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# Do remittance flows promote financial inclusion?\*

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## Abstract

In this paper, we evaluate whether remittances promote financial inclusion in developing countries. We construct an index of financial inclusion and present single equation estimates of the effects of remittances on financial inclusion. The paper uses data on remittance flows to 61 developing countries from different regions around the world spanning from 1990-2014 to explore this nexus. The study uses fixed effects estimations as well as GMM IV estimation method of panel data econometric analysis. The regression results confirm the hypothesis that remittances have an impact on financial inclusion through their effect on financial sector development. This can be intuitively explained by the fact that sending and receiving remittances increase senders and recipients use of financial services. The study shows that indeed remittances increase financial inclusion by about 2.49%. Remittances can therefore be considered a catalyst of financial inclusion in development.

**Keywords:** Remittances, Financial inclusion, Instrumental variables.

**JEL classification:** C23, F34, H63.

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# 1 Introduction

In general terms, worldwide remittances have been on a growing trend and remain highly significant for most developing and emerging economies. Although remittances declined by 1% and 2.4% in 2015 and 2016 respectively, there was an improved global economic outlook such that, remittances to developing countries rebound by about 8.5% to reach a record high of \$466 billion in 2017. According to World Bank estimates, i.e. Migration and Development Brief 2018, remittances to developing countries are expected to continue to increase in 2018 by 4.1% to reach \$485 billion. Most authors argue that remittances are inherently pro-poor owing to the fact that they are direct in nature and are much better targeted to the needs of the poor than Foreign Direct Investments and Official Development Assistance. This is due to the fact that remittances go directly to their intended recipients without necessarily undergoing bureaucratic processes. As a result, these remittances provide an additional source of income to the recipients without creating administration related problems associated with Official Development Assistance as cited by Ratha and Mahapatra (2007). At the Macrolevel, the role of remittances is observed in their potential to stabilize the capital account of the recipient countries because they do not create future liabilities and, as opposed to other capital flows, they are more stable or even countercyclical, as depicted by Fritz et al. (2008).

On the other hand, financial inclusion is an important emerging topic and is considered to be a salient driver of economic development. According to the Bank of International Settlements, financial inclusion is the process of ensuring access to appropriate financial products and services needed by all members of the society in general and vulnerable groups in particular, at an affordable cost and in a fair and transparent manner by mainstream institutional players. Some researchers have cited financial inclusion as the panacea for combating poverty and most importantly the impetus for growth and development with respect to developing countries. From a wider and more general perspective, financial inclusion is the ease of access, availability and usage of the formal financial system by all members of the economy. According to literature, lower levels of financial inclusion has been associated with financial exclusion, which has adverse repercussions such as: higher crime incidence, general decline of investments, difficulties in obtaining credit and increased levels of unemployment among many other dire consequences.

Researchers and practitioners working on issues of international development and poverty reduction take into consideration financial inclusion as a high-ranking agenda. For example, the United Nation's 2030 Sustainable Development Goals (SDG's) cite financial inclusion as a fundamental underpinning of wider progress, with 5 of the 17

SDG's specifically mentioning the need for improved or universal access to financial services. Another evidence of financial inclusion initiative is the Financial inclusion 2020 initiative, which brings together major donors, e.g. the UN and World Bank, as well as many private stakeholders, such as Citibank and Visa, purposely to discuss initiatives regarding achieving financial inclusion by the year 2020. Yet another initiative is the AFI (Alliance for Financial Inclusion) which was constituted in 2008 and includes members from more than 90 countries, working together to advance its mission of accelerating the adoption of proven and innovative financial inclusion policy solutions. All these initiatives support the notion that financial inclusion is not only essential but also very instrumental for inclusive economic growth.

There exists a high likelihood that remittances improve financial inclusion by providing affordable financial services within the formal financial system to those who would otherwise be excluded. In this respect, promoting financial inclusion can have significant positive benefits for households. There are two main ways in which remittances could potentially affect financial inclusion. Firstly, this could be viewed from the perspective that remittances might increase demand for savings instruments because households might require to save extra amount of remittances received. Secondly, it could be that remittances potentially increase household's likelihood of obtaining a loan. According to Anzoategui et al. (2014), remittances increases the likelihood of having an account by at least 11%.

There are a couple of benefits associated with an inclusive financial system. Firstly, facilitation of efficient allocation of productive resources can possibly diminish cost of capital and secondly, access to related financial services can notably cause an improvement in the day to day financial management. This therefore means that households can eventually eradicate poverty by working themselves and their families out of poverty. Thirdly, an inclusive financial system can help curtail the growth of informal sources of credit, e.g. exploitative money lenders. The aforementioned benefits are just but a few among the numerous merits of financial inclusion. Altogether, an inclusive financial system improves efficiency and welfare by providing channels for secure saving practices and by facilitating enhanced financial services. Kempson et al. (2004) evaluate the nexus between the level of financial inclusion and income inequality. The results depict that countries with low levels of income inequality tend to have lower levels of financial exclusion, while the highest levels of exclusion are found in the least equal ones. It is also evident that small countries with a large emigrant worker population may have higher levels of financial inclusion if emigrant workers utilize the banking system for receiving remittances. According to Toxopeus and Lensink (2008), remittances are likely to stimulate development

without increasing debt or administrative burden. This implies that they are likely to improve financial inclusion by virtue of providing affordable financial services within the formal system to those who tend to be excluded.

The aim of this paper is to evaluate whether remittances promote financial inclusion in developing countries. To this end, we construct our own index of financial inclusion (IFI) following Sarma (2008) to investigate macro level factors that can be associated with financial inclusion. We deem it necessary to construct a new index because of two main reasons: First, our priors omitted some variables which we consider important. For example, Toxopeus and Lensink (2007) construct a predicted share of households with bank accounts to depict financial inclusion. They achieve this by regressing the share of households with bank accounts on the log of deposit accounts per 100,000 people and log of average deposit account size in US Dollars. Much as their measure of financial inclusion takes into account banking penetration and usage dimensions, it is quite evident that access dimension was omitted. The new index that we construct in this paper is therefore a broader index owing to the fact that it consists of wider range of dimensions by incorporating banking penetration, access and usage proxies. Second, our sample period spans a wider time frame. As a matter of fact, our sample covers 61 economies spanning from 2000-2014. We take into account a wider time horizon in comparison to Sarma whose sample period only spans seven years from 2004-2010.

A measure that aggregates several dimensions into a single multidimensional index aids in summarizing the complex nature of financial inclusion and helps to monitor its evolution. We develop a three dimension index based on various proxies which are then aggregated into a composite index. The three dimensions constitute banking penetration, access and usage. Taking into account banking penetration, an inclusive financial system should have as many users as possible. Therefore, it should penetrate widely among its users. This is effected through taking into consideration the proportion of account holders in a certain population. Another important dimension is accessibility because it lays emphasis on geographic and demographic penetration indicators. This is key because physical distance to physical points of service tends to be a form of barrier to financial inclusion. Typically, in an inclusive financial system, banking services should be easily available and accessible to the users. Mostly, the most prominent indicators of accessibility are banking outlets such as personnel, branches and offices. In this case, we take into account number of bank branches and number of ATMs (Automated Teller Machines) to measure access. Usage dimension also comes into play and entails savings and deposits patterns by use of credit and deposit proxies.

We acknowledge that a good index of financial inclusion could facilitate the process of setting national financial inclusion targets as well as monitor progress in attaining them. This is in essence effected because policy makers would be in a position to diagnose the state of financial inclusion, set targets, identify barriers, craft policies and ultimately monitor and measure policy impact. The index of financial inclusion is a measure of inclusiveness of the financial sector of a country and it incorporates information on these dimensions in one single number lying between 0 and 1, where zero denotes complete financial exclusion and 1 complete financial inclusion. We construct a new index taking into consideration the minimum and maximum values across countries therefore provides a good measure of comparison.

This paper uses Fixed Effects Estimation as well as GMM Dynamic Panel Instrumental Variables Estimation to address endogeneity concerns. Reverse causality could be a problem because, firstly, financial inclusion might reduce the costs of sending and receiving remittances hence is likely to make migrants more prone to send and households to receive remittances. Secondly, financial institutions could finance migration, and, consequently increase the remittance flow toward households with access to credit.

One limitation of the study is the fact that, to some extent, digital cash variables are not fully captured because we include mobile subscription and internet users to incorporate mobile banking and technology respectively yet in actual sense, we ought to have taken into account mobile accounts and internet banking as more accurate proxies. This is motivated by the fact that adoption of branchless banking or mobile money can increase financial access for unbanked segments by reducing costs and eliminating distance travelled to access financial services.

The rest of this paper is organized as follows: Section 2 is devoted to a critical review of the related literature regarding financial inclusion and remittances. Section 3 describes the process of constructing an index of financial inclusion. Section 4 presents econometric methodology and data sources. The same section also provides a thorough descriptive analysis of remittances and financial inclusion. Section 5 introduces our empirical specifications whose base results are presented in section 6. In section 6, the link between remittances and financial inclusion is also investigated as well as the robustness of our findings. Section 7 concludes the paper.

## 2 Related Literature

Over the past decades, there has been a drastic surge in international remittances, consequently giving rise to a couple of studies which focus attention on remittance

flows. Of prime importance to our study is research that examines the nexus between remittances and financial inclusion. According to literature that links financial inclusion to remittance flows, most studies focused on household survey data, implying that their research mainly focused on microeconomic perspective. There have been different approaches in terms of coming up with a proxy for financial inclusion. Although there are guidelines on financial inclusion as depicted by various financial inclusion indicators availed by the World Bank, literature on the same is inconclusive. The Global Findex database is a recent initiative by the World Bank as depicted by Demirgüç-Kunt et al. (2015). It provides interesting indicators of financial inclusion from a micro perspective based on primary country-wide surveys but unfortunately the various variables of interest only cover 2011, 2014 and 2017. This brief time span complicates cross country studies since it is not enough to come up with conclusive studies. Moreover, pertinent variables like mobile money accounts are only availed in 2014 and 2017 database, yet, it is widely known that mobile money has played a paramount role in financial inclusion at least in the context of most developing countries in Sub-Saharan Africa. It is well acknowledged that country-wide surveys involve substantial cost in addition to being time-consuming thus making it difficult to be conducted on regular intervals.

Within this whole framework of studies which revolve around financial inclusion, a number of authors have attempted to construct a financial inclusion indicator. Honohan (2008) constructed estimates of the fraction of households who have access to formal financial intermediaries and afterwards did a comparison of these estimates to poverty and inequality using the Gini coefficient. The estimates were constructed by utilizing the ratio of Micro Finance accounts and bank accounts to total population, household survey based access and the average deposit size and GDP per capita for more than 160 countries. The main setback is that the estimates provide only a one-time measure of financial inclusion thus proves to be inefficient in explaining changes over time and across countries.

Sarma (2008) in her concept note 'Index of Financial Inclusion', takes into consideration 3 dimensions to measure financial inclusion. These three dimensions include:

- 1) Depth (banking penetration) using a proxy measure of the number of bank accounts per 1000 population.

- 2) Availability to measure proximity of access using the number of bank branches and number of ATMs per 1000 population.

- 3) Usage to measure the extent and frequency of use of the banking facilities by the customers. Due to data limitation, she takes into account credit to GDP ratio.

Prior research has focused on the role of remittances on financial inclusion in light

of development. Toxopeus and Lensink (2008) posit that remittances can accelerate development without increasing debt or the administrative burden. Remittances are also presumed to improve financial inclusion by providing affordable financial services within the formal financial system to those who tend to be excluded. Remittances may therefore be presumed to play a crucial role within the wider spectrum of access to finance. In explaining demand factors, Toxopeus and Lensink (2008) attest to the fact that remittance senders need financial services that offer international payments option. The demand can create the need for banking services or other financial services offered by financial institutions. On the other hand, remittances channelled through bank accounts may encourage savings and enable a better match for savings and investments in the economy. In conclusion, Toxopeus and Lensink (2008) find out that remittances potentially have a development impact through the effect on financial inclusion. They demonstrate this by use of single-equation estimates on remittances and financial inclusion. This is effected by carrying out system estimates in which economic growth is explained by financial inclusion and financial inclusion by remittances.

Anzoategui et al. (2014) evaluate remittances and financial inclusion and provide evidence from El Salvador. They use household survey data from National Rural Household Survey to investigate whether remittances affect household use of savings and credit instruments from formal institutions. To illustrate financial inclusion, they use three disparate alternative dependent dummy variables:

- 1) Whether the household has a deposit account at a formal financial institution.
- 2) Whether the household has applied for a loan at a formal financial institution.
- 3) Whether the household has received a loan from a formal financial institution.

Their findings reveal that although remittances have a positive impact on financial inclusion by promoting the utilization of deposit accounts, they do not have a significant effect on neither the demand for nor the use of credit from formal institutions. The resultant effect is also not robust. According to Anzoategui et al. (2014), by virtue of relaxing credit constraints, remittances might dwindle the need for external financing from financial institutions, while at the same time bolstering the demand for savings instruments at least in the context of El Salvador.

Another strand of literature closely related to our research is literature on the relationship between remittances and financial development. Various studies analyze the link between remittances and financial sector development. Burges and Pande (2005) show that, by allowing households to accumulate savings and obtain loans for productive long-term investments, the banking sector in particular can have very significant impact on the level of poverty and growth. It is evident from their study



that lack of access to finance is one among the key reasons why poor people remain in a state of poverty.

Orozco and Fedewa (2006) provide evidence to support the fact that remittances increase bancarization of remittance recipients, albeit at low levels. This is essentially because by transmitting mechanism through the financial system, remittances enables remittance recipients to obtain other financial products. Consequently, remittances ought to increase domestic credit if banks extend credits to remittance recipients owing to the fact that these flows are perceived to be not only large but also stable.

Aggarwal et al. (2011) empirically explore the impact of remittances on financial system development and provide evidence that remittances promote financial development by increasing the aggregate level of deposits and credits. They investigate the nexus between remittances and financial development by laying focus on the ratio of bank deposits and credit to GDP, taking into account 109 countries spanning across 1975-2007. The results obtained are robust to using different estimation methodologies taking into consideration endogeneity concerns emanating from omitted variables, measurement error and reverse causation. The overarching conclusion is that remittances are positively associated with bank deposits and credit.

Using a panel of approximately 100 countries, Giuliano and Ruiz-Arranz (2009) empirically investigate how financial development influences the impact of remittances on economic growth. Their study is based on the notion that remittances can be a substitute of financial development by providing an alternative way to finance investments and help to overcome credit constraints. The results obtained confirm their idea that remittances enhance growth to a higher extent in countries which have less developed financial systems.

Fromentin (2017) analyzes the dynamic impact of remittances on financial development for emerging and developing countries using Pooled Mean Group (PMG) approach. The results depict that a positive long-run relationship between remittances and financial development coexists with a significant and slightly positive short-run relationship, with the exception of low-income countries.

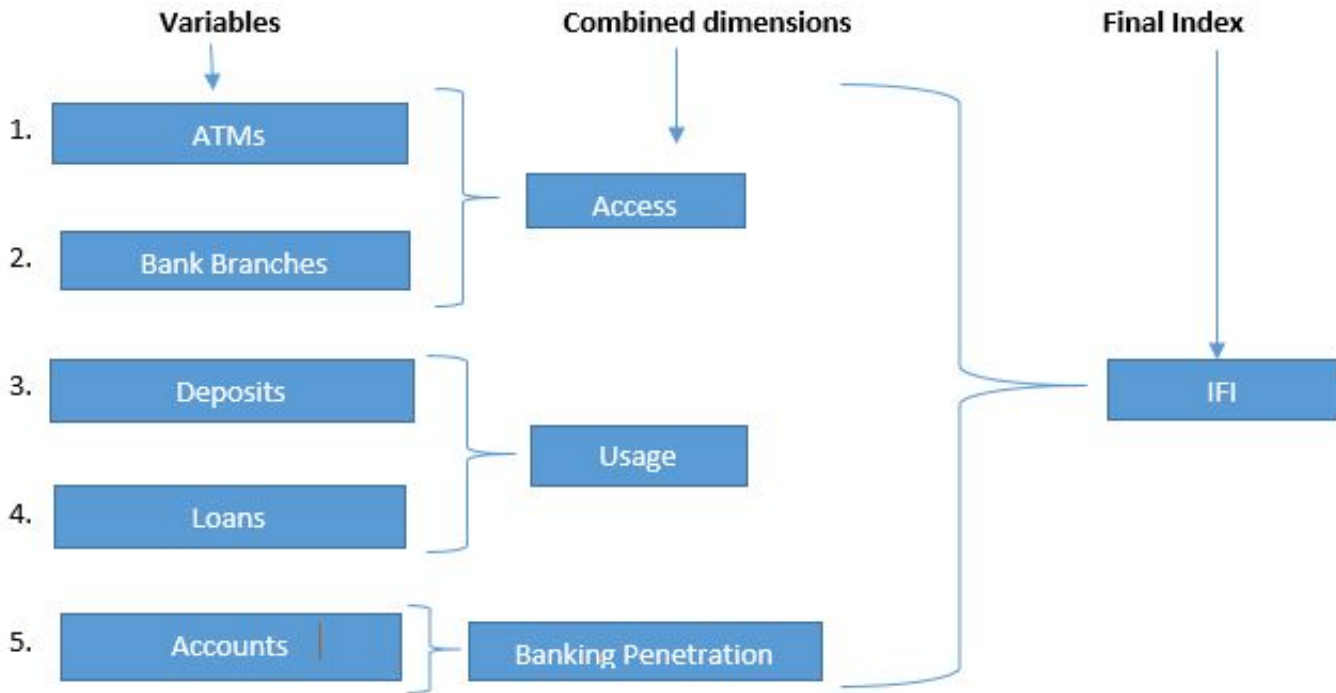
All the aforementioned strands of literature point out to the fact that there is an existing link between remittances and financial inclusion; a concept which we further investigate in this research paper.

### 3 Index of Financial Inclusion (*IFI*)

This section outlines sources and methods used to construct a multidimensional index of financial inclusion. We base our empirical analysis on an unbalanced panel of 61 developing countries with annual data from 2000 to 2014. Country coverage is dictated by data availability on main variables of interest, in particular remittances and financial inclusion indicators. We embark on computing our own index of financial inclusion precisely because past studies have omitted one or the other dimensions impacting financial inclusion for various reasons. For instance, in evaluating the relationship between remittances and financial inclusion with respect to El Salvadorian households, Anzoategui et al. (2014) use three alternative dependent dummy variables to represent financial inclusion: (i) deposit accounts at formal financial institutions, (ii) loan applications from financial institutions, and (iii) loans received from financial institutions. In this case, they use each of these variables separately. This implies that each time they use one of the three alternative measures, they omit a certain important aspect of financial inclusion. On the other hand, Toxopeus and Lensink (2007) use the predicted share of households with bank accounts as their measure of financial inclusion in investigating the nexus between remittances and financial inclusion in development. Sarma (2008) uses a dimension approach in calculating an index of financial inclusion. However, consideration of credit as a share of GDP as part of the usage dimension is somehow misleading. This is because credit as a share of GDP depicts financial depth as opposed to the usage dimension of financial inclusion. As a matter of bridging the existing gap, we consider all dimensions associated with financial inclusion to be critical, therefore, we incorporate three dimensions in order to acquire a more holistic view of financial inclusion. Additionally, we comply with some important mathematical properties associated with computation of a sound index such as boundedness, unit-free property, homogeneity and monotonicity. Our approach resembles Sarma (2008), whose methodology is similar to that used by the UNDP (United Nations Development Programme) for the construction of development indices.

The figure below demonstrates the process of constructing our new index of financial inclusion:

Figure 1: Index of Financial Inclusion (*IFI*) construction process



The index of financial inclusion which we compute in this paper takes into account three dimensions which include: access, usage and banking penetration. This multi-dimensional approach is motivated by the notion that the inclusiveness of a financial system should be evaluated along several pertinent dimensions. Taking into account the multiple divergent dimensions used, there are specific financial inclusion variables which constitute the respective dimensions. These variables provide useful information on the nature of inclusiveness of a financial system. On the flipside, when these variables are used individually, they may provide partial and incomplete information about the inclusiveness of the financial system. As a result, the inferences could be misleading because one single variable does not sufficiently capture the extent of financial inclusion.

Accounts are considered to be an important measure of financial inclusion owing to the fact that in essence, all formal financial activities take place through accounts. The main reason for choosing account ownership as one of the key constituent variables of dimension for financial inclusion is that it provides an avenue for both payments and savings, which are likely to be more closely related to household decisions than credit as depicted by Allen et al. (2016). Accounts in this case provide

a measure of banking penetration as an important dimension of financial inclusion. An inclusive financial system should widely penetrate among its users, therefore, this implicitly suggests that it should have as many users as possible. We obtain data on account ownership from the Financial Access Survey which is compiled and published by the IMF (International Monetary Fund). The banking penetration dimension in this case takes into account bank accounts with commercial banks per 1000 adults.

For the access and usage dimensions, we initially take into account two separate variables during the dimension index computation process. After that, we calculate the average of the two respective indices to arrive at the final combined dimension indices. To illustrate this, take for instance access, a dimension which represents the availability of financial services provided by banks to its customers. Banking services should be easily accessible by the users in an inclusive financial system. In this study, we measure access using two variables: ATMs (Automated Teller Machines) per 100000 people and commercial banks per 100000 people. ATMs are computerized telecommunications devices that provide clients of a financial institution with access to financial transactions in a public place. These ATMs are widely used and are practical in the sense that they are easily accessible and operate even beyond banking halls' opening hours. Commercial bank branches are retail locations of resident commercial banks and other resident banks that function as commercial banks. They provide financial services to customers and are physically separated from the main office but they are not organized as legally distinct subsidiaries. Considering the move towards electronic banking and mobile banking, data on the availability of these alternative forms of banking ought to be incorporated. However, we do not include these other dimensions due to lack of consistent data on the same. We then derive two indices using data on ATMs and commercial bank branches. The average of the two indices is then eventually considered as the combined index for the access dimension.

We also consider usage to be important in measuring the level of financial inclusion in an economy because it takes into consideration the actual activities that take place in the accounts. It is argued that simply being in possession of a bank account is not enough for an inclusive system because it is also imperative that the banking services are adequately utilized. We consider two forms of utilization in this case: savings and loans. This is captured using the available data on depositors per 1000 adults and borrowers per 1000 adults respectively. Depositors with commercial banks are the reported number of deposit account holders at commercial banks and other resident banks functioning as commercial banks that are resident nonfinancial

corporations and households. For many countries, data covers the total number of deposit accounts due to a lack of information on account holders. The major types of deposits are checking accounts, savings accounts, and time deposits. On the other hand, borrowers from commercial banks are the reported number of resident customers that are nonfinancial corporations. Likewise, households who obtained loans from commercial banks and other banks functioning as commercial banks are also categorized as borrowers. For the majority of countries, data covers the total number of loan accounts due to lack of information on loan account holders. The usage dimension also consists of two variables, namely depositors per 1000 adults and borrowers per 1000 adults. Both these usage variables are derived from the World Development Indicators. Sarma (2008) uses the ratio of domestic credit to GDP in depicting the usage dimension. This is where we differ because in our opinion, this ratio is more likely to reflect financial depth as opposed to usage because it provides a measure of the contribution of the financial system to economic activities. The construction of the index of financial inclusion entails three main steps as outlined below:

### 3.1 Step 1: Computation of dimension indices

The initial step entails consideration of all the five variables that constitute elements of the final index of financial inclusion. Putting this into perspective, we initially have five variables outlined as:

1. ATMs
2. Bank Branches
3. Deposits
4. Loans
5. Accounts

We configure all these variables and represent them as a share of 100,000 people. For each of these five variables, we need to construct an index bound between 0 and 1.

We use each of the aforementioned variables to compute a dimension index as follows:

$$d_{i,t}^j = \left( \frac{A_{i,t}^j - m^j}{M^j - m^j} \right)$$

where for country  $i$ ,

$j=1, 2, 3, 4, 5$  is the number associated with a specific variable i.e. ATMs, Bank Branches, Deposits, Loans and Accounts.

$A_{i,t}^j$  = Actual value of variable  $j$ .

$m^j$  = Lower limit for variable  $j$ , given by the observed minimum value,  $\forall i, \forall t$ .

$M^j$  = Upper limit for variable  $j$ , denoted by the maximum observed value,  $\forall i, \forall t$ .

The above computation ensures that  $d_{i,t}^j$  lies between 0 and 1 thus a higher value of  $d_{i,t}^j$  indicates a country's higher achievement in dimension  $i$ . This implies that a certain country which exhibits a maximum value of a certain variable at a certain time will have a dimension index of 1. On the contrary, a country which exhibits the minimum observed value will have a value of 0.

### 3.2 Step 2: Combination of dimension indices

This involves a combination of dimension indices with respect to variables that represent identical dimensions. This is because, looking at it from a broader perspective, we need to merge various dimension indices which consist of respective variables depicting the same dimension. Take for instance ATMs and Bank Branches, these two variables and the corresponding dimension indices principally represent the access dimension. On the other hand, deposits and loans depict the usage dimension. The last dimension, i.e. banking penetration is solely derived from bank accounts which is the only variable that depicts banking penetration in this study.

This process of merging the dimension indices to come up with a combined dimension indices is shown below:

1. Access dimension is calculated as:  $\frac{d_{1,i,t}+d_{2,i,t}}{2} = \tilde{d}_{1,i,t}$
2. Usage dimension is calculated as:  $\frac{d_{3,i,t}+d_{4,i,t}}{2} = \tilde{d}_{2,i,t}$
3. Banking penetration dimension undergoes no transformation but for notational consistency purposes, it is depicted as:  $d_{5,i,t} = \tilde{d}_{3,i,t}$

We then end up with a combined dimension denoted as  $\tilde{d}_{1,i,t}$  which represents access. The same calculation applies to the usage dimension because it is composed of two indices derived from ATMs and Bank branches variables. The resultant combined usage dimension is denoted as  $\tilde{d}_{2,i,t}$ . The banking penetration dimension consists of only one variable therefore the resulting dimension index is incorporated into the composite index without any form of modification. The banking penetration dimension is denoted as  $\tilde{d}_{3,i,t}$ .

### 3.3 Step 3: Computation of multi-dimensional index

The next step involves combining all the three dimensions to obtain a multi-dimensional index of financial inclusion. We work on the assumption that equal weights are attached to the various dimensions in this specific case. This therefore indicates equal importance of the respective constituent dimensions in quantifying the inclusiveness of a financial system. After obtaining the respective values of the combined dimension indices associated with access and usage as well as banking penetration dimension for various years, the index of financial inclusion ( $IFI_{i,t}$ ) is computed as follows:

$$IFI_{i,t} = \frac{1}{2} \left[ \frac{\sqrt{(\tilde{d}_{1,i,t})^2 + (\tilde{d}_{2,i,t})^2 + (\tilde{d}_{3,i,t})^2}}{\sqrt{3}} + \left( 1 - \frac{\sqrt{(1 - \tilde{d}_{1,i,t})^2 + (1 - \tilde{d}_{2,i,t})^2 + (1 - \tilde{d}_{3,i,t})^2}}{\sqrt{3}} \right) \right] \quad (1)$$

Essentially, the equation presented above depicts that the index of financial inclusion is measured by the simple average of two distances: the first being the normalized Euclidean distance of the various dimensions from the origin of the cartesian plane and the second is the normalized inverse Euclidean distance from the ideal point which is one in each of the three cases. Explaining this concept further, the concept of Euclidean distance is basically the distance between two points defined as the square root of the sum of the squares of the differences between the corresponding coordinates of the points. According to literature, Euclidean distance is the only metric that is the same in all directions and as such referred to as rotation invariant. The literature has considered this to be not only the most convenient but also the most perceptible way of representing distance between two points.

The resulting index of financial inclusion lies between 0 and 1 such that, 0 denotes financial exclusion while on the other hand, 1 indicates complete financial inclusion. The newly constructed index of financial inclusion is therefore a measure of inclusiveness of the financial sector of the various countries in our sample. We consider it to be appropriate owing to the fact that it is not only comparable across countries but it also takes into account various important variables which impact financial inclusion.

In the subsequent regression equations, the dependent variable is a logit transformation of the newly constructed index of financial inclusion ( $IFI_{i,t}$ ). In this case,

unlike  $IFI_{i,t}$  which lies between 0 and 1, the transformed variable lies between  $-\infty$  and  $\infty$ . As a result, the transformed variable is a monotonically increasing function of the  $IFI_{i,t}$  and maintains the same ordering as  $IFI_{i,t}$ . The transformed variable which is a logit function of the original variable  $IFI_{i,t}$  appears as depicted below:

$$TIFI_{i,t} = \ln \left( \frac{IFI_{i,t}}{1 - IFI_{i,t}} \right)$$

## 4 Data and Descriptive Evidence

A couple of other variables are incorporated in evaluating the relationship between financial inclusion and remittances. This is because these variables influence the degree of financial inclusion in respective countries in our sample of study.

*RemGDP* refers to the ratio of remittances to GDP. Personal remittances comprise personal transfers and compensation of employees. Personal transfers includes all current transfers in cash or in kind made or received by resident households from nonresident households. Personal transfers therefore consists of all current transfers between resident and nonresident individuals. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are considered nonresidents and of residents employed by nonresident organizations. According to IMF's Balance of Payments Manual, personal remittances constitute personal transfers and compensation of employees. The working hypothesis in this paper is that remittances contribute to financial inclusion in the sense that higher remittance inflows result into higher degree of financial inclusion.

Apart from remittances, there are many other control variables which are likely to influence financial inclusion. Key among them is income level of households which is measured by GDP per capita. Owing to the fact that a household's income could have a direct influence on financial inclusion, we include the natural logarithm of GDP per capita because it controls for income effects that may influence access to finance.

Literacy rate is also taken into consideration and it denotes the percentage of the population aged 15 years and above who can, with understanding, read and write a short, simple statement on their everyday life. In general terms, literacy also encompasses numeracy i.e. the ability to make simple arithmetic calculations. This indicator is calculated by dividing the number of literates aged 15 years and over



by the corresponding age group population and multiplying the result by 100. Taking literacy rate into account allows for the possibility that literate households are more likely to use financial services compared to illiterate households. We therefore include literacy rate as a proxy for financial literacy in our regressions. In this case, higher literacy rates ought to be associated with higher levels of financial inclusion. Literacy rate is depicted as *Litrte*.

Domestic credit to private sector refers to financial resources provided to the private sector by financial corporate entities. This is effected through loans, purchases of non-equity securities, and trade credits as well as other accounts receivables, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporate organizations where data is available. Higher domestic credit to private sector depicts higher levels of financial inclusiveness. This ratio is depicted as *Domcredit*.

Population encompasses total population which is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The population size plays a major role in measuring the inclusiveness of financial services that are availed to the citizens of a certain country. In our regressions, we take into account the natural logarithm of population depicted as *Logpop*.

Mobile subscriptions refers to mobile cellular telephone subscriptions which are subscriptions to a public mobile telephone service that provide access to cellular technology. The indicator includes the number of postpaid subscriptions, and the number of active prepaid accounts. The indicator applies to all mobile cellular subscriptions that offer voice communications. This combined with internet users capture branchless banking within a certain country. In our regressions, we use the logarithmic transformed version of mobile subscription depicted as *Logmbs*. Internet users are individuals who have used the Internet in the past 12 months. Although bank branches have been captured as part of access dimension, it is widely agreed that in the recent past most customers resort to internet banking which is deemed to be much more convenient. Both these attributes are associated with an elevated degree of financial inclusion. The variable representing internet users is depicted as *Logint*. Control of corruption reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption. The higher the value of control of corruption, the better off the country is because that implies that there are mechanisms in place to ensure that corruption is eliminated. Corruption is a vice which tends to undermine financial inclusion effects thus rendering citizens of a certain country to be excluded from mainstream provision of

financial services. We depict control of corruption as *Ctrlcorr*.

*AgeDR* is age dependency ratio which depicts the ratio of dependents. Generally, dependents constitute people younger than 15 years or older than 64 years expressed as a ratio to the working-age population(ages 15-64). According to the prevailing data, this is shown as the proportion of dependents per 100 working-age population. The lower the age dependency the higher the degree of financial inclusion and vice versa.

For the sake of incorporating business cycles, we ought to utilize 5 year averages. However, owing to the fact that our sample period spans only a short period of time, we settle on year on year GDP growth rate to capture business cycle effects. We therefore include GDP growth as one of our control variables in order to capture business cycle effects.

## 5 Econometric Framework

We formulate the following model to examine the relationship between remittances and financial inclusion:

$$TIFI_{i,t} = \beta_0 + \beta_1 (RemGDP)_{t-1} + \beta_2 X'_{i,t} + \varepsilon_{i,t},$$

where  $TIFI_{i,t}$  is the transformed logistic function of the index of financial inclusion.  $i$  refers to country and  $t$  refers to the time period from 2000 to 2014. Since we are looking for a causal effect of remittances on financial inclusion, we use a time lag in the analysis to address endogeneity issues. *RemGDP* refers to annual remittances as a share of the Gross Domestic Product for respective countries. The matrix  $X'_{i,t}$  is a matrix of control variables that literature has found to affect financial inclusion and  $\beta_0$  is the constant term.  $\beta_1$  is the coefficient of primary interest and the error term is denoted as  $\varepsilon_{i,t}$ .  $\beta_2$  on the other hand is a vector which includes coefficients on the control variables.

Domestic credit to private sector (/% to GDP) is a measure meant to illustrate that financial resources including loans and non equity securities are provided to the private sector. This covers financial institutions like banks and other financial corporations all measured as percentages with respect to GDP. The higher the ratio, the higher financing is to private sector in a country consequently resulting in greater opportunity and space for the private sector to develop and grow. Taking this into consideration, bolstering the private sector and making it play a salient role in a

country's economy is likely to contribute to overall development of a country. This ratio is therefore deemed to be pertinent and a key factor with respect to financial inclusion.

Population and GDP per capita are also considered to play a role in financial inclusion. This captures the divergent country demographics and facilitates the understanding of the role of population concentration on the penetration of banking system. According to a report prepared by CGAP (Consultative Group to Assist the Poor) in light of 2012 Global Findex report, it is depicted that countries with higher density and higher per capita income are associated with greater levels of financial inclusion. This intuitively implies that a larger population should increase financial access and as a result financial inclusion since this indicates a larger market size.

We also take into account mobile subscription to capture the utilization of mobile telephony for provision of financial services. This makes possible an offer of payment and a range of financial services without a bank account as the mobile phone can serve as a virtual bank card and store information related to customers and financial institutions. Though not all mobile subscribers have a mobile money account, it is widely accepted that mobile telephony reduces geographic constraints and transaction costs. By so doing, they increase the diffusion of a remote banking model without incurring prohibitive distribution costs for massive distribution. This, coupled with internet access take into account internet banking which is a recent trend which does not require physical banking outlets. Mobile banking phenomena is most widely embraced in Sub-Saharan Africa than any other region in the world.

We consider control of corruption as an important governance indicator because it is expected that low levels of corruption ought to be associated with a high level of financial inclusion and vice versa. Governments which have managed to reduce corruption levels through various proactive initiatives such as forming transparency agencies to enhance transparency and accountability have realized unprecedented levels of financial inclusion.

We took into consideration literacy rate as a proxy for financial literacy because data on financial literacy was not available. The rationale behind settling on this is that literate citizens are more likely to take initiative and make use of financial services thus be financially included as opposed to the illiterate ones. Atkinson and Messy (2013) define financial literacy as a combination of a host of attributes such as awareness, knowledge, skill, attitude and behaviour necessary to come up with sound financial decisions and ultimately achieve financial wellbeing. In order to comprehend financial planning, a person should be financially literate and able to

understand the importance of preparing household budgets, cash-flow management and asset allocation in order to meet financial goals. Generally, financial literacy is one of the major challenges facing countries across the globe, irrespective of their level of economic development and has been receiving significant attention from policy makers worldwide. When literacy is taken into consideration, it is often considered a hidden hurdle to bringing financial inclusion to the unbanked. Most times, systems that should work in theory break down when poor people are unable to learn how to use them or are unable to learn how to use them or are unable to assume the accountability of consumers who know their rights and how to obtain recourse to maintain transparency and honesty in the system.

Lower age dependency ratio would imply higher levels of financial inclusion and the converse is true when we have a high age dependency ratio. Essentially, a lower age dependency ratio implicitly means that majority of the country's citizens are in a position to fend for themselves and they do not necessarily depend on others to access financial services. A high age dependency ratio on the other hand implies that a larger segment of the population are either too young or above the retirement age, which impedes their access to financial services as they do not earn income.

We use GMM instrumental variables approach in our estimations because it is well suited to deal with endogeneity issues. It is common in financial inclusion regression that some of the explanatory variables are endogenous. This endogeneity may bias estimates of how the independent variables in equation may affect the dependent variable in equation. The major sources of endogeneity are likely to arise due to either unobservable heterogeneity or simultaneity. In normal circumstances, to eliminate unobservable heterogeneity, conventional fixed estimations are used. However, this estimation assumptions hold only when we assume that country characteristics or structures are strictly exogenous. i.e considered to be purely random observations through time unrelated to country's history. This is however a very strong assumption which is unlikely to be valid in reality. While OLS estimation may be biased due to the fact that it ignores unobservable heterogeneity, fixed effects may be biased owing to the fact that it neglects endogeneity. GMM is considered a more efficient estimator in comparison to other estimators because it can avoid the bias that ordinary least square suffers when an explanatory variable in a regression is correlated with the regression's disturbance term. Moreover, GMM provides theoretically based and powerful instruments that accounts for simultaneity while eliminating any unobservable heterogeneity.

The validity of our model is supported by a couple of indicators:

Hansen J test (1982) of over-identifying restrictions tests validity of instruments.

According to our regression results, the variables are found to be orthogonal to the error process of financial inclusion on the basis of the Hansen J test results. The implication therefore is that the choice of growth of OECD countries as an instrument is considered valid for this research. The joint null hypothesis of the Hansen test is that the instruments are exogenous. The foregoing statement implies that they are not correlated with the error term and that the excluded instruments are correctly excluded from the estimated equation. This therefore means that the choice of instrument is appropriate.

Additionally, the Arellano Bond test checks for autocorrelation in the idiosyncratic disturbance term in order to ascertain that the instruments are valid according to Roodman (2006). In this case scenario, there is sufficient evidence to suggest no serial autocorrelation.

We applied the Windmeijer finite sample correction to standard errors in order to evaluate the precision of the two-step estimators for hypothesis tests. Efficient two-step GMM estimator weighs the moment conditions by a consistent estimate of their co-variance matrix.

## 6 Empirical Evidence

### 6.1 Baseline Results

We follow Arellano and Bover (1995) and Blundell and Bond (1998) in carrying out GMM estimations. In order to effect GMM IV regressions, we utilize OECD growth as our instrument. The main reason as to why we settle on OECD growth is because we consider it to be not only relevant but also valid. It is correlated with other endogenous variables while at the same time orthogonal to the error process. We test the correlation aspect by examining the fit of the first stage regressions. The estimation results from GMM IV model yield the expected sign on the coefficient of *RemGDP* thus supporting the hypothesis that remittances have a positive and significant impact on financial inclusion. A country which receives remittances on average enjoys an advantage of 2.49% increment in financial inclusion.

<< insert table 2 here >>

According to Hansen J statistics, the P value 0.179 implies that the null hypothesis cannot be rejected. The inference here is that over-identifying restrictions are valid. With regard to instrumentation, our estimations employ lags limitation thus confining the instrument count in such a way that instrument used are always less than the number of panel groups.

Regarding AB test, our result is consistent as there is no second order autocorrelation. The P-value of AR(2) is 0.352 which fails to reject the null hypothesis of no second order autocorrelation.

## 6.2 Robustness Exercises

We carry out a number of robustness checks to ascertain whether our hypothesis holds. To facilitate this process, we carry out the following procedures:

1. Fixed Effects estimations
2. Consideration of individual respective indicators
3. Regional groups

We use fixed effects estimations as an alternative to GMM estimations to prove that our results hold. Fixed effects estimations take into consideration both country and period fixed effects. In actual sense, country fixed effects control for unobserved time-invariant country features. The results that we obtain are pretty similar to GMM estimation results. Although the coefficient of 1.25% obtained is lower than the coefficient resulting from GMM estimation, the theoretical underpinning is the same. Most of the coefficients on other control variables exhibit the expected signs and majority of them are significant. Carrying out fixed effects estimation in this case is likely to result in obtaining biased estimates. All in all, our overall regression results are interpreted with respect to the results obtained from GMM estimations because we consider GMM to be a better estimator.<sup>1</sup> Once again the results obtained from fixed effects methodology confirm the hypothesis that remittances promote financial inclusion.

<< insert table 2 here >>

Categorization of countries into regional groups paves way for evaluating the extent to which remittance inflows into various countries in divergent regions around the world promote financial inclusion. We consider this to be an important aspect to facilitate comparison between regional groups. This is a salient feature especially when we take policy implications into consideration because countries in these regions can benchmark against each other and make necessary reforms subject to necessity. The results obtained suggest that majority of countries within the world exhibit positive remittances-financial inclusion nexus with exception of these two regions: East Asia and Pacific and Southern Asia. However, fixed effects estimation results for South Asia is consistent with the overall expected results. On the contrary, results

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<sup>1</sup>GMM estimations takes into account lagged endogenous variables which are not captured when fixed effects estimations are carried out.

observed for East Asia and Pacific consistently display a negative coefficient. The most obvious explanation for this is the fact that only three countries feature as representative countries among our sample that fall within East Asia and Pacific region. In this case therefore, sample size is a limiting factor and most probably contributes to mixed results.

<< insert table 3 here >>

Computation of index of financial inclusion incorporated three dimensions which consequently resulted from taking into account various individual respective indicators. As part of our robustness checks, we take into account certain specific indicators which are considered to be at the center stage of financial inclusion. This supports the hypothesis that each of the indicators was useful and rightly included as an indicator of financial inclusion. Usage and banking penetration yield results which bear the expected sign. However, in the case of access, the coefficient is negative but all the same it is not significant. Prior studies have also taken into account bank account as a proxy for financial inclusion although it is well acknowledged that number of bank accounts as a measure on their own do not sufficiently measure the extent of financial inclusion. We also run regressions taking into consideration bank accounts as our dependent variable. We obtain consistent results in the sense that the coefficient on remittances as a share of GDP is positive and significant. These results confirm that the constituent components of the index of financial inclusion earlier constructed are not only relevant but also valid. Consequently, the individual respective dimension indices and corresponding composite index is well constructed and deemed to be reliable.

<< insert table 4 here >>

## 7 Conclusions

To emphasize the importance of remittances for developing countries, a lot of literature examines the impact of remittances on various aspects of countries' development. However, little attention has been dedicated to examine the nexus between remittances and financial inclusion. This is evidenced by the limited amount of literature in existence that evaluates the impact of remittances on financial inclusion. This paper sheds more light on the relationship between remittance inflows and financial inclusion. We employ GMM IV estimation as our main model and compare our results with the outcome of fixed effects estimation to support our results.

We consider financial inclusion and remittances to be important variables worth

examining because both are attributed to inclusive economic growth and poverty reduction. From a theoretical perspective, we could link up these two notions by stating that by the very aspect of sending remittances, migrants play the role of financial intermediaries. This is because they facilitate the process through which households and small scale entrepreneurs go to overcome credit constraints and imperfections in financial markets. This therefore suggests that remittances do in fact pave the way for financial inclusion through financial development channel.

The results depicted from this study give evidence to support the hypothesis that remittances contribute to financial inclusion. Our results suggest that increasing remittance flows positively and significantly improves financial inclusion. On average, a country that receives remittances is likely to experience approximately 2.49% increment in the degree of financial inclusion. Our results still hold after controlling for unobserved country characteristics and GMM IV regressions to correct for potential endogeneity of remittances. It can also be observed that the average marginal effect of remittances on financial inclusion is more pronounced at higher levels of remittances as a proportion of GDP.

Our research is beset by data limitations. Much as it would be important to incorporate data on internet banking and mobile banking, we are constrained by data availability since these variables are not available within the time spectrum of our study. Measurement error is also known to be inherent in remittances data. Since quality data is key for provision of appropriate policy guidance, it is imperative for responsible institutions to work on means of improving data collection, recording and reporting. This is likely to improve the quality of research and the resultant policy recommendations for respective policy makers.

Considering the implication of this research from a policy perspective, it would be important for policy makers to formulate and implement policies that encourage migrant workers to remit. Efforts should be undertaken to improve financial system efficiency because remittance flows through formal channels are more likely to have a positive effect on financial inclusion as opposed to remittances through informal channels. Aiming at reducing remittance costs is also very important. Reducing transaction fees will motivate poor migrants to remit since their disposable income will not significantly drop as a consequence of remitting funds. This is because remittances and the associated costs of remitting funds will only account for a relatively small portion of migrants' disposable income.



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## 8 Data Sources and Definitions

- *RemGDP* refers to the ratio between remittance inflows to GDP. Personal remittances comprise personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Personal transfers thus include all current transfers between resident and nonresident individuals. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities. Data are the sum of two items defined in the sixth edition of the IMF's Balance of Payments Manual: personal transfers and compensation of employees. This data is derived from World Bank database captured as part of World Development Indicators.
- *DomCredit* is domestic credit to private sector which refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). This data is derived from World Bank database captured as part of World Development Indicators.
- *Logpop* is the natural logarithm of population. Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates. This data is derived from World Bank database captured as part of World Development Indicators.
- *Logxr* is the natural logarithm of exchange rate. Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar). This data is derived from World Bank database captured as part of World Development Indicators.
- *Logmbs* is the natural logarithm of mobile subscriptions. Mobile cellular tele-

phone subscriptions are subscriptions to a public mobile telephone service that provide access to cellular technology. The indicator includes (and is split into) the number of postpaid subscriptions, and the number of active prepaid accounts (i.e. that have been used during the last three months). The indicator applies to all mobile cellular subscriptions that offer voice communications. It excludes subscriptions via data cards or USB modems, subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging and telemetry services. This data is derived from World Bank database captured as part of World Development Indicators.

- *Ctrlcorr* denotes control of corruption. This reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. This data is derived from World Governance Indicators. The Worldwide Governance Indicators (WGI) are a research dataset summarizing the views on the quality of governance provided by a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. These data are gathered from a number of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. The WGI do not reflect the official views of the World Bank, its Executive Directors, or the countries they represent. The WGI are not used by the World Bank Group to allocate resources.
- *AgeDR* is age dependency ratio. Age dependency ratio is the ratio of dependents (people younger than 15 or older than 64) to the working-age population i.e. those ages 15-64. Data are shown as the proportion of dependents per 100 working-age population. This data is derived from World Bank database captured as part of World Development Indicators.
- *lnGDPpc* is the logarithm of GDP per capita. GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. This data is derived from World Bank database captured as part of World Development Indicators.
- *Logint* refers to the logarithm of internet users. Internet users in this case are defined as individuals who have used the Internet (from any location) in

the last 12 months. Various channels through which internet can be accessed include but are not limited to via a computer, mobile phone, personal digital assistant, games machine, digital TV etc. This data is derived from World Bank database captured as part of World Development Indicators.

- *Litrte* denotes literacy rate. Percentage of the population age 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Generally, literacy also encompasses numeracy, the ability to make simple arithmetic calculations. This indicator is calculated by dividing the number of literates aged 15 years and over by the corresponding age group population and multiplying the result by 100. This data is derived from World Bank database captured as part of World Development Indicators.

## A Country Coverage

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Argentina	Dominican Republic	Lebanon	Rwanda
Azerbaijan	DR Congo	Lesotho	Sao Tome and Principe
Bangladesh	Ecuador	Libya	Seychelles
Belize	Egypt	Madagascar	Sierra Leone
Botswana	Equitorial Guinea	Malawi	Singapore
Brazil	Estonia	Maldives	Solomon Islands
Cabo Verde	Ethiopia	Mauritania	Swaziland
Cameroon	Gabon	Moldova	Syrian Arab Republic
Chad	Georgia	Myanmar	Tajikistan
China	Hungary	Namibia	Thailand
Colombia	Israel	Nigeria	Uganda
Comoros	Kenya	Pakistan	Uruguay
Congo	Kuwait	Paraguay	Yemen
Costa Rica	Kyrgyzstan	Peru	
Croatia	Lao People's DR	Qatar	
Djibouti	Latvia	Rwanda	

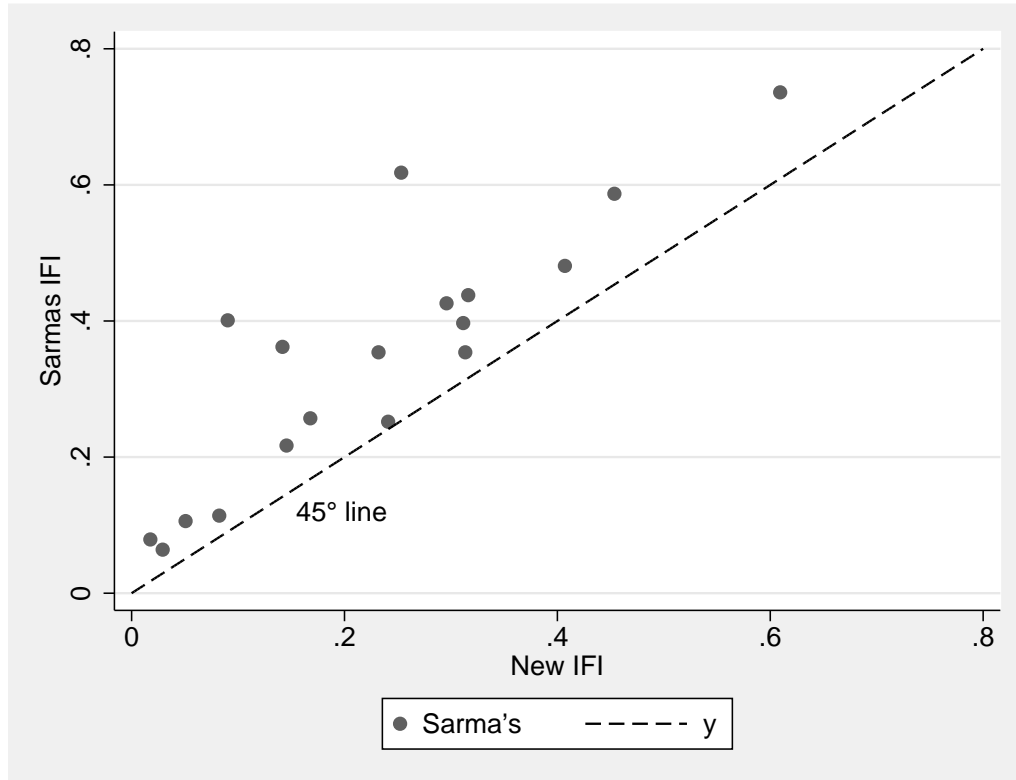
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Table 1: Summary statistics

Variable	Observations	Mean	Std. Dev	Max	Min
TIFI	671	-2.1958	1.4993	0.5726	-8.8455
RemGDP	671	4.8488	8.1470	49.290	0.0000
Ctrlcorr	671	-0.3883	0.7757	2.4167	-1.8365
AgeDr	671	65.049	19.079	108.57	17.031
Litrate	671	19.501	36.527	99.896	0.0000
DomCredit	671	32.267	28.325	147.00	0.0000
Logmbs	665	3.7752	1.1626	5.3865	-1.6854
lnGDPpc	661	7.9470	1.3669	11.461	4.9125
Logpop	671	15.716	1.9398	21.034	11.321
Logint	665	2.3096	1.5130	4.5162	-3.7157
GDPg	661	331.00	190.96	1.0000	661.00

## B Figures and Tables

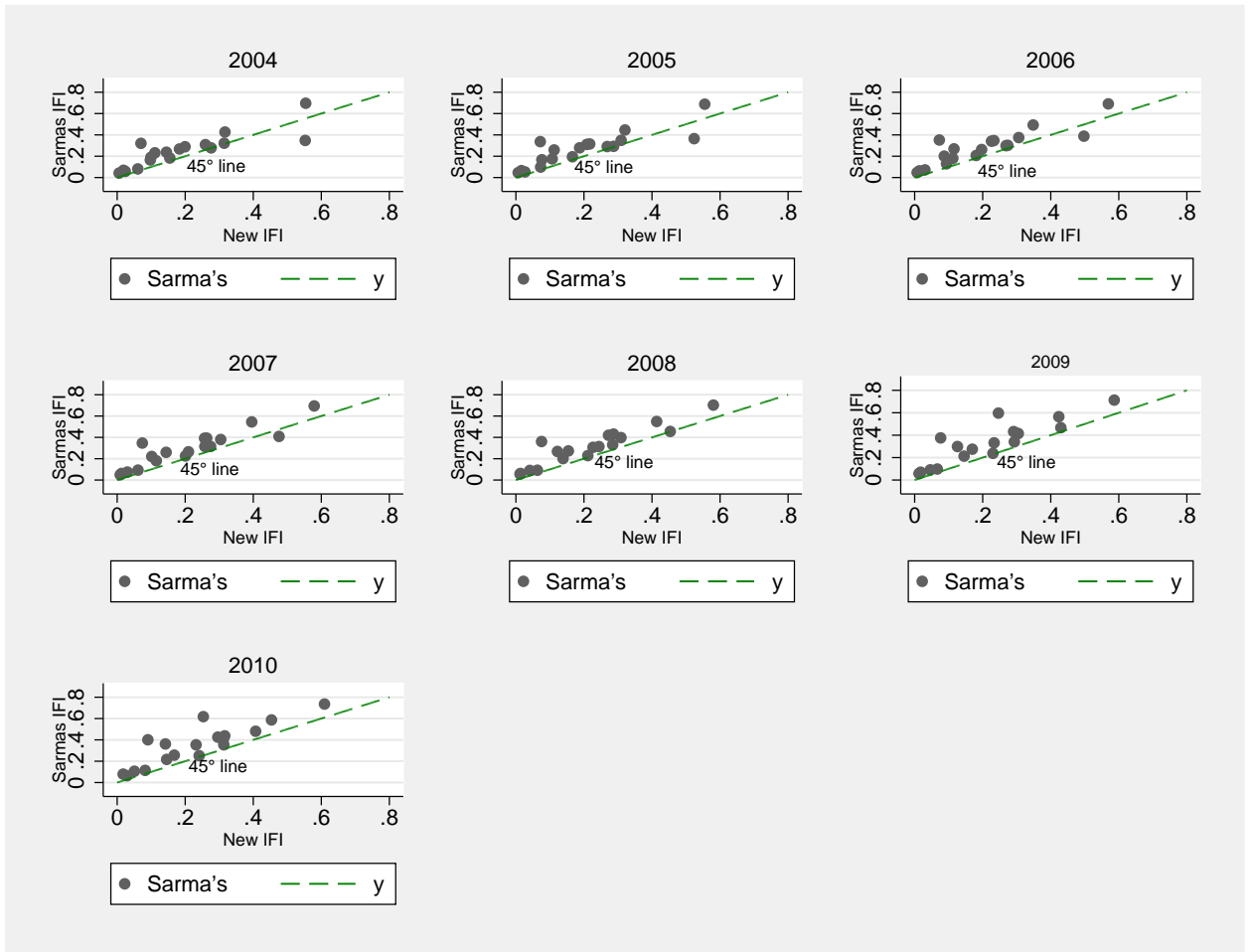
Figure 2: Comparison between Sarma's index and newly constructed index



*Notes:* We utilized 2010 indices data for both the newly constructed index and Sarma's index for comparison purposes because that was the most recent year when Sarma's index was available.



Figure 3: Comparison between Sarma's index and newly constructed index



*Notes:* We utilized 2010 indices data for both the newly constructed index and Sarma's index for comparison purposes because that was the most recent year when Sarma's index was available.

## C Findex and Transformed Findex

Country	Findex	Tfindex	Country	Findex	Tfindex
Argentina	0.3352	-0.2974	Latvia	0.4412	-0.1026
Azerbaijan	0.2298	-0.5253	Lebanon	0.2657	-0.4415
Bangladesh	0.1547	-0.7377	Lesotho	0.0986	-0.9608
Belize	0.2532	-0.4698	Libya	0.2723	-0.4270
Botswana	0.2096	-0.5764	Madagascar	0.0193	-1.7063
Brazil	0.3625	-0.2451	Malawi	0.0672	-1.1426
Cabo Verde	0.4931	-0.0120	Maldives	0.4059	-0.1654
Cameroon	0.0209	-1.6707	Mauritania	0.0436	-1.3407
Chad	0.0074	-2.1247	Moldova	0.3400	-0.2881
China	0.1386	-0.7936	Myanmar	0.0415	-1.3641
Colombia	0.5263	0.0458	Namibia	0.2958	-0.3767
Comoros	0.0297	-1.5139	Nigeria	0.1756	-0.6718
Congo	0.0110	-1.9548	Pakistan	0.0850	-1.0319
Costa Rica	0.3727	-0.2260	Paraguay	0.1230	-0.8532
Croatia	0.5653	0.1141	Peru	0.2503	-0.4764
Djibouti	0.0480	-1.2972	Qatar	0.2805	-0.4092
Dominican Republic	0.2309	-0.5226	Rwanda	0.0501	-1.2780
DR Congo	0.0379	-1.4049	Samoa	0.2915	-0.3856
Ecuador	0.2403	-0.4998	Sao Tome and Principe	0.2090	-0.5781
Egypt	0.1148	-0.8873	Seychelles	0.5165	0.0286
Equatorial Guinea	0.0917	-0.9958	Sierra Leone	0.0595	-1.1991
Estonia	0.6602	0.2885	Singapore	0.6919	0.3513
Ethiopia	0.0528	-1.2538	Solomon Islands	0.1213	-0.8599
Gabon	0.1266	-0.8389	Swaziland	0.1623	-0.7128
Georgia	0.4413	-0.1025	Syrian Arab Republic	0.0625	-1.1760
Hungary	0.3853	-0.2029	Tajikistan	0.2327	-0.5181
Israel	0.5218	0.0380	Thailand	0.4583	-0.0727
Kenya	0.2896	-0.3896	Uganda	0.0521	1.2600
Kuwait	0.2143	-0.5642	Uruguay	0.3481	-0.2726
Kyrgyzstan	0.1217	-0.8585	Yemen	0.0347	-1.4439
Lao People's DR	0.1336	-0.8121			

Table 2: Baseline Results

GMM & Fixed Effects Results		
Variable	GMM	Fixed Effects
Dependent variable: TIFI		
RemGDP (*10 <sup>-2</sup> )	2.49 [1.94]*	1.25 [1.97]**
DomCredit	0.71 [1.85]*	0.33 [7.70]***
Ctrlcorr	0.54 [1.69]*	0.40 [2.66]**
AgeDR (*10 <sup>-2</sup> )	1.64 [0.97]	1.49 [2.11]**
lnGDPpc	0.32 [1.32]	0.38 [5.61]***
Lirate (*10 <sup>-3</sup> )	0.05 [0.02]	-0.35 [-0.85]
Logpop (*10 <sup>-2</sup> )	-3.69 [-0.34]	10.24 [0.75]
Logmbs	0.33 [2.36]**	0.05 [1.25]
GDPg (*10 <sup>-3</sup> )	0.60 [2.18]**	5.17 [1.65]*
No. of countries	61	61
No. of observations	583	583
No. of instruments	37	
Hansen Test	0.179	

Notes: Absolute values of  $z$  and  $t$  statistics are in brackets. The symbols \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% level respectively.

Table 3: GMM Regional Groups Results

GMM Estimation Results						
Variable	MENA	EAP	SSA	SA	ECA	LAC
Dependent variable: TIFI						
RemGDP (*10 <sup>-2</sup> )	0.88 [1.69]*	-3.37 [-3.43]*	0.79 [1.55]	-2.12 [-0.54]	0.05 [0.05]	1.45 [2.18]**
DomCredit	0.20 [1.80]*	0.16 [1.83]*	-0.02 [-0.32]	0.27 [1.76]*	0.26 [1.99]**	0.23 [1.72]*
Ctrlcorr	-0.15 [-0.62]	-0.01 [-0.07]	0.03 [0.33]	0.06 [0.52]	0.07 [0.93]	0.14 [0.81]
AgeDR (*10 <sup>-2</sup> )	0.35 [1.08]	0.92 [1.84]*	-0.34 [-0.62]	0.87 [1.59]	0.01 [1.86]*	1.02 [1.89]*
lnGDPpc	0.15 [1.93]*	0.09 [1.70]*	-0.02 [-0.30]	0.08 [1.34]	0.09 [1.53]	0.07 [1.09]
Lirate (*10 <sup>-3</sup> )	0.57 [0.62]	0.58 [0.63]	0.70 [1.35]	0.07 [0.07]	0.74 [0.68]	1.22 [1.15]
Logpop (*10 <sup>-2</sup> )	-0.75 [-0.15]	-0.03 [-0.07]	1.51 [0.56]	0.60 [0.16]	1.33 [0.37]	3.77 [0.99]
Logmbs	-0.04 [-0.64]	-0.01 [-0.15]	-0.01 [-0.30]	0.01 [0.16]	0.02 [0.72]	0.01 [0.20]
GDPg (*10 <sup>-4</sup> )	5.74 [1.50]	7.12 [2.36]**	4.09 [1.44]	5.62 [1.66]*	7.56 [1.90]*	7.81 [2.11]**
No. of countries	9	7	23	3	9	10
No. of observations	82	64	220	30	9	100
No. of instruments	34	33	32	28	35	30
Hansen Test	0.394	0.508	0.359	0.527	0.783	0.693

Notes: Absolute values of  $z$  statistics are in brackets. The symbols \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% level respectively.

Table 4: GMM Respective Indicators Results

GMM Estimation Results				
Variable	Usage	Banking Penetration	Access	Bank Accounts
Dependent variable: TIFI				
RemGDP	4.72 [1.82]*	6.97 [1.91]*	-0.57 [-0.31]	5.41 [1.94]*
DomCredit	132.08 [2.68]**	33.90 [0.36]	41.67 [1.26]	-109.91 [-1.32]
Ctrlcorr	72.78 [1.38]	152.30 [1.64]	20.97 [0.53]	-60.73 [-0.58]
AgeDR	4.10 [1.43]	4.34 [1.16]	-0.21 [-0.11]	6.26 [1.48]
lnGDPpc	44.81 [1.33]	31.11 [0.68]	46.25 [1.90]*	113.92 [2.01]**
Litrate	0.19 [0.62]	0.62 [1.35]	0.32 [1.16]	0.70 [1.12]
Logpop	-6.89 [0.717]	0.87 [0.04]	0.71 [0.05]	8.06 [0.30]
Logmbs	16.14 [0.81]	47.81 [1.54]	48.18 [3.39]**	43.68 [1.17]
GDPg	0.12 [2.39]**	0.12 [2.47]**	0.07 [2.63]**	0.16 [1.48]
No. of countries	61	61	61	61
No. of observations	583	583	583	583
No. of instruments	34	34	34	34
Hansen Test	0.114	0.185	0.351	0.333

Notes: Absolute values of  $z$  statistics are in brackets. The symbols \*, \*\* and \*\*\* denote significance at 10%, 5% and 1% level respectively.