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# MOBILE MONEY AS A FINANCIAL INCLUSION TOOL FOR POVERTY REDUCTION

A cross-country analysis of low- and middle-income  
countries

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## **ABSTRACT**

This thesis aims to examine if mobile money can act as a financial inclusion tool to reduce poverty levels in low- and middle-income countries. In contrast to the majority of the literature within its research field, this thesis observes the relationship on an aggregate cross-country level instead of using data on an individual or household level, in order to fully examine the impacts on national poverty levels. The research question is analyzed through theory about how financial market imperfections hinder investments for the poor and consequently complicate their capital accumulation, which is necessary for poverty reduction. Furthermore does the study build on theory of how technical innovations in the private sector can produce new financial services that in turn enables financial inclusion, leading to a reduction in poverty levels. The overall results do not find support for my hypothesis of reduced poverty levels as an effect of mobile money, suggesting that further research is required.

**Key words:** mobile-money, financial inclusion, poverty, technology, cross-country analysis, low-income countries, middle-income countries

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## 1.1 Introduction

More than 2 billion people of the world's population are today living excluded from financial services (GPFI, 2016). That is almost half of the world's population that are living without access to a bank account for money deposits, credit or debit cards, loans, formal savings and insurance, simply because they are too poor to be considered valid customers for the formal banking sector. Being excluded from basic financial services is however more than a simple matter of inconvenience, and has consequences on both a micro-level for people's possibilities to escape poverty, and on a macro level affecting economic and societal development (GPFI, 2016; UNCTAD 2014). As a result, the role of financial inclusion has over the last decade gained increasing attention on the international agenda, and is today considered a key factor for development and poverty reduction, anchored as an enabler for 7 out of 17 of the Sustainable Development Goals (ibid).

While there are multiple elements required for attaining financial inclusion, many experts specifically stress the role of innovative business models and new technology (GPFI, 2016). Mobile phones is one technology that by most may not be considered as a new technology, but new or not, is the mobile phone a technology that currently is revolutionizing developing countries as a tool in the fight against poverty (GPFI, 2016). Yet, despite this increased attention for financial inclusion and mobile money, is still most of the research focusing on effects of mobile money on an individual household level, rather than national poverty levels. There is to the best of my knowledge few cross-national- studies examining the effect on poverty levels, and instead are the studies that have been made, either observing household income or savings, alternatively on a country level often estimating effects on economic growth, not living standards as poverty. This study therefore aims to contribute to the research on the effects of mobile money on poverty levels through doing a cross-country study on low- and middle-income countries. Through an OLS regression analysis the thesis furthermore aims to answer the research question '*Does the use of mobile money services reduce poverty levels in low and middle income countries?*'. The findings did however not manage to find any support for my hypothesis of a decrease in poverty levels as an effect

of mobile money, suggesting that further research is necessary. Especially given the timely discourse of financial inclusion and mobile phones on the international agenda.

In the development discourse, the mobile phone is a recognized tool in the way it can transport access, to services and information, that otherwise would remain inaccessible for the marginalized groups of society (Beck et al, 2015; Obijiofor, 2015; MercyCorps, 2017; Unwin, 2017). The fact that technology has the ability to transport services to remote places, reaching otherwise excluded groups, is something that particularly has become true in the case of mobile money. Mobile money services were first introduced a little more than ten years ago in South Africa and the Philippines, and has since then grown to be offered in 93 countries by more than 270 different companies (Suri & Jack, 2016). With the Kenyan success story of mobile money company M-Pesa showing the world how mobile money can open up access to financial services for unbanked people, and provide opportunities for facilitating everyday-banking solutions also for those who don't have a bank account (Mbiti & Neil, 2011; Suri & Jack, 2016), the interest for what mobile money can bring has not yet seen its peak.

Holding a bank account is according to the World Bank (2018) a potential gateway to other financial services such as savings, credits and insurance, and a mobile money account, could be the stepping-stone for unbanked marginalized people into formal banking services (Suri & Jack, 2016). Given the outburst of mobile money services in many developing countries, companies are today offering more services than transfers, payments and storage, such as savings, loans and insurance to its mobile money customers (Suri & Jack, 2016), and these services are essential for lifting people out of poverty (World Bank, 2018). Savings for example, are important for people to be able to deal with unpredicted expenses in case of sickness, unemployment or a bad harvest year for the self-employed farmer. Using a mobile money account and its services improves household cash flow variation management as well as consumption smoothing (Cull et al, 2014), and has been suggested by several studies that it furthermore increases household savings (Jack & Suri, 2011). Cull et al (2014) furthermore find that it for the poorest households without access to saving mechanisms, is more difficult to resist

immediate spending temptations than for those with available saving instruments, emphasizing the importance of formal saving services. Also loans and credits are important facilities, that for the unbanked, are hard to get approved without an account or credit history, leaving people not being granted the loan that either would finance their children's schooling or the loan needed to start up a new business or invest in a new cow for their farm. With the agriculture sector occupying a grand majority of people in developing countries (ILO, 2013), insurance is furthermore another central financial service to e.g. secure income during bad crop years. In other words are savings and income necessary for people to escape poverty, and given the services that mobile money companies' today offer, mobile money provides people with opportunities to change their savings and incomes.

Financial inclusion through technology and new business models like mobile money is therefore key for sustainable development (UNCTAD, 2014). Several studies have found supporting evidence for the positive impact of mobile money on saving habits, household income and investments (Morawczynski & Pickens, 2009). Although many scholars have examined the impacts of mobile money, the studies are as previously mentioned mainly focusing on economic effects on a household, or individual level (Morawczynski & Pickens, 2009; Mbiti & Neil, 2011; Mbogo, 2010), rather than poverty at a country level. Furthermore have previous research often been case studies on specific countries, where particularly African countries have been the most present (Mbiti & Neil, 2011; Mbogo, 2010; Must & Ludewig, 2010). Mobile money has been around for roughly a decade by now and it has because of that, perhaps been difficult to at earlier stages examine its affects on poverty level, for time-log reasons. Partly can the scarcity of studies on mobile money and poverty levels also be explained by the lack of data in its field, something that the Global Financial Index released by the World Bank in 2017 seeks to address. This thesis aims therefore as mentioned to contribute to the research field by using the Global Findex data and data on poverty levels for a cross-country data analysis of the effects of mobile money on poverty levels in low and middle-income countries.

The thesis will proceed as follows. Section 1 will encompass a literature review of previous research followed by the theoretical framework. In section 2, the methodology, data and variables will be explained, followed by a presentation and analysis of the regression results in section 4. Future research will furthermore be a part of section 4, and finally will a conclusion of this thesis be presented in section 5.

## **2. Literature review and theoretical framework**

This section presents a clarification of mobile money, a literature review in the field of mobile money and financial inclusion for poverty reduction, including a chapter on the research gap. Finally will a theoretical framework be presented.

### **2.1. Clarification of concepts – mobile money**

Mobile money refers to the service where people can send, store and receive money through SMS text message services provided by a mobile operator. The service enables people to exchange cash for “e-float” that then can be used to either pay bills or transferred to a friend’s or family member’s mobile money account (Mbiti & Weil, 2011). Stored or received money in a mobile money account can be withdrawn as regular cash at the users convenience. Mobile money does not require one to hold a bank account, and is not connected to a formal bank account in any way, as users instead either charge a refill-card with e-float, or exchange cash for e-float stored at their specific mobile money account, depending on the service provider.

### **2.2. Previous research**

#### **2.2.1. Previous literature on mobile money**

In terms of previous literature on the effects of mobile money, M-Pesa is a mobile money service that particularly re-appears in studies of different kinds, and is something that accordingly shapes the literature in this research field. As within the development discourse about mobile money, the Kenyan mobile payment service M-Pesa without doubt is the most acclaimed and most discussed case in its field, there are consequently numerous studies on the effects of this M-Pesa service. Ten years after its commercial release in 2007, more than 20 million users were subscribed to the M-Pesa service in



Kenya for both business and person-to-person purposes, making up almost half of the country's population (Monks, 2017). Although M-Pesa is far from the only mobile money service, with 93 different countries offering 271 different mobile money services at the end of 2015 (Suri & Jack, 2016), the success story of M-Pesa and its international acclaim has literature wise, resulted in plenty of case studies on short-term economic impacts of M-Pesa in Kenya at an individual level. These studies typically examine effects on household income, capital accumulation, savings and credits, in a Kenyan context, and have resulted in many positive results (Morawczynski & Pickens, 2009; Mbiti & Neil, 2011; Suri & Jack, 2016). One study about customer usage and impacts made by Morawczynski & Pickens (2009) reveals that rural citizens' incomes increased by up to 30% after starting to use M-Pesa. Furthermore did users start to integrate M-Pesa into their saving portfolios, which in turn changed saving patterns by increasing the frequency of money deposits with different saving mechanisms, often in order to accumulate money for investments in rural homes such as e.g. buying a cow (Morawczynski & Pickens, 2009). The increased number of deposits disclosed also a demand for more saving products (ibid) for the 'bottom of the triangle' that otherwise has to rely on informal saving mechanisms.

Research on M-Pesa has furthermore found effects for the number of businesses (Mbogo, 2010) and a transition from informal to formal banking (Mbiti & Neil, 2011). In one study on impacts of M-Pesa, Mbogo (2010) finds that increased usage of mobile money has a positive impact on the growth of micro-businesses, where one of the key ingredients is the convenience and accessibility mobile money offers. This remains an interesting finding as it highlights the role for innovative services reaching otherwise financially excluded for societal development and growth, in this case reflected in increased micro-businesses and i.e. also self-employment. A similar study conducted by Mbiti & Neil (2011) examines the economic impacts of M-Pesa in Kenya and provides evidence, in line with the findings of Morawczynski & Pickens (2009), for how increased usage of mobile money such as M-Pesa, lowers people's usage of informal saving mechanisms and increases formal banking probability, with M-PESA serving as a stepping stone into formal banking (Suri & Jack, 2016). In addition, the researchers find

that mobile money and M-PESA improves *“individual outcomes by promoting banking and increased transfers”* (Mbiti & Neil, 2011).

The economic impacts of M-Pesa are furthermore discussed in a study by Jack & Suri (2011), where they review the potential economic impacts, once again, at a household level. Through M-Pesa’s facilitation of money transfer and safe storage, they argue that it also facilitates trade in the way it makes it easier and safer to buy and sell goods and services. This is displayed through the example of paying electricity bills that for the mobile money user can save a lot of time not having to walk several kilometers to make the payment, as well as removing the safety risk of carrying the money on hand while going to the payment station (ibid). The safety aspect can secondly increase household savings (ibid), which also was confirmed in the studies by Morawczynski & Pickens (2009) and Mbiti & Neil (2011). Another effect on household level discussed by Jack & Suri (2011) is how mobile money services like M-Pesa that makes *“transfers across large distances trivially cheap”* can boost investments and allocation of human, as well as physical capital. The authors argue that when transfers are cheap, fast and easy, households may be more willing to send family members to *“high-paying jobs in distant locations (e.g., the capital), and to invest in skills that are likely to earn a return in such places”* outside of home (ibid).

While there is much evidence on the effects of mobile money in a short-term economic perspective, such as allocation of consumption smoothing over time because of changed saving habits (Morawczynski & Pickens, 2009; Mbiti & Neil, 2011; Jack & Suri, 2011) and increased household incomes (Morawczynski & Pickens, 2009), the effects on poverty levels remains however less studied. Jack & Suri (2016) tries to address this in a study where they examine if mobile money services can increase consumption and lift people out of poverty. Their results were positive and suggested that especially for female-headed households, access to mobile money reduces poverty, providing figures for how 194,000 Kenyan households in their study have been lifted out of poverty (Jack & Suri, 2016). Consistent with the authors’ previous works, do these findings furthermore imply that reduced poverty as an effect of mobile money services, *“derive from a more*

efficient allocation of labour, savings and risk” (ibid). Although not only female-headed households were examined in the study, were the authors unable to find any statistically significant estimates for male-headed households (ibid).

Also Must & Ludewig (2010) argue for how mobile money can be used as a tool for poverty reduction “by increasing savings rates, creating jobs, and increasing access to financial products offered by microfinance institutions” in their policy paper about cell phone banking in developing countries. Linked to evidence supporting how financial inclusion and access to financial services has proven very efficient for poverty reduction, the authors exemplify how access to financial services have in e.g. a study on Ethiopia reduced five out of seventeen poverty determinants (Must & Ludewig, 2010). They continue by describing how mobile money can be used to purchase micro-insurance for businesses (in Kenya for instance can farmers purchase crop insurance through mobile money and solar-powered weather stations) and decrease the cost of savings in the way people can store wealth in their mobile money account. “Savings is the complement to credit; both enable people to accumulate capital and smooth their consumption during times of need such as unemployment or drought. With credit, people acquire a lump sum up front and then pay it off over time. With savings, they accumulate capital over time in order to build a lump sum. A mobile money account can serve as an inexpensive risk-free means of storing wealth, an alternative to storing it in the form of livestock or as cash hidden in the home” (ibid).

Studies have also shown positive results of mobile money on remittances, which is a form of income that most marginalized people are relying on to some extent (Mbiti & Neil, 2011). These are transfers that family members and relatives send from either abroad or other regions in the home country, such as usually urban areas where there are more jobs. As research has suggested, mobile money increases transfers between people at a lower cost (Mbiti & Neil, 2011). Mobile money has therefore contributed to higher incomes through increased number or remittances (Jack & Suri, 2011), as it becomes easier, cheaper and faster, enabling, often rural households, to fast receive money for different reasons (ibid).

Another related field scholars have studied is how mobile phones with mobile money as one part of the 'mobile phone concept', is impacting poverty levels and livelihoods. Something that often is done from an access to information perspective (Sife et al 2010). In a study estimating the effect of mobile phones on poverty reduction in rural Tanzania, Sife et al (2010) found evidence for mobile phones contributing to poverty reduction and improved rural livelihoods. The authors explained their findings through expansion and strengthening of social networks (consistent with Jack & Suri, 2011), "increase people's ability to deal with emergencies; cut down travel costs; maximize the outcomes of necessary journeys; increase temporal accessibility; and amplify efficiency of activities" (Sife et al, 2010).

Although many studies are focusing on the African context are there also other countries where mobile money impacts have been examined. In a study on mobile money in the Philippines made by CGAP, GSMA and McKinsey in 2009, findings showed that 52% of the survey respondents requested more saving services from the mobile money services (Pickens, 2009), which ones again mirrors previous suggestions on how mobile payments can lead to increased financial-deepening. To hold an account with a bank, or another kind of formal financial institution, is considered to be a gateway into more financial services (World Bank, 2018). With mobile money as a an alternative, less expensive way of sending money for people without a formal bank account that they can send and receive money to, a mobile money account like M-Pesa, or refill-card, is claimed by scholars to therefore be analyzed as an 'alternative gateway' to financial services for financial inclusion, corresponding with the findings of saving behaviours made by Morawczynski & Pickens (2009), Mbiti & Neil, (2011) and Jack & Suri (2011).

### **2.2.2. Research on technology for development and financial inclusion**

Similarly to the amount of research on effects of M-Pesa, is there a plentiful of studies examining different effects of technology for development. The concept of how technology and digitalization have the ability to transport services to remote places and marginalized groups, that without technology are unable to access these services or

facilities needed for development, is for instance claimed by many scholars (Beck et al, 2015; Obijiofor, 2015; MercyCorps, 2017; Unwin, 2017). Consequently, poverty reducing impacts of technology in general, is a very well studied area where many studies have been made on the positives technology can bring for development and poverty (e.g. Dutton 2013; Cantoni and Danowski 2015; Hanna with summer 2015; Mansell and Ang 2015, Proenza 2015).

One of the main findings from previous literature is how technology creates new opportunities for people. Beck et al (2015) describes the technology of mobile banking and innovative institutions as 'one mechanism for closing the development gaps by creating opportunities for access to finance by underserved regions and populations segments'. Positive impacts of reduced transaction costs and increased reach on development can furthermore be exemplified by the way it '*can enable new business models to address other development priorities*' (Cull et al, 2014), something that thus in turn can help combating poverty in several ways. A good example of this is how M-PESA that now reaches 80% of the population in Kenya (ibid), has led to "second-wave innovations that use the infrastructure of M-PESA" like M-KOPA (ibid). In an interview with M-Pesa co-founder Nick Hughes, he describes how the mobile money service M-Pesa has open up ways for new business models like M-Kopa, building on customer needs through smart technology. "More than 700 millions lack access to reliable power and spend money on poor quality fuel depending on their limited available cash. *Mobile money allows us to offer a new delivery model. We produce good quality solar energy systems that are connected to the mobile network using GSM technology and that we can monitor remotely. We then allow customers to buy units of credit for a specific solar device by making small payments to us*".

Impacts of technological new delivery models is furthermore examined in a study made by Diniz et al (2011) on the triggers and barriers for financial inclusion, where the authors evaluated the role of technology for financial inclusion in the use of branchless banking, through digital information & communication technology (ICT) in Brazil. The results showed a positive impact on local socio-economic development, with the overall

conclusion that access to financial services brought by technology is fundamental for the low-income population to develop, but should also be accompanied by financial education in order to be successful (ibid).

Although there are many positive views and studies on the effects of technology for development, there are some critical arguments as well. Avergou (2010) argues that despite claims that new technologies can improve the socioeconomic conditions of people in developing countries, it is often the case that the development potential of new technologies is overrated. A problem that in turn, hinders wider constructive use of technology is the absence of an enabling environment that promotes awareness, understanding and acceptance of the values of new technologies (Obijiofor, 2015). Furthermore argues Obijiofor (2015) for how there needs to be a larger focus on regulatory aspects of technology, making the long-term finance agenda an extensive one for researchers and policy makers. Financial innovation in terms of new risk management tools and new markets also require new institutional arrangements (Beck et al, 2015).

A majority of the research on technology in general for development is furthermore examined through the perspective of economic growth. While many studies have been made on the positives technology can bring for development in terms of economic growth (e.g. Dutton 2013; Cantoni and Danowski 2015; Hanna with summer 2015; Mansell and Ang 2015, Proenza 2015), few of them seem to, as mentioned by other scholars (Avergou, 2010), address a critical approach towards the real effect of technology on development (Unwin, 2017). Unwin (2017) provides therefore more of a critical approach when he in his book argues that technology has been way too praised in the work for development with one of the main problems being that technology in itself cannot be viewed as a “silver bullet to fight poverty”. Many development practitioners have however also been skeptical of the value of technology in delivering on the basic needs of poor people (Unwin, 2017). “A frequent refrain from such practitioners is that poor and marginalized people need such things as security, food,

water clothing and shelter before they can think realistically about the potential benefits of technology” (ibid).

In a different study yet also presenting some critique about the effect of technology on development, Toayama (2015) argues for how there also needs to be more of “a *people-centric view of social change* to deliver on development goals”. Something that is in line with Unwin’s (2017) reasoning about how he finds it problematic that most technology, according to him, is produced for the poor and not with them. Unwin (2017) stresses that the poor and marginalized must be both stakeholders and partners in order for technological innovations to fully improve livelihoods and poverty, not only users and customers. Particularly since technology never is neutral, “but always closely linked with culture, society and government policies” (Green 2001, Lanier 2011).

### **2.2.3. Research gap**

In the previous literature on impacts of mobile money for poverty reduction, a large focus has been on the short-term economic effects on individual household levels (Morawczynski & Pickens, 2009; Mbiti & Neil, 2011; Mbogo, 2010) rather than exploring aggregate poverty reducing effects. There is to the best of my knowledge few cross-national- studies examining the effect on poverty levels, and instead are the studies that have been made on a country level often estimating effects on economic growth, not living standards as poverty. Moreover are many of the studies on technologies effects on development and poverty levels estimated through focusing on technology or mobile phones in general (Dutton 2013; Cantoni and Danowski 2015; Hanna with summer 2015; Mansell and Ang 2015, Proenza 2015), rather than specifically mobile money combined. Although there are studies estimating the impacts of mobile money on poverty levels (Suri & Jack, 2016), these are often case studies on specific countries (especially African countries where Kenya is extremely occurring) instead of cross-country analysis. This thesis therefore aims to contribute to the research field of mobile money with the main contribution being its cross-country perspective on national poverty levels, rather than short-term effects on an individual level or a specific country. There has as mentioned been few cross-national- studies to the best of my knowledge

and this thesis therefore contributes to research on mobile money and poverty levels at an aggregate level.

### **2.3. Theoretical framework**

The following section will present the theoretical framework used to explain the theoretical arguments behind how mobile money can impact and reduce poverty levels. My arguments will build on modern development theories of access to finance, financial market friction and capital accumulation combined with technical innovation principle. This section will conclude with providing a hypothesis for the thereafter-succeeding regression outputs.

The first argument for my theoretical framework assumes in line with the World Bank (2018) and Morawczynski & Pickens (2009) that *capital accumulation* for individuals and households are a crucial part of poverty reduction. This statement builds on theory that through different *financial services*, such as mobile account holding or payments, credit, insurance and savings, people are supplied with opportunities to accumulate capital (Morawczynski & Pickens, 2009; Must & Ludewig 2010; Mbiti & Neil, 2011; Jack & Suri, 2011). I support the idea that has been suggested by many scholars (Suri & Jack, 2016; World Bank, 2018) that holding a bank account can serve as gateway to other financial services, and that a mobile bank account is one form of bank account. I furthermore build on the assumption in line with (Morawczynski & Pickens, 2009; Suri & Jack, 2011 & 2016), that financial services such as e.g. credits can provide loans for education or entrepreneurship, savings can be used for unexpected expenses, and digital payments plus storage can smooth consumption. That is to say that financial services create opportunities for investments to improve one's living conditions. Because of this, accumulation of capital is necessary for the poor to be able to invest in their human capital, i.e. getting education, or invest in physical capital, which could be income generating activities such as family farming or entrepreneurial business operations of a different kind. I will therefore argue for that using financial services, mobile money in this case, can facilitate capital accumulation for the marginalized and therefore reducing



the percentage of people who are living under 1,90 USD per day, consequently reducing poverty.

My second building block concerns the vital need for *increased financial accessibility* as a means for poverty reduction. This suggests that while the use of financial services can be considered tools for capital accumulation and financial management, these services are yet, as stressed by many researches (Diniz et al, 2011) in many low- and middle-income countries only available to the already rich elite. Financial exclusion is in most cases a consequence of wealth and income inequalities (Demirguc-Kunt et al, 2008; World Bank, 2018), where only those who already are rich are entitled to financial services according to financial service providers. I therefore stress that lack of access to financial markets eliminates the opportunities to accumulate capital. Initiatives for financial inclusion and providing access to finance are consequently one important part of enabling capital accumulation and in the puzzle for development.

Thirdly, my theoretical reasoning incorporates theory about financial market friction and how *market friction is one reason for the lack of access to financial markets* for the marginalized, besides models of income inequalities. I here support the World Bank and researchers reasoning on how financial market friction can cause poverty traps and income inequalities (Demirguc-Kunt et al, 2008). Market frictions refer to transaction costs and market imperfections that hinder the exchange of, in this case, financial services or goods. Here, theoreticians' stress how "financial market imperfections determine the extent to which the poor can borrow to invest in schooling or physical capital" (Demirguc-Kunt et al, 2008). The market imperfections represent in this case the lack of information and transaction costs that lead to poor people being denied access to financial services.

In a book written by Galor and Zeira (1993) the authors develop a model describing how "because of financial market frictions, poor people cannot invest in their education despite their high marginal productivity of investment". A high marginal productivity of investments refers to an individual's incline to make an, in this case, investment. The

model assumes that only people who inherit more than the cost of education will find it economically profitable to invest in education, while those who are more marginalized to begin with, will due to market friction find it too expensive and therefore remain uneducated and poor, affecting long-term inequality (Galor & Zeira, 1993). In my case I comply with their reasoning and also emphasize that, as the poor remain poor because they initially are poor, their exclusion from formal financial markets will furthermore continue to deny them access. An additional assumption to this is furthermore that in situations where people are for some reason required to take a loan, the poor have to turn to more expensive informal alternatives, which even might make them worse off as they once again are stuck one kind of poverty trap. Banarjee & Newman (1993) developed a similar model from the perspective of an individual's occupational choices, which stipulates that because of market friction and imperfections, poor people remain wage earners in contrast to wealthier people who instead become entrepreneurs. In other words do market friction and imperfections determine people's occupational situation, which in turn determines their possibility to save and control risk, affecting their living conditions. These models thus exemplify how lack of financial access can be "the critical mechanism for generating persistent income inequality or poverty traps" (Demirguc-Kunt et al, 2008), which emphasizes that market friction is one key obstacle for accessibility.

The following argument in my framework will suggest that the *private sector* plays a significant role in providing financial accessibility and overcoming market friction. In contrast to many researchers who treat market imperfections as given "and suggest different redistributive policies to promote growth, focusing on schooling, saving or fertility changes" (Demirguc-Kunt et al, 2008), I instead reason that there is a market gap in financial services for the marginalized that needs to be filled, which can be addressed by the private sector developing new services and products for the poor. This argument complies moreover with the Demirguc-Kunt et al's (2008) claim that financial market imperfections need to be addressed directly "through putting financial inclusion initiatives at the frontline of the development agenda" (ibid), although from a private sector perspective. In order for the private sector to fill this market gap, I therefore in

line with (Cull et al, 2011; GPFI, 2016) state that new business models, products and services need to be developed to achieve access and escape potential traps.

Finally, will my last argument be linked to the previous reasoning for the private sector, and the need to develop new business models and new services. In the light of e.g. Solow's growth model (Solow, 1956) and researchers within Information Communication Technology (ICT), do I argue for *technology* as a necessary tool for improved financial access and poverty reduction. With the power of technology can information and services be transported to remote places and thus reach new users and actors that otherwise because of distances for instance. The final assumption for my theoretical framework is thus that technology is the required tool for overcoming obstacles hindering capital accumulation, financial exclusion and in-human living standards, i.e. poverty.

In short, will I through theory about how financial market imperfections hinder investments for the poor and consequently complicate their, for poverty reducing necessary capital accumulation, argue for how technical innovations in the financial sector can serve as a tool for financial inclusion with the result of reducing poverty levels. Accordingly, the following hypothesis can be assumed:

*H 1: Through usage of mobile money as a tool for financial inclusion, poverty levels can be reduced*

### **3. Research Design**

In this section the research design will be presented starting with a description of the data and its sources. Secondly, an explanation of the dependent variable will be presented followed by one of the independent variables. Subsequently, the control variables will be presented, followed by descriptive statistics. Finally a chapter on the method will conclude this section.

### **3.1 Data**

In this section will the data used for the study be presented. The data originates primarily from the World Bank but is in addition complemented by the Bertelsmann Stiftung and the Heritage Foundation. Below will a thorough description of the data and its variables be presented.

#### **3.1.1. Financial inclusion and poverty levels**

For data on mobile money and financial inclusion, the dataset *Global Financial Inclusion* has been collected from the World Bank, which was gathered in a partnership with the Gallup World Poll (World Bank, 2017). The *Global Financial Inclusion* set was released in 2017, and spans from 2011 to 2014 depending on the indicator (World Bank, 2017). The data has been collected through interviews with more than 150,000 people of different nationalities, with randomly selected adults from age 15 (ibid). It entails information about the outspread of services such as mobile payments and debit or credit cards to some extent, but primarily focuses on patterns of the respondents' habitudes for using financial services and offers thus information about "*how individuals save, borrow, make payments, and manage risks*" (ibid). Habits are encountered through if the respondent in the near time has for instance saved, taken a loan or insurance, and how payments have been made – be electronically, through mobile transfers or with cash. Prior to this release has there been an extensive lack of data on user habits of financial services and the data is since its release the world's most "*comprehensive database on financial inclusion*" (World Bank, 2017).

The full dataset includes data from 220 different countries and regions where 70 have been selected for this study as they offer data on the relevant indicators and correspond with the available data on poverty levels. In order to analyze the phenomena of mobile money's role for financial exclusion, only low and middle-income countries have been included from the data. A low-income country is according to the World Bank Atlas method a country with a GNI per capita of less than 1,005 USD and a middle-income country ranging between 1,006-12,235 USD (World Bank Group, 2018). The low-income countries for 2014 were 13, while the middle-income countries were 57 when putting

lower and upper-middle-income together. The overall number of countries for this study is consequently 70 and a list of all included countries for this study can be found in 7 in the appendix.

In addition to this data has also the dataset *World Development Indicators* been downloaded from the World Bank, in order to obtain data on poverty levels as well as for some control variables. This dataset is the World Bank's primary dataset on development, "and compiled from officially-recognized international sources" (World Bank, 2018). It "presents the most current and accurate global development data available, and includes national, regional and global estimates" (ibid). The full dataset contains data from 217 different economies and offers, depending on the indicator, data from 1960-2017. The first version of the dataset was released in 2010 but is updated on a quarterly basis, with the last update made in 2018.

### **3.1.2 Complementary data sources for control variables**

To be able to include some of the control variables I had to gather data from other sources than the World Bank. I therefore used data for two of the variables from The Bertelsmann Stiftung's Transformation Index, which is gathered by the Bertelsmann Stiftung. The complete dataset contains variables on quality of democracy, market economy and political management in 129 transition and developing countries to analyze and evaluate policies and political steering (Bertelsmann Stiftung, 2012). Both cross-sectional and time series data is available, although only the time series data (TS) has been selected for this study to match the variables from the World Bank data, making country year the unit of analysis. Data is available on every other year from 2006 until 2018, out of which the 2012 data is selected to correspond with the other control variables from the World Bank and Heritage Foundation. The decision to select data from 2012 is because a few of the countries for the poverty level data only were available for 2012, and I therefore naturally did not want to include control variables from after-following years in regard to this. The data is collected through surveys conducted in each reported country and over 300 professional academics are part of the

work for the so-called 'BTI-project', Bertelsmann Transformation Index, (Bertelsmann Stiftung, 2012).

In addition to the Bertelsmann Stiftung's Transformation Index I also used data from the American think tank the Heritage Foundation's Index of Economic Freedom for one control variable. The Index of Economic Freedom dataset contains 12 different freedom variables related to economic and financial freedom on an aggregate level (Heritage Foundation, 2018). The full dataset offers data on 186 countries, for high-, middle- and low-income countries (ibid), out of which 70 of the low and middle-income countries were selected to match the other data for my study. The data is collected yearly from surveying in the countries and has been collected for the last 20 years (ibid).

## **3.2. Operationalization and variables**

### **3.2.1. Dependent variable**

To capture the effect on poverty the dependent variable used for this study will be '*% of poverty gap*'. This variable is downloaded from the World Bank Indicator data catalogue and measures the poverty gap at 1,90 USD per day adjusted by 2011 year's purchasing power parity (PPP) (World Bank, 2018). More specifically does the variable capture "the mean shortfall in income or consumption from the poverty line 1,90 dollars a day (counting the non-poor as having zero shortfall), expressed as a percentage of the poverty line" (ibid). By measuring the percentage of the poverty line, i.e. gap in this case, it enables us to reflect on the "depth of poverty" as well as its extent (QoG, 2018). Furthermore, to look at the percentage of the poverty line and not the absolute numbers of people living under the poverty line, I am able to observe the impact of the phenomena, that it to say the independent variables, rather than what number of individuals that are affected. As the data was not available for all low and middle income countries the same year, 2014 is the main year but has been added data from 2012, 2013 and 2015 to include as many countries as possible.

### **3.2.2. Independent variables**

For the independent variables the data is retrieved from the *Global Financial Inclusion* data, which is provided by the World Bank in 2017. To observe the impact of mobile money technology, as it will be described in this thesis, there will be three different independent variables used from the dataset followed by one self-constructed based on the other three. The first one measures mobile money payments for goods or services in the year of 2011, expressed as a percentage of the total population within a country from the age of 15. It combines thus the percentage of people using a mobile phone for payments and will be named *mobile payments* (1). The second independent variable will be *mobile transfers* (2), measuring regular transfers made to another mobile money user, also this one measured in percentage of the whole population that in 2011 has made one or more transfers to e.g. a relative, neighbor or friend, using a mobile money service. The third variable is the *mobile transfer received* (3) variable, which expresses only transfers received using mobile money. To only receive transfers aims to target a maybe less active user of mobile money, that assumingly only uses it to receive remittances from family members living and working in remote areas. The first variable on the other hand aims to target the more active mobile money user that obviously has taken the service a step further and uses it for payments of different services and goods. My fourth and final independent variable is a combined term of using all three previously mentioned mobile money services. This combined variable will be called *mobile money* (4) and captures the % of a population that uses all three of these services. The fact that all independent variables only reflect the usage in 2011 is because of the lack of data on other years.

### **3.2.3. Control variables**

To control for external explanations and possible sources of endogeneity to changes in the poverty gaps, different control variables are included at a country level. Firstly, *GDP per capita* will be included since a country with a higher GDP per capita is believed to reflect a higher standard of living (The balance, 2018) and is therefore likely to affect the poverty levels of the people living in that country. The variable is expressed as a number and is downloaded from the World Bank. The observed year for the data is 2012.

Secondly, *property rights* will be added as studies have provided evidence for a correlation between secured property rights and reduced poverty levels (Galiani & Schargrodsky, 2010). Secured property, or land, rights is believed to increase investments primarily since it in a rural context secures ownership of land and the right to exclude others from using it, which in turn boosts e.g. agricultural investments (Goldstein & Udry, 2008). In an urban context, people are without secured property rights unwilling to leave their homes for work, because of the risk that their property will be expropriated in their absence (Field, 2007). Property rights are therefore important to prevent property theft and expropriation both by the state and neighbours, making it possible for people to leave their homes to engage in income generating activities. The variable is measured as a scale of each country's property rights ranging between 0 and 100, where 100 represents the "maximum degree of protection of property rights" (Heritage Foundation, 2018). The original source is the Heritage Foundation that collected this data for their Index of Economic Freedom. Similar to my first control variable is the selected year of data 2012.

Moreover, is the intensity of conflict in a country another factor that can explain poverty levels (Rohwerder, 2014; Justino/Justino & Verwimp 2010,2013; Kugler et al., 2013; Nasser et al., 2014). Where there is more conflict, people are unable to carry on with their everyday activities, such as e.g. going to work, as the conflict "damage infrastructure, destroys assets, forces displacement, increases unemployment, reduces spending on social services and cause death and injury to people" (Baddeley, 2011; Addison et al., 2010; Justino, 2010; Nasser et al., Justino and Verwimp, 2013). *Conflict intensity* will therefore be controlled for measured on a scale between 1 and 10, where 10 represent the highest number of conflict. The word conflict does here encounter social, ethnic and religious conflicts (Bertelsmann Stiftung, 2012). The data generates from Bertelsmann Stiftung that was collected for the Bertelsmann Transformation Index in 2012. From the same source of data is also the subsequent control variable *social safety nets* collected. A state with a stronger welfare regime that compensates people for social risks will be more able to make arrangements for its people not having to live in poverty (Fox et Al, 2013), and hence, a control variable will be included for the



level of social safety nets a country has, measured on a scale between 1 and 10 where 10 represent the highest level of social safety nets. The variable is defined to assess “whether there are available arrangements to compensate for social risks” (Bertelsmann Stiftung, 2012).

Furthermore, does the level of unemployment represent opportunities to earn an income and consequently provide for oneself and one’s family. In other words is it likely to assume that the lower unemployment there is in a country, the lower the possibility that people are living in poverty (Saunders, 2002). The variable *unemployment* is thus added and is measured as a percentage of the total labour force within the observed country that is unemployed. The variable uses data from 2012 and originates from the World Bank. On the topic of opportunities is in addition to employment, education another factor that can affect poverty levels (Ferguson, Bovaird & Mueller, 2007). Many studies show that the higher level of education people has, the lower risk of living in poverty (ibid). The variable *secondary education* aims therefore to capture the effect of getting secondary schooling compared to only primary schooling. It is expressed as the enrolment rates as no sufficient data could be found on the completion of secondary education. The data is collected from the World Bank as second hand data but originates from UNESCO. Enrolment rates are for year 2012.

Additionally, will also *health level* be controlled for measured as expenditures on health. Health is according to many both a cause and a consequence of poverty (World Bank, 2014), leading to people being trapped in a ‘poverty and poor health circle’. Through controlling for health expenditures I therefore aim to control for how higher health levels influence my dependent variable *poverty levels* instead of my independent variables about mobile money. I here assume that it is likelier for a country to have a healthier population if the country has higher expenditures on health, compared to lower levels of spending, and therefore control for this. The original source of data is the World Bank data catalogue and the data is from 2012.

Finally, in order to capture potential systematic differences between geographical regions, I will also include regional fixed effects through creating a dummy variable for each geographical region. These region dummies will be constructed as binary variables taking on values of 0 or 1, where 1 represents belonging to the specific regional group and 0 represents not belonging to the regional group. Countries are grouped together in five categories as: Europe (15 countries), Americas (19 countries), Asia & Pacific (23 countries), Middle East & Northern Africa (10 countries), and Sub-Saharan Africa (40 countries).

### 3.3.1. Descriptive statistics

In table 1 are descriptive statistics of all variables presented. The table entails number of observations (N), mean value, standard deviation, as well as a minimum and maximum value for each variable. Regional dummies are not part of the table.

**Table 1**  
Data description

<b>Variable Name</b>	<b>N</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Dependent Variable</b>					
Poverty gap USD 1,90	70	4,652857	8,004812	0	39
<b>Explanatory Variables</b>					
Mobile payments	97	2,592525	4,133918	0	25,65222
Mobile send transfers	97	4,572228	8,913239	0	60,478
Mobile received transfers	96	6,584215	11,17235	0	66,6526
Mobile money	96	4.593832	7.445234	0	46.85476
<b>Control Variables</b>					
GDP/capita	105	3714.439	3234.754	300.6766	13467.1
Property rights	107	42.98204	13.88306	5.2	83.8
Conflict intensity	102	5.254902	1.983528	1	10
Social safety	102	4.558824	1.691994	1	8
Unemployment	107	7.813664	6.233672	.179	26.975
Secondary education	71	74.20345	25.87506	20.56177	123.0861
Health expenditures	105	236.697	231.1481	16.63966	997.9314

### 3.4.1. Method

To examine the relationship between mobile money technology and poverty gaps in low- and middle-income countries, the statistical method of ordinary least squares (OLS) will be used for estimation. Both simple linear regression and multiple linear regressions will be conducted in order to examine the research question, which one depending on the specification. The sample size is 70, and in order to account for any multicollinearity in the independent variables robust checks will be carried out throughout the regressions. The main models of simplest specification will be the following:

$$(1) Y_i = \beta_0 + \beta_1 \text{mobile payments} + \beta_2 * X_i + \varepsilon_i$$

$$(2) Y_i = \beta_0 + \beta_1 \text{mobile transfers} + \beta_2 * X_i + \varepsilon_i$$

$$(3) Y_i = \beta_0 + \beta_1 \text{mobile transfers receive} + \beta_2 * X_i + \varepsilon_i$$

$$(4) Y_i = \beta_0 + \beta_1 \text{mobile money} + \beta_2 * X_i + \varepsilon_i$$

The models present the outcomes of the different explanatory variables,  $\beta_i$ , on poverty gaps,  $Y_i$ , in low- and middle-income countries where  $\beta_0$  is a constant interception term. The interpretation of a negative  $\beta_i$  would suggest that the estimated mobile money service has a reducing effect on poverty, while a positive suggests instead an increasing. The parameter  $\beta_2 * X_i$  represents the different control variables that further on will be added subsequently to develop the models. These include both control variables for alternative explanations to a given poverty level, as well as regional fixed effects that will be included in the final specification to control for any regional differences. Finally, the error term  $\varepsilon_i$  aims to capture unobserved variations that were not possible to include such as e.g. personal characteristics of the respondents, but also factors concerning the studied country or area that I could not control for.

This section has presented a description of the data, its sources and information about the different variables. Additionally, were descriptive statistics presented followed by the statistical method for the estimation of a correlation.

## **4.1. Results**

This section presents the OLS regression outputs in Table 2. The table display whether the different independent variables for mobile money coefficients are significant, and if so, how they affect the outcome where a negative sign would imply a reduction in poverty while a positive would suggest the opposite.

### **4.1.1. Robust Regression Results**

To test my hypothesis whether *usage of mobile money* could serve as a financial inclusion tool for a *reduction in poverty gaps*, I carried out multiple cross-country regressions. First, with each mobile money service separately as the independent variable thus using simple linear regression and then subsequently adding control variables one by one in multiple linear regressions. This was followed by another simple linear regression using a combined term for all mobile money services as the independent variable, with an additional control variable for each specification in a multiple linear regression. Table 2 shows the coefficients for *mobile payments*, *mobile transfers*, *mobile transfers received* and the combined mobile money service variable *mobile money* from running robust regressions.

**Table 2**  
OLS Estimates output

<b>Dependent Variable: Poverty Gap USD 1,90</b>	<b>(I)</b>	<b>(II)</b>	<b>(III)</b>	<b>(IV)</b>	<b>(V)</b>	<b>(VI)</b>	<b>(VII)</b>	<b>(VIII)</b>	<b>(VIV)</b>
<b>Mobile payments</b>	-0.005 (.040)	-0.076 (.074)	-0.057 (.075)	-0.015 (.041)	-0.021 (.043)	-0.054 (.055)	-0.051 (.059)	.009 (.116)	-.356 (.414)
<b>Mobile transfers</b>	.008 (.032)	-.015 (.042)	.134* (.070)	-.020 (.033)	.125** (.057)	.002 (.042)	.010 (.043)	.000 (.034)	.072 (.176)
<b>Mobile transfers receive</b>	.008 (.254)	-.176 (.226)	-.169 (.229)	-.186 (.233)	-.102 (.227)	-.083 (.230)	-.062 (.233)	-.085 (.307)	-.142 (.725)
<b>Mobile money</b>	.005*** (.001)	-.004*** (.001)	.004*** (.001)	.005*** (.000)	.004*** (.001)	.004*** (.001)	.004*** (.001)	.010*** (.002)	-.002 (.004)
GDP/capita		Yes							
Property rights			Yes						
Conflict intensity				Yes					
Social safety					Yes				
Unemployment						Yes			
Health expenditures							Yes		
Secondary education								Yes	
Regional fixed effects									Yes
<b>N</b>	<b>64</b>	<b>64</b>	<b>64</b>	<b>62</b>	<b>62</b>	<b>62</b>	<b>62</b>	<b>46</b>	<b>34</b>

Robust standard errors in parentheses. Level of significance: \*\*\*p<0,01, \*\*p<0,05, \*p<0,1  
Constants included in all specifications but omitted from the table.

The obtained results for the first regression do not manage to yield any significant estimates for *mobile payments* and does consequently neither find any support for my hypothesis of a potential reduction in poverty gaps from usage of mobile payments. The simplest specification for the analysis starts for all specifications with running the explanatory variable on my dependent variable poverty gap where for every specification an additional control variable is added until the last one includes them all. While a few of the control variables turned significant in some of the specifications, social safety and secondary education, these did not affect the level of significance on the main explanatory variable *mobile payments*. The number of observations decreases slightly in the first few specifications and drastically in the last two (VII) and (VIV). A

table of all specifications (I-VIV) including control variables can be found in table 3 in the appendix.

For the next independent variable *mobile transfers* the results show that neither mobile transfers gained significant coefficients, with the exception of specification III and V, where they temporarily turned significant. This one- and two-star level of significance does however disappear when adding more control variables and consequently remove the potential impact on poverty gaps that mobile transfers could have. Furthermore are the two significant coefficient positive, which would imply that the higher % that use mobile transfers would lead to an increase in poverty gaps, something that in turn opposes my hypothesis and theoretical arguments. Just like in the previous regressions, observations continue to drop throughout the specifications. A table of all specifications (I-VIV) including control variables can be found in table 4 in the appendix.

The coefficients for the third regression, *mobile transfers received*, remain like the ones in *mobile payments* insignificant through all specifications (I-VIV). Once again some of the control variables (GDP/capita, Conflict intensity, Social safety, Secondary education) are in contrast to the main explanatory variable significant in a couple of specifications, although this seems to have no effect on the level of significance for the independent variable observed. In line with previous regressions, observations decrease for almost every specification. These results can be seen in Table 5 in the appendix, displaying all results for specification (I-VIV).

Finally the combined main explanatory variable *mobile money* is examined in the fourth multiple regression, for which a full table with the outputs and significance of control variables can be found in the appendix, table 6. Unlike previous regressions, here the coefficients remain significant all through the specifications until the very last one, regional controls, where through a fixed effects model one by one, each region is held constant to detect any regional differences. Whether losing the level of significance in (VIV) is due to regional differences or something different may however be difficult to determine because of the large drop of observations, resulting in an almost non-existing

sample size. Whether or not the loss of significance is a consequent of regional differences, sample size or something else, it is regardless worth commenting on the sign of the coefficient for those that are significant as they all are positive, which in other words is in disagreement to my hypotheses and theoretical arguments. Standard errors can however not be considered particularly large, in turn not implying that the results should be treated with special caution because of this.

As previously mentioned, robust regressions were carried out in order to account for outliers and influential observations (IDRE, 2017). The action of controlling for regional differences through fixed effects was furthermore also an attempt to remove more of the potential error variance and thus make the results more robust, as the regressions gets several treatments. Although this both proved unsuccessful in gaining more significant results, there can nevertheless be other issues hindering significant coefficients, where one problem could be multicollinearity in some of the variables. To check for multicollinearity among the variables I therefore tested the variance inflation factors (VIF) for each variable, to find if it could be the case that some are highly correlated, especially given my small sample where multicollinearity is known to be most common (2017). In regard to 10 being 'viewed as a threshold' for high collinearity, none of the variables could however be considered highly correlated, since the highest VIF value to be found for the first *mobile payments* regression was 8,81 for GDP/capita. Also taking into consideration that the 'tolerance' should not be below 0,1, none of the variables fell below this number either although GDP/capita was close with a tolerance of 0,1135. Similarly for the second, third and fourth regression examining the *mobile transfers*, *mobile transfers received* and the combined *mobile money* variables, no VIF values of 10 or above were found. The highest value was once again for GDPC/capita and was 8,51; 8,48 and 8,48, with no values of tolerance below 0,1. Consequently, it would not be likely that the variables could be predicted from one another, something that in turn could have increased standard errors.

Alternative explanations to the lack of significance for the grand majority of the results are likely to be related to the sample size. Because of the lack of data on poverty levels

from the same years, the sample size was already stretching it from the beginning. When the first drop in observations appeared in the first specification for each mobile money independent variable, and then continued to decrease for each one, it would be likely to assume that this is one of the main reasons behind this. Another explanation could be because of time-log aspects, in the sense that a few of the country data were collected rather short after the mobile money data was collected and therefore potentially too close to be able to detect any difference. To continue on explanations based on time-log aspects, it is also worth mentioning that once again because of poor data, all data on poverty levels were not from the exact same year, something that in turn could have affected the statistical outcomes. Also selection biasness could have a finger in the game as several of the countries that lacks data on poverty levels are categorized as low income countries, and therefore could it be likely to assume that there would be a higher prevalence of poverty in such countries.

#### **4.2. Future research**

In the absence of more data on poverty levels a suggestion for future research is to use proxy variables for poverty levels. Since poverty levels often are calculated based on household income, savings and consumption expenditures (World Bank, 2017), one suggestion could be to for instance use household consumption expenditures data as a proxy variable for poverty levels. This could be a good fit since according to several studies (Wamuyu, 2016) savings tend to be down prioritized in many poor households in low income countries and because of this probably only play a small part in the household economy, unless the household in question is from a richer quintile of the populations, something that in turn could be controlled for through different control variables. The main reason for suggesting proxies is to maintain the analysis on an aggregate cross-country level, and thus be able to more look at the phenomenon of mobile money and poverty levels than using individual data on a micro level. Since there already are many studies on mobile money, specifically M-PESA, on a household/individual level, it remains important to do similar studies like this one to fill the research gap on an aggregate cross country level. As new data is made available on



poverty levels, household income and expenditures, opportunities for further research on an aggregate level will continue to grow.

## **5. Conclusion**

In the light of financial inclusion's increased attention on the development agenda and mobile money success stories like M-Pesa, this thesis has aimed to examine the effect of mobile money as a financial inclusion tool for reduced poverty levels in low- and middle-income countries around the globe. In contrast to a previous study on the effects of mobile money on household levels in a Kenyan perspective (Jack & Suri, 2016), the obtained results did not manage to find any support for my hypothesis that the usage of mobile money could serve as a tool for financial inclusion and consequently reducing poverty levels. Although four different independent variables for mobile money were run robust regressions on, neither found support for my hypothesis. While the majority of the output estimates were insignificant, a few also turned temporarily significant in some of the regressions, although these instead showed a positive coefficient sign, which opposes my theory that mobile money could reduce poverty. Potential explanations to why no findings yielded support for my hypothesis can be discussed from different viewpoints where one reason could be due to time lag issues between the independent and dependent variables. Another reason could be a consequence of the relative lack of data on poverty levels, which did not make it possible to use poverty data from the same year for all countries. An additional explanation could furthermore be related to the small sample size. Worth considering is yet that doing a cross-country analysis at an aggregate level does limit the sample size one could have, as there only are a certain number of countries in the world that categorizes as low- or middle-income countries, compared to studies on a micro level that could include thousands of observations. An alternative approach for future research could therefore be to use a multi-level approach and combine aggregate cross-country data with data on individuals or households. Most certainly are there however also other aspects that could be the reasons behind my insignificant results, such as different uncertainties, unobserved variations and other exogenous or endogenous characteristics among others.

One fact that this thesis does point towards is however the need for more research on mobile money and poverty levels. Derived from findings of mobile money on increased household income (Morawczynski & Pickens, 2009), savings (ibid), self-started businesses (Mbogo, 2010) together with the role of financial inclusion on the development agenda and theories about capital accumulation, access to finance and technology for new financial services, this certainly indicates possibilities for further effects of mobile money in development. And to be able to observe the phenomena of mobile money on poverty levels, studies from cross-country perspectives are needed. In the absence of more data, one suggestion is therefore to instead use proxy variables for poverty. And as new data is made available on poverty levels, opportunities for further research on an aggregate level will continue to grow.

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## 7. Appendix

**Table 3**

OLS Estimates output

<b>DV: Poverty Gap USD 1,90</b>	<b>(I)</b>	<b>(II)</b>	<b>(III)</b>	<b>(IV)</b>	<b>(V)</b>	<b>(VI)</b>	<b>(VII)</b>	<b>(VIII)</b>	<b>(IX)</b>
<b>Mobile payments</b>	-0.005 (.040)	-0.076 (.074)	-0.057 (.075)	-0.015 (.041)	-0.021 (.043)	-0.054 (.0554)	-0.051 (.059)	.009 (.116)	-.356 (.414)
GDP/capita		-0.000*** (.000)	-0.000** (.000)	-0.000 (.000)	-0.000 (.000)	-0.000 (.000)	-0.000 (.000)	-0.000 (.000)	-0.000 (.001)
Property rights			-0.034 (.030)	-0.017 (.017)	-0.003 (.020)	.010 (.025)	.012 (.026)	-0.003 (.040)	.037 (.063)
Conflict intensity				.038 (.105)	-0.080 (.112)	-0.098 (.1375)	-0.076 (.150)	.147 (.241)	-.214 (.350)
Social safety					-0.507** (.205)	-0.818*** (.269)	-0.837*** (.279)	-0.589 (.514)	-0.888 (.787)
Unemployment						.081* (.044)	.075 (.048)	.042 (.085)	.185 (.194)
Health expenditures							.001 (.003)	.002 (.004)	.003 (.008)
Secondary education								-0.091*** (.023)	-.060 (.037)
Regional fixed effects									Yes
N	64	64	64	62	62	62	62	46	34

Robust standard errors in parentheses. Level of significance: \*\*\*p<0,01, \*\*p<0,05, \*p<0,1

Constants included in all specifications but omitted from the table.

**Table 4**

OLS Estimates output

<b>DV: Poverty Gap USD 1,90</b>	<b>(I)</b>	<b>(II)</b>	<b>(III)</b>	<b>(IV)</b>	<b>(V)</b>	<b>(VI)</b>	<b>(VII)</b>	<b>(VIII)</b>	<b>(IX)</b>
<b>Mobile transfers</b>	.008 (.032)	-.015 (.042)	.134* (.070)	-.020 (.033)	.125** (.057)	.002 (.042)	.010 (.043)	.000 (.034)	.072 (.176)
GDP/capita		-.000** (.000)	-.000** (.000)	-.000 (.000)	-.000 (.000)	-.000 (.000)	-.000 (.000)	-.000 (.000)	-.001* (.001)
Property rights			-.045 (.034)	-.018 (.017)	.012 (.033)	.003 (.024)	.007 (.024)	.003 (.018)	.124 (.075)
Conflict intensity				.034 (.104)	-.118 (.182)	-.077 (.131)	-.041 (.140)	.207* (.105)	-.080 (.397)
Social safety					-1.000*** (.330)	-.746*** (.257)	-.756*** (.262)	-.072 (.225)	.569 (.944)
Unemployment						.060 (.041)	.051 (.043)	.006 (.034)	-.703** (.311)
Health expenditures							.002 (.003)	.002 (.002)	.013 (.008)
Secondary education								-.017 (.010)	-.116** (.043)
Regional fixed effects									Yes
N	64	64	64	62	62	62	62	46	33

Robust standard errors in parentheses. Level of significance: \*\*\*p<0,01, \*\*p<0,05, \*p<0,1

Constants included in all specifications but omitted from the table.



**Table 5**

OLS Estimates output

<b>DV: Poverty Gap USD 1,90</b>	<b>(I)</b>	<b>(II)</b>	<b>(III)</b>	<b>(IV)</b>	<b>(V)</b>	<b>(VI)</b>	<b>(VII)</b>	<b>(VIII)</b>	<b>(IX)</b>
<b>Mobile transfers received</b>	.008	-.176	-.169	-.186	-.102	-.083	-.062	-.085	-.142
	(.254)	(.226)	(.229)	(.233)	(.227)	(.230)	(.233)	(.307)	(.725)
GDP/capita		-.001***	.001***	-.001***	-.001**	-.001**	-.001	-.001	-.002
		(.000)	(.000)	(.000)	(.000)	(.000)	(.001)	(.001)	(.001)
Property rights			-.020	-.044	.066	.065	.072	.022	.065
			(.086)	(.091)	(.099)	(.099)	(.100)	(.117)	(.163)
Conflict intensity				-.701	-.922*	-.886	-.780	-.273	-.581
				(.560)	(.545)	(.551)	(.581)	(.708)	(.897)
Social safety					-2.414**	-2.145*	-2.194*	-.291	-.432
					(1.001)	(1.086)	(1.095)	(1.518)	(2.101)
Unemployment						-.112	-.143	-.143	-.234
						(.169)	(.1780)	(.226)	(.445)
Health expenditures							.007	.006	.014
							(.011)	(.012)	(.020)
Secondary education								-.166**	-.136
								(.067)	(.093)
Regional fixed effects									Yes
N	64	64	64	62	62	62	62	46	34

Robust standard errors in parentheses. Level of significance: \*\*\*p<0,01, \*\*p<0,05, \*p<0,1

Constants included in all specifications but omitted from the table.

**Table 6**

OLS Estimates output

DV: Poverty Gap USD 1,90	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)
<b>Mobile money</b>	.005***	-.004***	.004***	.005***	.004***	.004***	.004***	.010***	-.002
	(.001)	(.001)	(.001)	(.000)	(.001)	(.001)	(.001)	(.002)	(.004)
GDP/capita		-.000*	-.000**	-.000	-.000	-.000	-.000	-.001	-.001
		(.000)	(.000)	(.000)	(.000)	(.000)	(.001)	(.001)	(.001)
Property rights			-.046	-.013	.002	.003	.009	-.010	.038
			(.032)	(.018)	(.025)	(.027)	(.029)	(.029)	(.069)
Conflict intensity				.078	-.086	-.103	-.066	-.081	-.247
				(.115)	(.141)	(.149)	(.168)	(.171)	(.363)
Social safety					-.657**	-.791**	-.869***	-.632*	-.755
					(.261)	(.296)	(.319)	(.365)	(.829)
Unemployment						.039	.029	-.020	.134
						(.046)	(.051)	(.058)	(.188)
Health expenditures							.003	.003	.005
							(.003)	(.003)	(.007)
Secondary education								-.026	-.067
								(.017)	(.040)
Regional fixed effects									Yes
N	63	63	63	61	61	61	61	45	34

Robust standard errors in parentheses. Level of significance: \*\*\*p&lt;0,01, \*\*p&lt;0,05, \*p&lt;0,1

Constants included in all specifications but omitted from the table.

**Table 7**

<b>Countries</b>	<b>Income level*</b>	<b>Countries</b>	<b>Income level*</b>
Burundi	Low	Philippines	Lower-middle
Benin	Low	El Salvador	Lower-middle
Burkina Faso	Low	Tajikistan	Lower-middle
Comoros	Low	Ukraine	Lower-middle
Ethiopia	Low	Vietnam	Lower-middle
Guinea	Low	Yemen, Rep.	Lower-middle
Haiti	Low	Zambia	Lower-middle
Liberia	Low	Albania	Upper-middle
Madagascar	Low	Argentina	Upper-middle
Niger	Low	Bulgaria	Upper-middle
Rwanda	Low	Bosnia and Herzegovina	Upper-middle
Togo	Low	Belarus	Upper-middle
Uganda	Low	Brazil	Upper-middle
Armenia	Lower-middle	China	Upper-middle
Bangladesh	Lower-middle	Colombia	Upper-middle
Bolivia	Lower-middle	Costa Rica	Upper-middle
Bhutan	Lower-middle	Dominican Republic	Upper-middle
Cote d'Ivoire	Lower-middle	Ecuador	Upper-middle
Cameroon	Lower-middle	Croatia	Upper-middle
Djibouti	Lower-middle	Iran, Islamic Rep.	Upper-middle
Egypt, Arab Rep.	Lower-middle	Iraq	Upper-middle
Georgia	Lower-middle	Kazakhstan	Upper-middle
Ghana	Lower-middle	Mexico	Upper-middle
Guatemala	Lower-middle	Macedonia, FYR	Upper-middle
Honduras	Lower-middle	Montenegro	Upper-middle
Indonesia	Lower-middle	Mauritius	Upper-middle
Kyrgyz Republic	Lower-middle	Panama	Upper-middle
Lao PDR	Lower-middle	Peru	Upper-middle
Sri Lanka	Lower-middle	Paraguay	Upper-middle
Moldova	Lower-middle	Romania	Upper-middle
Myanmar	Lower-middle	Russian Federation	Upper-middle
Mongolia	Lower-middle	Serbia	Upper-middle
Mauritania	Lower-middle	Thailand	Upper-middle
Nicaragua	Lower-middle	Turkey	Upper-middle
Pakistan	Lower-middle	South Africa	Upper-middle

\*World Bank Atlas method