

**FINANCIAL INNOVATIONS AND FINANCIAL INCLUSION:  
THE CASE OF MOBILE MONEY TRANSFER AMONG THE  
URBAN POOR IN KENYA**

**NAME: JACOB WANYONYI NATO**

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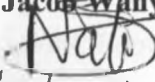
# DECLARATION

I hereby declare that this research paper is my own work, and to the best of my knowledge has not been presented for the award of a degree in any other University.

Candidate: ~~Jacob Wanyonyi Nato~~

Reg. No. X50/78048/2009

Signature



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Date...10/11/2011.....

# APPROVAL BY UNIVERSITY SUPERVISORS

We confirm that this work has been for submitted for examination with our approval as University supervisors.

Name: Dr Joy M Kiiru

Signature

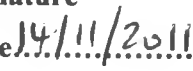


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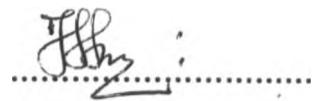
  
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Name: Dr Seth O Gor

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Date...14/11/2011.....

  
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## DEDICATION

I dedicate this work to my late parents Mr. Benjamin Nato and Mrs. Isabella Mutua for their relentless efforts at ensuring that I went to school. Indeed, the magnitude of their love, support, upbringing, training, provisions, discipline, and wisdom has left me in awe today.

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## **ABSTRACT**

The main objective of this paper was to examine the factors determining access to financial services for the urban poor of Kibera slums, with an intentional bias towards mobile money transfer services. Being a Binary Response Variable, the Binary Logit Model has been run for Access to Financial services against the determinants which include: age, gender, and ownership of a mobile phone, employment Status, level of financial innovations and perception about importance of finance.

The determinants of financial access are identified to include: age, level of education, preference for others access to finance, employment status, ownership of mobile phone, and most importantly, the level of financial innovations. While the probability of access to financial services could not be ascertained between the period 2005 – 2008 due to limited data points, there is evidence to prove that probability for access to finance rose from 50.7% in 2008 to 60.14% in 2011. This significant jump was largely attributed to financial innovations as proxied by the number of financial products, of which mobile money was the most significant. Of all mobile money transfer services, Safaricom's M-Pesa commanded the largest share of the market at 85%.

Based on the above findings, the study recommends that policies aimed at promoting the operations of mobile money transfer services be up scaled, greater cooperation be forged between banks and mobile money operators, and that mobile money services be provided and the necessary legislation put in place to allow them to operate as bank accounts.

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## LIST OF ABBREVIATIONS AND ACRONYMS

AFL.....	Alliance for Financial Inclusion
ATFS.....	Access to Financial Services
ATISG.....	Access through Innovation Sub-Group
ATM.....	Automated Teller Machine
BLUE.....	Best Linear Unbiased Estimators
CBK.....	Central Bank of Kenya
CGAP.....	Consultative Group to Assist the Poor
CMA.....	Capital Markets Authority
EAC.....	East African Community
ECM.....	Error Correction Mechanism
EFInA.....	Enhancing Financial Innovation and Access
Fininc.....	Financial Inclusion
GDP.....	Gross Domestic Product
GoK.....	Government of Kenya
IFAD.....	International Fund for Agricultural Development
KIPPRA.....	Kenya Institute of Policy Research and Analysis
LPM.....	Linear Probability Model
MICR.....	Magnetic Ink Character Recognition
MFI's.....	Micro-Finance Institutions
MM.....	Mobile Money
MoF.....	Ministry of Finance
NSE.....	Nairobi Stock Exchange
OLS.....	Ordinary Least Squares
PROFIT.....	Program for Rural Outreach Financial Innovations and Technology
R&D.....	Research and Development
ROSCAs.....	Rotating Savings and Credit Associations
SACCOs.....	Savings and Credit Cooperative Societies
UN-HABITAT.....	United Nations Habitat

# CHAPTER ONE

## 1. INTRODUCTION

### 1.1 Financial Inclusion and Innovation: Is there any Link?

Financial inclusion refers to the process that ensures ease of access, availability and usage of the formal financial system for all members of an economy (Sarma, 2008). The merits of an inclusive financial system are many-fold: it facilitates an efficient allocation of productive resources hence significantly reducing the cost of capital, thus ultimately ensuring that investors are not rationed out (Garrido, Kumar, Ndung'u and Randa, 2010). In addition, an inclusive financial system can help in reducing the growth of informal sources of credit which can not only be exploitative, but undermine the stability of a country's financial system as a whole. Overall, an all-inclusive financial system enhances efficiency and welfare by providing avenues and safe saving practices and by facilitating a whole range of efficient financial services.

The Kenya Vision 2030 places an intelligent emphasis on the role of the financial sector as stimulant towards achieving broad macroeconomic goals. In overall, Kenya is esteemed to be a regional hub in terms of financial services and the vision foresees Kenya as a Regional Financial Center (RFC) in the entire East African Region. This is important for the country's long-term growth prospects and development if it is to continue to maintain a competitive edge as a destination for most of the financial services in the East and South African regions.

The importance of an inclusive financial system is widely recognized and this has prompted Governments, financial regulators and most industry players to develop and fast-track initiatives for financial inclusion. For example, in France, the law on exclusion (1998) emphasizes on an individual's right to have a bank account. In the United Kingdom, a "Financial Inclusion Task Force" was constituted by the government in 2005 in order to monitor the development of financial inclusion.

A number of local and international bodies committed towards an all inclusive financial system as a panacea towards economic growth and poverty reduction, have constantly identified financial innovation as holding a strong foundation towards the financial access initiative. Noyer (2007), in his speech at the Deutsche Bundesbank's

9<sup>th</sup> spring conference noted that increased financial asset holding would indeed result from financial innovation. Similar sentiments have also been echoed by Ndung'u and Kimenyi (2009) for the Africa Growth Initiative at Brookings, on how financial inclusion in Africa can be supported by innovations in mobile technology and financial services.

The Access through Innovation Subgroup (ATISG) observes rather strongly that financial innovation has emerged as a promising vehicle to greatly expand access, lending policy makers and regulators the challenge of removing any bottlenecks on the way of Innovation, among other goals (ATISG Report, 2010). The global survey by the Alliance for Financial Inclusion (AFI, 2010) recognizes innovations via technology as being a long-term remedy for expanding access to finance

The Government is currently on a program of ensuring access to affordable financial services particularly to the lowest cadres of society. In the context of the Vision 2030, Kenya seeks to benchmark its economic performance either with rapidly growing economies (such as Vietnam) or middle-income countries (South Africa, Namibia or Thailand) which have considerably higher levels of access. Against these benchmarks, a conservative target for formal access by 2030 (Republic of Kenya, 2030) would be doubling formal financial inclusion up to fifty percent. Indeed, the Government is committed to enhancing an inclusive system of finance for all.

Among the programs and actions undertaken by the government to promote Access to Financial Services (ATFS) is the Small and Medium Enterprises (SME) fund under the Ministry of Finance whose goal is to enhance financial inclusion by providing savings facilities. Another such program is the Program for Rural Outreach of Financial Innovations and Technology (PROFIT) implemented by International Fund for Agricultural Development (IFAD). The program has two key components: Rural Finance Outreach and Innovations, and Technical Support Services.

Financial innovation on the other hand is broadly defined as the evolution of new financial instruments and new and more efficient methods of offering financial services. Various types of financial innovations have been documented in the literature. These include: institutional innovations, process innovations, and product

innovations, technological innovations and circumventive innovations. Institutional innovations relate to changes in legal and supervisory frameworks, business structures and establishment of new types of financial intermediaries or structures. Process innovations are aimed at increasing efficiency in operations and lead to market expansion.

**Table 1.1: The Automated Teller Machine (ATM) Network in Kenya<sup>1</sup>**

Month	2008	2009	Growth
January	1018	1325	307
February	1050	1426	376
March	1063	1497	434
April	1104	1497	393
May	1120	1497	377
June	1177	1586	409
July	1218	1589	371
August	1243	1589	346
September	1289	1614	325
October	1312	1646	334
November	1325	1697	372
December	1325	1717	392

*Source:* CBK (2010)

Product innovations on the other hand are done so as to respond better to changes in market demand, while technological innovations are new innovations that take advantage of technological advancements to achieve either all or some of the above mentioned objectives. A classic example here would be Mobile Money (MM) transfer services widely recognized as the preferred payment system in Kenya, ATMs and credit or debit cards – often regarded as the direct indicators of Financial Innovation (Misati, R et al., 2010). Table 1.1 shows the ATMs network in Kenya and reveal an expansion of the ATM network in Kenya. The growth in ATM network demonstrates increased automation of banking services as part of measures to enhance operational efficiency in the sector occasioned by increased competition and cut costs (CBK, 2010).

<sup>1</sup> Figures exclude the 110 Pesa Point ATMs

Circumventive innovations on their part are aimed at bypassing certain monetary and regulatory controls imposed in pursuance of certain public policy goals and objectives. On the other hand, certain innovations may come forth purely in order to help comply with given regulatory controls.

## **1.2 The Financial System in Kenya**

The Financial Sector in Kenya comprises of the Central Bank of Kenya, Commercial banks, non-bank financial Institutions, the Nairobi Stock Exchange (NSE), Insurance companies, the capital market, building societies, Savings and Credit Cooperative Societies (SACCOs) among other institutions. As a whole, the financial sector plays an invaluable role towards economic growth in terms of providing intermediation between savers and borrowers; administering the country's payment mechanism, establishing an institutional framework within which monetary policy can be implemented, as well as achieving certain economies of scale from its operations.

Currently, the financial sector in Kenya has forty four commercial banks offering a wide range of financial services, about forty major microfinance institutions (MFIs) and one hundred and thirty foreign exchange bureaus, at least one thousand seven hundred ATMs and close to a thousand branches throughout the country (CBK, 2009). The sector also comprises of the capital markets authority that regulates the capital markets segment of the economy.

The full potential of the financial services sector has not been exploited due to a number of challenges. These include limited accessibility to bank's financial services, with only 19 percent of the bankable population utilizing formal financial services, 8 percent had access to other formal finance through SACCOs and MFIs, 35 percent had access to informal finance and 38 percent had no access to finance (KIPPRA, 2009).

Low penetrations of banking, insurance and long term pension products and services, as well as low levels of consumer literacy are recognized as some of the key bottlenecks in the financial services sector (Republic of Kenya, 2009).

Table 1.2 shows that the use of formal financial services in Kenya is at similar levels to other East African countries, but below that in several countries in Southern Africa. The share of the population that is completely excluded from any formal or informal financial service is lower in Kenya (34%) than in any other country except for South Africa. This suggests the strong role of formal and informal finance plays in Kenya (Thorsten, 2010).

**Table 1.2: Use of Financial Services across Africa<sup>2</sup>**

	Formal	Formal, other	Informal	Excluded
Kenya	21.5	15	29.5	34
Tanzania	15	2	7	75
Uganda	18	0	29	52
Zambia	14	12	11	62
Botswana	44	5	5	48
South Africa	54	6	9	31
Namibia	53	3	1	42

A large body of empirical evidence shows that AFTS, and indeed overall financial development is crucial to economic growth and poverty reduction (Brookings, 2009)

### **1.3 Financial Innovations in Kenya**

Kenya's banking and payments systems are relatively well developed, and are considered the best in the East African region. For example, Real Time Gross settlement system (RTGS) for large value payments was introduced in July 2005 in an attempt to modernize the country's payment system in line with global trends; Automated Clearing House, Magnetic Ink Character Recognition (MICR) that ensures the speedy and efficient clearing of cheques; extensive bank branch and ATM networks, shared ATMs such as Pesapoint, leading mobile payments innovations such as M-pesa, ZAP and Essar, and MM transfers systems are growing fast (Republic of Kenya Vision, 2009).

Kenya's financial sector has also witnessed rapid innovations in attempts to not only enhance financial access, but also to broaden the range of assets and services that

<sup>2</sup> Porteus (2007) and Beck 2009

would yield better customer satisfaction. Key innovations witnessed in the recent past include: Investment in long term Government bonds (Securities) e.g. Infrastructure bond, mobile banking and electronic money transfers particularly by M-Pesa and Zap services; establishment of Automated Teller Machines (ATMs); credit cards instant loan agreements; Islamic banking and gender specific products; industry-wide branch network expansion strategies, and many other such innovations. Agent banking has also taken root in the country thanks to the banking act amendment through the finance Act of 2009 and the licensing of few credit reference bureaus. The product innovations and increased investment in new delivery channels in the form of branches and ATMs is a testimony of commercial banks' growing interest in new markets.

In general, financial innovations in Kenya are particularly driven by among other factors: advances in technology, changing economic conditions, changes in the international financial environment, increased competition among industry players, profit motive among institutions, financial deregulation, as well as the increasing integration of domestic and international financial markets (Ho, 2006; Noyer, 2007; Akhtar, 1983;).

#### **1.4 Mobile Money Transfer Services in Kenya**

Of all the MM schemes presently in use in the country, Safaricom's M-Pesa service has received considerable attention, in comparison to Airtel's Zap Money service and Yu's Essar MM. The M-pesa mobile telephone banking service was first conceived by Safaricom in 2005, but was launched in March 2007 (AFI, 2010). Since then, the service has witnessed increasing importance and recognition as an important financial innovation in the country. From 175,000 customers and 577 agents by July 2007, M-Pesa had attracted over 11.83 million customers and 23,000 agents as of July 2010. Having started as a pilot project of the United Kingdom (UK) mobile operator, the Vodafone group, Kenya was privileged to have been selected as the pilot project country.

The legality of the mobile transfer service also came to the fore during the early years of service with many stakeholders questioning the extent to which such a service could meet the requirements of the Banking Act and specifically, measures towards

risks and money laundering issues were being addressed. M-Pesa has however successfully weathered the storm and is today a leading payment system in the country (Fin Access, 2009).

### **1.5 Motivation of the Study**

The development of financial sector plays an invaluable role in economic development, even though there are mixed views on this assertion. Although the two concepts are positively related, it is not clear which one leads to the other (Patrick, 1996 and McKinnon, 1988). Lukas (1988) emphasizes that economists 'badly over-stress' the role of financial factors in economic growth. According to Gurley and Shaw (1955), the observable difference between the developed and the underdeveloped economies is due to the role financial intermediaries play in improving the efficiency of inter-temporal trade thus enhancing general economic activity.

A cohort of empirical studies has been done on Kenya's financial sector. However, most of these studies have dwelt on the impact of financial sector reforms on economic performance. Other studies have assessed the efficiency of the financial sector, particularly with regard to the stock market. Major studies have particularly concentrated on the role of financial sector developments on Economic growth (Mwaura, 2009; Ngugi, 2009; Ross, 1996; and Shaw, 1973).

Research shows that expanding financial inclusion can have positive effects on economic growth and poverty alleviation by helping the poor people to save and build their asset base, while helping to break the vicious cycle of poverty. This partly explains the policies designed to increase ATFS across Africa in the recent years (Thorsten et al, 2010)

The relationship between financial development and financial inclusion has not received much attention in the Literature, while the available ones only concentrate on theoretical concepts with little or no empirical work (White and Frame, 2001). The need to closely monitor the linkage that exists between financial innovations and financial access therefore arises, coupled with the need to elaborate the nature of such innovations.

## 1.6 Statement of the Research Problem

The financial sector has rightly been seen as the lifeblood of an economy, and the centrality of finance in an economy and its importance for economic growth is much documented (Levine, 2005; Demircuc-Kunt and Maksimovic 1998; Beck, Levine and Loayza, 2000; Rajan and Zingales, 1998). But perhaps of even greater emphasis is how well the system as a whole is innovative and adaptive to the needs of financial product consumers. Besides, the central role of finance in economic growth naturally raises the importance of financial innovation (White and Frame, 2001).

Claessens (2006) has shown that Countries can facilitate access to finance by strengthening institutional infrastructure, liberalizing markets and facilitating greater competition, and encouraging greater use of know-how and technology.

Kenya's financial system has failed to provide adequate access to banking services for the bulk of the population, with only a limited outreach (Thorsten et al, 2010). Currently only twenty-three percent of Kenyans above the age of eighteen years have access to formal finance such as banks with twenty seven percent of them in informal banking. Another thirty eight percent of the population is not aware of banking. A further 33% is totally excluded from the financial services sector (Fin Access, 2009). Generally, access to finance in Kenya remains limited to the main cities (Beck and Fuchs, 2004; Republic of Kenya, 2007). For this reason, financial inclusion is a key priority area for the government currently.

Brooking (2009), shows that technological innovations (of which M-Pesa takes the lead) have made it possible to extend financial services to millions of poor people at a relatively low cost. An empirical examination of the role played by financial innovations and how this affects inclusion is the gap that this paper fills.

## **1.7 Objectives of the Study**

### **1.7.1 General Objective**

The broad objective of this study is to determine the linkage between financial access and financial innovations for the case of MM services among the urban poor of Kibera slums.

### **1.7.2 Specific Objectives**

Specifically, the study seeks to:

- (i) Examine the extent of utilization of MM services among the urban poor of Kibera Slums;
- (ii) Describe the overall banking behavior of the urban poor of Kibera prior to the introduction of MM services;
- (iii) Find out if the introduction of MM services has significantly improved the financial inclusion level of the urban poor of Kibera slum dwellers;
- (iv) Derive policy recommendations for financial access.

## **1.8 Research Questions**

In view of the foregoing observations, the study seeks to find answers to the following questions:

1. What is the level of utilization of MM services among the residents of Kibera slums?
2. What has been the banking behavior of the urban poor prior to the conception of the MM service?
3. Have financial innovations led to greater access in the financial systems?
4. What policy issues arise from this study?

## **1.9 Research Hypotheses**

The research hypotheses will determine the parameters of the research questions and the methods to be employed in testing the hypotheses.

This study will adopt the following research hypothesis:

Ho: Kibera slum dwellers are effectively utilizing MM services.

Ha: Kibera slum dwellers are not effectively utilizing MM services.

---

Ho: Prior to the introduction of the MM service, Kibera slum dwellers had been financially excluded from the conventional banking system.

Ha: Prior to the introduction of the MM service, Kibera slum dwellers had not been financially excluded from the conventional banking system.

Ho: There has since been greater financial access among Kibera slum dwellers.

Ha: There has since not been greater financial access among Kibera slum dwellers.

### **1.10 Scope of the Study**

The study concentrates on financial innovations with specific reference to MM transfer services. The emphasis on MM is due to the fact that this service has come to be regarded as the most effective and efficient form of the national payment system (Munywoki and Mutua, 2011). The Kenyan financial sector has also undergone tremendous change in the last two decades, most notably advances in technology and changing economic conditions in the last two decades (Misati et al, 2010). By use of a dedicated household and individual survey, the study dwells particularly on the financial behavior of respondents before and after the introduction of MM, while ascertaining the extent of utilization of this service as a growing national payment system. A large survey would most likely have heavy implications in terms of time requirements and cost constraints. As a consequence, the study focuses only on one urban region, which is Kibera slum as the field of study.

The rest of the paper is organized as follows: Chapter 1 provides a background to the study, the motivation and statement of problem, and the main research questions. Chapter 2 highlights relevant literature on the topic while methodology and data issues are discussed in chapter 3. The methods of data analysis and results are provided in chapter 4, while the final chapter will concentrate on the conclusions and key findings that would then lead to the prescription of appropriate policies to follow.

### 2.0 REVIEW OF LITERATURE

#### 2.1 Theoretical Literature Review

Schumpeter (1912), the much celebrated economic historian, is renowned among the key pioneers of financial innovation. Schumpeter opines that well-functioning banks spur technological innovations by funding those entrepreneurs with best chances of successfully implementing innovative products and production processes (Mwaura and Ngugi, 2009). Earlier on, Bagehot (1873) credited the superiority of the English financial markets with the latter's rapid development.

Innovation entered all the modern dynamic macroeconomic models, since the influential considerations of Schumpeter (1950), passing through the initial formalizations of Solow's model (1956) and finally onto the endogenous growth theories and the knowledge economy models (Romer, 1990; Grossmann-Helpman, 1991; Aghion-Howitt, 1992; Jones, 1995). Schumpeter's view of innovation as "creative destruction" was aimed at portraying innovation as being dynamic and one that was necessary for the evolution of industries (Malerba, 2005).

Solow (1956) has emphasized on the need for capital accumulation which would then set the pace for technological improvements in firms as a key prerequisite for enhancing efficiency. Hence in Solow's model, the implication of a firm enhancing her competitiveness through constant improvements in technology is quite resounding, and this implication can be seen, at least in the light of innovations.

The ability of firms to develop their production potential and to use such technologies to reduce labor costs was much emphasized by the great economic historian Karl Marx (1950s). It was in Marx's view that as capitalists profits increased, they deemed it fit to substitute machines and other labor-saving technologies for the "demanding" laborers. With time, the capitalists' profits would swell and this would then automatically encourage further innovations.

Innovativeness of men and women towards entrepreneurship and new ways of thinking is well documented in the great stage theory of Walt Rostow. For Rostow (1960), if a society would transform itself from a stage of underdevelopment to a

stage of full development, it needed at least to have people who would have an innovative mind-set and to supersede in authority the traditional and rather contended masses who did not find innovative ideas as being of any help. It was indeed in Rostow's contention that no society would progress from a level of poverty to a level of affluence if it still holds onto old practices and technologies.

The endogenous growth theories are a further and most recent inkling of the need for Research and Development (R&D) and innovation in economic growth, since this is a kind of public good with externalities (Arrow, 1962; Sena, 2004). A key assumption here is that technology is a public good or at least non-rival (Romer, 1990; Jones, 1995; Arnold, 2005). Of much emphasis is that both the Solow and Endogenous Growth Models concur that savings and physical investment are not able to explain sustained economic growth in the absence of technological progress. This is indeed a main criticism of the Classical School of economic thought which perceived economic growth in the complete absence of technology.

Economic history is indeed replete with classic examples illustrating the importance of financial markets for growth. Hicks (1969) and North (1981) argued that the distinguishing feature of industrial revolution was not particularly due to development of new technologies but because of, for the first time, implementation of technological advances became a highly capital intensive process.

## **2.2 Empirical Literature Review**

Access to Financial Services (ATFS) is a relatively recent phenomenon being discussed across the financial circles and as a result, it is only now that literature on this subject has started picking up particularly in the Kenyan context. Hence, empirical literature reviewed here is particularly on studies done from other parts of the world. This is followed by the African experience, before zeroing in on studies specific to Kenya.

At the domestic scene, household surveys conducted by the Financial Sector Development Trust Kenya jointly with the Central Bank of Kenya, confirm three previously assumed conclusions about ATFS. First, a large proportion of the Kenyan

population has no ATFS, whether formal or informal; second, there is a general tendency for access to services from formal and semiformal providers (banks and SACCOs) and MFIs to decline as one moves from urban to rural, from high income to low income, and from better educated to not educated. Third, although the percentage of the population that is served is similar in urban and rural areas, the mix of those services is different; in urban areas, respondents rely more heavily on services from banks, SACCOs and MFIs, while there is greater reliance on informal sources in the rural districts (Fin Access, 2006; Fin Access 2009; Johnson, 2009; Thorsten et al. 2010).

The survey also had a lot of revelations about the significant differences in the use of financial services across different subgroups. While formal banking services were preferred by men, informal services tended to remain the domain of women. However, the likelihood of financial exclusion tended to remain constant for both gender. Urban Kenyans are more than twice as likely to use formal financial services as rural Kenyans because more than fifty percent of Kenya's bank branches are in urban areas. The level of one's education was also found to have a strong positive correlation with the use of formal financial services. Here, Kenyans with tertiary education are more likely to use formal and informal financial services than those with secondary and primary education respectively (Beck, 2009).

Other important predictors for financial inclusion include: Age, employment status, cell phone ownership, and an individual's risk aversion; being positively correlated with the usage of either formal and informal services or both. Income was also found to be one of the important determinants of usage of both formal and informal financial services.

A number of studies on the financial innovations have focused particularly on the link between financial innovation and the conduct of monetary policy. Generally, no consensus exists so far on the link between innovations in finance and monetary policy because new developments in the financial sector call for a continuous revision in the traditional tools of monetary policy, which such innovations render ineffective (Pradhah, 2008; Mario, 2007; Noyer, 2007; Iris and Grimes, 2003). Those who support the effectiveness of monetary policy after financial innovations argue that

with increased financial innovation, investors easily access products that allow hedging of interest rate risks which in turn encourages portfolio diversification amongst investors with positive implications on the pass-through effects of policy rates (Jurgen, 2008; Mishra and Pradhah, 2008; Weber, 2008; Mario, 2007; Mohan, 2007; Noyer, 2007; Roldos, 2006).

The effect of mobile phone development on financial inclusion for a cross-country analysis has been modeled by Kendall, Mylenko and Ponce (2010), while controlling for a range of factors. The authors have modeled financial inclusion as follows:

$$FI_{i,t} = \gamma_0 + \gamma_1 y_{i,t} + \gamma_2 dens_{i,t} + \gamma_3 mob_{i,t} + \sum X_{i,t}^k + \partial_i + \varepsilon_{i,t}$$

Where FI, the dependent variable, stands for the index of financial inclusion, measured by the number of deposits and loans per head; mob, the variable of interest, denotes the mobile phone penetration rate; y and dens, the main control variables, represent the level of GDP per head and population density respectively; X is a set of other control variables such as banks' overhead costs, quality of legal environment and bank penetration. Finally,  $\partial$  accounts for country-specific effects and  $\varepsilon$  is the error term. This model has been adopted by Andrianaivo and Kpodar (2011) using panel data random effects estimator for the sample period 2003 and 2007. This study concludes that mobile phone development is strongly positively correlated to financial inclusion. Patrick Honohan (2008) conducted a study to assess the cross-country variation in household ATFS through deposit or loan accounts by combining account numbers at banks and MFIs together with in-country household surveys, and how these impact on poverty levels.

Other studies have particularly narrowed down on the role of financial developments on Economic Growth (Mwaura, 2009; Ngugi, 2009; Ross, 1996; and Shaw, 1973; Levine and Zervos, 1996). These studies hold that financial systems are important for productivity, growth and development via savings and technological progress.

Ho (2006) focused on the linkage between financial innovation, growth and monetary policy transmission mechanisms. He suggests that the evolution of electronic means of payment (e-money) could replace bank demand deposits and other types of highly liquid deposits, thereby undermining the functioning of monetary transmission

mechanism since it weakens the link between change in bank deposits and change in real sector activities. Moreover, technological advances in payment systems which allow for a more efficient settlement of interbank transactions reduce the necessity of holding excess reserves with central bank for precautionary motives. This may lead to a destabilization of the money stock and nominal income, and ultimately countries may abandon monetary targeting (Iris and Grimes, 2003).

Financial innovation fosters the faster dissemination of information and its more rapid incorporation into financial market prices and monetary policy decisions. Hence, Noyer (2007) is of the view that financial innovation increases the effectiveness of monetary policy, particularly via the interest rate channel.

Sukudhew et al., (2007) used a two-step Engle-Granger ECM approach to obtain a long run relationship between market rate of interest and policy rate and to gauge the strength of association between interest rate pass-through and financial innovation indicators. Their results indicated that developments in the financial markets strengthens asset price channel; weakens impact of monetary policy on bank lending channel and has mixed impact on balance sheet channel.

The impact of monetary policy on the real economy particularly via its effects on housing prices was given attention by Aoki et al. (2004). The study finds that the recent financial innovations such as flexible refinancing terms and increased consumer access to unsecured credit may have changed the transmission mechanism through housing prices.

Misati et al (2010) studied the effects of financial innovation on the reaction to monetary policy moves. By using an Autoregressive Distributed Model (ADL) specification and the Two Stage Least squares (2SLS) estimation technique, the study argues that financial innovation dampens the interest rate channel of monetary policy, while reducing the output gap since they increase the efficiency with which money is transmitted into the economy.

## 2.3 Overview of the Literature

The importance of technology, R&D and innovations in economic growth has received considerable attention both in the theoretical and empirical literature. Today, these concepts have still allured wide interest from economists, policy makers and politicians (Manganelli, 2008). A common example here is the so-called Lisbon Agenda that sets out a commitment to develop policies and provide a basis for an economy in which knowledge would be the driving force of economic growth (Segarra, 2007).

From the foregoing however, there is relatively little empirical research done on the area of financial innovations so far (White and Frame, 2001). Most studies that have touched on financial innovation have tended to focus their attention on its effects on money demand and monetary policy (Hasan, 2009; Sukudhew, 2007; Noyer, 2007; Scott and White, 2002; Glennon and Lane, 1996; Niehans, 1983). There has been however mixed results on the impact of financial innovations on the effectiveness of monetary policy. Indeed, no systematic analysis of the effects of financial innovation on macroeconomic variables and monetary policy exist in the literature, particularly for Kenya (Misati et al., 2010).

Other studies have tended to focus on the linkage between financial innovation and growth (Ho, 2006; Mwaura and Ngugi, 2009; Levine and Zervos, 1996; King and Levine, 1993). These studies have argued that developments in the financial sector would spur savings and investments, which by themselves would motivate growth.

A review of the literature also reveals that a good deal of attention has been given to the determinants of financial access and inclusion. More specifically, personal attributes, social characteristics and demographic factors have been identified as key players in one's financial inclusiveness (Johnson, 2009; Fin Access, 2009).

The link between financial innovation and financial access has not been exhaustively explored as yet. Despite this, a key agenda among regulators, Governments, and public policy makers is in terms of ensuring access to finance for all, at least through encouraging rapid developments and innovations in the financial sector. It is for this reason that we study that the nature of financial innovations in Kenya's financial system, and test for the relationship that exists between such innovations and the inclusiveness of the financial system.

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## CHAPTER THREE:

### 3. RESEARCH METHODOLOGY

#### 3.1 Introduction

This chapter provides the theoretical framework to the study. This is then followed by an empirical model which establishes the econometric model to be specified and a description of the variables to be used and the estimation procedure. Thereafter, we provide a brief discussion of the study area, the data types and sources.

#### 3.2 Theoretical Framework

Mobile telephony allows expansion and ATFS to previously underserved groups in developing countries since it has contributed to the emergence of branchless banking, thereby improving financial inclusion (Andrianaivo and Kpodar, 2011; ATISG Report, 2010) by reducing transaction costs.

Literature reviewed is awash with explanations of how penetration of banking services in particular and financial services in general have for a long time been the preserve for the urban elite, while excluding the urban poor and the rural areas. There is therefore a clear financial infrastructure gap in Kenya, just like in other developing countries.

The expansion of mobile telephony in Kenya over the last four years has proceeded much faster than that of the conventional financial system that has in fact failed to guarantee greater financial access (Njuguna and Kimenyi, 2009).

Accordingly, considering the growth in mobile phone use and spread and taking into account low ATFS, mobile financial services have indeed been regarded as an opportunity to reach the unbanked customers. Indeed, all evidence show that MM has helped the previously unbanked populations to be regarded as “banked”.

Mobile financial services are a recent phenomenon in Kenya dating back to June 2007. To date, only three countries in Africa- South Africa, Zambia and Kenya are utilizing the service. As a consequence, not much empirical work exists on the link between financial inclusion and financial innovations (Frame and White, 2004). In this section therefore, we discuss the available studies on this area.

### 3.3 Model specification

From the literature review and what is provided for by economic theory, the current study employs the methodology of limited dependent variables. More specifically, the logistic regression model is used to estimate the marginal effects on access.

Hence, the functional relationship between financial access and financial innovation is represented as:

$$\text{Financial access} = f(\text{Respondent's Age, Level of education, Perception about financial services, employment status, ownership of handset and degree of Financial innovations})$$

The estimation of such a functional relationship involves a limited dependent variable since ATFS would have a unit code (access=1) whereas exclusion from financial services would carry a zero code (no access=0).

The logistic regression is derived by obtaining the logarithm of the odds ratio; that is the ration of the probability of any event occurring to the probability that the said event will not occur (Long, S J, 1997). Hence, given that  $y = 1$  is the probability of an event taking place, the  $1 - (y = 1)$  would be the likelihood that the event will not take place.

Therefore, if we let  $(y = 1) = \frac{e^{(\alpha + \beta x + \epsilon)}}{1 + e^{(\alpha + \beta x + \epsilon)}}$  then, the probability that the event will

$$1 + e^{(\alpha + \beta x + \epsilon)},$$

not take place can be given as:

$$1 - (y=1) = 1 - \frac{e^{(\alpha + \beta x + \epsilon)}}{1 + e^{(\alpha + \beta x + \epsilon)}} = \frac{1}{1 + e^{(\alpha + \beta x + \epsilon)}}$$

Taking the ratio and cancelling out the denominators therefore yields:

$$\frac{y}{1 - y} = e^{(\alpha + \beta x + \epsilon)}$$

$$1 - y$$

The logistic regression is thus obtained by taking the logarithms as follows:

$$\text{Log} \left[ \frac{y}{1 - y} \right] = \log [e^{(\alpha + \beta x + \epsilon)}] = \alpha + \beta x + \epsilon.$$

With this in mind, a logit regression model would be run since this methodology is not only best suited for binary response models, but indeed carries with it the ease of estimation and interpretation of research findings.

### 3.3.1 The Model

Access to financial services is modeled as a binary response variable where access (=1) and no Access (=0). Models of such a Binary response can be estimated using either the Binary Logit or the Binary Probit Models of Limited dependent variables.

Literature on ATFS has identified Age, employment status, Level of education, gender, and ownership of a mobile phone as being the key determinants of ATFS.

Since MM transfer services were conceived in Kenya in 2005 but effectively took root in 2007, a system of three logistic regressions is run: for the year 2005 before MM Transfer Services, for the year 2008 at the infancy of MM Transfer services, and the year 2011, where such services are relatively well developed.

The estimable logistic model for this study can thus be represented as:

$$\log(y/1-y) = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + u \dots \dots \dots (1)$$

Where the explanatory variables:  $x_1$  is the age of respondent in years;  $x_2$  is the level of education in years of schooling;  $x_3$  is a measure of one's perception about the financial system;  $x_4$  is the employment status of the respondent;  $x_5$  is one's ownership of a mobile phone, and  $x_6$  is the number of transactions per month for every individual or household if they are included in the financial system. The coefficients  $b_1$ ,  $b_2$ ,  $b_3$ ,  $b_4$ ,  $b_5$  and  $b_6$  are attached to each respective explanatory variable, and their utility will be found in explaining marginal effects for each variable to probability of financial access. The last term  $u_i$  is the error term. Equation (1) above is run for information before the inception of MM transfer services. Therefore, in measuring  $p(y=1/x_i)$  for equation (1), this probability value should be the one before MM services.

Having estimated this regression without MM, the study will also run a second logistic regression, this time with the probability value  $p(y=1/x_i)$  including only those currently utilizing MM transfer services.

Hence, the second estimable logistic regression shall be expressed as:

$$\log (y/1-y) = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + u \dots \dots \dots (2)$$

The explanatory variables in equation (2) are as defined, except for variable  $x_6$  which would now represent the number of monthly transactions for MM alone, ignoring transactions in the conventional banking system.

Finally, the study makes the assumption that the introduction of MM transfer services did not completely discourage access to finance in the conventional banking industry. This assumption is supported by the recently witnessed nexus between banks and MM services including Equity Bank (M-Kesho), Cooperative Bank's (MM) and Family bank's (Pesa Pap), among other ongoing MM-bank cooperation's.

With this recognition in mind and by virtue of the fact that withdrawals of MM can still be undertaken at Bank's ATM and other upcoming outlets, a logistic regression that captures both MM and conventional banks would be an interesting one. Therefore, the study runs the following regression:

$$\log (y/1-y) = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + u \dots \dots \dots (3)$$

The reason for the above specified model is because it is supported by the observed behavior of the existing partnerships between MM providers and banks to extend ease of ATFS.

### 3.3.2 Expected Signs of Variables

From the review of literature, it has been noted that all the explanatory variables proposed in this study; Age of respondent; years of schooling; perception about banks; and employment status do have important implications as far as probability of ATFS is concerned. Younger populations tend to have higher access to finance than older populations, giving an indication of an inverse relationship. Similarly, literate people who have had some years in school tend to be financially included than the illiterate population. Hence, a positive relationship is expected between the levels of education and financial access. This same kind of relationship can be seen to be true

illiterate population. Hence, a positive relationship is expected between the levels of education and financial access. This same kind of relationship can be seen to be true even to one's employment status, perhaps because remuneration for employment is mainly channeled through the financial system.

### **3.4 Description of the Study Area**

Kibera is a division of Nairobi area, Kenya located approximately five kilometers southwest of the city centre. This region is recognized worldwide as one of the largest slums in Africa, and the world.

The region is divided into a number of villages namely: Kianda, Soweto, Gatwekira, Kisumu Ndogo, Lindi, Laini Saba, Siranga, Makina and Mashimoni. This region lies within the broader Lang'ata constituency of Nairobi province. The exact population of Kibera slums is really not clear, but estimates of between 0.5 million and 1.2 million have been floated by various sources<sup>34</sup>. The region is basically cosmopolitan as 41 Kenya's ethnic tribes are housed in the region, but the major tribes to be found here are the Luhya, Luo, Kikuyu, Akamba, and Nubians.

The vast majority of the population in Kibera lack access to formal banking facilities. This "unbanked" segment of the population frequently resorts to micro-finance groups such as Msingi Bora. In particular, they heavily rely on the "merry-go-round" (ROSCA) contributions for their livelihoods<sup>5</sup>. The entrance of MM transfers and banking agents is however expected to reinforce ATFS in the rather "financially excluded" region (CGAP, 2009).

### **3.5 Data Sources and Data Types**

#### **3.5.1 Data Types**

The study collected data on the extent of utilization of MM services among the urban poor; usage of the conventional banking services before and after the establishment of MM; and the perceptions among the slum dwellers on their inclusiveness in the financial system. Finally, some data on the individual or household socio-economic characteristics was also sought to act as control variables.

<sup>3</sup> Tropical vacations Inc., Website accessed on 20<sup>th</sup> September 2011.

<sup>4</sup> Kibera, Facts and information, Website accessed on 20<sup>th</sup> September 2011.

<sup>5</sup> The Humanitarian News analysis Services, IRIN website accessed on 21<sup>st</sup> September 2011.

### 3.5.2 Data Sources

Honohan (2005) contends that there is generally a problem in the measurement of overall financial access, partly due to the paucity of data in this area. He is of the view therefore that any study that touches on financial access would require a generalized or a dedicated household or individual financial access survey. Upon this realization, the study performed a dedicated sample financial access survey on the urban poor of Kibera slum. The survey area was arrived at because the problem of financial access is a phenomenon common among the rural and urban poor. Therefore, Kibera slum guaranteed a high share of low income people in the overall population, being widely recognized as one of the world's largest slums.

The survey instrument used involves a questionnaire with a face-to face interview with the respondents, via random sampling procedures.

## CHAPTER FOUR:

### 4. DATA ANALYSIS, PRESENTATION AND DISCUSSION OF RESULTS

#### 4.1 Introduction

This chapter presents the summary statistics and regression results for determinants of ATFS among the urban poor of Kibera slums, with a bias towards MM services. The variable on ATFS is modeled as a function of key explanatory variables such as age, educational level, occupation, and marital status, ownership of a mobile phone, poverty index and one's attitude towards MM services. In aggregate, 45 variables have been formulated in order to achieve the objectives of the study.

#### 4.2 Definition of Variables and Descriptive Statistics

Table 4.1 provides the Definition and Descriptive Statistics of the Variables used in this study.

**Table 4.1: Descriptive Statistics**

Variable	Definition	Observations	Mean	Min	Max
Age	Age of respondent in years	300	31.25333	16	64
Household size	Household size in numbers	300	3.5	1	9
Occupation	Occupation of respondent	300	1.82333	0	5
Gender	Gender of the respondent, with 0 = female; 1 = male	300	0.64667	0	1
Marital status	Marital status of respondent, where 0 = separated; 1 = single; 2 = married	299	1.62876	0	2
Knowledge of mobile money (MM)	Has the respondent heard of MM services, 0 = no; 1 = yes	300	0.99333	0	1
Current Utilization of Mobile Money	Is the respondent currently utilizing any of these services, 0 = no, 1 = yes	300	0.916667	0	1
Mobile money services being used	Which MM services is the respondent using	300	1.163333	0	6
Attraction to use mobile money	What attracted the respondent to utilize MM services?	300	1.596667	0	11

Ownership of a handset	Does respondent own a handset, 0 = no; 1 = yes	300	0.93667	0	1
Other financial services apart from Mobile Money	Apart from MM, does respondent have other financial services? 0 = no; 1 = yes	300	0.63	0	1
If yes which ones	If respondent has other financial services, which are they?	300	2.64667	0	27
Reason for ownership of handset	Reasons for ownership of mobile phone is to transact with MM	298	4.13	1	5
Use of mobile money services	The use of MM transfer services	300	9.79	0	21
Aware of partnerships between mobile money service providers and banks	Is the respondent aware of partnerships between MM providers and banks? 0 = no; 1 = yes	300	0.73	0	1
Importance of partnerships between mobile money service providers and banks	Is partnership between MM and banks useful for access to finance? 0 = no; 1 = yes, 2 = uncertain	300	1.23333	0	2
Mobile banking transacted with	MM banking services that respondent has ever transacted with	300	0.23333	0	12
Scale index for importance of financial services in 2005	Index for importance of determinants of financial services access in 2005	115	43.87826	8	80
Scale index for importance of financial services in 2008	Index for importance of determinants of financial services access in 2008	262	45.0687	6	82
Scale index for importance of financial services in 2011	Index for importance of determinants of ATFS in 2011	267	38.43446	4	86
Preference for others access to financial	Respondent's preference for others ATFS	300	94.76667	0	100

services					
Level of education	Respondent's level of education	300	2.75	1	4
Total transactions in the year 2005	Total transactions in 2005	35	3.114286	1	8
Total transactions in the year 2008	Total transactions in 2008	155	5.748387	0	37
Total transactions in the year 2011	Total transactions in 2011	274	9.963504	1	47
Employment status in the year 2005	Employment status in 2005	296	1.587838	1	3
Employment status in the year 2008	Employment status in 2008	298	1.885906	1	3
Employment status in the year 2011	Employment status in 2011	298	2.090604	1	4
Approximate monthly expenditure	Approximate monthly expenditure	151	12749.34	1000	73100
Monthly expenditure on food	Monthly expenditure on food	131	5125.191	500	21000
Monthly expenditure on clothing	Monthly expenditure on clothing	46	1621.739	200	10000
Monthly expenditure on housing	Monthly expenditure on housing	267	2048.502	500	20000
Monthly expenditure on medical care	Monthly expenditure on medical care	60	476.5	20	6000
Monthly expenditure on school fees	Monthly expenditure on education or school fees	110	3944.091	100	20000
Monthly expenditure on donations to friends, church	Monthly expenditure on donations to friends, church offerings, etc	18	519.4444	100	1000
Monthly expenditure on airtime purchase	Monthly expenditure on airtime purchase	118	860.1695	50	5000
Savings (Bank, Chama, SACCOs, etc)	Savings (Bank, Chama, SACCOs, etc)	96	2659.583	20	30000
Amount spent on any other big expenditure	Amount spent on any other big expenditure	8	4712.5	300	20000

Type of house that respondent lives in	Type of house that respondent lives in	299	1.498328	1	3
Nearness to toilet facility	Nearness to toilet facility	299	2.73913	1	4
Number of key assets owned	Number of key assets owned	297	3.229	1	8
Owner of the toilet facility used	Owner of the toilet facility used	299	3.230769	1	6
Type of dwelling that respondent lives in	Type of dwelling that respondent lives in	299	5.12709	1	7
Material that makes up the main walls	Material that makes up the main walls	299	4.040134	1	8
Rooftop	Material that makes up the roof top	299	1.06689	1	8
Other arising issues	Any other issues that respondent would want to be addressed	300	1.37667	1	15

## 4.3 Definition of Variables

### 4.3.1 Dependent Variable

Access to Financial Services (ATFS) is the dependent variable captured by the responses from the respondents as to whether they use or do not use the financial system. This variable takes only two possible values, i.e., yes (=1) and no (=0). These responses were obtained through a combination of oral interview guided by questionnaire.

In the second instance, ATFS is measured by means of a latent variable whereby if one's number of transactions exceed the 50<sup>th</sup> percentile value, then ATFS = 1, otherwise ATFS = 0. This transformation was performed in order to capture respondent's ATFS over the years: 2005, when no MM transfer services existed; year 2008, which saw the launch of MM services in the Country; and year 2011 where such services are relatively well developed.

To achieve these objectives, the study obtained data on the number of transactions for each of these three durations and utilized the latent variable approach to estimate ATFS. For each period, the 50<sup>th</sup> percentile was obtained and is thought to provide an

excellent dummy variable. The 50<sup>th</sup> percentiles were 3 transactions, 5 transactions and 6 transactions for years 2005, 2008, and 2011 respectively. Hence, the measure of financial inclusion is specified as shown here below for each particular year that the study focuses on:

Year 2005:

ATFS = 1 if number of transactions is greater than or equal to 3  
0, otherwise

Year 2008:

ATFS = 1 if number of transactions is greater than or equal to 5  
0, otherwise

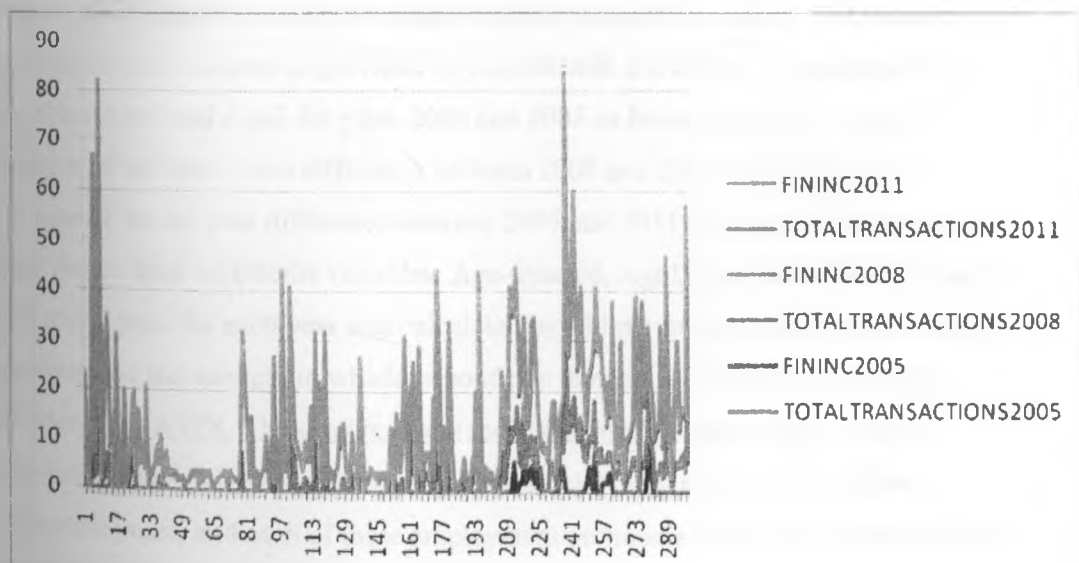
Year 2011:

ATFS = 1 if number of transactions is greater than or equal to 6  
0, otherwise

Measures of access to finance which have been recently used fall into two broad categories: those based on provider's information, and those based on user's information (Kumar, 2005). Therefore, this study employs user's information.

Figure 6 shows the variation in the number of transactions for each period.

**Figure 1: Total Number of Financial Transactions and Dummy Variable for Financial Inclusion (2005, 2008 and 2011)**



Having specified the nature of dummy variables used the study then runs a logit as specified in the model for each year. The explanatory variables of interest are: age of the respondent, age square, level of education, preference for others to access to finance (a proxy for attitude to ATFS), a weighted scale index, employment status, ownership of a mobile phone, and the nature of financial innovations (the number of various financial products that respondents can access).

From Figure 1, there is an early indication that the year 2005 witnessed the lowest level of financial inclusion with the least number of total transactions recorded. Table 4.1 clearly demonstrates this with the mean number of transactions that year being approximately 3, while the line graph depicts that the graph for financial inclusion in 2005 was the lowest. It is evident that the level of financial inclusion improved in the year 2008, since  $\text{fininc } 2008$  is higher than  $\text{fininc } 2005$ . Equally important is that the mean number of transactions in 2008 is higher (mean = 5.748) than 2005. Finally, the year 2011 has witnessed the highest level of financial inclusion with the line graph for this year ( $\text{fininc } 2011$ ) being visibly higher than all the rest. The mean value for the total number of transactions in 2011 has a mean value of 9.964. By early signals therefore, there is all evidence to show that financial inclusion has been increasing from 2005 to 2008 and onto 2011.

Before exploring the results, the study had to generate a set of new variables while making the assumption that most other variables remained constant. The variable Age in years for 2011 is used as provided by respondents. However, we generated the variables Age1 and Age2 for years 2008 and 2005 as follows:  $\text{Age1} = (\text{Age} - 3)$  because of the three years difference between 2008 and 2011.  $\text{Age2} = (\text{Age} - 6)$  because of the six year difference between 2005 and 2011. These transformations thus gave rise to three additional variables: Age-squared, Age1-squared and Age2-squared. The scale index for each year was calculated by adding up the scores for the various responses on the strength to which respondents thought some specified variables affected their ATFS. These scores were then converted to percentages. Finally, respondents were also asked to specify their employment records for the three respective years, and each of these employment pronunciations was included in their respective logit models.

All the other variables: level of education, preference for others access, ownership of mobile phone and nature of financial innovations were kept constant for the six year period from 2005 to 2011 due to respondents “fatigue” and claim of loss of memory for these variables.

#### **4.3.2 Independent Variables**

The explanatory variables against which ATFS have been modeled have been informed by previous studies on financial inclusion. These Variables include: Age of the respondent as captured by number of years; the Size of the household; the respondents Gender; Marital status; Level of education in terms of none at all, Primary, Secondary, and College or University; Ownership of a mobile phone; Use of other financial services; knowledge of existence of Mobile Money services whereby the response was a yes (=1) or a no (0); awareness of partnerships between MM service providers and banks, and their importance in enhancing financial inclusion and the Number of Assets owned. The study recognizes that use of any good or service is directly related to the potential benefit to be derived there from and that agents will utilize the financial system only if they perceive some utility from it. As a consequence, information on how important access to finance is has been sought for and used in the estimation.

### **4.4 Discussion of Descriptive Statistics**

#### **4.4.1 Access to Financial Services**

Of the sample respondents interviewed, only 25 of the respondents admitted not utilizing any of the MM transfer services currently available, thus representing 92 percent of the sample who utilize these services. Similarly, from Table 4.1, the mean value for current utilization of MM stands at 0.91667. This indicates that most responses have been closer to 1(those who use the services) than to 0(those who do not use the services). This is equally well illustrated by the histogram in Figure 2; the distribution of utilization of financial services is mainly batched around 1 and skewed to the left. As seen from Appendix table 3A, ATFS is seen to be positively correlated (corr. = 0.6325) with one’s ownership of a mobile phone. These results are expected.

#### 4.4.2 Knowledge of Existence of Mobile Money Transfer Services

The study posits that a respondent's awareness that MM transfer services exist would have important bearings on whether they would utilize such services. Only 2 respondents said they have not heard of MM. The other 99.3 % have heard of MM. Figure 3 depicts the distribution of awareness of existence of MM transfer services, as shown by the single visible bar at the yes responses. Indeed, the mean value of 0.9933 seen in Table 4.1 on knowledge of financial services goes a long way to reinforce the idea that a major section of the population is aware of these services.

#### 4.4.3 Ownership of a Mobile Phone Handset

A study by Fin Access (2009) revealed that ATFS can be explained in part by one's ownership of a mobile phone. This was a study conducted at the national scene. Therefore, this variable is thought of as being significant for one's access to finance, particularly MM. Narrowing down to Kibera slums, 19 of the respondents do not own mobile phones. This translates to 93.7% of the sample owning handsets. A critical look at this sample as shown in Table 4.2<sup>6</sup> which further reveals that of the 13 students in the sample, only 2 do not own handsets. Similarly, of the 74 casual laborers, 71 of them have ownership of phones; whereas out of the 191 individuals in business, 178 of them own their own handsets. All teachers or civil servants are in possession of mobile phones.

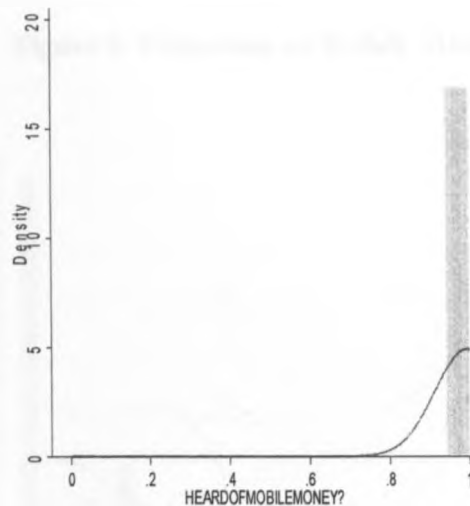
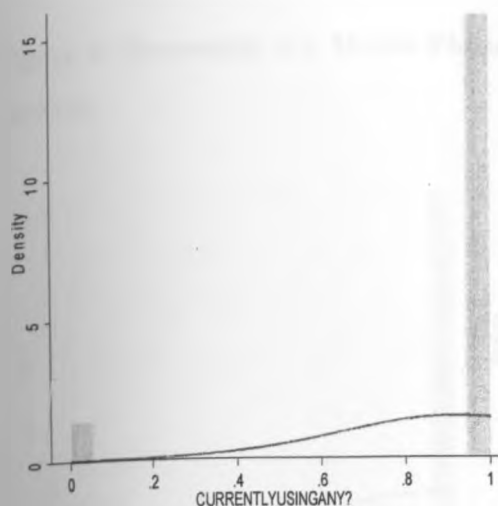
The distribution of handsets within the sample is illustrated in Figure 4 that reveals a right skew with a majority of "yes" responses. An even interesting result shows that approximately 61% of respondents "strongly agree" that their ownership of mobile is because it allows them to transact with MM. Approximately 8% "strongly disagree" with this reasoning, while 9% neither agree nor disagree.

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<sup>6</sup> See also Appendix, Table A2

**Figure 2: Utilization of Mobile Money Transfer Services**

**Figure 3: Knowledge of Existence of Mobile Money Services**



**Figure 2**

**Figure 3**

As expected, there is a positive correlation between ownership of a mobile phone handset and access to MM services, with a correlation value of +0.6325 (Appendix, table A3).

**Table 4.2: Comparison of Ownership of Mobile Phone with one's Occupation**

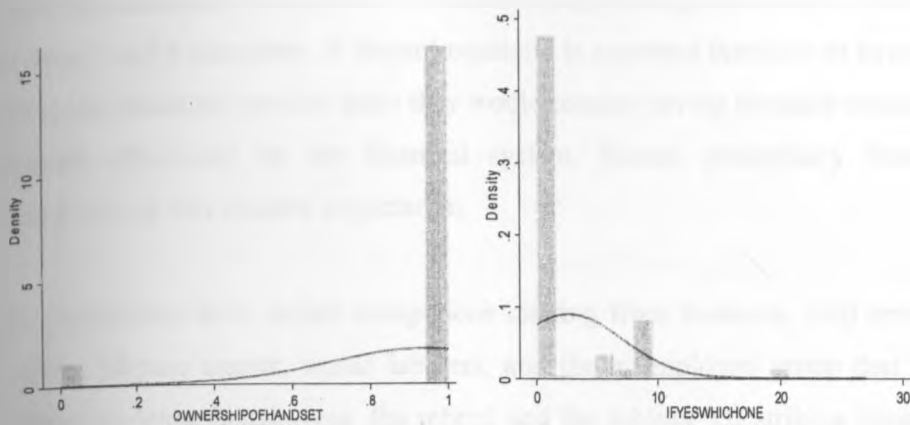
Those who own Mobile Phones			In General		Overall Percent
Occupation	Freq.	Percent	Freq.	Percent	
Unemployed, Housewife (0)	12	4.27	13	4.33	92.31
Business (1)	178	63.35	191	63.67	93.19
Teacher, Civil Servant (2)	8	2.85	8	2.67	100.00
Student (3)	11	3.91	13	4.33	84.62
Casual, Temporary (4)	71	25.27	74	24.67	95.95
Retired (5)	1	0.36	1	0.33	100.00
Totals	281	100	300	100	93.67

#### 4.4.4 Utilization of other Financial Services

A critical determinant of one's utilization of MM is whether they do have access to other financial services. This view is supported by the theory of demand and supply,

which emphasize that availability of other related goods and services can affect people's level of demand and/or supply for a certain good or service

**Figure 4: Ownership of a Mobile Phone    Figure 5: Utilization of Mobile Money services**



From the sample, 111 (37%) of the respondents denied use of other financial services; hence the other 63% use other services apart from MM. Of these who utilize other financial services apart from MM, 116 (61.38%) use bank accounts, 16 (8.47%) utilize Chama/merry-go-round, while 38 (20.11%) utilize both banks and Chama simultaneously. In aggregate therefore, 89.96% of the sample use either banks, Chama or both.

From Figure 5, the distribution is such that four key bars are visible. These bars represent bank accounts (=1), merry-go-round or Chama (=5), a combination of banks and merry-go-round or Chama (=9). However as can be seen, a disproportionately large number of respondents lack access to other financial services (=0).

#### 4.4.5 Other Results

The age of the respondent is derived from their own pronouncements of their ages in years. The mean sample age is 31.25 years with the youngest member of the sample having 16 years, and the oldest being 64 years. Age is seen as an important

determinant for ones ATFS. Age is seen to be positively negatively correlated (corr. = +0.2609) with one's use of financial services<sup>7</sup>.

Household size as measured by the number of people "staying under one roof" is on a scale of 1 - 9. This means that some respondents stay on their own (single), while the largest household had a number of 9. However, the average household is seen to have between 3 and 4 occupants. A larger household is expected therefore to have a higher affinity for financial services since they would require having frequent transactions as provided effectively by the financial system. Hence, preliminary findings are consistent with this positive expectation.

The respondents have varied occupations ranging from business, civil servants and teachers, M-pesa agents, casual laborers, and the unemployed group that generally includes students, housewives, the retired and the jobless. Of striking importance is that 191 (64%) of the respondents are in business, while 7 (2.33%) are civil servants or teachers, 13 (4.33%) are students, 75 (24.67%) are casual or temporary employees, 13 (4.33%) are jobless and/ or housewives, while 1 (0.33%) is a retiree. An individual's occupation too is negatively correlated with their access to MM although the correlation is only weak (corr. = -0.25) from appendix, table 3A.

The impact of gender on access to MM is not clear theoretically, but the sample reveals a positive correlation value (corr. = +0.25) between gender and use of MM. This depicts that gender and use of MM move together in the same direction, thus the male gender is associated more with use of MM services compared to their counterparties. Of the sample population, 194 (64.7%) of the respondents are males, while 106 (35.3%) are females. There is however a complete reversal of results if we focus specifically on gender and use of MM alone. Table 4.3<sup>8</sup> shows that by focusing on gender and use of MM alone, there is now a negative correlation. In this instance, the male gender is associated more with use of MM services compared to their counterparties

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<sup>7</sup> See Appendix, Table 3A  
<sup>8</sup> Compare with Appendix Table A4

Table 4.3: Correlation between Gender and Current Use of Mobile Money

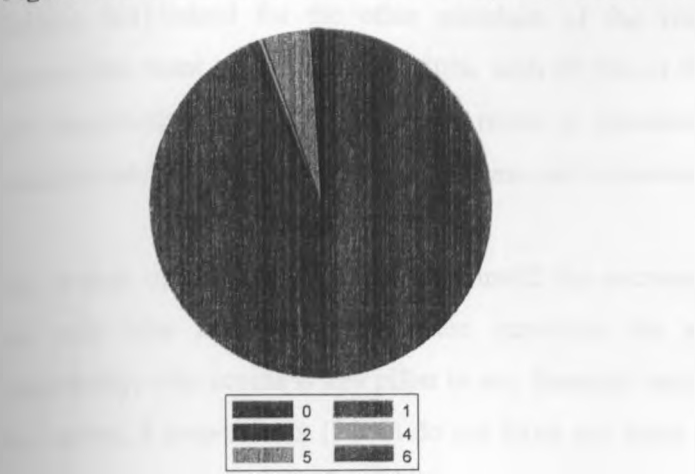
	Gender	current~y
Gender	1.0000	
currentlyu~y	-0.0210	1.0000

Among the main uses of mobile phone services recognized are: sending money, receiving money, purchasing airtime, saving money, buying goods, paying bills and ATM withdrawals or some combinations of these. Hence, the greater the number of uses to which individuals have for MM services, the greater the access to MM services is as depicted by the strong positively correlation between uses of MM and access to MM services (corr. = +0.4875). The largest proportion (71%) of the sample use MM for sending money, receiving money, and purchasing airtime.

MM service providers are related to a specific telecommunication company. Hence, Safaricom runs M-PESA, Airtel operates ZAP; Orange oversees the workings of ORANGE-MONEY, while YU runs YU-MONEY. From the pie-chart presented in Figure 6, 85% (purple pie) of the respondents use M-PESA transfer services, with 1% utilizing ZAP (red pie), 0.3% use Orange Money (orange pie), 4.3% (grey pie) use M-PESA and ZAP simultaneously, 1% use MPESA and YU-MONEY simultaneously (green pie), while the remaining 8% (blue pie) do not utilize any of these services. An interesting result here is that use of MM services is perfectly positively correlated with the choice of MM provider to use (corr. = +1, from appendix, table 3A).

Attraction to MM received varied responses, but 72% have been attracted via advertising, while 6.7% are using this service because of the efficiency it affords to them. 4% have cited family needs as the driving force to their use of the service with a marginal 3% citing friends as the people who motivated them to use the service. On the other hand, 8% of the respondents said nothing much has pulled them to utilize MM.

Figure 5: Distribution of Mobile Money Services Used.



From our findings in Figure 6, a disproportionately large part (85%) of the sample utilizes M-Pesa services. This finding is related to others which observe that the entry of M-Pesa into the remittance market has been powerful and has been behind the increase in the use of transactions services (Beck, T; Cull, R; Fuchs, M; Getenga, P; et al, 2010).

Financial innovations have recently allowed banks and MM service providers to partner in an attempt to improve ATFS. Here in Kenya, key examples include: M-KESHO (Equity bank), PESA-PAP (Family Bank), KCB-MTAANI (KCB), MOBILE MONEY, among many other continuing arrangements. As is expected, there is a positive though weak correlation ( $\text{corr.} = +0.1698$ ) between use of financial services and awareness of such partnerships. Of the respondents, 219 (73%) are aware of such existing arrangements, but only 208 (69.33%) feel that such partnerships are important with the remaining 11 respondents (3.67%) do not feel if such arrangements are important.

As a consequence, 24 respondents (8%) have transacted with M-KESHO. 2 respondents (0.33%) with PESA-MKONONI, 1 has used both M-KESHO and PESA-PAP, 1 has used MKESHO and KCB-MTAANI. 13 of them have not used any of these, while 2 respondents claimed to have used others. Approximately 85% of those who are aware that such partnerships exist are utilizing M-PESA services. Thankfully, 94% of those who are aware of such partnerships feel that they are important.

The region as a whole is also concerned, not of each particular individual's access to finance, but indeed for the other members of the village. At least 94% of the respondents want to see an-above 80%, with 82.3% of them specifically wanting to see 'everybody' having ATFS. This result is important as it then has important ramifications on policies for financial access and inclusion.

The system of education is thought to instill the necessary skills and knowledge on not only why financial services are important for a country, but even more importantly, why access is key pillar in any financial sector reform programme. From the survey, 4 respondents (1.3%) do not have any form of schooling, 102 (34%) of them have up to primary level education, 159(53%) have up to secondary school education, while the remaining 35 (11.7%) have up to college level education. The mean value of 2.75 in Table 4.1 reinforces the idea that most respondents have between primary and secondary level education. As expected from Appendix, Table 3A, the level of education is positively correlated with the access to MM.

The poverty level within the region is also thought to deter ATFS. Indeed, this is line with our initial findings that reveal a considerable degree of negative correlations between ATFS and poverty proxies such as type of dwelling that respondent stays in (corr. = -0.5394). However, the same is not true for type of house (corr. = 0.0596) as shown in table 4.4 (compare with Appendix, Table A5).

**Table 4.4: Correlations between Use of Mobile Money and Poverty Proxies**

	Type of house	Type of Dwelling	Currently Utilizing Any?
Type of house	1.0000		
Type of Dwelling	-0.5394	1.0000	
Currently Utilizing Any?	0.0596	0.0564	1.0000

### 4.5 Regression Results

The dependent variable for this study was access to MM services by individuals, effectively making it a binary response variable. With binary response models, the study therefore uses all the three functional forms to estimate the equations: linear OLS (also referred to as the linear probability model, binary logit and binary Probit

models. The results for LPM coefficient values and marginal effects are reported depicted in Table 4.5 (see appendix, table A6:1-3).

**Table 4.5: OLS, Logit and Probit Models Results<sup>9</sup>**

Use of mobile money	OLS/LPM	Logit	Probit
Constant	0.2792569 (t = 1.21)	-4.424874 (z = -1.62)	-2.14415 (z = -1.52)
Age	0.0048848*** Mfx=0.0048848 (t = 3.04)	0.074444** Mfx=0.0018806 (z = 2.44)	0.033678** Mfx=0.0024208 (z = 2.25)
Household Size	-0.0177428* Mfx=-0.0177428 (t = -1.75)	-0.150915 Mfx=-0.0038005 (z = -0.81)	-0.0916082 Mfx=-0.0065849 (z = -1.00)
Gender	-0.049183* Mfx=-0.049183 (t = -1.66)	-0.3861522 Mfx=-0.0091002 (z = -0.64)	-0.0808831 Mfx=-0.0056923 (z = -0.28)
Knowledge of MM	-0.0982422 Mfx=-0.0982422 (t = -0.57)	Predicts perfectly -	Predicts perfectly -
Ownership of Phone	0.4696328*** Mfx=0.4696328 (t = 7.50)	3.448169*** Mfx=0.3832069 (z = 4.34)	1.784191*** Mfx=0.4052662 (z = 4.32)
Use of other Financial Services	0.0276218 Mfx=0.0276218 (t = 0.65)	0.8324922 Mfx=0.0238898 (z = 1.10)	0.3304589 Mfx=0.0259881 (z = 0.90)
Awareness of Partnerships	0.0014966 Mfx=0.0014966 (t = 0.03)	-0.2670738 Mfx=-0.0063757 (z = -0.32)	-0.1367534 Mfx=-0.0092803 (z = -0.32)
Preference for others Access	-0.0012944 Mfx=-0.0012944 (t = 1.19)	0.0152693 Mfx=0.0003857 (z = 0.94)	0.0083412 Mfx=0.0005996 (z = 0.96)
Level of Education	-0.0167456 Mfx=-0.0167456 (t = -0.74)	-0.1641879 Mfx=-0.0041477 (z = -0.38)	-0.0599063 Mfx=-0.0043062 (z = -0.27)
Number of Assets Owned	0.0229708 Mfx=0.0229708 (t = 1.46)	0.4047466 Mfx=0.0102247 (z = 1.32)	0.1898493 Mfx=0.0136467 (z = 1.26)

\*\*\*significant at 99percent; \*\*significant at 95percent; \*significant at 95percent

Marital Status	0.0757128*** Mfx=0.0757128 (t = 2.70)	1.095875** Mfx=0.027684 (z = 2.15)	0.5335049** Mfx=0.0383492 (z = 2.15)
Importance of Partnerships	-0.0496285 Mfx=-0.0496285 (t = -1.34)	-0.9612092 Mfx=-0.0242821 (z = -1.36)	-0.4785763 Mfx=-0.0344008 (z = -1.28)
y = Pr(Currently using Any Financial Service)	Y = 0.91554054	Y = 0.97406537	Y = .96794227
Adjusted (pseudo)R-Squared	0.2606	0.3851	0.3681
Log likelihood	N/A	-52.692862	-54.155911

#### 4.5.1 Results from the LPM

The results in the second column of Table 4.4 are for linear OLS, also known as LPM. The overall significance of the explanatory variables as captured by F-statistics at 9.67 is weak (p-value reported is  $P = 0.0000$ ). Therefore, the null hypothesis that the coefficients are jointly equal to zero cannot be rejected. As a result, the LPM provides a poor fit for the measurement of access to MM services. The Adjusted R-squared reported is 0.2606.

The LPM indicates that by holding all other factors constant, the probability of access to MM is 91.55%. This result however may not be meaningful owing to the limitations of LPM models, particularly the property that these predicted probabilities lie out of the 0-1 interval (min  $\hat{y} = 0.2267624$ ; max  $\hat{y} = 1.206499$ ). Most importantly, the LPM does not also guarantee that the estimates obtained would be BLUE due to its too restrictive assumptions (Long, 1997).

Age is positively related to one's use of MM, such that a unit increase in an individual's age leads to a change in probability of use of MM by 0.00488 holding all other factors constant. It is also statistically significant at the 99 percent level of significance. Larger household sizes are also associated with lower probability of access to MM, with each additional household member lowering probability of access by 0.0177 (*ceteris paribus*). The variable is statistically significant at the 90% level of significance.

On the results of the gender dummy variable, males have a 0.0492 lower probability of Access to Financial Services compared to their female counterparts, holding all

other factors constant. The variable is statistically significant at the 90% level of significance. On the other hand, a shift in knowledge of existence of MM from “not heard” to “hear” reduces probability of access by 0.0982, and this result is not statistically significant. Indeed, this result is not expected because it would be difficult to imagine that probability of use of MM grows with lack of knowledge on the same! However, ownership of a mobile phone produces an expected positive relationship, since a shift in ownership of a mobile phone from “no” to “yes” is associated with a rise in probability of use of MM by 0.47 holding everything else equal. As can be seen from the Table 4.5, this result is equally statistically significant at the 99 percent level of significance.

Gender enters into this framework meaningfully, since marital status has a positive though weak correlation ( $\text{corr.} = +0.19$ ) with whether one is using MM or not. Marital status is negatively correlated with employment status, which in itself is a positive correlate of access. From the findings in Table 4.4, a change in Marital status from “separated” to “single” significantly and positively raises probability of use of MM by 0.076 holding everything else constant. The same can be said of the change in marital status from “single” to “married”.

The results further reveal that the probability of a respondent to utilize MM is also positively related with: use of other financial services apart from MM ( $\text{pr.} = +0.0276$ ); awareness of partnerships between banks and MM services ( $\text{pr.} = +0.0015$ ); each person’s preference for other’s ATFS ( $\text{pr.} = 0.0013$ ); and wealth levels as proxied by the number of assets owned ( $\text{pr.} = 0.023$ ). These results only hold by assuming respectively that all other factors do not vary.

#### **4.5.2 Logit Model Results**

The results in the third column of table 4.5 are those for the logit model (logistic regression). From the logit model, the value of Pseudo- $R^2$  is 0.3851. Thus, the explanatory variables explain 38.51% of the variations in the use of MM. The log of pseudo likelihood is -52.693. The coefficients as well as their variances are obtained through maximum likelihood estimation (MLE). The pseudo- $R^2$  reported is 0.3851.

The Logit model shows that by holding all other factors constant, the probability of access to MM is 97.41%. The likelihood ratio chi-square statistic is reported as 66.01 at 11 degrees of freedom. Since the probability of obtaining this chi-square statistic is  $p=0.0000$ , the overall model is thus statistically significant.

Like the LPM, age is positively related to one's use of MM and is statistically significant at 95%. The positive sign implies that a unit increase in the age of an individual will increase the log-odds of the dependent variable (currently using MM) by 0.0744. The marginal effects equally indicate that, a one hundred percentage change in respondent's age increases the probability of use of MM by 0.19% holding all other factors constant. Larger household sizes are also related to lower probability of use of MM, with each additional household member lowering probability of log-odds of use of MM by 0.151 *ceteris paribus*.

The log-odds of use of MM transfer services are lower by 0.386 for males than for females holding all other factors constant. However, this result is not statistically significant. The associated marginal effect is -0.0091. This means that males are 0.91% less likely to use MM services than females. On the other hand, knowledge of existence of MM perfectly predicts the Logit and Probit models. As expected, ownership of a mobile phone produces an expected positive relationship, since a shift in ownership of a mobile phone from lack of a phone to owning one is associated with a rise in log-odds of use of MM by 3.45, a result that is statistically significant at 90%, holding everything else equal. The marginal effect from Table 4.4 shows that people who own mobile phones are 38.3% more likely to transact with MM.

From the findings in Table 4.5, a change in marital status from "separated" to "single" significantly and positively raises log-odds of use of MM by 1.096 holding everything else constant. The same can be said of the change in marital status from "single" to "married". The marginal effects on their part carry the meaningful interpretation that singles are 2.8% more likely to use MM than the separated group, while the married are equally 2.8% more likely to use MM transfer services compared to the singles, holding all other variables constant.

The results further reveal that the log odds of a respondent to utilize MM are also positively related with: use of other financial services apart from MM (log-odds = +0.832); each person's preference for other's ATFS (log-odds = 0.015); and wealth levels as proxied by the number of assets owned (log-odds = 0.405). However, the Logit for use of MM moves inversely (log-odds = -0.267) to awareness of partnerships between banks and MM services. These results only hold by assuming respectively that all other factors do not vary.

The marginal effects also portray similar conclusions as their associated coefficients. Individuals who use other financial services are 2.39% more likely to use MM than those who are not, *ceteris paribus*. People's preference for other's access to finance varies on a scale of 0% - 100%. However, the positive sign on the marginal effects in Table 4.5 shows that those who have higher preferences for other's to access financial services have a 0.039% higher likelihood to use MM than the rest if all other determinants are held fixed.

For awareness of existence of MM services, the results are unexpected but not statistically significant. From the results, individuals who are aware of MM services, holding everything else constant; have a 13.7% lower likelihood of utilizing these services.

### 4.5.3 Probit Models Results

While the Logit model assumes that the error terms are logistically distributed, the Probit Model on the other hand views them as being normally distributed. In principle however, the logit have been found to be approximately 1.83 times those of the Probit Model.

Therefore, while the results between the Logit and Probit Models are only a scalar multiple of each other, it would add value to estimate both models owing to the fact that the nature of the distribution of the error terms is not certain.

The results in the fourth column of Table 4.5 are those for the Probit model. Like for the Logit regression, measure for goodness of fit is the Pseudo- $R^2$ . From the Probit

model, the value of Pseudo- $R^2$  is 0.3681. Thus, the explanatory variables explain 36.81% of the variations in the use of MM. The log of pseudo likelihood is -54.16.

The Probit model shows that by holding all other factors constant, the probability of access to MM is 96.79%. The likelihood ratio chi-square statistic is reported as 63.09 at 11 degrees of freedom. Since the probability of obtaining this chi-square statistic is  $p=0.0000$ , the overall model is thus statistically significant.

Like the LPM and logit models, age is positively related to one's use of MM and is statistically significant at 95%. The positive sign implies that a unit increase in the age of an individual will result in a 0.0337 higher probability of access to MM transfer services. The marginal effects equally indicate that, a one hundred percentage change in respondent's age from the mean age increases the probability of use of MM by 2.42% holding all other factors constant. Larger household sizes are also related with lower probability of use of MM; with each additional household member lowering probability of the predicted Probit index by 0.006585 standard deviations *ceteris paribus*.

The results for gender resemble those in the logit model. Holding all other factors constant, males have a 0.0916 lower likelihood of using financial services than females. However, this result is not statistically significant. The associated marginal effect is -0.005692. This means that males are 0.57% less likely to use MM services than females. As expected, ownership of a mobile phone produces an expected positive relationship, since a shift in ownership of a mobile phone from lack of a phone to owning one is associated an increase in the probability of Access by 1.784. This result is statistically significant at 90%, holding everything else equal. The marginal effect from Table 4.5 shows that people who own mobile phones are 43.2% more likely to transact with MM.

From the findings in Table 4.5, separated couples have a 0.5335 higher probability of using MM services than the singles, *ceteris paribus*. The same conclusion holds in the case of married couples who have a 0.5335 higher probability of utilizing MM transfer services than the singles, holding everything else constant. The marginal effects on their part carry the meaningful interpretation that singles (married people)

are 3.84% more likely to use MM than the separated group(singles) holding all other variables constant.

The results further reveal that the Probit index to utilize MM is also positively related with: use of other financial services apart from MM (Probit index = +0.3305); each person's preference of the other's ATFS (Probit index = 0.008341); and wealth levels as proxied by the number of assets owned (Probit index = 0.18985). However, as in the Logit, use of MM moves inversely (Probit index = -0.1368) to awareness of partnerships between banks and MM services. These results only hold by assuming respectively that all other factors do not vary.

The marginal effects also portray similar conclusions as their associated coefficients. Individuals who use other financial services are 2.6% more likely to use MM than those who are not, *ceteris paribus*. People's preferences for others access to finance has the expected results. The positive sign on the marginal effects after Probit in Table 4.5 shows that those who have higher preferences for others to access financial services have a 0.06% higher likelihood to use MM than the rest if all other determinants are held fixed.

For awareness of existence of MM services, the results are unexpected but not statistically significant. It would have been ideal to observe that as awareness to MM services increases, so should the use of such services! However, the results show that individuals who are aware of MM services, holding everything else constant; have a 13.7% lower likelihood of utilizing these services from the mean value of 0.73.

## 4.6 Discussion of the Main Results

The Logit Model Results discussed so far have utilized the Binary Responses provided by respondents as to whether they are utilizing any financial services currently, and this has been modeled as ATFS = 1 (if yes) and ATFS = 2 (if no).

While these results are meaningful, they still remain blurred as to whether the inception of Mobile Money services has or has not enhanced greater access to financial services. Year 2005, was the period when no MM transfer services existed;

year 2008, saw the launch of MM services in the Country; and year 2011 in which MM services are relatively well developed. Thus, we separate the results owing to Binary response models towards the Latent variable approach, in order to gain a better understanding of the role, if any, of MM transfer services have had on financial access by the slum dwellers of Kibera Slum.

#### **4.6.1 Logit model results for year 2005**

The logit model for the year 2005 could not produce any output purely because of the reasons given above: most respondents failed to specify the number of transactions they had for this year on grounds that they had no memory of such. This shortcoming can be seen in Table 4.2 where only 35 (12%) of the respondents gave approximate values of the transactions undertaken. This fatigue and loss of memory on the part of the respondents can be seen as a big blow here.

#### **4.6.2 Logit Model Results for Year 2008**

For the year 2008, a unit increase in age increases the log-odds of financial access by 0.1851 holding all other factors constant, as shown in Table 4.6. In the same vein, a one percentage change in an individual's age raises the logit index from the mean value of 28.20 years by 0.04737%, *ceteris paribus*. However, the quadratic term (age-squared) has a negative coefficient. Thus, unit's change in age-squared lowers probability of financial access by 0.0027, *ceteris paribus*. A similar conclusion is arrived at by looking at the marginal effects, that is, a 100% change in age-squared lowers the log-odds of ATFS by 0.067%. Both of these results however do not pass the minimum 10% statistical significance test. Age clearly affects financial access. These findings are consistent with Kumar (2005) who concludes that age is inversely related to financial access, i.e., younger people have a lower demand for savings but this result depends on the minimum age that is 18 years.

**Table 4.6: Results of the Logit Regressions for years 2008 and 2011**

<b>VARIABLE</b>	<b>Parameters of Interest</b>	<b>Year 2008 (n = 152)</b>	<b>Year 2011 (n = 249)</b>
Age	Coefficient	0.1851	0.1682
	Probability: $p > z$	0.126	0.121
	Mean value	28.2033	31.2033
	Marginal effects	0.04737	0.04032
Age-Squared	Coefficient	-0.002679	-0.002539
	Probability: $p > z$	0.144	0.093
	Mean value	889.21	1067.43
	Marginal effects	-0.0006697	-0.0006086
Level of Education	Coefficient	-0.04140	0.2236
	Probability: $p > z$	0.871	0.321
	Mean value	2.75	2.75
	Marginal effects	-0.01035	0.05360
Preference for others' access to Financial services	Coefficient	0.02560	-0.006515
	Probability: $p > z$	0.602	0.615
	Mean value	94.7667	94.7667
	Marginal effects	0.006399	-0.001562
Scale-index	Coefficient	-0.0207	-0.03290
	Probability: $p > z$	0.279	0.003
	Mean value	45.0687	38.4345
	Marginal effects	-0.005182	-0.007886
Employment Record	Coefficient	-0.1122	0.78047
	Probability: $p > z$	0.720	0.020
	Mean value	1.8859	2.0906
	Marginal effects	-0.02804	0.1871
Ownership of Mobile Phone Handset	Coefficient	1.1312	-0.2349
	Probability: $p > z$	0.337	0.775
	Mean value	0.9367	0.9367
	Marginal effects	2.6100	-0.05490
Financial Innovations	Coefficient	0.1134	0.2145
	Probability: $p > z$	0.006	0.000
	Mean value	3.5633	3.5633
	Marginal effects	0.2833	0.05143
Constant	Coefficient	-5.9304	-3.2266
	Probability: $p > z$	0.288	0.188
LR Chi2 (8)		18.35	65.69

Prob > Chi2	0.0188	0.0000
Pseudo R2	0.0871	0.1925
Log likelihood	-96.1719	-137.81153
Predicted probability (y = 1)	0.5070	0.6014

The level of education has not significantly contributed to ATFS. This observation could be explained in part by low levels of educational attainment in the region: 4 respondents (1.3%) do not have any form of schooling, 102 (34%) of them have up to primary level education, 159(53%) have up to secondary school education, while the remaining 35 (11.7%) have up to college level. Indeed, a change in the status of education from one level to the next reduces the log-odds of financial access by 0.0414, or equivalently, by 0.0104% from the mean level of education. The observation that educational attainment level is inversely related to financial access has been supported by Kumar (2005, pp26), who emphasizes voluntary exclusion and provider discrimination as some possible causes for this.

The results from the Logit model further reveal that as one's preference for other's ATFS increases, so does their own access to such services. A 20% increase in one's preference for others' ATFS, raises the log-odds of their own access by 0.0256. In the same light, a 100% change in one's preference for others' access to finance changes their own access in the same direction by 0.64% from the mean value of 94.8%, *ceteris paribus*.

The scale index is calculated as a weighted percentage of how strongly individuals feel that specified determinants to financial access could have hindered their own access to finance. This variable is however included here only as a control variable, and for both periods, i.e., 2008 and 2011, the results do not vary significantly.

In a similar vein, the employment status of individuals in 2008 has not positively explained their ATFS. In the study, important categories recognized here include: unemployed, business, civil servant or teacher, student, temporary or casual employment or retired. From the Table 4.6 and holding everything else constant, a change in employment status from one level to another reduces the log-odds of ATFS by 0.1122; an equivalent reduction of 0.028% from the mean.

Ownership of a mobile phone in 2008 comes in with the expected sign. Individuals who own a mobile phone have log-odds of access to financial services of 1.1312 higher than those who lack such handsets. This translates to a 261% change in ATFS from the mean, for every shift from lack of a mobile phone to ownership of one.

The level of financial innovations has been constructed by summing up all the financial products that individuals are currently using. These include: Bank accounts, MFI's, SACCOs, Chama or ROSCAs, formal insurance, Mobile money, or any combinations of these. Financial innovations are known to raise the probability of people's ATFS, and therefore our results are not disappointing. A unit change in the level of financial innovations can be associated with a change in the log-odds of ATFS by 0.1134 in the same direction, *ceteris paribus*. This has a similar meaning to an increase in financial access by 28.33% for every 100% change in the level of financial innovations from the mean value. These results are equally statistically significant at 1%.

Holding all other factors equal, the probability of access to finance is equivalent to 73.05% from the Logit regression, however, the predicted probability stated is 50.7%. The model for 2008 however only saw 152 respondents providing information on their characteristics in that year, representing 50.67% of the sample. The model is statistically significant at 5% level of significance and the explanatory variables explain 8.71% of the change in ATFS.

#### **4.6.3 Logit Model Results for year 2011**

Turning to the year 2011, a unit increase in Age increases the log-odds of financial access by 0.1682 holding all other factors constant, as shown in Table 4.6. In the same vein, a one percentage change in an individual's age raises the Logit index from the mean value of 31.2033 years by 0.04032%, *ceteris paribus*. However, age-squared has a negative coefficient like in the previous year of 2008. Thus, a units change in age-squared lowers probability of financial access by 0.0025, *ceteris paribus*. A similar conclusion is arrived at by looking at the marginal effects, that is, a 100% change in age-squared lowers the log-odds of ATFS by 0.061%. The variable Age-squared is also statistically significant at the 10% level.

The level of education in 2011 can now explain ATFS. A change in the status of education from one level to the next raises the log-odds of financial access by 0.2236, or equivalently, by 0.0536% from the mean level of education.

One's preference for other's ATFS however yields results opposite to those in 2008. For every 20% increase in one's preference for others access to finance reduces their own log-odds access by 0.006515. The marginal effects also arrive at a similar conclusion: a 100% change in one's preference for others access to finance lowers their own access 0.1562% from the mean value of 94.8%, *ceteris paribus*. The caution here is that the level of education has presumably been held constant over the period 2008 – 2011.

Unlike the year 2008, employment status is now positively associated with ATFS. A level change in employment status raises log-odds of ATFS by 0.7805, a result also supported by the marginal effects that depict a rise in probability of financial access by 0.1871% from the mean value, holding other variables fixed.

Ownership of a mobile phone in 2011 does not contribute to ATFS but comes in with the expected sign. Individuals who own a mobile phone have log-odds of ATFS of 0.2349 lower than those who lack such handsets. This translates to a reduction of 5.49%% in ATFS from the mean, for every shift from lack of a mobile phone to ownership of one.

Like for the year 2008, a unit change in the level of financial innovations is associated with a change in the log-odds of ATFS by 0.2145 in the same direction, *ceteris paribus*. This has a similar meaning to an increase in financial access by 5.14% for every 100% change in the level of financial innovations from the mean value. These results are statistically significant at 1%. The importance of financial innovations to access to finance as illustrated in this study, have also been supported by Atieno, Barako and Bokea (2010), who have cited the magnificent role of such innovations, proxied by M-Pesa, as a key driver towards financial access by majority of the poor sections of the population.

Holding all other factors equal, the probability of access to finance is equivalent to 72.35% from the Logit regression, however, the predicted probability stated is higher than for 2008 since it is calculated as 60.14%. The model for 2011 was more robust not only because of a larger sample size: 296 (98.7) of the respondents provided information on their characteristics in that year, but also due to the fact that the model is statistically significant. The explanatory variables also explain 19.25% of the change in ATFS.

## CHAPTER FIVE

### 5. SUMMARY, CONCLUSIONS AND POLICY

#### RECOMMENDATIONS

##### 5.1 Summary of Findings and Conclusions from the Study

The main objective of this paper was to examine the factors determining access to financial services among the urban poor of Kibera slums, with an intentional bias towards mobile money transfer services. In specificity, the study aimed at examining whether the introduction of mobile money in 2007 (M-Pesa) has had any significant gains in as far as access to financial services is concerned.

To determine the suitable methodology to use, the study was divided into three distinct periods, i.e., 2005 before any mobile money services; 2008 when the first mobile money service was in operation; and the present 2011 which has seen more mobile money service providers coming on board, and presumably that the ensuing competition should have resulted into more improved services. This study preferred user's information as opposed to the other alternative of provider's information.

For each of these three distinct periods, and owing to the fact that the dependent variable (access to finance) is a binary response variable, all three models for such models were run; i.e., the Linear Probability model, the Logit Model and the Probit model in order to identify a more robust model. The OLS model was dropped owing to the many limitations associated with it. However, since the Probit and Logit models tend to provide almost similar results in large samples, the Logit model was adopted because it is relatively easy to understand and interpret.

The year 2005 failed to provide any vital estimations owing largely to the fact that respondents claimed fatigue and loss of memory. This led to insufficient data points. For the other two years, that is 2008 and 2011; the determinants of financial access can be summarized as: Age, Level of education, Preference for others access to finance, Employment status, Ownership of mobile phone, and most importantly, the level of financial innovations as proxied by the number of financial products available and used. These findings have also been supported by a host of other studies on financial access.

While the probability of access to financial services cannot be ascertained between the period 2005 – 2008 due to limited data points, there is evidence to prove that probability of access to finance has risen from 50.7% in 2008 to 60.14% in 2011, and this significant jump can largely be attributed to financial innovations as proxied by the number of financial products, of which mobile money has been most significant.

## **5.2 Recommendations and Implications for Policy**

Based on the above findings, the study recommends that policies aimed at promoting the operations of mobile money transfer services should be up-scaled to encourage mobile money operators to continue enhancing financial outreach. This policy is explicitly outlined here because not on a few occasions have banks confronted the regulator (CBK) that M-Pesa has not received stringent regulations as they do. While regulations aimed at protecting consumers is welcome, regulations aimed at curtailing competition are bound to have adverse effects.

Recently, there have been efforts between banks and mobile money transfer agents to partner in enhancing access to finance. As the study reveals, some proportion of the urban poor are aware of such partnerships, with 68% of the sample thinking that these partnerships are important. A sizeable number also agree that mobile banking is important. However, only 10% of the sample has for example utilized mobile banking! Consequently, banks and mobile money operators should tap into this gap and upscale their existing account linkages not only with banks, but with the other organizations that frequently transact, while making the process easy to understand.

There is an urgent need to develop mobile money services and provide them with the necessary legislation to allow them to operate as bank accounts particularly from the observation that at least 64% of the sample is involved in business. The study further reveals that 71% of the respondents are using mobile money for sending money, receiving money and purchasing airtime. Only 16 out of the 300 members of the sample are using mobile money, at least as a bank. While not initially designed as a saving scheme, mobile money has proved its resilience, flexibility and adaptability to changing needs. As a result, policies aimed at designing the system to include savings options would be badly needed to not only promote entrepreneurship, but rather to

provide 'true' financial access. The no minimum balance requirement is welcome. Most importantly is the need for mobile money operators to exercise great transparency, and safely keep the surpluses on customer accounts.

The revelation that 85% of the sample<sup>10</sup> is utilizing M-Pesa is wanting. Competition is good to allow the 'best' firm to operate, but, it may encourage monopolistic tendency that is often exploitative. With 72% of the population citing advertising as their biggest 'pull-factor' for their preference to any given Mobile Money Service operator, firms' followers to dominant Safaricom could upscale their advertising strategies if they are to survive competition.

Last but not least, policies aimed at enhancing the network in rural areas, lowering costs, while offering employment opportunities to the unemployed will remain critical. This is an important policy prescription, since respondents have often cited these as issues that should be dealt with if efforts at promoting access to finance are anything to go by.

### **5.3 Limitations and Areas for Further Study**

While the study has achieved the set objectives, a study like this done on a national scale would be more meaningful. Data paucity was a big problem: frequent and timely collection of data would have yielded a better pay-off. This is especially so since poor memory resulted in no meaningful estimates for the year 2005.

A lot of opportunities also exist for obtaining information from providers of finance, rather than users of finance as presumed by this study.

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<sup>10</sup> It stands at 80 percent at the national level.

## APPENDICES

### APPENDIX I: OUTPUT FROM RAW DATA ANALYSIS

**Table A1: Descriptive Statistics for the Variables in the Study**

Variable	Obs	Mean	Std. Dev.	Min	Max
questno	300	150.5	86.74676	1	300
village	300	5.486667	2.864234	1	10
age	300	31.20333	9.700291	16	64
households-e	300	3.373333	1.627714	1	9
occupation	300	1.823333	1.358285	0	5
gender	300	.6466667	.4788038	0	1
maritalsta-s	299	1.628763	.5550036	0	2
heardofmob-y	300	.9933333	.081513	0	1
currentlyu-y	300	.9166667	.2768472	0	1
mobilemone-d	300	1.163333	1.019864	0	6
attraction	300	1.596667	1.694173	0	11
ownershipo-t	300	.9366667	.2439685	0	1
otherfinan-s	300	.63	.483611	0	1
ifyeswhich-e	300	2.646667	4.462608	0	27
reasonforo-e	300	4.13	1.237553	1	5
useofmobil-s	300	9.79	3.746914	0	21
awareofpat-g	300	.73	.4447012	0	1
importance-g	300	1.233333	.5030564	0	2
mbankingtr-h	300	.2333333	1.209863	0	12
scalein~2005	115	43.87826	12.95955	8	80
scalein~2008	262	45.0687	11.83228	6	82
scalein~2011	267	38.43446	14.98541	4	86
preference-e	300	94.76667	13.64672	0	100
levelofedu-n	300	2.75	.6700721	1	4
totaltr~2005	35	3.114286	1.622841	1	8
totaltr~2008	155	5.748387	5.352016	0	37
totaltr~2011	274	9.963504	9.292487	1	47
employ~2005	296	1.587838	.6423374	1	3
employ~2008	298	1.885906	.6198751	1	3
employ~2011	298	2.090604	.5335659	1	4
approximon-e	151	12749.34	10955.1	1000	73100
monthlyexp-d	131	5125.191	3142.545	500	21000
monthly-hing	46	1621.739	2014.604	200	10000
monthly-sing	267	2048.502	1494.985	500	20000
monthlyexp-e	60	476.5	862.3712	20	6000
monthlyexp-s	110	3944.091	3970.671	100	20000
monthlyexp-f	18	519.4444	292.6245	100	1000
monthlyexp-h	118	860.1695	949.1012	50	5000
savingsban-c	96	2659.583	4044.132	20	30000
anyotherbi-e	8	4712.5	6520.175	300	20000
typeofhouse	299	1.498328	.7017456	1	3
nearnessto-t	299	2.73913	.9116181	1	4
numberofke-d	297	3.228956	1.097342	1	8
ownerofthe-y	299	3.230769	1.559854	1	6
typeofdwell-g	299	5.12709	1.24939	1	7
mainwallof-e	299	4.040134	1.69832	1	8
rooftop	299	1.06689	.472968	1	8
otherarisi-s	300	1.376667	3.140222	0	15
yhat	296	.9155405	.1501892	.2267624	1.206499

**Table A2: Occupation versus Occupation if one owns a Phone**

OCCUPATION	Freq.	Percent	Cum.
0	13	4.33	4.33
1	191	63.67	68.00
2	8	2.67	70.67
3	13	4.33	75.00
4	74	24.67	99.67
5	1	0.33	100.00
Total	300	100.00	
OCCUPATION	Freq.	Percent	Cum.
0	12	4.27	4.27
1	178	63.35	67.62
2	8	2.85	70.46
3	11	3.91	74.38
4	71	25.27	99.64
5	1	0.36	100.00
Total	281	100.00	

**Table A3: Correlations among Important Explanatory and Dependent Variable**

age	househ-e	occupa-n	gender	marita-s	curren-y	mobile-d	attrac-n	owners-t	ifysw-e	reason-e	useofm-s
1.0000											
-0.8516	1.0000										
-0.0803	0.3536	1.0000									
-0.0401	0.3536	0.5000	1.0000								
0.3174	-0.2236	-0.6325	-0.3162	1.0000							
0.2609	-0.1768	-0.2500	0.2500	0.6325	1.0000						
0.2609	-0.1768	-0.2500	0.2500	0.6325	1.0000	1.0000					
0.1444	-0.4341	-0.3508	-0.4385	0.3883	0.6139	0.6139	1.0000				
0.3174	-0.2236	-0.6325	-0.3162	1.0000	0.6325	0.6325	0.3883	1.0000			
-0.2348	0.1826	-0.4243	-0.7380	0.4784	-0.2952	-0.2952	-0.0356	0.4784	1.0000		
-0.0558	-0.3273	-0.9258	-0.4629	0.2928	0.0000	0.0000	0.2436	0.2928	0.2904	1.0000	
0.6702	-0.7756	-0.7312	-0.4875	0.7708	0.4875	0.4875	0.5558	0.7708	0.2248	0.5265	1.0000
-0.6982	0.6708	-0.3162	0.3162	0.2000	0.3162	0.3162	-0.0555	0.2000	0.0817	0.2928	-0.2312
0.8198	-0.6959	-0.2460	0.3281	0.2594	0.4101	0.4101	0.0144	0.2594	-0.4993	0.1772	0.5730
-0.5180	0.4750	0.6890	0.1895	-0.9260	-0.7407	-0.7407	-0.4684	-0.9260	-0.1799	-0.3987	-0.8901
0.3652	-0.3761	0.3219	0.0560	-0.6551	-0.6999	-0.6999	-0.4960	-0.6551	-0.2861	-0.0778	-0.1945
-0.1073	0.2751	0.3632	0.7264	-0.6235	-0.4021	-0.4021	-0.8100	-0.6235	-0.4987	-0.1441	-0.5817
-0.2208	0.1768	-0.2500	0.2500	-0.3162	-0.5000	-0.5000	-0.7016	-0.3162	-0.0184	0.4629	-0.2437
-0.5967	0.7826	-0.1581	0.1581	0.4000	0.1581	0.1581	-0.2774	0.4000	0.4784	0.0000	-0.2312
0.4797	-0.0928	0.1313	-0.1313	0.4152	-0.1313	-0.1313	-0.3916	0.4152	0.4603	-0.3647	0.2240
0.8129	-0.5449	-0.1594	0.3986	0.4034	0.4783	0.4783	-0.0839	0.4034	-0.3883	0.0000	0.5376
0.8648	-0.7281	0.0000	0.1626	0.3599	0.6503	0.6503	0.4420	0.3599	-0.4829	-0.1756	0.6142
2005 0.0929	0.3273	0.0000	0.4629	0.2928	0.0000	0.0000	-0.7308	0.2928	0.1537	-0.1429	-0.0752
0.2101	0.0514	0.0727	-0.3634	0.2758	-0.4361	-0.4361	-0.4589	0.2758	0.7026	-0.2243	0.0827
mbanki-b	sca-2005	sca-2008	sca-2011	prefer-e	levelo-n	tot-2005	tot-2008	tot-2011	emp-2005	othera-s	
1.0000											
-0.5623	1.0000										
0.2801	0.5054	1.0000									
0.2425	0.5023	0.5723	1.0000								
0.1640	0.2412	0.4339	0.7653	1.0000							
-0.4150	-0.1416	-0.6817	-0.0082	0.1581	1.0000						
0.1508	-0.2488	0.1250	-0.0954	-0.1313	0.1661	1.0000					
0.9503	-0.6262	0.1428	0.2110	0.0797	-0.2017	0.3769	1.0000				
0.7778	-0.5909	0.0228	-0.2320	-0.4877	-0.5141	0.1921	0.7777	1.0000			
2005 0.2784	-0.2073	-0.0259	0.4803	0.4629	0.5855	0.6078	0.4921	-0.0753	1.0000		
-0.1589	-0.0300	0.1790	-0.1169	0.0000	0.2298	0.9161	0.0309	-0.1654	0.4934	1.0000	

**Table A4: Correlation between Gender and Use of Mobile Money Services**

	gender current~y	
gender	1.0000	
currently~y	-0.0210	1.0000

**Table A5: Correlation between use of Mobile Money Services and Poverty**

**Proxies**

	current~y	typeof~e	typeof~g
currently~y	1.0000		
typeofhouse	0.0596	1.0000	
typeofdwell~g	-0.0564	-0.5394	1.0000

**Table A6-1: Linear OLS (The Linear Probability Model)**

Source	SS	df	MS	
Model	6.65425572	12	.55452131	Number of obs = 296
Residual	16.2342578	283	.057364869	F( 12, 283) = 9.67
Total	22.8885135	295	.077588181	Prob > F = 0.0000
				R-squared = 0.2907
				Adj R-squared = 0.2606
				Root MSE = .23951

currently~y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
age	.0048848	.0016042	3.04	0.003	.0017271	.0080425
households~e	-.0177428	.0101677	-1.75	0.082	-.0377567	.0022711
gender	-.049183	.0296401	-1.66	0.098	-.1075261	.0091602
maritalsta~s	.0757128	.0280249	2.70	0.007	.0205492	.1308764
heardofmob~y	-.0982422	.1720798	-0.57	0.569	-.4369609	.2404765
ownershipo~t	.4696328	.0626234	7.50	0.000	.346366	.5928995
otherfinan~s	.0276218	.042183	0.65	0.513	-.0554105	.1106542
awareofpat~g	.0014966	.046211	0.03	0.974	-.0894642	.0924575
importance~g	-.0496285	.0371655	-1.34	0.183	-.1227844	.0235274
preference~e	.0012944	.0010899	1.19	0.236	-.000851	.0034398
levelofedu~n	-.0167456	.0227178	-0.74	0.462	-.061463	.0279718
numberofke~d	.0229708	.0157527	1.46	0.146	-.0080366	.0539782
_cons	.2792569	.2310924	1.21	0.228	-.1756212	.734135

**Table A6-2: Logistic Regression**

Logistic regression

Number of obs = 296  
 LR chi2(11) = 66.01  
 Prob > chi2 = 0.0000  
 Pseudo R2 = 0.3851

Log likelihood = -52.692862

currently-y	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
age	.074443	.0305755	2.43	0.015	.0145162	.1343698
households-e	-.1504421	.1876544	-0.80	0.423	-.5182379	.2173537
gender	-.3775692	.6012604	-0.63	0.530	-1.556018	.8008794
maritalsta-s	1.095875	.5088928	2.15	0.031	.0984632	2.093286
ownershipo-t	3.448169	.7940014	4.34	0.000	1.891955	5.004383
otherfinan-s	.8324922	.7572939	1.10	0.272	-.6517766	2.316761
awareofpat-g	-.2670738	.826791	-0.32	0.747	-1.887554	1.353407
importance-g	-.9612092	.7091066	-1.36	0.175	-2.351033	.4286142
preference-e	.0152693	.0163049	0.94	0.349	-.0166876	.0472263
levelofedu-n	-.1641879	.4342142	-0.38	0.705	-1.015232	.6868562
numberofke-d	.4047466	.3069654	1.32	0.187	-.1968945	1.006388
_cons	-4.424874	2.739293	-1.62	0.106	-9.793789	.9440411

**Table A6-3: Probit Regression**

Probit regression

Number of obs = 296  
 LR chi2(11) = 63.09  
 Prob > chi2 = 0.0000  
 Pseudo R2 = 0.3681

Log likelihood = -54.155911

currently-y	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
age	.033678	.0149349	2.25	0.024	.0044061	.0629499
households-e	-.0916082	.0914777	-1.00	0.317	-.2709012	.0876848
gender	-.0808831	.2871233	-0.28	0.778	-.6436344	.4818682
maritalsta-s	.5335049	.2478943	2.15	0.031	.0476409	1.019369
ownershipo-t	1.784191	.412566	4.32	0.000	.9755765	2.592806
otherfinan-s	.3304589	.3674904	0.90	0.369	-.3898091	1.050727
awareofpat-g	-.1367534	.4267902	-0.32	0.749	-.9732469	.69974
importance-g	-.4785763	.3740153	-1.28	0.201	-1.211633	.2544802
preference-e	.0083412	.008693	0.96	0.337	-.0086968	.0253792
levelofedu-n	-.0599063	.2251538	-0.27	0.790	-.5011996	.381387
numberofke-d	.1898493	.1503161	1.26	0.207	-.1047648	.4844633
_cons	-2.14415	1.406934	-1.52	0.128	-4.901689	.6133892

Table A7-1: Logistic Regression for Year 2005 and 2008 respectively

```
. logit fininc2005 agein2005 agein20052 levelofeducation preferenceforaccesstofinancialse scaleindex2005 employmentrecord2005 owners
> hipofhandset fininnov
```

note: employmentrecord2005 != 3 predicts failure perfectly  
employmentrecord2005 dropped and 2 obs not used

note: preferenceforaccesstofinancialse != 100 predicts success perfectly  
preferenceforaccesstofinancialse dropped and 1 obs not used

```
outcome = scaleindex2005 > 48 predicts data perfectly
r(2000):
```

```
. mfx
last estimates not found
r(301):
```

```
. logit fininc2008 agein2008 agein20082 levelofeducation preferenceforaccesstofinancialse scaleindex2008 employmentrecord2008 owners
> hipofhandset fininnov
```

Iteration 0: log likelihood = -105.34521  
Iteration 1: log likelihood = -96.357904  
Iteration 2: log likelihood = -96.173493  
Iteration 3: log likelihood = -96.171949  
Iteration 4: log likelihood = -96.171949

Logistic regression	Number of obs	=	152
	LR chi2(8)	=	18.35
	Prob > chi2	=	0.0188
Log likelihood = -96.171949	Pseudo R2	=	0.0871

fininc2008	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
agein2008	.1895094	.1238784	1.53	0.126	-.0532877	.4323065
agein20082	-.0026793	.0018327	-1.46	0.144	-.0062713	.0009128
levelofedu~n	-.0413988	.2556008	-0.16	0.871	-.5423671	.4595696
preference~e	.0255989	.04904	0.52	0.602	-.0705178	.1217155
scalein~2008	-.0207324	.0191572	-1.08	0.279	-.0582799	.0168151
employ~2008	-.1121899	.3124407	-0.36	0.720	-.7245625	.5001827
ownership~t	1.131169	1.177426	0.96	0.337	-1.176543	3.43888
fininnov	.1133504	.041032	2.76	0.006	.0329291	.1937717
_cons	-5.930364	5.576504	-1.06	0.288	-16.86011	4.999383

Table A7-2: Logistic Regression for Year 2011

Logistic regression	Number of obs	=	249
	LR chi2(8)	=	65.69
	Prob > chi2	=	0.0000
Log likelihood = -137.81153	Pseudo R2	=	0.1925

fininc2011	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
agein2011	.1681957	.1084719	1.55	0.121	-.0444053	.3807967
agein20112	-.0025387	.0015102	-1.68	0.093	-.0054987	.0004212
levelofedu~n	.2235987	.2255234	0.99	0.321	-.218419	.6656164
preference~e	-.0065146	.0129513	-0.50	0.615	-.0318986	.0188695
scalein~2011	-.0328974	.0111402	-2.95	0.003	-.0547318	-.0110631
employ~2011	.7804672	.336767	2.32	0.020	.120416	1.440519
ownership~t	-.2349464	.8210294	-0.29	0.775	-1.844134	1.374242
fininnov	.2145316	.0544161	3.94	0.000	.1078781	.3211852
_cons	-3.226643	2.452462	-1.32	0.188	-8.033381	1.580094

**Table A8-1: Marginal Effects after Logistic Regression for Year 2008**

Marginal effects after logit  
 $y = \text{Pr}(\text{fininc2008})$  (predict)  
 $= .50702524$

variable	dy/dx	Std. Err.	z	P> z	[	95% C.I.	]	x
age~2008	.047368	.03097	1.53	0.126	-.01333	.108066		29.7434
ag~20082	-.0006697	.00046	-1.46	0.144	-.001568	.000228		966.533
levelo~n	-.0103477	.06389	-0.16	0.871	-.135565	.11487		2.84868
prefer~e	.0063985	.01226	0.52	0.602	-.017626	.030423		99.3421
sca~2008	-.0051821	.00479	-1.08	0.279	-.014567	.004203		44.6447
emp~2008	-.0280419	.0781	-0.36	0.720	-.181108	.125024		2.13816
owners~t*	.2609999	.228	1.14	0.252	-.18588	.70788		.953947
fininnov	.028332	.01025	2.76	0.006	.008246	.048418		5.05263

(\*) dy/dx is for discrete change of dummy variable from 0 to 1

**Table A8-2: Marginal Effects after Logistic Regression for Year 2011**

Marginal effects after logit  
 $y = \text{Pr}(\text{fininc2011})$  (predict)  
 $= .60140384$

variable	dy/dx	Std. Err.	z	P> z	[	95% C.I.	]	x
age~2011	.0403194	.02606	1.55	0.122	-.010759	.091398		32.0241
ag~20112	-.0006086	.00036	-1.68	0.094	-.00132	.000103		1113.98
levelo~n	.0536005	.05404	0.99	0.321	-.052319	.159519		2.78715
prefer~e	-.0015617	.0031	-0.50	0.615	-.007645	.004522		96.2249
sca~2011	-.0078861	.0027	-2.92	0.003	-.013177	-.002595		37.4779
emp~2011	.1870915	.08048	2.32	0.020	.029358	.344825		2.16064
owners~t*	-.0548964	.18614	-0.29	0.768	-.419718	.309925		.959839
fininnov	.0514269	.01247	4.12	0.000	.026983	.075871		3.98795

(\*) dy/dx is for discrete change of dummy variable from 0 to 1

## APPENDIX II: SURVEY INSTRUMENT

### A QUESTIONNAIRE ON ACCESS TO FINANCIAL SERVICES: THE CASE OF MOBILE MONEY TRANSFERS AMONG THE URBAN POOR OF KIBERA SLUMS

#### INTRODUCTION

Hallo respondent. I and other research assistants are collecting information for the purposes of a postgraduate study on financial access with emphasis on mobile money transfer services among the residents of Kibera Slum. The questionnaire is being distributed randomly to other residents and will be filled through oral interview.

The purpose of this questionnaire therefore is to request respondents to complete all the information required as accurately as possible, as the information so provided will not only further the research project, but would indeed be very valuable in terms of policy recommendations. It is estimated to take about 20 minutes of your time.

The information you provide will be treated with a lot of confidentiality. Thank you for accepting to take part in this study.

#### PART A: PERSONAL INFORMATION

NAME (Optional) \_\_\_\_\_ QUEST \_\_\_\_\_

NO \_\_\_\_\_ VILLAGE \_\_\_\_\_

AGE IN YEARS \_\_\_\_\_ HOUSEHOLD SIZE \_\_\_\_\_ OCCUPATION \_\_\_\_\_

GENDER				MARITAL STATUS					
MALE	1	FEMALE	2	SINGLE	1	MARRIED	2	SEPARATED	3

#### PART B: INFORMATION ON ACCESS TO FINANCIAL SERVICES

1. Have you heard of the mobile money transfer services?

YES	1	NO	2
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2. Are you currently utilizing any of them? 1) Yes 2) no. (If no, go to 9)

3. Which of the following mobile money transfer services are you currently utilizing?

MPESA	1	ZAP	2	YU MONEY	3	ORANGE MONEY	4	OTHERS (specify)	5
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4. What attracted you to utilize mobile-money transfer services?

Advertising	Friends	Family needs	Efficiency	Others(specify)
1	2	3	4	5

5. Do you own a mobile phone/handset? (If No, skip to 10)

YES	1	NO	2
-----	---	----	---

6. Besides your mobile phone, do you have other financial services?

YES	1	NO	2
-----	---	----	---

7. If Yes in (6) above, which are these?

Bank account(s)	MFIs	SACCOs	Formal insurance	Chama/merry-go-round	Other (please specify)
1	2	3	4	5	6

8. One of the reasons why you own a mobile phone is because it enables you to easily transact with mobile money transfer services.

Strongly disagree	Somehow disagree	Neither agree nor disagree	Somehow agree	Strongly agree
1	2	3	4	5

9. If No in (2) above, why?

Poor	Unemployed	For the Rich	Unable to operate	Inefficient	Not interested	Others(specify)
1	2	3	4	5	6	7

10. If you don't own a mobile phone, what do you think is a cause for this?

Poor	Unemployed	For the Rich	Unable to operate	Not interested	Others(Specify)
1	2	3	4	5	6

11. How are you utilizing mobile money transfer services?

Sending money	1	Buying Goods	5
Receiving money	2	Paying Bills	6
Purchasing Airtime	3	ATM withdrawals	7
Saving money (bank)	4	Others(specify)	8

12. Are you aware of the partnership between banks and mobile money services

YES	1	NO	2
-----	---	----	---

13. Do you think that the partnership between banks and mobile money transfer service is important to your access to financial services?

YES	1	NO	2	UNCERTAIN	3
-----	---	----	---	-----------	---

14. Which of the following mobile money banking services have you transacted with?

M-KESHO	PESA MKONONI	PESA PAP	KCB MTAANI	NONE	OTHERS(SPECIFY)
1	2	3	4	5	6

15. Mobile money transfer services can be divided into three distinct periods as follows:

-2005: Lack of mobile money transfer services

-2008: Introduction of mobile money services but not well developed

-2011: Relatively well developed transfer services

With these periods in mind, fill the table below appropriately on a scale of 1-5 of how strongly you agree or disagree with the following factors influencing your access to finance, where:

Strongly disagree (1), Somehow disagree (2), neither agree nor disagree (3), somehow agree (4) strongly agree (5) Please tick only one for each year.

VARIABLE\YEAR	2005	2008	2011
Poor	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
Unemployed	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
Family needs	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
Formalities or restrictions	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
For the rich people	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
Lack of an ID Card	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
Inefficient system	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
No\poor knowledge of the financial system	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
No\poor advertising	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5
Not interested\not important	1-2-3-4-5	1-2-3-4-5	1-2-3-4-5

16. How many transactions (approximately) have you had per month for these 3 periods? e.g.,(one=1, two=2, three=3, etc)

	2005	2008	2011
Mobile money agents			
Banks			
MFIs			
SACCOs			
Formal insurance			
Chama\merry-go-round			
Other(specify)			

17. Kindly indicate by an (X) your employment history for the following three durations.

	2005	2008	2011
Unemployed			
Temporary/casual/manual			
Permanent			
Retiree\pensionable			

18. Highest level of education?

None    1    Primary    2    Secondary    3    Graduate\college    4    Postgraduate    5

19. What percentage of the urban poor would you like to see being able to get access to financial services in the country?  
Please tick only one using (X).

0%	20%	40%	50%	60%	80%	100%
----	-----	-----	-----	-----	-----	------

--	--	--	--	--	--	--

# **PART C: INFORMATION ON SOCIO-ECONOMIC INDICATORS**

20. What is your approximate monthly expenditure (in Ksh?) \_\_\_\_\_

21. Please indicate your monthly expenditure on the following items

ITEM	Approximate value (Ksh)
Food	
Clothing	
Medical care	
Education or school fees	
Donations (To friends, Church offerings, etc)	
Airtime purchase	
Savings (Bank, Chama, SACCOs, etc)	
Other big expenditure (specify)	

22. Type of house that you stay in?

Temporary	1	Semi-permanent	2	Permanent	3
-----------	---	----------------	---	-----------	---

23. Indicate by a cross (X) if you own any of the following

TV	Bicycle	Refrigerator
Radio	Car/truck/tuk-tuk	Computer
Motorcycle	Farm at home	electricity

24. How near are toilet facilities from your residence

Self-contained	1	Shared	2	Less than 20 meters	3	More than 20 meters	4
----------------	---	--------	---	---------------------	---	---------------------	---

25. Who paid or built the toilet facility you are using in your residence?

household	landlord	neighbor	community	Local authority	others
1	2	3	4	5	6

26. What type of dwelling do you live in?

House	Flat	Maisonnett	Swahili	Traditional	shanty	Others (specify)
			house/			
1	2	3	4	5	6	7

27. What makes up the main walls of your residence/place of dwelling?

Stone	Brick	Mud/wood	Mud/cement	Wood	iron sheets	Grass	Tin	Others
1	2	3	4	5	6	7	8	9

28. What is the main material that makes up the roof of your dwelling?

Sheets	tiles	concrete	Asbestos	grass	makuti	polythene	Tin	Others
1	2	3	4	5	6	7	8	9

29. Any other issues you could like see being done?

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**THANK YOU SO MUCH FOR YOUR TIME AND COOPERATION**

Jacob Nato: [jacobnato@yahoo.com](mailto:jacobnato@yahoo.com) or 0726460771.

## REFERENCES

- Aghion, P & Howitt, P 1990, 'A model of Growth through Creative destruction', *National Bureau of Economic Research*, Working Paper no. 3223.
- Akhtar, M 1983, 'Financial Innovations and implications for Monetary Policy: An International Perspective', *BIS Economic Papers*, vol. 9, pp. 1-64.
- Aoki, K, Proudman, J & Vlieghe, G 2004, 'House prices, Consumption, and Monetary Policy: A Financial Accelerator Approach', *Journal of Financial Intermediation*, vol. 13, pp. 414-445.
- Arnold, LG 2005, 'The dynamics of the Jones R&D growth model', *Review of Economic Dynamics*, vol. 9, pp. 143-152.
- Atieno, R, Barako, D & Bokea, C 2010, 'Policies for prosperity, Innovation, and Financial Access: The Role of M-Pesa in Kenya', in C Adam & N Ndung'u (eds), *Policies for Prosperity*, Oxford University Press, London.
- ATISG Report 2010, *Innovative Financial Inclusion: Principles and Report on Innovative Financial Inclusion from Access through Innovation*. Sub-group of the G20 Financial Inclusion Experts Group.
- Beck, T & Fuchs, M 2004, 'Structural Issues in the Kenyan Financial System: Improving Competition and Access', *World Bank Policy Research*, Working Paper 3363.
- Beck, T 2009, 'Fin Access 2009: Trends, Analysis and Policy conclusions', *Consultant Report for FSD Trust Kenya*, viewed 22 September 2011, <http://papers.ssrn.com/sol3/Delivery.cfm/5442.pdf>
- Beck, T, Demirguc-Kunt, A & Levine, R 2010, 'Financial Institutions and Markets across Countries and over Time: Data and Analysis', *World Bank Economic Review*, vol. 24, pp. 77-92.
-

Beck, T, Cull, R, Fuchs, M, Getenga, J, Gatere, P, Randa, J & Trandafir, M 2010, 'Banking sector stability, efficiency, and outreach in Kenya', in C Adam, P Collier & N Ndung'u (eds), *Kenya Policies for Prosperity*, Oxford University Press, London.

Central Bank of Kenya (various reports), *Annual Reports*, Central Bank of Kenya, Nairobi, Kenya.

Claessens, S 2006, 'Access to Financial Services: A Review of the Issues and Public Policy Objectives', *The World Bank Research Observer*, vol. 21, pp. 207-240.

Financial Services Deepening Kenya and Central Bank of Kenya 2009, *Fin Access National Survey 2009: Dynamics of a Changing Landscape*.

Garrido, L, Kumar, P, Ndung'u, N & Randa, J 2010, 'Growth analysis and diagnostics for Kenya', in C Adam, P Collier & N Ndung'u (eds), *Kenya Policies for Prosperity*, Oxford University Press, London.

Glennon, D & Lane, J 1996, 'Financial Innovation, New Assets and the Behavior of Money Demand', *Journal of Banking and Finance*, vol. 20, no. 2, pp. 207-225.

Hasan, M 2009, 'Financial Innovations and Interest Elasticity of Money Demand in the UK', *International Journal of Business and Economics*, vol. 8, no. 3, pp. 225-242.

Ho, NW 2006, *Financial Innovation and its Impact on Central-Bank policies*, Monetary Authority of Macao, Macao.

Honohan, P 2008, 'Cross-country variation in Household Access to Financial Services', *Journal of Banking and Finance*, vol. 32, pp. 2493-2500.

Iris, C & Grimes, A 2003, 'Asymmetric Information, Financial Intermediation and Monetary Transmission Mechanism: A Critical Review', *New Zealand Treasury*, Working Paper 03(19).

Johnson, S 2009, 'Financial Access and Exclusion in Kenya and Uganda', *Bath Papers in International Development*, no. 1.

Jones, CI 1995, 'R&D-based models of Economic Growth', *The Journal of Political Economy*, vol. 103, no. 4, pp. 759-784.

Jurgen, S 2008, 'Growth and Productivity of the Financial Sector - Challenges for Monetary Policy', *BIS Review*, vol. 137/2008.

Kenya Institute for Public Policy Research and Analysis (KIPPRA) 2009, *Kenya Economic Report 2009: Building a Globally Competitive Economy*, Kenya Institute for Public Policy Research and Analysis, Nairobi, Kenya.

Kumar, A 2005, *Measuring Financial Access through user's surveys core concepts, questions and indicators*. Paper prepared for the joint world bank/DFID/Fin mark Trust Technical Workshop "Defining Indicators of Financial Access", Washington DC.

Long, SJ 1997, *Regression models for categorical and limited dependent variables: advanced quantitative techniques in the social sciences*, Sage Publications, New Delhi.

Malerba, F 2005, 'Innovation and the Evolution of Industry', *CESPRI, Univ. Comm. Luigi Bocconi*, Working Paper no. 172.

Manganelli, AG 2008, 'The R&D of Norwegian Firms: An Empirical Analysis', *Ragnar Frisch Center for Economic Research*, Working Paper no. 5/2008.

Mario, D 2007, 'Monetary Policy and New Financial Instruments', *BIS Review*, vol. 61/2007, pp. 1-6.

Misati, R et al. 2010, 'Financial Innovation and Monetary Transmission in Kenya', *International Research Journal of Finance and Economics*, vol. 50, pp. 123-136.

Mishra, P & Pradhah, B 2008, *Financial Innovation and Effectiveness of Monetary Policy*, viewed 25 September 2011, <http://ssrn.com/abstract 1262657>

Mohan, R 2007, *Recent Financial Market Development and Implications for Monetary Policy*, Address at Asia Regional Economic Forum.

Mwaura, M, Ngugi, R & Njenga G 2009, 'Financial Sector Development and Economic Growth for African Countries,' *African Finance Journal*, pp. 74-94.

Niehans, J 1983, 'Financial Innovation, Multinational Banking and Monetary Policy', *Journal of Banking and Finance*, vol. 7, pp. 537-551

Njuguna, SN & Kimenyi, SM 2009, 'Expanding the Financial Services Frontier: Lessons from Mobile Phone Banking In Kenya', *Brookings Papers* 2009.

Noyer, C 2007, 'Financial Innovation, Monetary Policy and Financial Stability', *Micro-data Analysis and Macroeconomic Implications*, Deutsche Bundesbank's 9<sup>th</sup> Spring Conference, Eltville, 27-28 April 2007.

Olga, M & Mark, P 2009, 'Poor people using Mobile Financial Services: Observations on Customer Usage and Impact from M-PESA', Consultative group to assist the poor publication, World Bank,

Porteous, D 2007, 'Finance Service Access and Usage in Southern and East Africa: What do Fin scope surveys Tell Us?', *Fin Mark Trust South Africa*.

Republic of Kenya, 2007, *The Vision 2030*, Government Printer, Nairobi.

Roldos, J 2006, 'Disintermediation and Monetary Transmission in Canada', *IMF Working paper* WP/06/84.

Romer, PM 1990, 'Endogenous Technological Change', *The Journal of Political Economy*, vol. 98, no. 5(2), pp. 71-102.

Schumpeter, J 1939, *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process*, McGraw-Hill, New York City, NY.

Scott, W & White, L 2002, 'Empirical Studies on Financial Innovation: Lots of Talk, Little Action', *Federal Reserve Bank of Atlanta Working Paper*, 2002-12.

Sena, V 2004, 'The Return of the Prince of Denmark: A Survey of Recent Developments in the Economics of Innovation', *The Economic Journal*, vol. 114(June), pp. 312-332.

Shaw, ES 1973, 'Financial deepening in Economic Development', Oxford University Press, London.

Sukudhew, S et al. 2007, 'Impact of Financial Market Developments on the Monetary Transmission Mechanism', *BIS Papers*, no. 39.

Weber, A et al. 2008, *Has the Monetary Transmission Process in the Euro Area Changed? Evidence Based on VAR Estimates*, BIS Conference, Luzern, Switzerland.