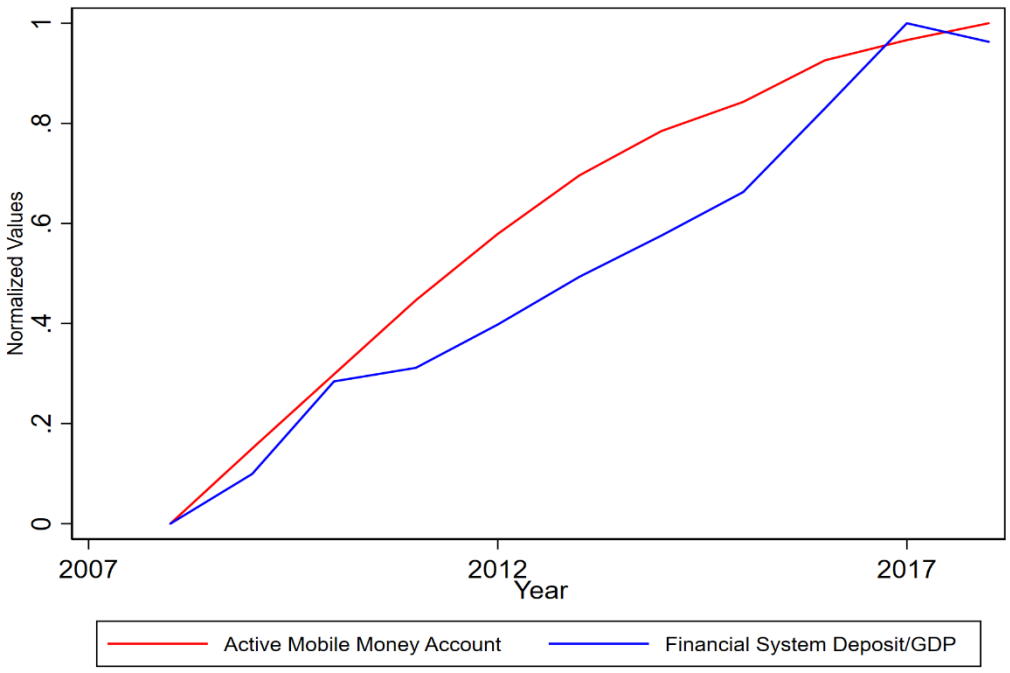

Figure 6: **International Comparison with Indicators of Formal Inclusion**

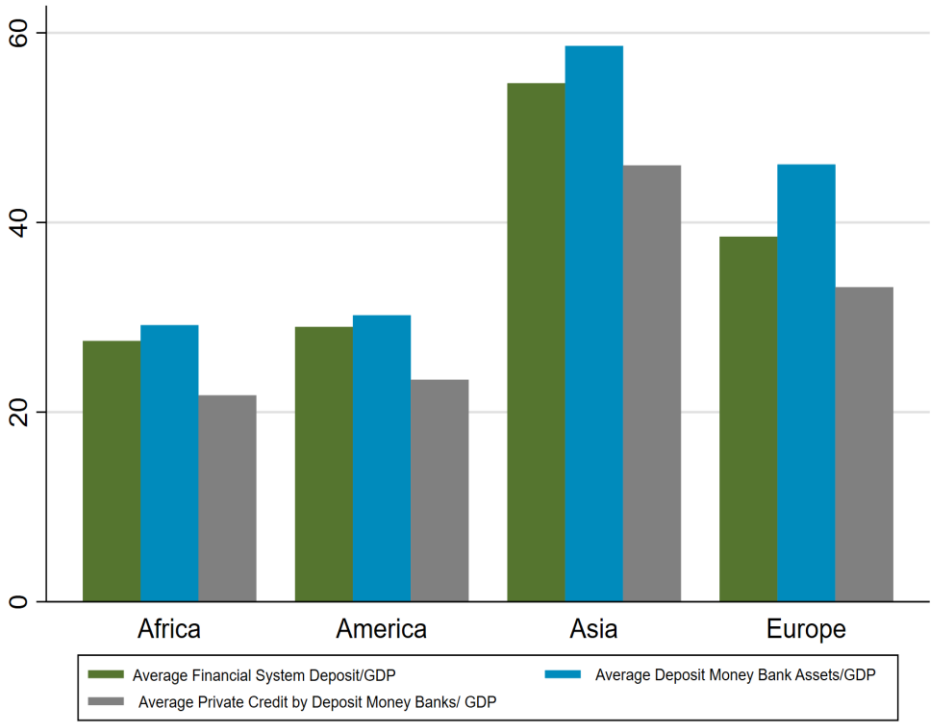

Figure 7: **Mobile Inclusion According to Continent**

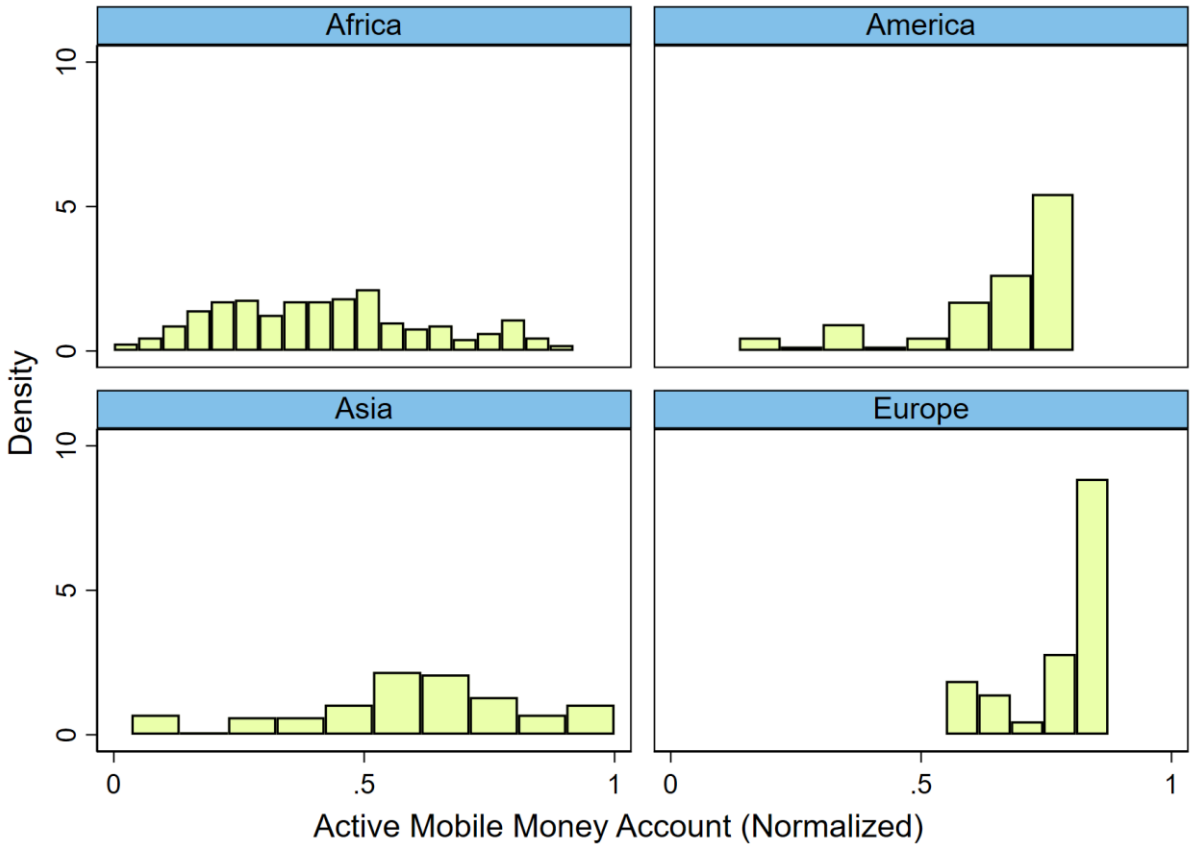

Table 1: **Sample Countries**

| | | |
|---|---|---|
| Albania | Ghana | Mozambique |
| Angola | Guatemala | Myanmar |
| Armenia | Guinea | Namibia |
| Bangladesh | Guinea-Bissau | Niger |
| Benin | Haiti | Nigeria |
| Botswana | India | Pakistan |
| Burkina Faso | Indonesia | Paraguay |
| Cambodia | Jamaica | Philippines |
| Cameroon | Jordan | Romania |
| Central African Republic | Kenya | Rwanda |
| Chad | Lesotho | Senegal |
| Congo, Rep, | Madagascar | South Africa |
| Côte d'Ivoire | Malawi | Sudan |
| Dominican Republic | Malaysia | Tanzania |
| Ecuador | Maldives | Thailand |
| Egypt, Arab Rep, | Mali | Togo |
| Eswatini | Mauritania | Uganda |
| Fiji | Mauritius | Zambia |
| Gabon | Mexico | Zimbabwe |

Table 2: **Descriptive Statistics**

| Variables | Observations | Mean | Std. Dev. | Min | Max | Countries |
|---|---|---|---|---|---|---|
| GDP per capita growth rate (log) | 570 | 0.0220799 | 0.0435327 | -0.4593397 | 0.4786493 | 57 |
| Initial GDP per capita (log) | 570 | 8.3089 | 0.9039889 | 6.392678 | 10.09818 | 57 |
| Population growth rate | 570 | 0.0205858 | 0.010919 | -0.010667 | 0.0551331 | 57 |
| Inflation rate | 570 | 0.0140312 | 0.1435726 | -0.6598689 | 2.388937 | 57 |
| Openness rate | 627 | -0.079580 | 0.1449723 | -0.6091282 | 0.6253507 | 57 |
| Government expenditures | 627 | 0.1631975 | 0.0663236 | 0.0151194 | 0.4060143 | 57 |
| Financial system deposits (log) | 619 | 3.286671 | 0.6797125 | 0.8164545 | 4.858567 | 57 |
| Active mobile money account (log) | 625 | 1.341744 | 0.3847388 | 0.0899879 | 1.958363 | 57 |
| Mobile cellular subcriptions (log) | 627 | 4.187808 | 0.6684843 | 0.4054651 | 5.334167 | 57 |
| Deposit money bank assets (log) | 619 | 3.317805 | 0.7454707 | 1.022286 | 4.960848 | 57 |
| Private credit by deposit money banks (log) | 618 | 3.023796 | 0.7613919 | 0.7920645 | 4.787427 | 57 |

Table 3: **Impact of Formal and Mobile Inclusion on Growth**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Initial GDP per capita (log) | -0.0122*** | -0.0375*** | -0.0503*** | -0.0199*** | -0.0429*** |
| | (0.00239) | (0.0130) | (0.0118) | (0.00410) | (0.00604) |
| Financial system deposits (log) | | 0.0236** | 0.0911** | | |
| | | (0.0112) | (0.0362) | | |
| L.Financial system deposits (log) | | | -0.0541* | | |
| | | | (0.0284) | | |
| Active mobile money account (log) | | | | 0.0349*** | 0.557*** |
| | | | | (0.0112) | (0.0759) |
| L.Active mobile money account (log) | | | | | -0.443*** |
| | | | | | (0.0649) |
| Population growth rate | -0.848*** | -1.464*** | -1.725*** | -0.780*** | -1.115*** |
| | (0.139) | (0.410) | (0.347) | (0.140) | (0.199) |
| Inflation rate | 0.0304*** | 0.0350*** | 0.0422*** | 0.0306*** | 0.0546*** |
| | (0.00511) | (0.01000) | (0.0109) | (0.00501) | (0.0107) |
| Openness rate | 0.00585 | 0.0785** | 0.102*** | 0.0228** | 0.0867*** |
| | (0.00863) | (0.0355) | (0.0342) | (0.0106) | (0.0183) |
| Government expenditures | 0.0666** | 0.126* | 0.155** | 0.0506** | 0.0935*** |
| | (0.0259) | (0.0655) | (0.0684) | (0.0246) | (0.0298) |
| Constant | 0.129*** | 0.271*** | 0.333*** | 0.147*** | 0.214*** |
| | (0.0183) | (0.0794) | (0.0680) | (0.0209) | (0.0308) |
| Observations | 513 | 503 | 501 | 512 | 511 |
| Number of countries | 57 | 57 | 57 | 57 | 57 |
| Hansen test (prob.) | 0.108 | 0.340 | 0.280 | 0.106 | 0.368 |
| AR2 (prob.) | 0.430 | 0.361 | 0.360 | 0.440 | 0.488 |

Notes: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: **Sensitivity Test for Robustness**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Initial GDP per capita (log) | -0.0349*** | -0.0353*** | -0.0404*** | -0.0206*** | -0.0492*** | -0.0559*** |
| | (0.00898) | (0.0105) | (0.00916) | (0.00211) | (0.00666) | (0.00509) |
| Deposit money bank assets (log) | 0.0253*** | 0.148*** | | | | |
| | (0.00640) | (0.0447) | | | | |
| L.Deposit money bank assets (log) | | -0.113*** | | | | |
| | | (0.0422) | | | | |
| Private credit by deposit money banks (log) | | | 0.0266*** | 0.0381*** | | |
| | | | (0.00654) | (0.00541) | | |
| L.Private credit by deposit money banks (log) | | | | -0.0195*** | | |
| | | | | (0.00461) | | |
| Mobile cellular subcriptions (log) | | | | | 0.0452*** | 0.213*** |
| | | | | | (0.0111) | (0.0202) |
| L.Mobile cellular subcriptions (log) | | | | | | -0.140*** |
| | | | | | | (0.0146) |
| Population growth rate | -1.261*** | -1.026** | -1.456*** | -0.740*** | -1.825*** | -1.791*** |
| | (0.352) | (0.441) | (0.334) | (0.124) | (0.243) | (0.204) |
| Inflation rate | 0.0369*** | 0.0535** | 0.0337*** | 0.0401*** | 0.0340*** | 0.0375*** |
| | (0.0104) | (0.0240) | (0.0103) | (0.00382) | (0.00726) | (0.00602) |
| Openness rate | 0.0598** | 0.0438 | 0.0785*** | 0.0449*** | 0.0882*** | 0.108*** |
| | (0.0261) | (0.0379) | (0.0276) | (0.00939) | (0.0163) | (0.0164) |
| Government expenditures | 0.0853* | 0.0768* | 0.0973* | 0.0400** | 0.103** | 0.0811*** |
| | (0.0464) | (0.0444) | (0.0544) | (0.0166) | (0.0405) | (0.0226) |
| Constant | 0.243*** | 0.204*** | 0.297*** | 0.146*** | 0.261*** | 0.189*** |
| | (0.0614) | (0.0779) | (0.0623) | (0.0149) | (0.0283) | (0.0237) |
| Observations | 503 | 501 | 502 | 500 | 513 | 513 |
| Number of countries | 57 | 57 | 57 | 57 | 57 | 57 |
| Hansen test (prob.) | 0.246 | 0.489 | 0.243 | 0.121 | 0.113 | 0.120 |
| AR2 (prob.) | 0.369 | 0.484 | 0.389 | 0.396 | 0.387 | 0.302 |

Notes: Standard errors in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01

Table 5: **Stability Test for Robustness**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Initial GDP per capita (log) | -0.0395*** | -0.0298*** | -0.0357*** | -0.0182*** | -0.0416*** |
| | (0.00677) | (0.00438) | (0.00398) | (0.00253) | (0.00361) |
| Financial system deposits (log) | | 0.0283*** | 0.0363*** | | |
| | | (0.00506) | (0.00969) | | |
| L.Financial system deposits (log) | | | -0.00443 | | |
| | | | (0.00996) | | |
| Active mobile money account (log) | | | | 0.0303*** | 0.619*** |
| | | | | (0.00551) | (0.0455) |
| L.Active mobile money account (log) | | | | | -0.505*** |
| | | | | | (0.0426) |
| Population growth rate | -1.952*** | -0.106 | -0.185 | 0.0729 | -0.483** |
| | (0.601) | (0.283) | (0.194) | (0.148) | (0.240) |
| Inflation rate | 0.0165 | 0.0333*** | 0.0264*** | -0.00819 | 0.00139 |
| | (0.0114) | (0.00971) | (0.00617) | (0.00793) | (0.0130) |
| Openness rate | 0.0727** | 0.0395*** | 0.0623*** | -0.0137 | 0.0665*** |
| | (0.0333) | (0.0141) | (0.0186) | (0.0111) | (0.00730) |
| Government expenditures | 0.132** | 0.0364 | 0.0454 | 0.0297 | 0.0415** |
| | (0.0518) | (0.0349) | (0.0315) | (0.0243) | (0.0200) |
| Constant | 0.366*** | 0.166*** | 0.203*** | 0.116*** | 0.186*** |
| | (0.0492) | (0.0250) | (0.0275) | (0.0143) | (0.0214) |
| Observations | 306 | 297 | 295 | 306 | 306 |
| Number of countries | 34 | 34 | 34 | 34 | 34 |
| Hansen test (prob.) | 0.137 | 0.276 | 0.245 | 0.239 | 0.551 |
| AR2 (prob.) | 0.319 | 0.274 | 0.253 | 0.334 | 0.382 |
| Africa | Yes | Yes | Yes | Yes | Yes |

Notes: Standard errors in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01