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**The comparative exploration of mobile money services in inclusive development**

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## **The comparative exploration of mobile money services in inclusive development**

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January 2017

### **Abstract**

**Purpose-** We respond to some challenges in the transition to Sustainable Development Goals by examining the correlations between mobile and inclusive development (quality of growth, poverty and inequality) in 93 developing countries for the year 2011.

**Design/methodology/approach-** Mobile money service entails: ‘mobile used to pay bills’ and ‘mobile used to receive/send money’. Interactive Ordinary Least Squares are employed.

**Findings-** The following findings are established. First, increasing use of the mobile phones to pay bills: is positively linked to ‘quality of growth’ in lower-middle income countries (LMIC) and negatively correlated with inequality in Latin American countries (LA). Second, growing use of mobile phones to send/receive money is negatively associated with poverty in Asia and Pacific (AP) and Central and Eastern Europe (CEE).

**Originality/value-** Macroeconomic data on mobile money service is scarce. No study to the best of our knowledge has used this macroeconomic mobile money service data before.

*JEL Classification:* G20; O40; I10; I20; I32

*Keywords:* Mobile money services, Quality of growth, poverty, inequality

### **1. Introduction**

One of the greatest economic tragedies of contemporary capitalism is exclusive development, apparent by increasing immiserizing growth, inequality and poverty. A plethora of stylized facts substantiate this position (Asongu & De Moor, 2015). The World Hunger (2010) has sustained that the main cause of hunger and poverty in the world today is the underlying capitalistic economic system, which structurally encourages a minority to possess and control a great majority of global wealth, leaving the bottom to survive piece meal.

Income inequality has also substantially risen over the past decade (Milanovic, 2011). According to Joseph Stiglitz: *“There has been no improvement in well-being for the typical American family for 20 years. On the other side, the top one percent of the population gets 40 percent more in one week than the bottom fifth receive in a full year”*. (Nabi, 2013, p.10). Some more recent accounts sustain that: (i) the Top 1% has benefited from all the income accruing from the recent economic recovery (Covert, 2015) and (ii) by 2016, the income of the Top 1% of estimated to exceed that of the Bottom 99% (Oxfam, 2015). Some studies have focused on the urgent *“Need to design the right economic policies to enhance inclusiveness specially in the developing countries”* (Nabi, 2013, p. 13). This includes, among others: the restoration of finance as a fundamental mechanism to inclusive development (Freeman, 2010). While this call for the reinvention of finance is more aligned to the formal financial system, there are recent advances in inclusive financial development like mobile banking that have been documented to be positively (negatively) correlated with the informal (formal) financial system.

Liberalisation of information and communication technologies (ICT) and associated positive externalities like the mobile phone<sup>1</sup> revolution is transforming many industries in developing countries, among others: enhancement of interactive networks and provision of services to sectors that have been hitherto underserved (e.g. banking and health care). According to the Asongu and De Moor (2015), mobile phone applications are increasingly being tailored towards the improvement of inter alia: business solutions to Small and Medium Size Enterprises (SMEs); interaction among businesses; banking services to the neglected factions of the population; staff monitoring and consultation with medical doctors.

The potential inclusive benefits of mobile phones have prompted a number of calls for more scholarly research to establish the impact of mobile phones on inclusive development (Mpogole et al., 2008, p. 71). This is consistent with evidence sustaining that mobile phones are considerably: (i) improving the delivery of health services in rural and peripheral communities (Kliner et al., 2013) and (ii) fighting poverty in rural communities *‘We conclude that mobile phone-based money transfer services in rural areas help to resolve a market failure that farmers face; access to financial services’* (Kirui et al., 2013, p. 141).

To the best of our knowledge, despite an evolving literature on the development outcomes of mobile phones, not much is known about the macroeconomic relationship

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<sup>1</sup> Throughout this paper, the terms ‘mobile phones’, ‘cell phones’ and ‘mobile telephony’ are used interchangeably.

between mobile money services and inclusive development. This scarce literature may be traceable to at least two factors, notably: lack of data on mobile money services and inclusive development. Therefore, the present study contributes to this scarce literature by exploring two new datasets on inclusive development and mobile money services, notably: (i) the only macroeconomic ‘mobile money services’ data available (to the best our knowledge) published in 2013 by the World Bank (Mosheni-Cheraghrou, 2013) and (ii) a new dataset on growth quality recently published by the International Monetary Fund (IMF) in 2014 (Mlachila et al., 2014)<sup>2</sup>. We devote space to discussing these points in substantive detail.

First, as far as we have reviewed, the macroeconomic literature on mobile money services is sparse because of constraints in data availability. It is in this light that the literature on this stream has focused on country-specific studies and survey data for the most part (Asongu, 2013a). To the best our knowledge, the only macroeconomic data available is cross sectional for the year 2011, published by the World Bank in 2013 (Mosheni-Cheraghrou, 2013). Hence, we respond to the growing call for more scholarly research on the development outcomes of mobile phones (Mpogole et al, 2008, p. 71) by exploring the underlying dataset.

Second, on the dimension of inclusive development, Mlachila et al. (2014) have built on definitions, measurements and concepts of ‘pro-poor growth’ documented in previous inclusive growth studies (Commission on Growth and Development, 2008; Ianchovichina & Gable, 2012; Anand et al., 2013) to provide the scientific community with a new indicator called the Quality of Growth Index (QGI). Inclusive is conceived in the QGI as ‘pro-poor growth’ that is durable, high and socially-friendly. The index embodies crucial elements that are essential for growth quality like: poverty reduction, stability and strength of growth, increased productivity and better living standards. Hence, we employ the inclusive growth index from Mlachila et al. (2014) in the present study because it has incorporated social dimensions in the intrinsic measurement of growth. Given the inclusive development character of the study, we complement the QGI with two more inclusive measurements (in order to provide space for more policy implications) namely: the poverty rate and inequality index.

We devote space to articulating the comparative character of this line of inquiry. Motivated by the need to provide results with more specific policy implications, we decompose the dataset into seven sub-panels based on two fundamental characteristics,

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<sup>2</sup> The interested reader can find the published data on the following link:  
<http://www.imf.org/external/pubs/cat/longres.aspx?sk=41922.0>

notably: income levels (low income, lower middle income and upper middle income) and regions (Asia and Pacific, Central and Eastern Europe, Latin America and Middle East and North Africa). The justification for the comparative features is directly aligned with dynamics of inclusive development and mobile phones/banking. We discuss each of the two dynamics in two streams.

First, on the inclusive development: (i) Mlachila et al. (2014, p.13-14) have used the same disaggregation to substantiate ‘quality of growth’ differences in underlying sub-panels and (ii) the April 15<sup>th</sup> 2015 publication by the World Bank of World Development Indicators (WDI) has revealed that extreme poverty has been decreasing in all regions of the world with the exception of sub-Saharan Africa (SSA) (Asongu & Kodila-Tedika, 2015; World Bank, 2015). Issues of immiserizing growth are clearly apparent in the second point because SSA has been enjoying over two decades of growth resurgence (Fosu, 2015, p. 44) on the one hand, and on the other hand, the sub-region is host to seven of the ten fastest growing economies in the world (Asongu & Rangan, 2016). Hence, the World Bank’s position that about 45% of countries in the sub-region are substantially off-track from attaining the Millennium Development Goals (MDGs) extreme poverty target clearly shows that accounting for regional and other specificities documented by Mlachila et al. (2014) is relevant for results with more targeted policy implications. It is important to note that points (i) and (ii) converge within the spectrum that, construction of the QGI is partly motivated by immiserizing growth in one of the regions or SSA (Dollar & Kraay, 2003; Dollar et al., 2013; Martinez & Mlachila, 2013; Ola-David & Oyelaran-Oyeyinka, 2014).

Second, we engage the comparative motivation of mobile phones/banking in two streams, notably: mobile phones and mobile money services. (i) According to Penard et al. (2012), SSA represents substantial growth opportunities in mobile phone penetration because high-end markets in North America, Asia and Europe are experiencing stabilization in the growth of mobile phones. (ii) Mosheni-Cheraghloou (2013) has established that the mobile phone penetration rate is higher in more advanced countries. Accordingly, African countries are in the drivers’ seat when it comes to mobile money applications (for sending/receiving money and/or payment of bills).

The theoretical underpinnings for using mobile phones for inclusive development are consistent with the motivations of new technology adoption. According to Yousafzai et al. (2010, p. 1172), inter alia, the most popular theories along this stream are the: theory of reasoned action (TRA), technology acceptance model (TAM) and theory of planned behavior

(TPB). A common denominator among these theories is that mobile phone adoption is a complex and multifaceted process, entailing: (i) an approach from information managers and system developers that is not concentrated on the influence of attitudes, but on customer's formation of belief and (ii) relevant features that involve composite considerations like, social, psychological, behavioral, utilitarian and behavioral aspects of customers.

We briefly summarize the three theories for brevity and lack of space. First, consistent with Yousafzai et al., the TRA developed by Bagozzi (1982), Ajzen and Fishbein (1980) and Fishbein and Ajzen (1975), is for the most part based on the assumption that customers are agents that are very rational when it comes to incorporating implications of their actions. Second, the TPB which is pioneered by Ajzen (1991) has complemented the TRA by articulating the lack of distinctions between customers who possess a conscious control of the actions compared to those that do not. Third, the TAM developed by Davis (1989) considers that the adoption process of a specific technology by customers can be elucidated, for the most part by customers' voluntary intention to accept and use the underlying technology.

The engaged three theories above align with the positioning of this study in the stance that customers adopt mobile phones because they are conscious of the potential inclusive development rewards of mobile money service applications.

The rest of the study is structured the following manner. The data and methodology are discussed in Section 2. Section 3 presents the results and corresponding discussion. Section 4 concludes with implications and further research directions.

## **2. Data and Methodology**

### **2.1 Data**

We assess a sample of 93 developing countries with cross sectional data: (i) inclusive development and control variables from Mlachila et al. (2014) consisting of a 2005-2011 average and (ii) mobile money service variables from Mosheni-Cheraghrou (2013), for the year 2011. While data from the former source consists of four non-overlapping intervals (1990-1994; 1995-1999; 2000-2004 and 2005-2011), the latter is only available for the year 2011.

Hence, the matching process yields cross-sectional for the year 2011 because as far as we know, mobile money service macroeconomic indicators are only available for this year<sup>3</sup>.

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<sup>3</sup> The data on mobile money services and quality of growth have recently been used respectively by Asongu and Nwachukwu (2017a) and Asongu and Nwachukwu (2017b).

The QGI dependent indicator is derived with data from multiple sources, namely: IMF's World Economic Outlook, United Nations (UN) COMTRADE database, World Development Indicators of the World Bank, Sala-i-Martin (2006) and Barro and Lee (2010). We complement the QGI with two more inclusiveness indicators in order to avail more space for policy implications, namely: the poverty rate and inequality index. The independent variables of interest or mobile money service indicators from Mosheni-Cheraghlou (2013) are two, namely: '*mobile phone usage for the payment of bills (% of adults)*' and '*mobile phone usage for sending/receiving of money (% of adults)*'.

In accordance with recent inclusive literature, the control variables entail: *education spending, government stability, credit, inflation, foreign direct investment (FDI) and remittances* (Anand et al., 2013; Asongu & Rangan, 2016; Odhiambo, 2009, 2011, 2010a, 2010b, 2013; Asongu & Nwachukwu, 2016). A complete definition of the variables is disclosed in Appendix 1. But for inflation which has a sign that cannot be established with certainty, we expect other control variables to be positively linked to inclusive development. In essence, whereas chaotic inflation is unappealing for inclusive growth, low and stable inflation has appealing income redistributive effects (Asongu, 2013b), essentially because it facilitates conditions to stimulate investment needed for economic prosperity. This is fundamentally because, chaotic inflation is favourable to uncertainty and investors have been documented to be more friendly to investment strategies that less ambiguous (Le Roux & Kelsey, 2015ab).

Expected signs from the positive covariates align with the bulk of inclusive development literature. Consistent with Anand et al. (2013) and the IMF (2007), macroeconomic stability, structural change and human capital are important pro-growth determinants in developing countries. Structural change embodies globalisation (for example financial globalisation or FDI), macroeconomic stability and human capital. Other structural and macroeconomic features essential for inclusive growth are: access to finance (Levine, 2005); less negative volatility of output and low/stable inflation (Dollar & Kraay, 2003; Barro & Lee, 2010); modernisation of production facilities (Mishra et al., 2011); development of domestic infrastructure (Calderon & Servén, 2004; Seneviratne & Sun, 2013) and enhancement of value chains (Hausmann et al., 2007; Anand, et al., 2012).

The choice of the seven fundamental characteristics or sub-panels from two criteria (income levels and regions) has been substantially engaged in the introduction. The summary statistics corresponding to the variables is disclosed in Appendix 2, whereas the correlation

matrix is presented in Appendix 3. From the former, two observations are note worthy. On the one hand, the means are comparable. On the other hand, we can be confident that reasonable estimated linkages would emerge because of the substantial degree of variation observed in the variables. The objective of the correlation matrix is to avoid potential issues of multicollinearity that may arise if some variables enjoy a high degree of substitution. Two such concerns are noted and highlighted in bold, notably: (i) 0.898 for the QGI and education and (ii) 0.865 for the two mobile money service variables. Whereas the first concern is not really an issue because the two correlated indicators involve independent and dependent variables, we address the second concern by employing two specifications involving distinct mobile money service variables.

## 2.2 Methodology

We adopt an estimation technique that is consistent with the cross-sectional nature of the data structure. Accordingly, heteroscedasticity-consistent Ordinary Least Squares (OLS) has been employed in previous mobile phone (Asongu, 2013a), inclusive development (Andrés, 2006) and human development (Kodila-Tedika & Asongu, 2015) literature.

Equation 1 below investigates the correlation between inclusive development and mobile money services.

$$ID_i = \alpha_1 + \alpha_2 MB_i + \alpha_3 MBMB_i + \alpha_4 X_i + \varepsilon_i \quad (1)$$

Where:  $ID_i$  ( $MB_i$ ) represents an (a) inclusive development (mobile money services) indicator for country  $i$ ,  $\alpha_1$  is a constant,  $X$  is the vector of control variables, and  $\varepsilon_i$  the error term. ID includes: the GQI, poverty rate and inequality index. MB entails the two mobile money service indicators discussed in the preceding section. MBMB is the interaction between mobile money service indicators, whereas X embodies *educational spending, government stability, credit, inflation, FDI and remittances*.

We devote some space to clarifying pitfalls in interactive regressions. As documented by Brambor et al. (2006), in order for the estimation to have economic meaning, the interactive coefficients are interpreted as conditional marginal correlations. Moreover, the corresponding modifying mobile money service indicator should be within the range disclosed by the summary statistics for the underlying marginal correlation to have economic meaning.

### 3. Empirical results

Table 1, Table 2 and Table 3 respectively present results corresponding to ‘quality of growth’, poverty and inequality. Whereas Panel A of all tables provide findings on ‘*mobile phone used to pay bills*’, the results of Panel B are related to ‘*mobile phone used to send/receive money*’. Before engaging table-specific results, it is important to clarify two concerns in order to improve readability, namely: nature of signals and expected signs of thresholds for inclusive development. First, whereas growth quality has a positive signal for inclusive development, poverty and inequality denote negative signals. Second, for mobile money service to stimulate inclusive development, positive thresholds are needed for the modifying or interactive variable with a positive signal (quality of growth) while negative thresholds are required for the dependent variables with negative signals (poverty and inequality).

The following findings can be established from Table 1 on linkages between ‘mobile money services and growth quality’. First in Panel A, increased use of the mobile to pay bills increases ‘growth quality’ in lower-middle-income countries (LMIC) and the modifying positive threshold of 22.50 (0.009/0.0004) is within the range (0.000 to 25.70) provided by the summary statistics corresponding to the modifying mobile money service variable (or mobile used to pay bills). Second, in Panel B, we also find evidence of modifying positive thresholds in upper-middle-income countries (UMIC). Unfortunately, the corresponding threshold is not within the range (0.000 to 60.50) of ‘mobile used to send/receive money’ provided by the summary statistics, notably: 63.33 (0.019/0.0003). Third, most of the significant control variables display the expected signs: (i) private domestic credit, government stability and educational spending are positively related to growth quality; (ii) inflation is negatively correlated with the dependent variable and (iii) whereas FDI is not consistently significant, remittances display an unexpected negative correlation. The unexpected sign of remittances on growth quality may be traceable to the fact that the computation of ‘growth quality’ is substantially driven by aggregate production variables, while remittances have been documented not to be directly linked to production purposes, inter alia: education and consumption purposes (Gyimah-Brempong & Asiedu, 2015).

*“Insert Table 1 here”*

The following findings can be established from Table 2 on linkages between ‘mobile money services and poverty’. First, no significant negative thresholds are apparent in Panel A. Second, in Panel B, we find evidence of modifying negative thresholds in Asia and Pacific (AP) and Central and Eastern Europe (CEE). The corresponding thresholds are within the range (0.000 to 60.50) of ‘mobile used to send/receive money’ provided by the summary statistics, notably: 5.25 (0.042/0.008) for AP and (ii) 26.66 (0.0008/0.00003) for CEE. Third, most of the control variables display signs that are broadly consistent with the discussion provided in Table 1. Moreover, it should be noted that the sign of remittances is not positive because remittances directly contribute to reducing poverty by increasing the amount of USD spent on a daily basis.

*“Insert Table 2 here”*

The following findings can be established for Table 3 on linkages between ‘mobile money services and inequality’. First in Panel A, increased use of the mobile to pay bills reduces inequality in Latin American countries (LA) and the negative threshold of 4.27 (9.730/2.277) is within the range (0.000 to 25.70) provided by the summary statistics corresponding to the modifying mobile money service variable (or mobile used to pay bills). Second, no significant negative thresholds are apparent in Panel B. Third, the signs of most of the significant control variables are broadly consistent with the discussion provided for those in preceding tables.

*“Insert Table 3 here”*

#### **4. Concluding implications and future directions**

Economic opportunities in developing countries are increasingly being ameliorated with the conversion of mobile phones into pocket banks which are enabling a great part of the population that was previously excluded from financial institutions to have the much needed financial access (Demombynes & Thegeya, 2012). Our results show that such better financial access by means of mobile money services promotes inclusive development in developing countries. Specifically, we have established two main findings to this end. First, increasing use of the mobile phone to pay bills: is positively linked to ‘growth quality’ in lower middle income countries (LMIC) and negatively correlated with inequality in Latin American

countries (LA). Second, growing use of the mobile to send/receive money is negatively associated with poverty in Asia and Pacific (AP) and Central and Eastern Europe (CEE).

The established appealing relationship between mobile money services and inclusive development is broadly consistent with documented evidence on the positive benefits of mobile phones/banking engaged in Section 2, notably: Ondiege (2010), Al Surikhi (2012), Ojo et al. (2012) and Mishra and Bisht, (2013). Hence, by using macroeconomic mobile money service data from 93 developing countries to confirm findings established by previous studies (essentially based on survey-oriented, country-specific and microeconomic data), we have confirmed the importance of tailoring holistic policies towards addressing global concerns of inequality, poverty and immiserising growth in developing countries. As a policy implication, the pro-poor character of mobile money services should not be limited to country-specific contexts but given broader scope.

Surprisingly, the findings are not consistently significant for the SSA sample. We discuss this puzzling result on two counts, notably, in relation to: the engaged literature and stylized facts. First, the findings do not confirm Asongu (2015a, 2015b) for a number of reasons. While Asongu (2015b) has established that mobile phones reduce inequality in Africa, especially when the mobile banking channel is used (Asongu, 2015a), the findings of the author are not broadly confirmed here for a plethora of reasons, inter alia: (i) sampling, involving African countries as opposed to SSA countries; (ii) cross-sectional data for the year 2009, contrary to the year 2011 used in this study and (iii) measuring of mobile banking as an instrumentation of mobile phones with aggregated macroeconomic indicators with the help of an instrumental variable estimation technique.

Second, given that countries in the SSA sub-region have been documented by Mosheni-Cheraghrou (2013) to display relatively higher levels of mobile money services in relation to other developing countries, we expected the relation in the SSA to be significant. Evidence of this point is articulated with an asymmetry between Somalia and Russia. In essence, while Russia is ranked 7<sup>th</sup> in terms of mobile phone subscriptions rates in the world, it is unfortunately associated with countries in the bottom rank when it comes to mobile money services (usage of mobile to pay bills and send/receive money). Conversely, Somalia which is the 4<sup>th</sup> lowest in terms of mobile phone penetration by global standards, ranks 1<sup>st</sup> and 3<sup>rd</sup> respectively when it comes to usage of the mobile to send/receive and pay bills. But Mosheni-Cheraghrou has gone further to sustaining that the availability of technology and regulation are the most fundamental determinants of the effectiveness of mobile

phones/banking. This is consistent with Ojo et al. (2012) on the conditions needed for the inclusive benefits of mobile money services. Hence, in respect of Ojo et al. (2012), the following may contribute to enhancing the significance of mobile money services in inclusive development in SSA, inter alia: “1) updating financial and telecommunication regulations to enable the provision of mobile-based services e.g. mobile microfinance, to vulnerable groups; 2) mobilizing local communities in the production of local contents; and 3) engaging non-governmental organizations in building capacity of government agencies in mobile service delivery and in training vulnerable communities in effective use of mobile technology to access information and services critical to their needs” (p. S30).

Therefore, the mere availability of mobile phones and usage of mobile money service applications are not ends in themselves for inclusive development. Governments in place need to tailor policies toward redistributing the fruits of economic prosperity by such mobile money service mechanisms. No wonder, SSA is the only region in which poverty has been increasing since 1990s. Accordingly, 45% of countries in the sub-region are off-track from achieving the MDGs poverty target of halving poverty in 2015 from a 1990 base year. This is unfortunate, despite over two decades of growth resurgence (Fosu, 2015, p.44) and the region currently hosting seven of the ten fastest growing economies (Asongu & Rangan, 2016). As a policy implication, seriously considering the instrumentality of mobile money services in current debates on the post-2015 agenda is imperative.

Unfortunately, some ongoing reports like the ‘Vodafone SIM project’ are substantially motivated by evidence that the inclusive role of mobile phones/banking in sustainable and inclusive development does not feature prominently in the SDGs agenda (Asongu & De Moor, 2015). May be a reason for this missing element is the absence of macroeconomic evidence on the underlying relationship. To this end, while the comparative analysis of this line of inquiry is exploratory owing to ‘mobile money service macroeconomic data’ constraints, future research should be devoted to employing richer mobile money service data to assess causality in the established nexuses.

In the light of the above, future studies devoted to establishing causality through more robust empirical strategies that are consistent with richer datasets can benefit from Findex 2015 which is a new dataset with detailed insights into the deployment of mobile money from the International Monetary Fund’s Financial Access Database and the Committee on Payments and Market Infrastructure.

**Table 1: Mobile money services and quality of growth**

Panel A: Mobile for Payment of Bills (Mobile.Pay)								
	Income Levels			Regions				
	LIC	LMIC	UMIC	AP	CEE	LA	MENA	SSA
Constant	<b>0.313***</b> ( <b>0.000</b> )	<b>0.325***</b> ( <b>0.000</b> )	<b>0.366***</b> ( <b>0.002</b> )	<b>0.300*</b> ( <b>0.065</b> )	<b>0.788***</b> ( <b>0.001</b> )	<b>0.538***</b> ( <b>0.002</b> )		<b>0.350***</b> ( <b>0.000</b> )
Mobile.Pay	0.009 (0.184)	<b>-0.009*</b> ( <b>0.066</b> )	-0.007 (0.870)	-0.012 (0.427)	0.002 (0.748)	-0.032 (0.137)		-0.001 (0.810)
Mobile.Pay × Mobile.Pay	<b>-0.0005*</b> ( <b>0.078</b> )	<b>0.0004**</b> ( <b>0.042</b> )	-0.0005 (0.945)	0.003 (0.552)	-0.0001 (0.559)	0.007 (0.100)		0.0003 (0.524)
Educational Spending	<b>0.339***</b> ( <b>0.000</b> )	<b>0.444***</b> ( <b>0.000</b> )	<b>0.478***</b> ( <b>0.001</b> )	<b>0.445**</b> ( <b>0.019</b> )	-0.026 (0.872)	<b>0.259**</b> ( <b>0.034</b> )		<b>0.378***</b> ( <b>0.000</b> )
Government Stability	<b>0.007***</b> ( <b>0.008</b> )	<b>0.011**</b> ( <b>0.014</b> )	<b>0.017**</b> ( <b>0.025</b> )	<b>0.009**</b> ( <b>0.048</b> )	<b>0.008**</b> ( <b>0.010</b> )	<b>0.015**</b> ( <b>0.017</b> )		<b>0.008**</b> ( <b>0.044</b> )
Inflation	-0.001 (0.470)	-0.001 (0.548)	<b>-0.003*</b> ( <b>0.057</b> )	0.002 (0.462)	<b>-0.005**</b> ( <b>0.013</b> )	<b>-0.003**</b> ( <b>0.021</b> )		-0.002 (0.377)
Credit	<b>0.0009**</b> ( <b>0.020</b> )	<b>0.0005**</b> ( <b>0.012</b> )	-0.00003 (0.930)	<b>0.0007**</b> ( <b>0.025</b> )	0.0001 (0.643)	-0.00001 (0.943)		0.00005 (0.549)
Foreign Direct Investment	0.003 (0.403)	-0.0003 (0.852)	-0.009 (0.163)	-0.005 (0.163)	0.0005 (0.606)	0.005 (0.129)		-0.001 (0.426)
Remittances	<b>0.002*</b> ( <b>0.093</b> )	-0.0007 (0.408)	0.009 (0.213)	0.00006 (0.976)	<b>-0.001**</b> ( <b>0.029</b> )	<b>-0.003**</b> ( <b>0.028</b> )		<b>-0.001**</b> ( <b>0.01</b> )
R <sup>2</sup>	0.875	0.928	0.825	0.992	0.940	0.962		0.826
Fisher	<b>43.62***</b>	<b>29.99***</b>	<b>14.44***</b>	<b>285.30***</b>	<b>47.75***</b>	<b>763.86***</b>		<b>54.12***</b>
Observations	25	30	18	11	15	13		26

Panel B: Mobile for sending and receiving money (Mobile.SR)								
	Income Levels			Regions				
	LIC	LMIC	UMIC	AP	CEE	LA	MENA	SSA
Constant	<b>0.324***</b> ( <b>0.000</b> )	<b>0.328***</b> ( <b>0.000</b> )	<b>0.729***</b> ( <b>0.000</b> )	<b>0.279*</b> ( <b>0.065</b> )	<b>1.075***</b> ( <b>0.000</b> )	<b>0.619***</b> ( <b>0.005</b> )		<b>0.348***</b> ( <b>0.000</b> )
Mobile.SR	0.0002 (0.943)	-0.003 (0.171)	<b>-0.019***</b> ( <b>0.001</b> )	0.006 (0.848)	0.008 (0.294)	-0.003 (0.908)		-0.0008 (0.639)
Mobile.SR × Mobile.SR	-0.000004 (0.954)	0.00006 (0.416)	<b>0.0003***</b> ( <b>0.008</b> )	-0.001 (0.824)	-0.004 (0.184)	-0.0006 (0.924)		0.00002 (0.501)
Educational Spending	<b>0.391***</b> ( <b>0.000</b> )	<b>0.438***</b> ( <b>0.000</b> )	0.101 (0.435)	<b>0.478*</b> ( <b>0.091</b> )	-0.331 (0.102)	0.173 (0.222)		<b>0.380***</b> ( <b>0.000</b> )
Government Stability	<b>0.007**</b> ( <b>0.037</b> )	<b>0.012**</b> ( <b>0.011</b> )	<b>0.011***</b> ( <b>0.004</b> )	0.009 (0.119)	<b>0.007**</b> ( <b>0.040</b> )	<b>0.013**</b> ( <b>0.044</b> )		<b>0.009*</b> ( <b>0.052</b> )
Inflation	-0.003 (0.193)	-0.001 (0.267)	<b>-0.006***</b> ( <b>0.003</b> )	0.0002 (0.979)	<b>-0.007***</b> ( <b>0.007</b> )	<b>-0.004**</b> ( <b>0.019</b> )		-0.002 (0.387)
Credit	<b>0.001**</b> ( <b>0.010</b> )	<b>0.0005**</b> ( <b>0.011</b> )	-0.00005 (0.611)	0.0005 (0.557)	-0.0002 (0.556)	-0.0001 (0.767)		0.00006 (0.558)
Foreign Direct Investment	0.001 (0.674)	0.0001 (0.912)	-0.003 (0.267)	-0.003 (0.341)	0.002 (0.298)	0.003 (0.347)		-0.001 (0.514)
Remittances	-0.0002 (0.852)	-0.0007 (0.474)	-0.003 (0.474)	0.001 (0.805)	<b>-0.002***</b> ( <b>0.002</b> )	<b>-0.003*</b> ( <b>0.060</b> )		<b>-0.001***</b> ( <b>0.006</b> )
R <sup>2</sup>	0.855	0.923	0.950	0.991	0.945	0.951		0.825
Fisher	<b>33.19***</b>	<b>30.75***</b>	<b>376.19***</b>	<b>2299.47***</b>	<b>32.35***</b>	<b>30.17***</b>		<b>50.45***</b>
Observations	25	30	18	11	15	13		26

\*\*\*, \*\*, \*: significance levels of 1%, 5% and 10% respectively. LIC: Low Income Countries. LMIC: Lower Middle Income Countries. UMIC: Upper Middle Income Countries. AP: Asia and Pacific. CEE: Central and Eastern Europe. LA: Latin America. MENA: Middle East and North Africa. Mobile.Pay: Mobile for payment of bills. Mobile. SR: Mobile of Sending and Receiving in Money. No regressions are performed for the MENA region because of issues with degrees of freedom.

**Table 2: Mobile money services and poverty**

<b>Panel A: Mobile for Payment of Bills (Mobile.Pay)</b>								
	<b>Income Levels</b>			<b>Regions</b>				
	LIC	LMIC	UMIC	AP	CEE	LA	MENA	SSA
Constant	0.116 (0.246)	0.047 (0.377)	<b>0.033***</b> <b>(0.006)</b>	0.084 (0.631)	-0.006 (0.146)	-0.111 (0.471)		0.050 (0.652)
Mobile.Pay	0.012 (0.572)	0.047 (0.219)	-0.004 (0.242)	-0.042 (0.261)	0.0002 (0.208)	0.051 (0.275)		-0.027 (0.285)
Mobile.Pay × Mobile.Pay	-0.0005 (0.595)	-0.0004 (0.149)	0.0008 (0.179)	0.006 (0.647)	-0.00001 (0.178)	-0.010 (0.248)		0.002 (0.192)
Educational Spending	-0.079 (0.810)	-0.062 (0.374)	<b>-0.028**</b> <b>(0.045)</b>	-0.102 (0.618)	0.005 (0.185)	0.058 (0.739)		-0.144 (0.503)
Government Stability	-0.007 (0.460)	-0.002 (0.636)	-0.0003 (0.447)	-0.005 (0.399)	0.00005 (0.687)	0.002 (0.717)		0.006 (0.687)
Inflation	0.006 (0.683)	-0.0008 (0.630)	-0.0002 (0.171)	0.002 (0.802)	0.00004 (0.445)	0.0007 (0.626)		0.015 (0.108)
Credit	-0.00096 (0.532)	-0.0001 (0.523)	0.00001 (0.419)	0.0004 (0.549)	0.00001 (0.465)	0.0001 (0.720)		0.0002 (0.601)
Foreign Direct Investment	0.011 (0.283)	0.001 (0.476)	0.00007 (0.837)	0.002 (0.721)	-0.00005 (0.575)	0.0009 (0.881)		0.007 (0.146)
Remittances	-0.002 (0.808)	0.003 (0.106)	-0.0009 (0.211)	0.005 (0.321)	0.0001 (0.035)	<b>0.003**</b> <b>(0.047)</b>		<b>0.005***</b> <b>(0.007)</b>
R <sup>2</sup>	0.204	0.491	0.672	0.911	0.754	0.644		0.339
Fisher	<b>2.22*</b>	1.53	<b>3.87**</b>	2.27	<b>8.95***</b>	3.30		<b>13.14***</b>
Observations	25	30	18	11	15	13		26

<b>Panel B: Mobile for sending and receiving money (Mobile.SR)</b>								
	<b>Income Levels</b>			<b>Regions</b>				
	LIC	LMIC	UMIC	AP	CEE	LA	MENA	SSA
Constant	0.129 (0.145)	0.055 (0.287)	-0.026 (0.132)	0.023 (0.771)	0.003 (0.638)	-0.284 (0.140)		0.068 (0.481)
Mobile.PS	0.0001 (0.984)	-0.001 (0.596)	0.0003 (0.613)	<b>0.042*</b> <b>(0.081)</b>	<b>0.0008*</b> <b>(0.059)</b>	0.006 (0.808)		-0.006 (0.206)
Mobile.SR× Mobile.SR	0.00003 (0.750)	0.0001 (0.364)	0.000 (0.693)	<b>-0.008*</b> <b>(0.058)</b>	<b>-0.00003*</b> <b>(0.064)</b>	0.001 (0.756)		0.0001 (0.163)
Educational Spending	-0.087 (0.780)	-0.048 (0.352)	0.029 (0.148)	0.233 (0.180)	-0.005 (0.538)	0.241 (0.191)		-0.182 (0.349)
Government Stability	-0.003 (0.762)	-0.004 (0.413)	-0.0003 (0.382)	-0.002 (0.480)	-0.000 (0.918)	0.003 (0.449)		0.004 (0.768)
Inflation	0.004 (0.749)	-0.0008 (0.582)	0.0001 (0.210)	<b>-0.025*</b> <b>(0.085)</b>	0.000 (0.978)	0.003 (0.110)		0.014 (0.110)
Credit	-0.0009 (0.558)	-0.0002 (0.413)	<b>0.00002*</b> <b>(0.097)</b>	-0.001 (0.114)	0.000 (0.899)	0.0002 (0.511)		0.00008 (0.845)
Foreign Direct Investment	0.013 (0.212)	0.001 (0.421)	0.00006 (0.820)	<b>0.012**</b> <b>(0.040)</b>	0.00003 (0.567)	0.0002 (0.286)		<b>0.009*</b> <b>(0.086)</b>
Remittances	-0.003 (0.457)	0.003 (0.126)	0.00009 (0.857)	<b>0.014**</b> <b>(0.019)</b>	0.00003 (0.109)	<b>0.004**</b> <b>(0.027)</b>		<b>0.004***</b> <b>(0.005)</b>
R <sup>2</sup>	0.223	0.483	0.869	0.981	0.831	0.793		0.355
Fisher	<b>4.76***</b>	1.35	<b>636.37***</b>	<b>60.82**</b>	<b>3.02*</b>	<b>5.61*</b>		<b>8.54***</b>
Observations	25	30	18	11	15	13		26

\*\*\*, \*\*, \*: significance levels of 1%, 5% and 10% respectively. LIC: Low Income Countries. LMIC: Lower Middle Income Countries. UMIC: Upper Middle Income Countries. AP: Asia and Pacific. CEE: Central and Eastern Europe. LA: Latin America. MENA: Middle East and North Africa. Mobile.Pay: Mobile for payment of bills. Mobile. SR: Mobile of Sending and Receiving in Money. No regressions are performed for the MENA region because of issues with degrees of freedom.

**Table 3: Mobile money services and Inequality**

Panel A: Mobile for the Payment of Bills (Mobile.Pay)							
	Income Levels			AP	CEE	Regions	
	LIC	LMIC	UMIC			LA	MENA
Constant	<b>36.065***</b> ( <b>0.000</b> )	<b>40.945***</b> ( <b>0.001</b> )	46.257 (0.120)	11.391 (0.768)	<b>62.619**</b> ( <b>0.031</b> )	-1.315 (0.956)	<b>31.001***</b> ( <b>0.000</b> )
Mobile.Pay	0.322 (0.765)	1.734 (0.304)	<b>2.563**</b> ( <b>0.019</b> )	4.656 (0.448)	0.159 (0.928)	<b>9.730*</b> ( <b>0.063</b> )	0.089 (0.959)
Mobile.Pay× Mobile.Pay	-0.009 (0.829)	-0.081 (0.247)	13.398 (0.676)	-0.925 (0.676)	-0.007 (0.914)	<b>-2.277*</b> ( <b>0.054</b> )	-0.007 (0.952)
Educational Spending	15.568 (0.233)	<b>20.999**</b> ( <b>0.047</b> )	0.229 (0.768)	30.787 (0.387)	-30.452 (0.251)	48.294 (0.111)	14.972 (0.142)
Government Stability	0.014 (0.977)	<b>-3.199***</b> ( <b>0.008</b> )	0.229 (0.768)	-0.054 (0.958)	<b>-1.488*</b> ( <b>0.075</b> )	-0.609 (0.396)	0.178 (0.866)
Inflation	0.033 (0.953)	<b>-0.877**</b> ( <b>0.012</b> )	0.020 (0.947)	-0.750 (0.477)	0.041 (0.912)	-0.022 (0.928)	0.114 (0.802)
Credit	<b>-0.126*</b> ( <b>0.099</b> )	-0.032 (0.466)	<b>0.152***</b> ( <b>0.007</b> )	0.020 (0.728)	0.0003 (0.997)	0.044 (0.371)	<b>0.103**</b> ( <b>0.011</b> )
Foreign Direct Investment	0.251 (0.643)	-0.377 (0.209)	<b>-2.112***</b> ( <b>0.008</b> )	-0.257 (0.784)	0.607 (0.265)	-0.299 (0.635)	0.381 (0.216)
Remittances	<b>-0.500*</b> ( <b>0.099</b> )	0.142 (0.569)	-1.026 (0.640)	0.393 (0.657)	-0.081 (0.466)	<b>0.597*</b> ( <b>0.079</b> )	-0.396 (0.394)
R <sup>2</sup>	0.559	0.475	0.797	0.815	0.479	0.832	0.573
Fisher	<b>8.47***</b>	<b>9.19***</b>	<b>13.17***</b>	2.77	<b>12.55***</b>	<b>9.48**</b>	<b>11.46***</b>
Observations	23	27	17	11	15	13	22

**Panel B: Mobile for sending and receiving money (Mobile.PS)**

Panel B: Mobile for sending and receiving money (Mobile.PS)							
	Income Levels			AP	CEE	Regions	
	LIC	LMIC	UMIC			LA	MENA
Constant	<b>36.586***</b> ( <b>0.000</b> )	<b>38.030**</b> ( <b>0.011</b> )	-57.471 (0.227)	18.002 (0.544)	<b>104.05*</b> ( <b>0.069</b> )	-32.129 (0.268)	<b>31.084***</b> ( <b>0.000</b> )
Mobile.SR	-0.140 (0.717)	0.585 (0.462)	-1.187 (0.526)	-3.238 (0.755)	2.511 (0.335)	0.639 (0.887)	-0.057 (0.849)
Mobile.SR × Mobile.SR	0.004 (0.469)	-0.014 (0.569)	0.048 (0.290)	0.658 (0.676)	-0.109 (0.318)	0.394 (0.716)	0.0006 (0.901)
Educational Spending	12.175 (0.292)	25.029 (0.114)	<b>102.67*</b> ( <b>0.058</b> )	6.115 (0.907)	-76.472 (0.177)	<b>80.212**</b> ( <b>0.030</b> )	16.149 (0.113)
Government Stability	0.335 (0.443)	<b>-3.498***</b> ( <b>0.004</b> )	-0.127 (0.927)	-0.305 (0.805)	<b>-1.495**</b> ( <b>0.043</b> )	-0.158 (0.696)	0.184 (0.859)
Inflation	0.048 (0.918)	<b>-0.698*</b> ( <b>0.078</b> )	0.762 (0.051)	1.200 (0.744)	-0.203 (0.619)	0.449 (0.194)	0.097 (0.816)
Credit	<b>-0.146**</b> ( <b>0.043</b> )	-0.023 (0.614)	<b>0.175**</b> ( <b>0.021</b> )	0.177 (0.542)	-0.058 (0.601)	0.069 (0.301)	<b>0.100**</b> ( <b>0.023</b> )
Foreign Direct Investment	0.466 (0.409)	-0.477 (0.138)	-1.468 (0.288)	-1.088 (0.388)	0.806 (0.109)	0.431 (0.575)	0.384 (0.266)
Remittances	<b>-0.424**</b> ( <b>0.016</b> )	0.086 (0.729)	0.043 (0.985)	-0.317 (0.822)	-0.169 (0.262)	<b>0.699*</b> ( <b>0.068</b> )	-0.413 (0.345)
R <sup>2</sup>	0.6088	0.454	0.751	0.805	0.592	0.876	0.576
Fisher	<b>24.99***</b>	<b>4.01***</b>	<b>12.70***</b>	5.69	<b>11.16***</b>	<b>14.86***</b>	<b>10.62***</b>
Observations	23	27	17	11	15	13	22

\*\*\*, \*\*, \*: significance levels of 1%, 5% and 10% respectively. LIC: Low Income Countries. LMIC: Lower Middle Income Countries. UMIC: Upper Middle Income Countries. AP: Asia and Pacific. CEE: Central and Eastern Europe. LA: Latin America. MENA: Middle East and North Africa. Mobile.Pay: Mobile for the payment of bills. Mobile. SR: Mobile of Sending and Receiving in Money. No regressions are performed for the MENA region because of issues with degrees of freedom.

## Appendices

### Appendix 1: Definition of variables

Variable(s)	Definition(s)	Source(s)
Quality of Growth Index (QGI)	<i>“Composite index ranging between 0 and 1, resulting from the aggregation of components capturing growth fundamentals and from components capturing the socially-friendly nature of growth. The higher the index, the greater is the quality of growth”</i> (p. 25).	Mlachila et al. (2014)
Poverty	Poverty rate: Proportion (per cent) of the population living on one USD a day	Mlachila et al. (2014)
Inequality	GINI index of Inequality	
Mobiles for bills	Mobile phone used to pay bills (% of Adults)	Mosheni-Cheraghlou (2013)
Mobiles to receiving/sending	Mobile phone used to send/receive money (% of Adults)	
Educational Spending	<i>“Public resources allocated to education spending, as percent of GDP”</i> (p. 25)	Mlachila et al. (2014)
Government Stability	<i>“Index ranging from 0 to 12 and measuring the ability of government to stay in office and to carry out its declared program(s).The higher the index, the more stable the government is”</i> (p. 25).	Mlachila et al. (2014)
Inflation	Inflation rate based on the Consumer Price Index (CPI)	Mlachila et al. (2014)
Credit to private sector	<i>“Domestic credit to private sector, namely credit offered by the banks to the private sector, as percent of GDP”</i> (p. 25).	Mlachila et al. (2014)
Foreign Direct Investment	<i>“Net Inflows of Foreign Direct Investments, as percent of GDP”</i> (p. 25)	Mlachila et al. (2014)
Remittances	<i>“Workers' remittances and compensation of employees (Percent of GDP), calculated as the sum of workers' remittances, compensation of employees and migrants' transfers”</i> (p. 25).	Mlachila et al. (2014)

### Appendix 2: Summary Statistics

	Mean	S. D	Minimum	Maximum	Obs
Quality of Growth Index (QGI)	0.656	0.122	0.333	0.842	93
Poverty rate	0.062	0.113	0.000	28.127	93
Inequality	41.844	8.339	28.127	65.27	78
Mobile for Bills payment	2.601	4.125	0.000	25.70	80
Mobile for Sending/Receiving money	4.802	9.615	0.000	60.50	80
Educational Spending	0.701	0.211	0.202	1.000	93
Government Stability	2.626	2.242	-0.379	11.278	93
Inflation (log)	7.909	4.106	2.202	21.669	90
Domestic Credit (log)	39.730	34.036	-14.660	169.251	90
Foreign Direct Investment	4.488	3.720	0.0007	20.869	92
Remittances	5.445	7.612	0.003	38.590	84

S.D: Standard Deviation. Obs: Observations.

### Appendix 3: Correlation Matrix

Control variables						Mobile money services		Inclusive development			
Educ	GovStab	Infl	Credit	FDI	Remit	MBills	MSR	Pov.	GINI	QGI	
1.000	0.235	0.263	0.392	0.005	0.143	0.207	-0.006	-0.267	0.312	<b>0.898</b>	Educ
	1.000	0.277	0.324	-0.125	-0.063	0.080	-0.182	-0.171	-0.188	0.437	GovStab
		1.000	0.199	0.171	-0.059	0.300	0.130	0.129	-0.019	0.231	Infl
			1.000	-0.202	0.530	0.082	-0.183	-0.367	-0.185	0.576	Credit
				1.000	-0.159	-0.082	0.012	0.203	0.065	-0.117	FDI
					1.000	-0.080	-0.172	-0.130	0.145	0.230	Remit
						1.000	<b>0.865</b>	0.142	0.039	0.121	MBills
							1.000	0.185	0.062	-0.154	MSR
								1.000	0.223	-0.402	Pov.
									1.000	0.135	GINI
										1.000	QGI

Educ: Educational Spending. GovStab: Government Stability. Infl: Inflation. Credit: Domestic Credit. FDI: Foreign Direct Investment. Remit: Remittances. MBill: Mobile used for Paying Bills. MSR: Mobile used for Sending/Receiving Money. Pov: Poverty rate. GINI: Inequality Index. QGI: Quality of Growth Index.

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