

Kenya's Financial Transformation in the 21st Century

Edited by Amrik Heyer and Michael King



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Dedication

Ravi Ramrattan was FSD's Research Economist from 2011 to 2013. Ravi played a major role in developing FSD's quantitative research programme, including delivering the 2013 FinAccess survey. He also spearheaded the expansion of FinAccess to include a geo-spatial mapping of financial access points (FinAccess Maps) now in its second round, and a pioneering study on the supply and demand of financial services for businesses, FinAccess Business. Ravi worked closely with colleagues from the Central Bank, the Bill and Melinda Gates Foundation and the World Bank to develop these outputs, as well as involving top academics to improve the rigour and analysis of this research. Ravi had been closely involved in early discussions on the concept of an e-book following the FinAccess 2013 survey, with the aim of bringing expert analytical capacity to bear on FinAccess datasets. Ravi was a wonderful and inspiring colleague. Through this and other work, he made an important contribution to financial inclusion in Kenya. Tragically, he lost his life in the Nairobi Westgate terror attack of September 21st 2013. It is to his memory and his work that we dedicate this book.

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She has a background in economics and agricultural economics and worked in development organisations for eight years before joining academia. She investigates the means through which social and cultural factors influence the economy and markets, especially their embeddedness in social relations. She has researched and written extensively in the field of microfinance and financial access, analysing their gender dimensions, the role of informal financial services and the impact of interventions on poverty.

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Foreword

Access to financial services has received growing attention from policymakers around the world over the last decade. From being an issue largely associated with credit, driven in large part by the microcredit movement, it is now increasingly understood as an important dimension of economic and social inclusion. At the World Bank's spring meeting of 2015, the World Bank's President, Jim Yong Kim, announced an initiative to accelerate progress towards achieving universal financial access by 2020. The goal is to ensure all adults worldwide have "access to a transaction account or an electronic instrument to store money, send and receive payments, recognising financial access as a basic building block to managing an individual's financial life". This initiative built on an earlier move in 2010 by the G20 group of industrial and emerging-market countries to establish a Global Partnership for Financial Inclusion (GPII).

Kenya has made remarkable progress over the last decade in expanding financial access. With three quarters of adult Kenyans now having a formal account through which they can save and transact, the country has reached a level of financial access seen in more developed economies. The Brookings Institute's 2015 report on financial and digital inclusion ranked Kenya first out of 24 emerging economies that are increasing access to affordable financial services. This progress is due, in large part, to the collective efforts of various players in the Kenyan financial system. Regulators opened the way for innovators to deliver ground-breaking solutions through digital technology, banks developed basic accounts delivered through branches and agents close to where people live and work, and government social transfer programmes are using the financial system to reach remote corners of the country.

Measurement of financial access was started in Kenya a decade ago with the creation of the FinAccess survey by a coalition of public and private partners. Led by the Central Bank of Kenya and supported by the Kenya National Bureau of Statistics and FSD Kenya, this survey provided the first accurate data on levels of access across the country. The three rounds of FinAccess demand-side surveys completed thus far provide the evidence of Kenya's remarkable improvement in expanding the reach of its formal financial system. Looking at the rate of progress revealed by the surveys suggests that Kenya should be well positioned to achieve the goal of universal financial access by 2020.

As ever, there are layers of complexity beneath the headline figures. Analysis of the data from FinAccess combined with other more qualitative research suggests that reaching at least some of the poorest may be considerably more difficult than the progress in headline numbers imply. While technology has dramatically reduced the costs of delivery – providing the engine for Kenya's success – it is not a panacea. Economic, social and financial marginalisation tend to interact.

A perhaps more fundamental question is whether financial access should be seen as anything more than a milestone on a longer journey. Levels of usage among many of the newly financially included remain quite modest. It is hard to see how the putative economic and social development benefits of formal financial inclusion can be achieved where use of formal services still appears to play only a marginal role in the financial lives of the poor.

This book represents the results of a sustained effort to look beneath the headline numbers. The ambition is to develop a deeper understanding of Kenya's financial landscape and its ongoing transformation. By gaining a clearer view on the complexities here, Kenya will be much better placed to harness the potential of the financial system to contribute to accelerating inclusive development and reducing poverty. The more nuanced story which emerges points to the need for yet greater efforts by both government and industry if we are to create a financial system which delivers on its promise. This research represents an important contribution to identifying the way ahead. It doesn't attempt to provide all the answers – but in raising questions, it will certainly help us in trying to find the right path.

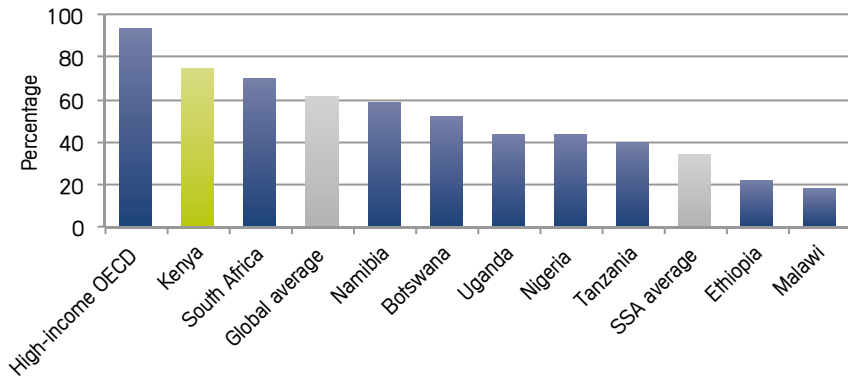
David Ferrand
Director, FSD Kenya
October 2015

Introduction

AMRIK HEYER AND MICHAEL KING¹

By any comparison, the transformation of financial services in Kenya in the last ten years has been impressive. Recent global data shows that 75% of adults have a formal account that allows them to save, send or receive money, making Kenya the leader in sub-Saharan Africa. Indeed, Kenya outperforms both the global average and many middle-income countries such as Chile, Brazil, India, Mexico and Russia (see Figure 1).

Figure 1: Adults with an account (as a percentage of total)



Source: Findex, 2014.

Despite Kenya being a regional leader for financial sector innovation – with M-PESA, M-Shwari, agency banking and local language bank staff acting as exemplars for sub-Saharan Africa – it is conceivable that these innovations are only scraping the surface of what might possibly emerge over the next 10 to 15 years. The prospect of real mobile banking is close. The challenge

1 We gratefully acknowledge the insightful comments on this introduction and the following chapters from Edoardo Totolo, the current Research Economist at FSD.

will be to design products that play a serious welfare-improving role in the financial management practices of low- and middle-income households. Digital technology has breached the access frontier, enabling more intensive engagements between providers and consumers of finance. Will this create a win-win situation where value is created for all parties? Or will it lead to more opportunities for extraction by corporations at the expense of the poor? What factors are likely to sway the balance between these possibilities?

The aim of this book is to stimulate debate on how we analyse and think about the future of market development and its implications for poverty and growth. The book was commissioned by Financial Sector Deepening (FSD) Kenya as an invitation to scholars to dig more deeply into the data that have been collected over the past ten years by FSD and its partners, especially the Central Bank of Kenya (CBK). While a wealth of data exists on Kenya's financial markets, our understanding of market drivers and their development impacts is still limited. Drawing on cutting-edge methodology and sophisticated analysis, the purpose of this book is to take a step back from the narrative of progress that has characterised financial inclusion reports. The chapters take a more critical look at the financial landscape, highlighting constraints to infrastructural expansion, effects of market structure, demand-side drivers of uptake and usage, as well as the implications of financial sector development for poverty and growth. The seven chapters can be grouped into three broad areas. The first three chapters look at the achievements and constraints to formal access, leveraging demand and supply-side data. The middle chapters look at the effects of digitisation on financial inclusion, while the final chapters propose new measures of financial inclusion.

The book draws principally on time-series data produced by three successive rounds of the Kenya FinAccess household surveys (CBK and FSD Kenya, 2007 2009, 2013). The FinAccess surveys, following the South African FinScope model, were instituted to track and better understand progress towards financial inclusion from a policy perspective, as well as providing valuable market data for industry, including market sizing and segmentation. The chapters also draw on supply-side analysis from geo-spatial mapping of financial outlets (Bill and Melinda Gates Foundation, CBK and FSD Kenya, 2014, 2015) and financial institution annual returns, as well as referencing qualitative studies such as FSD's Kenya Financial Diaries (Zollmann, 2014), which provide invaluable insights into financial usage and behaviour. Ultimately, the book is testimony to the importance not only of data but also of the analytical frameworks we use in its interpretation, and how this affects the way we understand and shape markets.

Understanding the transformation

The first section of the book analyses the expansion of formal financial inclusion over the past ten years, emphasising the major contributions of the country's economic growth, a technology revolution in the form of a country-wide digital platform for financial transactions supported by extensive use of mobile phones, innovative business models for hitherto untapped low-income markets, progressive regulation, and a political climate that has underpinned the rise of local corporations. Focusing on the twin revolution in digital finance and banking, the chapters show how the financial sector has expanded profitably into previously unreached market segments. Over the last ten years, bank branches have become a dominant presence in towns and cities throughout the country, growing in number from 534 in 2005 to nearly 1,300 in 2015 (King, 2012; Bill and Melinda Gates Foundation, CBK and FSD Kenya, 2015). These early chapters show that the most notable influence underpinning this expansion has been the rise of locally owned banks, supported by the country's changing political affiliations. Radha Upadhyaya and Susan Johnson (Chapter 1) document the ways in which local banks have exerted competitive pressure on the industry, reducing the dominance of foreign-owned banks, partly through a populist focus on underserved market segments, including lower-income households and micro and small enterprises. This contributed to a culture shift in the financial sector as a whole, with the increasing recognition that lower-end markets represent an untapped market opportunity.² Equity Bank led the way in creating no-frills, low-balance accounts and customer-friendly front offices (including staff who are familiar with local languages), which has enabled lower-income segments and businesses to enter formal banking. The growth in bank branch outreach has been complemented by the establishment of the largest number of bank agents in the region, with over 13,000 registered bank agents in 2015 (Bill and Melinda Gates Foundation, CBK and FSD Kenya, 2015).

While the expansion of bank branches has been impressive, mobile money has made an even stronger contribution to financial access. By 2015, a network of approximately 68,000 agents had pushed out the access frontier, partly through a densification of access points, but also through establishing outlets in poorer counties and underserved regions (Bill and Melinda Gates Foundation, CBK and FSD Kenya, 2015). As a result, 73% of the population now live within 3 kilometres of a financial sector touch point. Mobile money agents also created

2 An Oxford Policy Management impact assessment of FSD Kenya (Stone et al., 2010) comments on the role of the FinAccess survey itself in creating this culture shift in the recognition by financial players of the market opportunity at the 'bottom of the pyramid', underlining the importance of research in supporting market change.

a demonstration model, leading to new regulation in 2010 that opened the way for bank agents.

Mobile money services leveraged a new mass-market platform created by the rapid expansion of mobile phone coverage and airtime agents, as well as a supportive regulatory environment (Heyer and Mas, 2010). From modest beginnings in March 2007, 63% of Kenyan adults now have a mobile money account (InterMedia, 2015). Perhaps for the first time, mobile money represented a direct response to a demand-side need, fuelled by the country's migrant labour economy. The initial service offer enabled people to transfer digital value across space in real time, galvanising domestic remittances with evident impacts on resilience to shocks, and emerging impacts on livelihood security and growth (Jack and Suri, forthcoming; Jack et al., 2013; Suri et al., 2012).

Mobile money has also created a bridge to the formal sector for some (though not all) groups who previously relied entirely on informal institutions for their economic and financial needs. Developing an innovative pseudo-panel from FinAccess data (2009-2013), Alev Gürbüz and William Jack (Chapter 4) illustrate the formalising effects of mobile money on the financial portfolios of underserved populations. Between 2009 and 2013, populations with a lower likelihood of formal uptake – urban poor, rural populations, women and less educated populations – saw a very substantial increase in formalisation (driven both by mobile money usage and uptake of other formal products). More recently, M-PESA has also created direct access to formal banking. Following the launch in 2012 of M-Shwari – a partnership between the telecommunications giant, Safaricom, and the Commercial Bank of Africa (CBA) – over 10 million adults have opened a formal savings accounts with M-Shwari, of which about 50,000 are accessing loans each day. This has created a demonstration effect in the market, with competitors such as KCB M-PESA and Equitel now emerging in the new mobile banking space.

However, despite the expansion of financial infrastructure over the past ten years, access is still skewed. While 93% of the richest are formally included, 55% of the poorest are completely excluded from formal and informal financial services (FinAccess, 2013). Usage remains shallow, and the value proposition of finance for poverty and growth is still questionable. The drive and innovation that pushed out the access frontier may have exhausted early wins as formal institutions, motivated by easier-to-reach and more lucrative markets, fail to overcome the infrastructure and wealth constraints at the margins. Giorgia Barboni (Chapter 2) finds that proximity is still a constraint for the poorest, with those in the wealthiest population band living, on average, less than 1 kilometre from the closest financial services provider, while the poorest live

more than 5 kilometres from any financial access point. She analyses the factors behind geographical outreach. Banks clearly follow wealthier, easy-to-reach markets, with radial models of expansion around prominent urban hubs. Agents (bank and mobile money) are more dispersed, but tend to be concentrated near primary and, to some extent, secondary roads, leaving large swathes of the country untouched (for example, Marsabit, Tana and Isiolo). This is partly related to lack of network in these areas, but it also underlines the tendency for agents to focus on denser population areas with reasonable access to infrastructure. The promise of bank agents in driving outreach also appears to be more limited than was originally hoped. A survey of agent networks (Khan et al., 2015) found that bank agents are mainly delivering to already included populations, rather than pushing out the access frontier. The survey report hints at the incentive structures around agency models that prioritise denser areas and existing customers rather than investing in deepening outreach to new and harder-to-reach consumers.

From a demand-side perspective, Tara Bedi and Michael King (Chapter 3) analyse demographic drivers of usage and uptake, finding that wealth and income are strongly correlated with use of bank accounts. Three quarters of non-banked individuals cite lack of income or banks being ‘too expensive’ as major constraints, pointing to price as a continued barrier to uptake. Bedi and King also analyse patterns of lending, showing that these are skewed towards salaried populations rather than informal clients. FinAccess data show that bank account users mostly access their accounts once a month – linked to the withdrawal of salaries – while mobile and informal accounts are used daily and weekly, indicating a higher level of importance in people’s daily lives and a stronger connection with informal income flows (CBK and FSD Kenya, 2013). The failure of banks to reach out beyond their core markets is partly due to a failure of communication, which is underscored by a general perception of lack of transparency in the banking sector (for example, 19% of bank users from the FinAccess 2013 survey claim to have experienced unexpected charges from banks).³ Similarly, transaction data hint at the continuing effect of high transactions costs on mobile money usage, with the FSD Financial Diaries study finding that 83% of transactions over 1,000 shillings are still in cash.

What are the signs that financial providers will overcome the hurdles of price and innovation to reach the next frontier of financial sector deepening? The leading banks and mobile operators are making considerable profits on their existing business models, with little incentive to move out of their comfort zones. In their analysis of the banking sector, Upadhyaya and Johnson find

3 The Kenya Financial Diaries report (Zollmann, 2014) also documents the perceived lack of transparency of banks. More tangible evidence of this is emerging from recent FSD mystery shopping data.

that interest rate margins and spreads remain high, as do profit margins, and there is a danger of a low-level equilibrium trap as the access gains driven by large local banks start to plateau. The authors look at the value proposition of the banking sector, pointing to a declining domestic savings rate and a decreasing proportion of lending to key economic sectors. Lending patterns within the banking sector appear to be strongly linked to the rising middle class, with growth in lending largely focused on easy wins in consumer lending (especially payslip lending) and property markets. This is not likely to deliver the dividends for employment and growth that would come from increased lending to core productive sectors such as manufacturing, agriculture and small and medium-sized enterprises (SMEs). This is corroborated by demand-side data that underscore the relationship between patterns of lending and salaried employment.

Upadhyaya and Johnson point to political economy factors that have influenced a skewed market structure, encouraging the dominance of large local banks at the expense of more efficient smaller players. They argue that the reputational advantages enjoyed by large local banks need to be extended to the sector as a whole and in particular to small local banks, which show strong levels of performance at much tighter profit margins but still have a low market share. The struggle for smaller banks to compete effectively may be partly responsible, they suggest, for the lack of progress towards efficiency resulting in the price constraints experienced by lower-income groups. At the same time, the monopoly over mobile channels by the market leader, Safaricom, with approximately 77% of mobile money subscribers in 2015, also raises concerns. Its strong market position may prevent the move towards interoperable infrastructures that will allow banks and telecommunications companies to compete (and cooperate) effectively in delivering low-cost solutions for the poor. Without improvements in market structure resulting in a more level playing field, there is a danger of a duopoly in the low-end market that will fail to deliver the potential value proposition of the financial sector for pro-poor growth in Kenya.⁴ This scenario suggests that pro-poor market development will continue to rest on political as well as corporate incentives in guiding the financial sector towards increased efficiency and competitiveness through supporting an even playing field.⁵ A proactive approach involving industry

4 The low-income market is currently dominated by two local corporate giants, Equity Bank and Safaricom, that have been largely responsible for the gains in financial inclusion to date, but whose market dominance may compromise these positive trends going forward unless more widespread competition is unleashed.

5 While government may have had a role to play in creating a level playing field, this can also be achieved through the private sector. The forthcoming banking switch currently under development is an example of the powerful role that the private sector can play if coordination failures can be overcome to support 'cooperative competition' (see <http://www.nation.co.ke/business/Banks-take-on-M-Pesa-in-fight-for-money-transfer-billions/-/996/2836358/-/format/xhtml/-/33qs4n/-/index.html>).

and policy is also needed to steer financial markets towards increased support to the real economy if Kenya's Vision 2030 (Government of Kenya, 2007) is to be realised.

Barboni's analysis develops this conclusion, pointing to continuing infrastructure constraints to formal financial access which may not be easily solvable until mobile networks are improved and mobile channels opened up to deliver a suite of affordable financial solutions that reduce the dependence on cash-in, cash-out outlets. In the meantime, more emphasis may be needed to sustain and improve semi-formal and informal institutions, including ROSCAs and ASCAs, but also SACCOs and MFIs, which are reaching remoter and poorer populations with financial offers that are often more closely tailored to local needs. While agency models push access into poorer counties, but with limited financial solutions, Barboni's analysis shows that SACCOs and MFIs are providing credit and savings products to more marginalised groups, albeit within wealthier counties. This underlines the need to support a diverse as well as competitive market structure that does not just cater to the mass market, but continues to push for solutions at the margins.

Delivering value for consumers

The first section of the book analyses the drivers of financial inclusion, questioning the extent to which the profit motives of corporates are able to overcome the barriers of price and infrastructure that continue to constrain market development. Later chapters focus our attention on the extent to which Kenya's financial transformation has succeeded in delivering relevant day-to-day financial solutions for Kenyans, in other words, moving beyond the consideration of usage and access to look at the value proposition of the sector for low-income populations. Michael King (Chapter 6) finds that the majority of Kenyans still cite their most important financial services as being 'exchanges between friends and family' and 'savings under the mattress'. This appears to be at odds with the impressive rise in Kenya's formal inclusion, until we look more closely at the story behind the digital revolution.

Gürbüz and Jack (Chapter 4) and Christopher Yenkey, Laura Doering and Pete Aceves (Chapter 5) review the effects of mobile money in raising levels of formal inclusion from 27% to 67% in just six years. Both chapters find that mobile money had a strong effect on the formalisation of Kenyans' financial portfolios. At the same time, Yenkey et al. find that there has been an even stronger effect on informality, which is masked by our current analytical frameworks. The authors argue that categorising mobile money as a formal

service reflects a provider-led bias in our analytical frameworks that obscures the role of mobile money in intensifying informal financial practices and improving the efficiency of informal financial institutions. To illustrate their point, they analyse data beyond the simple act of registering for mobile money (by which it is classified as 'formal'). Instead, they look at data on use-cases for mobile money, finding that the vast majority are connected to financial activity in the informal sector, especially via investments in social networks. The authors then conduct regression analysis on the association between mobile money and other financial products. They find that uptake of mobile money is associated with more intensive use of both formal and informal services. When they break this down by sub-population, the authors find that mobile money is more strongly associated with formal financial activity for male and urban users, while female and rural users deploy this tool to deepen their participation in the informal sector.⁶

Mobile money clearly has a value proposition in relation to its efficiency gains in moving value across space and offering a relatively secure wallet to store value. This stems from its formal properties leveraging a technology solution from a formal provider within a formally regulated payment space. However, the reputed value of mobile money for low-income households in Kenya with respect to risk pooling, liquidity management and possibly even investment and growth (Jack and Suri, forthcoming; Jack et al., 2013; Suri et al., 2012) occurs mainly through informal social networks (peer-to-peer borrowing and saving), which are still little understood, let alone taken seriously as an important aspect of financial inclusion (Johnson, 2014; Johnson and Krijtenburg, 2015).

The two perspectives that emerge from the analyses of Gürbüz and Jack and Yenkey et al. are not necessarily mutually exclusive. The informal sector activity being driven by mobile money is at the same time being increasingly formalised through use of the service itself, with its attributes of security, scale, efficiency and regulation. More recently, the layering of formal financial intermediation devices on mobile money rails – such as M-Shwari – is also bridging the informal/formal divide. Moving away from the informal/formal dichotomy, Yenkey et al. propose that we focus instead on the value proposition of financial institutions with respect to risk pooling, investment, liquidity management and transaction costs. Gürbüz and Jack propose the same, from a different perspective, asking what the significance is of increased formality in financial service use unless it increases utility for the majority of the population.

6 Similarly, the FinAccess 2013 report underlines the extent to which people increasingly use services in their portfolios, suggesting an increased intensity of usage rather than an evolution from informal to formal.

Measuring financial inclusion

The last two chapters in this volume address the question of how we conceive of, and therefore measure, financial inclusion. Michael King (Chapter 6) develops an index that broadens the metric of formality in the access strand⁷ to include function (savings, credit, payments and insurance) and frequency, thereby delivering a richer measure of ‘quality of access’. He complements this deeper approach with a focus on key constraints to access – including affordability, proximity, numeracy, and so on – to construct financial inclusion profiles for individuals and sub-populations. These profiles highlight the discrepancy between people’s financial inclusion status and his suggested ‘aspirational line of inclusion’, showing how far we still have to go. Whereas this richer measure of access moves us closer to an apprehension of ‘quality’, it still relies on usage profiles and, by definition, does not capture the ultimate metric of ‘value’ hinted at above, assuming instead that usage implies there is some value for customers.

Susan Johnson, Yihang Li, Silvia Storchi and Sunčica Vujić (Chapter 7) propose a more radical ‘financial capability index’ that attempts to capture the extent to which usage of financial instruments empowers people to have more control over their financial lives. This moves us a step closer to measuring the value proposition of finance for consumers. The authors draw on a data envelopment analysis (DEA) that measures individual endowments (wealth, education, proximity to services, etc.) and looks at how effectively individuals have converted these into good financial practices, such as not overspending, staying in control of one’s budget, or being able to grasp opportunity. Surprisingly, they find that people in Nyanza have higher capability scores than people in Nairobi, implying that people in Nyanza are able to achieve relatively effective use of financial services, despite having fewer endowments. Similarly, they find that individuals who profess to shared household decision-making have higher capability scores, implying that partnership is important for effective financial usage. They also find a positive relationship between capability and certain

7 The financial access stand is created through a categorisation of institutions providing financial services and products currently used by consumers. Individuals are classified according to the highest formality level of their reported usage. The categories are as follows. ‘Formal prudential’: service providers that are prudentially regulated and supervised by independent statutory regulatory agencies (CMA, CBK, IRA, RBA and SASRA), including commercial banks, deposit-taking micro finance institutions (DTMs), deposit-taking SACCOs (DTs), insurance providers, capital markets, and forex bureaux; ‘Formal non-prudential’: service providers that are subject to non-prudential oversight by regulatory agencies or government departments/ministries with focused legislation, including mobile financial service providers, the National Social Security Fund (NSSF), the National Hospital Insurance Fund (NHIF), and Postbank; ‘Formal registered’: providers that are registered under a law and government direct interventions, such as credit-only MFIs, credit-only SACCOs, hire purchase companies and the Government of Kenya; ‘Informal’: unregulated forms of structured provision, such as informal groups, shopkeepers/merchants, employers and money lenders.

types of salaried employment, showing the importance of regular income flows in financial planning and budgeting. Interestingly, they find that ROSCA use and, to some extent, bank use are related to higher levels of capability, while use of mobile money is not. The discipline of saving in a ROSCA and the ability to plan that the ROSCA cycle enables provide an explanation for this relationship. Usage of bank accounts, while not facilitating qualities of discipline and planning to the extent that ROSCAs do, may nonetheless enable better money management through 'locking money away', thus reducing the temptation to spend. Confirming the analysis of Yenkey et al., the capability score of Johnson et al. underlines the fact that mobile money is a tool rather than a financial action in its own right, and that it does not by itself have intrinsic attributes to enable improved money management, other than possibly providing a safe and convenient way to store money.

An underlying thread through the different chapters is the need for richer data and new frameworks to analyse progress towards financial inclusion, and the impacts of financial inclusion on development goals. The chapters point to the need to look beyond an economic measure of success and to attend more closely to the political dimensions that shape the trajectories of markets (often to the benefit of some and to the detriment of many). As well as tracking progress towards access and uptake, improved tools are needed to understand the influence of informal practices on financial inclusion and to focus more seriously on the value proposition of financial tools in the lives of consumers. How far FinAccess surveys can deliver on these data needs is questionable, which underlines the importance – highlighted in all of the chapters – of drawing on, and developing other sources of data, both qualitative and quantitative.

The debates which run through this book over current metrics reflect a change in focus for organisations working to improve financial inclusion in developing country contexts. Since the first FinAccess survey in Kenya in 2006, there has been a shift from a supply-side focus on broadening access through expansion of infrastructure to an increasingly demand-led focus on the value proposition of financial services. This is partly a result of the substantial gains over the past decade with regards to proximity, affordability and relevance, compelling us to start posing a new generation of questions that move us further down the impact path. Following the sub-prime crisis in the United States and recent studies showing the limited impact of microfinance on the lives of the poor (Bateman, 2012; Banerjee et al., 2015), it is becoming increasingly important to monitor closely the extractive tendencies of financial markets⁸ and to ask

8 <http://www.bankofengland.co.uk/publications/Pages/speeches/2015/821.aspx>

hard questions regarding the value proposition of the sector for development objectives. The recent global financial crisis has shown how destructive lending products can be, underlining the need for strong consumer protection measures in the Kenyan market, particularly in view of the substantial business opportunities emerging in consumer credit and the increasing use of data to expand market share. If the deeper drivers of poverty are to be addressed, we also need to focus our attention beyond household finance and address the financial constraints to inclusive growth and economic opportunity (for example, through developing linkages between finance and other sectors such as health, education, agriculture, and manufacture). Finally, if we are to deliver genuine value for lower-income households, we need to pay closer attention to the needs and aspirations of clients, particularly at the lower end of the spectrum where consumer information is scarce. All this suggests that, as the sector evolves, the metrics with which we measure and understand progress also need to evolve if they themselves are not to constitute a constraint to pro-poor market development.

The chapters in this book are an attempt to bring top quality research and analytics to bear on policy and market expansion, underlining the potentially valuable synergies between research and practice. The views and analysis put forward in this book are those of the authors, and part of its richness stems from the contrasting perspectives they express. It is our anticipation that the book will throw up as many questions as answers, making us think more deeply about the evolving relationship between markets, poverty and growth.

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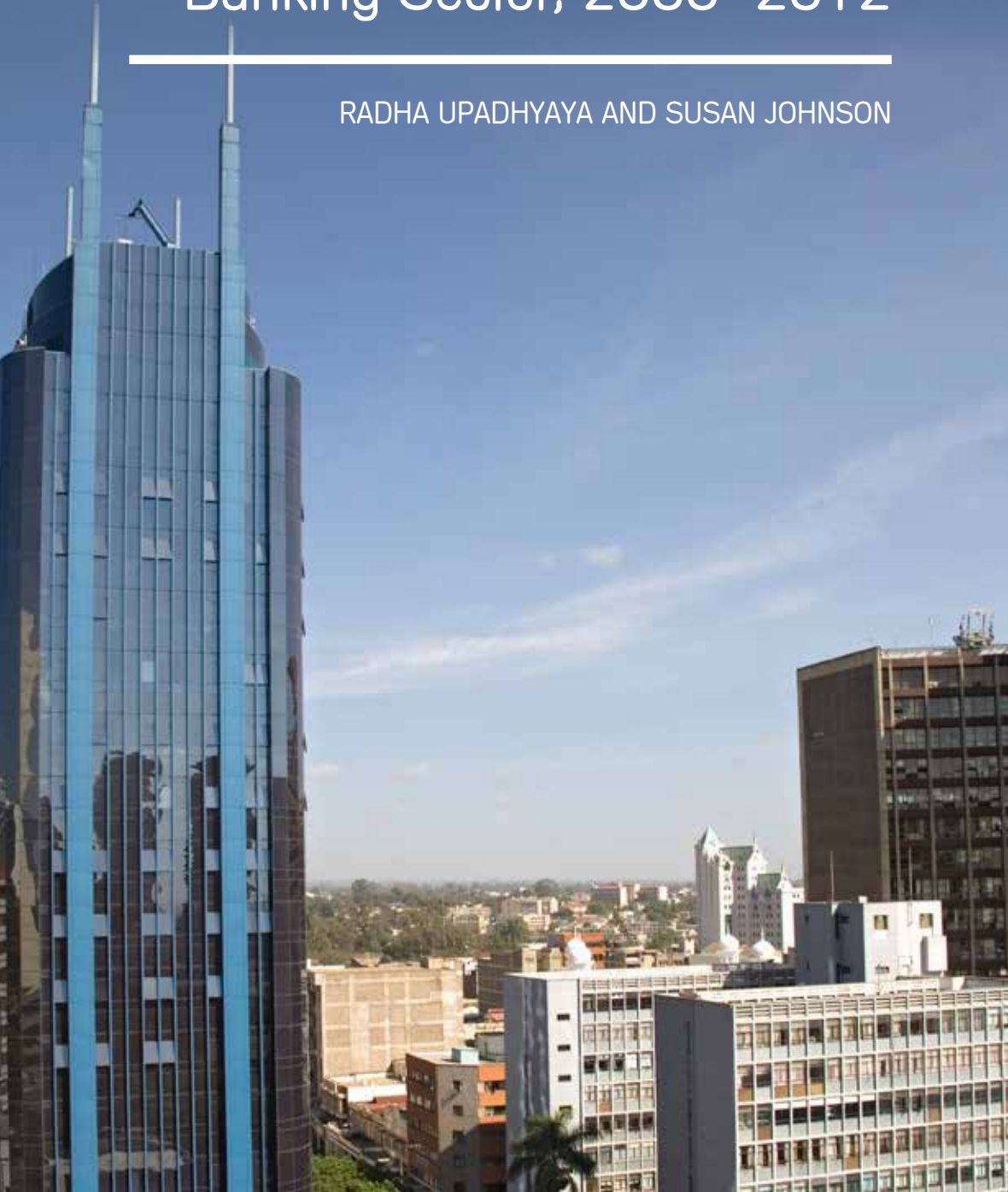
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CHAPTER 1

Transformation of Kenya's Banking Sector, 2000–2012

RADHA UPADHYAYA AND SUSAN JOHNSON



1 Introduction and motivation

The finance for growth literature emphasises the long-run positive relationship between finance and economic growth (Levine, 1997; Demirgüç-Kunt and Levine, 2001). However there is now an acceptance that this relationship has important ‘non-linear effects’ (Beck, 2013) and that ‘we cannot carry on assuming that more finance is better’ (Griffith-Jones, 2013). Furthermore, it has now been recognised that it is not only foreign banks, but also local banks, that are important drivers of credit growth, access to finance for the poor and innovation (Lin, 2009). It is within the context of these debates that this chapter discusses the evolution of the banking sector in Kenya.

The changes in the Kenyan banking sector since colonial times largely mirror the country’s political and economic transformation from a colony into an independent nation. The pre-independence period was characterised by a small banking sector with foreign-owned banks that predominantly extracted profits out of the colony. The post-independence era from 1963 to 2000 had three phases that reflect the growing pains of a newly independent nation. The first phase (*‘Harambee’*), from 1963 to 1980, saw the creation of government-owned banks. The next phase (*‘Nyayo’*) was characterised by a large increase in banks and non-banking financial institutions (NBFIs) including the creation of local banks, several of which had strong political connections.¹ The next phase (*‘Liberalisation’*), from 1990 to 1999, saw an explosion in the growth of banks but was also characterised by instability, with a large number of bank failures. Therefore, while liberalisation had some positive effects including an increase in the levels of deposits, the overall results of liberalisation were largely disappointing both in terms of the depth and the stability of the financial sector. Furthermore, financial access was not a major consideration for commercial banks or the Central Bank of Kenya.

The next phase (*‘Transformation’*), from 2000 to 2012, is the focus of this chapter. One of the impetuses for this phase was changes in the regulatory environment in 2000. Among these key changes were an increase in minimum capital requirements, the reinforcement of single borrower limits and restricted lending to insiders.

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1 *Harambee* and *Nyayo* were the terms used by the first and second presidents of Kenya, President Jomo Kenyatta and President Daniel Arap Moi, to capture the philosophy of their leadership.

The chapter shows that the banking sector in Kenya transformed significantly during this period, with increased depth, stability and access. The chapter also shows that the composition of the banking sector changed significantly during this period. The transformation has been led by local large privately owned banks that have pursued expansionary strategies, including developing products for small and medium-sized enterprises and a focus on the ‘unbanked’.

However, the chapter highlights that key challenges remain, including (i) high interest rate spreads; (ii) a decreasing proportion of lending going to key economic sectors including agriculture and manufacturing; and (iii) slower transformation of local small privately owned banks.

The chapter is organised as follows. Section 2 provides a historical perspective on the banking sector in Kenya, summarising the major changes in the banking sector from 1896 to 2000. Section 3 analyses the changes that took place in the banking sector as a whole in the period 2000–2012. Section 4 discusses the changes in the industry composition and focuses on the segmented nature of the banking sector in Kenya. It also highlights the rise of local large privately owned banks and their contribution to increased financial access. Section 5 concludes.²

2 History of the banking sector – 1896 to 2000

2.1 Colonial origins – 1896 to 1950

The establishment of the British Empire in East Africa began with the establishment of a trading frontier under the agency of the Imperial British East Africa Company (IBEAC), incorporated in the United Kingdom in 1888. IBEAC sought to inherit the centuries-old long-distance trade that linked the African interior to the African coast, and the African coast to the Indian sub-continent via the Indian Ocean. Colonial rule was formally established with the declaration of the East African Protectorate in 1895 under the sovereignty of the Sultan of Zanzibar. Construction of the Uganda Railway (later the East African Railway) began in 1896 from the East African coast at Mombasa and reached the point that would become the capital of modern Kenya, Nairobi,

2 The data sources for this chapter are listed in Appendix 1. For aggregate-level indicators, we have used data that are publicly available from the World Bank website and the Central Bank of Kenya (CBK) website. Data on banks’ financial statements are also publicly available, as banks are required to publish their financial statements quarterly in the Kenyan press. However, these bank-level data are not available in a database from the CBK website. We have therefore relied on two companies – Think Business and RSM Ashvir – that collate the publicly available data into a database and use the data to present annual awards for banks. The dataset was randomly checked against original bank balance sheets to confirm its veracity.

in May 1898. In 1920, the nominal sovereignty of the Sultan of Zanzibar was confined to a ten-mile strip along the coast, which the British then rented from the Sultan. The country was renamed the Colony and Protectorate of Kenya (Hazlewood, 1979; Atieno-Odhiambo, 2000).

The origins of commercial banking in Kenya lie in these commercial connections between British East Africa and British India at the close of the 19th century. The first two British banks to be established were the National Bank of India in 1896 and the Standard Bank of South Africa in 1910. The former became National and Grindlays Bank and the latter became Standard Chartered Bank. The National Bank of South Africa was established in 1916 but was later merged with Colonial Bank and Anglo-Egyptian Bank to form Barclays Bank (Dominion, Colonial and Overseas) in 1926, which was also based in London.

The most important point to recognise is that while commercial banking became relatively well established in Kenya during the colonial period, the banks showed little interest in the indigenous African population. As branches of metropolitan banks, they were designed to settle accounts of the colonial economy and were therefore not interested in encouraging savings amongst Africans or financing African enterprise (Engberg, 1965; Mkandawire, 1999). It has been further argued that the banks did little to help even their main customer base – the white settler community that was dominated by farmers:

‘... these banks lent money to the farmers at [interest rates of] anything from 8 to 10 per cent. When crisis came [after the First World War] they operated their traditional policy and shut down on credit at the moment when it was most required. When European farmers were mortgaged to the hilt and the wages of Africans were at least halved, these banks remained woefully prosperous. Throughout the crisis the Standard Bank of South Africa did not declare a dividend of no less than 10 per cent... A good deal of property as well as money passed into their hands during these years. Organised to *take money out of the colony*, there is little evidence that the banks have proved adventurous in promoting industrial development in Kenya.’ Aaronovitch and Aaronovitch (1947, p. 177)³

Interestingly, the restriction of credit by the three banks led to pressure on the government to relieve the heavily indebted white farmers. The colonial government established the Land Bank in 1931 as a source of alternative credit. However, it has been observed that the private banks benefited more

3 Emphasis added.

than farmers, as 39% of the funds of the Land Bank were used to discharge existing mortgages with private banks and therefore did not increase the total availability of credit (Aaronovitch and Aaronovitch, 1947).

2.2 Pre-independence growth – 1950 to 1963

It was not until the 1950s that other banks began to be established. These were mainly single branch banks, headquartered in Nairobi with a focus on trade finance (Engberg, 1965; Central Bank of Kenya, 1976).

There are other structural features that should be noted. First, there was no central bank fulfilling the function of lender of last resort. In its place was the East African Currency Board (EACB) with the limited function of maintaining a strict parity between the East African shilling and the British pound.⁴ Therefore, the supply of credit was fully determined by the commercial banks. Commercial bank advances consisted of their own resources and funds borrowed from parent banks. Funds moved freely from parent banks to their branches, as there were no capital account restrictions. Second, prudential regulation was very lenient with no statutory liquidity or cash requirement ratios (Central Bank of Kenya, 1976, 1986).⁵ Third, there was very little effort amongst the banks to compete for deposits. Interest rates on deposits and loans were determined by collective (cartel-type) bank arrangements decided by the three major banks and subscribed to by the other banks (Engberg, 1965).

Between 1950 and 1963, the levels of deposits, assets and loans held by commercial banks in East Africa (and therefore Kenya) grew substantially (see Table 1).

4 The establishment of the EACB in 1919 led to the introduction of the East African florin in 1920 and the East African shilling in 1922. Prior to that, the currency of use in East Africa was the Indian rupee, due to centuries-old trade connections between India and East Africa. However the fluctuations in the value of the rupee in relation to sterling during the First World War led to the establishment of the EACB (Central Bank of Kenya, 1976). The Board, operating through commercial banks, issued shillings at a fixed exchange rate of 20 East African shillings for every £1. The Board had all its assets in UK securities and all its currency issues had to be fully backed by foreign exchange (Hazlewood, 1979).

5 The first three banks to be established during the colonial period were regulated by the Banking Ordinance of 1910. This Act was repealed and replaced by the Banking Ordinance of 1956, which specified for the first time minimum capital requirements for banks and established a Registrar of Banks with power to license banks. The minimum capital was set at 2 million East African shillings (approximately US\$0.28 million).

Table 1: Monetisation, assets and deposits held by banks in East Africa, 1950–1963

Year	Total deposits (£m)	Local earning assets (£m)	Local earning assets as % of total deposits	Loans and advances (£m)	Loans and advances as % of total deposits
1950	64	22	34%	17	27%
1960	87	78	90%	69	80%
1963	121	105	87%	93	77%

Note: It has not been possible to get a breakdown of these figures between the three East African countries (Kenya, Uganda and Tanzania).

Source: Engberg (1965).

It has been documented that the banks tended to be very conservative, applying credit standards set by their head offices that were not realistic in the extremely under-developed countries in which they were operating (Engberg, 1965). The unwillingness of banks to extend credit led to a situation in the 1950s where there was an *export* of capital from the under-developed periphery to the developed metropole (Maxon, 1992).

The second important point to note is that the safety of the deposits held by the branches of the main banks did not depend on the quality of assets of these banks in East Africa, but was linked to the capital and reserves of the parent banks overseas. Therefore, when large withdrawals of deposits took place in 1955, 1960 and 1963, the banks were able to use the inter-bank borrowing facilities of their London head office (Abdi, 1977). This point is crucial to keep in mind for our discussion below on segmentation – foreign banks had already established a reputation as ‘safe banks’ before independence.

On 30 June 1963, on the eve of independence, there were nine banks operating in Kenya.⁶ Table 2 lists these banks.

6 The financial sector also included three private NBFIs: Diamond Jubilee Investment Trust established in 1946; Credit Finance Corporation established in 1955; and National Industrial Credit established in 1959. In addition, there were two private housing finance companies: Savings and Loans established in 1949; and East African Building Society established in 1959 (Central Bank of Kenya, 1972, 1986). Though it has not been possible to find the exact figures for the asset bases of these financial companies at independence, it would be reasonable to assume that they were very small compared to the banks. These NBFIs were restricted from raising deposits and were also single branch institutions.

Table 2: Banks operating in Kenya in 1963

	Nationality (place of incorporation)	Date of incorporation
Barclays D.C.&O. (presently Barclays Bank)	British	1896
National and Grindlays (presently Kenya Commercial Bank)	British	1910
Standard Bank (presently Standard Chartered Bank)	British	1916
Nederlandsche Handel-Maatschappij	Dutch	1951
Bank of India	Indian	1953
Bank of Baroda	Indian	1953
Habib Bank (Overseas) Ltd	Pakistani	1956
Ottoman Bank	Turkish	1958
Commercial Bank of Africa	Tanzanian	1958

Notes: It has not been possible to establish the exact size of these banks in terms of asset base in 1963. However, Barclays D.C.&O. was the largest in terms of asset size (Onyonka, 1968, quoted in Maxon, 1992).

Source: Engberg (1965) and Central Bank of Kenya (1986).

In summary, at independence in 1963, the first three banks to be established in Kenya continued to dominate the banking sector, controlling about 85% of the total branch network (Engberg, 1965). It is also important to note that the data in Table 2 highlight that at independence, all banks were foreign owned and there were no banks that could be termed 'local'. Furthermore, all non-bank financial institutions were British owned except Diamond Jubilee Investment Trust, which was the only financial institution whose ownership could be termed 'local' at independence.⁷ Finally, all financial institutions primarily concerned themselves with trade finance and had very little interest in lending.

2.3 *Harambee*: The creation of government-owned banks – 1963 to 1980

The post-independence bank developments started with the establishment of the Central Bank of Kenya (CBK) in 1966 after the dissolution of the EACB. Kenya's first national currency – the Kenyan shilling (KSh) – was introduced on 14 September 1966 at the rate of KSh20 to the pound (Central Bank of Kenya, 1976). At independence in 1963, the prevalent understanding was that development entailed massive resource mobilisation and banks were seen as key instruments in this. However, in Kenya, unlike in most other African countries, there was no wholesale nationalisation of the banks. This can be seen as part

⁷ Diamond Jubilee Investment Trust was set up by members of the Ismaili community (a sub-community of the Asian-African community) to commemorate the Diamond Jubilee (60th anniversary) of leadership of His Highness Aga Khan III of the community.

of the broader strategy by Kenyan leaders at independence to accommodate colonial interests and prevent a wholesale migration of foreign capital (Leys, 1975). At independence, the first president Jomo Kenyatta assured the white settler community:

‘The Government of independent Kenya will not be a gangster Government. Those who have been panicky...can now rest assured that the future African Government...will not deprive them of their property rights of ownership. We will encourage investors...to come to Kenya... to bring prosperity to this country.’ Quoted in Ndege (2000, p. 107) and Hazlewood (1979, p. 13).

Therefore international banks – now classified as foreign-owned banks – including Barclays D.C.&O. and Standard Bank continued to operate in Kenya.⁸ Only National and Grindlays Bank was bought out by the Government of Kenya (GoK) and became the Kenya Commercial Bank (KCB) (Central Bank of Kenya, 1986).⁹ In 1974, two US banks were established – the First National Bank of Chicago and the First National City Bank of New York (Nasibi, 1992).

In the 1960s, Kenya experienced impressive economic growth, mainly driven by the commercialisation of African smallholder agriculture. In the first decade of independence, GDP at constant prices grew at an annual rate of 7.1% (Hazlewood, 1979). The M2-to-GDP ratio increased from 19% in 1963 to 30% in 1970 (Central Bank of Kenya, 1986). However, the government was dissatisfied with the pace of adjustment, in particular with the very low loans-to-deposit ratio of 64.6% in 1969 (Republic of Kenya, 1968).¹⁰ It was argued that:

‘... the urgency of development is so great, that the need for specialized institutions for the collection of savings and investment cannot be left to the process of slow evolution.’ Republic of Kenya (1968, p. 558).

8 In the 1970s, Standard Bank became Standard Chartered Bank Ltd and Barclays Bank D.C.&O changed its name to Barclays Bank International Ltd, both becoming wholly owned subsidiaries of the parent banks in London (Central Bank of Kenya, 1976).

9 This was part of the resource mobilisation and ‘Africanisation’ strategy of the government discussed below. The purchase of National and Grindlays Bank was on a willing seller, willing buyer basis. In 1968, the Ottoman Bank was taken over by National and Grindlays Bank. Then in 1970, an agreement was reached between National and Grindlays Bank and the government. The bank was split into an international bank in which the government took a 40% share, and the local branch system of the bank, renamed Kenya Commercial Bank, in which the government took a 60% share. The remaining shares were quoted on the London and Nairobi stock exchanges, respectively (Hazlewood, 1979).

10 The loans-to-deposit ratio in 1969 was even lower than the 1963 figure of 77%.

There was an understanding that economic development entailed massive resource mobilisation, and that these resources could be raised through banks. There was also the political reality that needed to be addressed – the need for visible ownership in the Kenyan economy by African Kenyans – and the government's stated policy of 'Africanisation' was also pursued through the financial system. The government also established two new banks – Co-operative Bank of Kenya and National Bank of Kenya – in 1968. Specialised credit institutions, or development finance institutions (DFIs) – including the Industrial & Commercial Development Corporation (ICDC), the Industrial Development Bank (IDB), the Development Finance Corporation of Kenya (DFCK) and the Agricultural Finance Corporation (AFC) – were set up to give loans to Kenyans and also to purchase shares in public corporations (Grosh, 1991).¹¹

There was also growth of local financial institutions, termed 'indigenous' banks. Between 1971 and 1980, one local private bank and nine local NBFIs were established (Kariuki, 1993). These financial institutions were mainly owned by African (Kikuyu) businessmen who had built up capital during the coffee boom of 1976–1979 due to their close links to President Kenyatta, who was also from the Kikuyu ethnic group (Thrupp, 1987). The commercial banks and NBFIs were largely free from regulatory controls, except the stipulation of lending and deposit interest rates (Brownbridge, 1998). There was a condition that banks should extend credit to agriculture amounting to 17% of their deposits, but this requirement was rarely enforced (Kariuki, 1993).

The M2-to-GDP ratio throughout the 1970s and 1980s remained at approximately 30%. There was some financial deepening, however, as the loans-to-deposits ratio grew from 64.6% in 1969 to 80% by 1980. The ratio of financial institutions' (banks and NBFIs) assets to GDP grew from 28% in 1971 to 40% in 1980 (Ngugi, 2000).¹²

2.4 *Nyayo*: The rise of indigenous and political banks – 1980 to 1990

When President Kenyatta died in 1978, he was succeeded by President Moi, who was from the Kalenjin community. The watchword chosen by Moi for his presidency was *Nyayo* (meaning 'footsteps'), emphasising continuity with the

11 ICDC was originally incorporated in 1954 as Industrial Development Corporate (IDC) to assist and encourage medium- and large-scale investment in the industrial sector. In 1973, IDB was set up as a subsidiary of ICDC. However, ICDC, DFCK and IDB had overlapping and duplicating roles (Grosh, 1991).

12 It should be noted that this ratio is different from the private credit-to-GDP ratio, as it includes public as well as private lending and also includes liquid assets which are not lent out.

economic policies of the Kenyatta era by remaining committed to a capitalist economy with a focus on attracting foreign investment and maintaining policies of Africanisation of the economy (Maxon and Ndege, 1995).

The 1980s witnessed a large growth in the number of NBFIs from 20 in 1980 to 53 in 1990 (a rise of 165%). The number of banks also grew from 17 to 24 (a rise of 17%).¹³ The majority of these new financial institutions were owned by local entrepreneurs (Kariuki, 1993). These local banks fulfilled a very useful function, as they catered for mainly small and medium-sized enterprises, often from their own communities, that the foreign-owned and government-owned banks did not serve (Nasibi, 1992).

However the proliferation of local banks and NBFIs was also facilitated by several political and regulatory factors. First, regulatory barriers – including the minimum capital requirements and reserve ratios – were very low compared to banks (Brownbridge, 1998). In particular, the minimum capital requirements for NBFIs were extremely low even though they were allowed to take deposits.¹⁴ There was a regulatory ‘arbitrage’ between banks and NBFIs, and most banks (including foreign-owned and government-owned banks) started an NBFi as a subsidiary to take advantage of this regulatory loophole.¹⁵ Second, political interference subverted prudential criteria in the awarding of licenses, as Section 53 of the Banking Act gave the minister of finance authority to grant exemptions to the Act (Brownbridge, 1998).¹⁶ Third, many banks had prominent politicians on their boards and were able to use these connections to obtain public sector deposits very cheaply (Ndi, 1994; Brownbridge, 1998). Fourth, the CBK had very little capacity to supervise the growth of non-bank financial institutions (World Bank, 1989). As will be seen below, these factors sowed the seeds of weakness in the banking system from the very establishment of these NBFIs.

Furthermore, during the first decade of the Moi era, due to external and internal economic factors, Kenya experienced a severe reduction in GDP growth and macroeconomic imbalances, including declining terms of trade

13 See Table 3. It should be noted that it has been difficult to get data on the exact number of banks that opened and closed each year. In particular, it has been difficult to establish the exact number of banks in 1983 prior to large number of bank failures in 1984. Therefore, these trend figures do not capture the full details of the movements in the number of banks.

14 From 1963 to 1980, the minimum share capital for banks remained KSh2 million and the minimum share capital of NBFIs was KSh500,000 (Brownbridge, 1998). See Table 4 for a list of capital requirements of the Central Bank of Kenya from 1956 onwards.

15 This policy was reversed in 1993, as will be discussed below.

16 The Banking Act is Chapter 488 of the Laws of Kenya; the Central Bank of Kenya Act is Chapter 491 of the Laws of Kenya (see www.centralbank.go.ke).

and budget deficits, and was forced into undertaking structural adjustment policies recommended by the IMF and the World Bank (Ngugi, 2000).¹⁷

The banking system was repressed according to the McKinnon-Shaw hypothesis, as interest rates up to the early 1980s were low and negative in real terms (Mwega et al., 1990). It was acknowledged that:

‘it had been official policy in Kenya since independence to follow a ‘low interest rate policy’ in order to encourage investment and to protect the small borrower.’ Central Bank of Kenya (1986, p. 54)

The main structural adjustment policy relating to the financial sector was a gradual increase in interest rates, and real lending rates of banks increased from -2.5% in 1980 to 9% in 1990 (Brownbridge, 1998).

The rapid rise of financial institutions, very poor regulation, shifting political economy trends and also declining economic growth resulted in the failure of 12 banks between 1984 and 1989 (see Table 3). In December 1989, nine of these banks were taken over by the government to form the Consolidated Bank (Ngugi, 2000).¹⁸ A more detailed discussion on the reasons for bank failures, in particular the political economy shifts, is presented below. In 1989, there was a major amendment to the Banking Act and Central Bank of Kenya Act establishing stricter guidelines for the licensing of institutions and establishing single borrower limits (Nasibi, 1992).¹⁹ In 1989, the Deposit Protection Fund Board was also established to compensate small depositors in case of bank failures. This institution also assumed responsibility for liquidating failed banks (Nasibi, 1992).

This section has shown that the banking sector in Kenya immediately prior to full-scale liberalisation in the 1990s was fragile. Despite the increase in the number of financial institutions to 94 in 1990, the M2-to-GDP ratio and the loans-to-deposits ratio of banks remained constant throughout the 1980s at about 30% and 80% respectively. Furthermore, the ratio of total financial

17 The main external factor was the oil price shocks of 1973 and 1979 and the key internal factor was the drought of 1979 and 1984 (Ngugi and Kabubo, 1998). From an average rate of 7.1% (mentioned above), GDP growth fell to 3.9% in 1980 and then to a low of 0.8% in 1984, but grew again to 5% by 1989.

18 These are Union Bank, Jimba Credit Corporation, Estate Finance, Estate Building Society, Business Finance, Nationwide Finance, Kenya Savings and Mortgages, Home Savings and Mortgages, and Citizens Building Society (Nasibi, 1992; Brownbridge, 1998).

19 The Central Bank of Kenya Act was only tinkered with from 1969 to 1984. In 1985, it was overhauled. The key amendments were that first, applications for the license of banks had to go through the CBK and not directly to the Minister of Finance; second, minimum capital requirements were increased to KSh15 million; and third, single borrower limits were set at 100% of share capital (Central Bank of Kenya, 1986). See Table 4 for a list of changes to capital requirements through the years.

institutions' assets to GDP rose only marginally from 40% in 1980 to 41.6% in 1989 (Central Bank of Kenya, 1986; Ngugi, 2000).²⁰

2.5 Liberalisation – 1990 to 1999

Following the structural adjustment programmes of the 1980s, which were focused on debt and budget reform and only contained minor financial sector reforms, Kenya embarked on full-scale financial liberalisation in the 1990s. Unlike other African countries, the official reports of the Kenyan government lauded the success of the structural adjustment programmes of the 1980s (Nasibi, 1992).²¹ Liberalisation of the financial sector was financed by the World Bank's Financial Sector Adjustment Credit (FSAC), which was approved by the Board of the World Bank in June 1989. The theoretical basis of financial liberalisation was the McKinnon-Shaw hypothesis, in which government control of interest rates was seen as a key constraint to financial sector development.²²

The key step of full-scale financial liberalisation was the complete deregulation of interest rates in 1991 (Brownbridge, 1998). In 1992, commercial banks were authorised to deal in foreign exchange, and in 1993 a market-determined flexible exchange rate system was adopted for the Kenyan shilling (Brownbridge, 1998). While liberalisation was taking place, big political changes were also taking place and in 1992, Kenya had its first multi-party elections. President Moi was returned to power due to an extremely fractured opposition. However, funding the elections left the public finances in disarray. In particular, government borrowing jumped and this is reflected in the Treasury bill rates. In March 1993, the 91-day Treasury bill rate was 25%. This jumped to 46% in April

20 Ngugi (2000) argues that this is because the M2/GDP figure does not take into account assets and liabilities of NBFIs. She shows that NBFi assets as a percentage of GDP grew from 12.1% in 1980 to 22% in 1984, but dropped again to 14.5% in 1989, while bank assets as a percentage of GDP were constant at around 28% throughout the decade. However, she does not give a figure of the loan-to-deposit ratio of NBFIs. It is estimated that the M3-to-GNP ratio increased from 38% in 1973 to 45% in 1985 (Mwega et al., 1990).

21 It should be noted that in Kenya, the clamour for liberalisation was not only external. Leaders of the private sector, including several chairmen of the Kenya Association of Manufacturers (the principal manufacturing and trade lobby group), were calling for a deregulation of interest rates and commodity prices (Nasibi, 1992). Though it should also be noted that there were differences in positions between export-oriented manufacturers, such as textile manufacturers, who opposed the liberalisation and import-oriented manufacturers who lobbied for the liberalisation.

22 The references to the McKinnon-Shaw hypothesis are explicit. The objectives of financial liberalisation were stated as:

'to encourage mobilisation of savings and contribute to the maintenance of financial stability...and to ensure that funds flow into those areas which are most productive, and that the biases which have existed against lending to small business are eliminated.' Central Bank of Kenya (1988, p. 18), quoted in Kariuki (1995, p. 6).

1993, peaked at 85% in July 1993, and then dropped steadily but remained still very high at 44% in December 1993.²³

This liberalisation of interest rates and exchange rates provided further avenues for local banks to compete with more established banks, and was an added stimulus for local bank entry (Brownbridge, 1998; Nding'u and Ngugi, 1999). While the 1980s witnessed the rise of African (mainly Kikuyu) banks, the late 1980s and 1990s witnessed the rise of several African (Kalenjin) and Asian-African banks.²⁴ By the mid-1990s, it is estimated that local banks controlled about a quarter of the market (Brownbridge, 1998).²⁵ Table 3 shows the growth in the total number of financial institutions from 1990 to 1993. The total number of banks grew by 67% and the total number of NBFIs by 13%.

Table 3: Number of financial institutions in Kenya, 1963–2000

	1963	1975	1980	1990	1993	1994	1997	1998	2000
Banks	9	14	17	24	40	37	53	53	49
NBFIs	3	8	20	53	60	44	19	15	5
Building Societies	2	2	2	17	11	6	6	4	4
Total	14	22	39	94	111	87	78	72	58

Source: Engberg (1965); Brownbridge (1998); Central Bank of Kenya (2000a, 2003, 2005).

However, as will be shown below, the experience with liberalisation in terms of financial deepening was very unsatisfactory.

After 1994, there was a decline in the total number of institutions. This was partly due to the failure of 15 financial institutions in 1993. Furthermore, in 1993 the Central Bank of Kenya adopted a universal banking policy and reduced the regulatory advantages that were available to NBFIs. This led to several NBFIs converting to banks or merging with their parent bank, and to a consolidation of the banking sector (Ngugi, 2000). However, towards the end of the 1990s, the banking sector still remained fairly fragile and six more banks were put under CBK statutory management towards the end of 1998.

23 Data for Kenyan GDP growth rates, inflation rates, exchanges rates and T-bill rates from 1990–2005 are displayed in Appendix 7.

24 The Asian-African community is a new label of identity used by people of Indian origin who settled in Kenya (Asian-African Heritage Trust, 2000). This community is often also referred to as Kenyan-Asians, East African-Asians or South Asian-Kenyans.

25 It has not been possible to get disaggregated data at the segment level on banks' assets for the periods before 2000.

3 Banking sector industry trends, 2000–2012

The banking sector as a whole changed significantly during this period, facilitated by regulatory changes, the rise of large locally owned private banks and increased competition.

3.1 Regulatory changes

Throughout the late 1990s and up to 2000, the CBK Act and the Banking Act were amended to improve regulation and supervision of banks.²⁶ In October 1995, key amendments included the harmonisation of banks' accounting financial years, the approval of bank auditors by the CBK and the reduction of the single borrower limit to core capital ratio from 100% to 25% (Central Bank of Kenya, 1995, 1996).²⁷ In 1997, the responsibilities for appointing the governor and the management of the CBK were transferred to a board of directors appointed by the president, rather than directly by the minister of finance, in order to reduce political interference in the Bank (Central Bank of Kenya, 1997). In response to another spate of bank failures in 1998, several changes were brought into force in 1999. Detailed guidelines on provisioning for non-performing loans were set out and a requirement was established for banks to publish their accounts, including details on their non-performing loans, in the national press (Central Bank of Kenya, 1999). Minimum capital was increased to KSh200 million by December 1999. In October 2000, minimum capital requirements were increased to Ksh250 million. Table 4 summarises the changes in the minimum capital requirements for banks in Kenya from 1956 onwards.

Also in October 2000, guidelines were issued requiring banks to conform to the Basel Capital Accord in terms of the composition of capital, and also new regulatory capital ratios were specified. The October 2000 guidelines also reinforced the single borrower limits to 25% of core capital, restricted lending to insiders to 20% of core capital, defined a large exposure as 10% of core capital, and further restricted lending to all large borrowers to five times the core capital (Central Bank of Kenya, 2000b).

26 President Moi did not contest the December 2002 elections and in 2003, President Mwai Kibaki became the third president of Kenya as head of NARC (the National Rainbow Coalition), a coalition of parties of which the two largest were the NAK (National Alliance Party of Kenya) and LDP (Liberal Democratic Party of Kenya).

27 The single borrower limit is aimed at reducing exposure to one borrower. The previous limit of 100% meant that a single non-performing loan to one borrower could wipe out the entire capital of a bank.

Table 4: Regulatory minimum capital requirements for banks in Kenya, 1956–2012

Year	KSh million	US\$ million
1956–68	2	0.28–0.28
1968–80	2	0.28–0.27
1980–82	5	0.67–0.46
1982–85	10	0.92–0.61
1985–92	15	0.91–0.41
1992–1999	75	2.07–1.37
31/12/1999	200	2.74
31/12/2000	250	3.20
31/12/2005	250	3.45
31/12/2009	350	4.61
31/12/2010	500	6.2
31/12/2011	700	8.7
31/12/2012	1000	12.4

Source: Brownbridge (1998), Central Bank of Kenya (2000b, 2006, 2008).²⁸

The Central Bank of Kenya also passed regulations allowing the establishment of credit registries. The legislation was tabled in Parliament in 2006 and passed as a Bill in 2008. In 2009, the first company – Credit Reference Bureau Africa Limited – was licensed to operate a credit reference bureau and began operations in July 2010. In 2011, a second company, Metropol Credit Reference Bureau Limited, was licensed.

As will be seen below, following the introduction of these guidelines and the high levels of provisioning undertaken by banks, non-performing loans have fallen.

The Central Bank of Kenya also brought in regulations that enabled innovation in the banking sector, in particular regulations on agent banking enacted in 2011. Agent banking is an arrangement by which licensed institutions (banks and microfinance banks) engage third parties to offer specified banking services on behalf of the institution. In Kenya, agent banking is governed by the Prudential Guideline on Agent Banking (CBK/PG/15). As will be seen below, this has enabled banks to increase access to finance throughout the country.

²⁸ The minimum capital requirements were stipulated in Kenyan shillings and remained constant during each of the periods. The dollar value fluctuates depending on the exchange rate and the values quoted are for the beginning and end of the period.

In the rest of this section, we discuss general trends in the financial sector in Kenya, focusing on depth, efficiency, stability and access.

3.2 Changes in financial sector depth

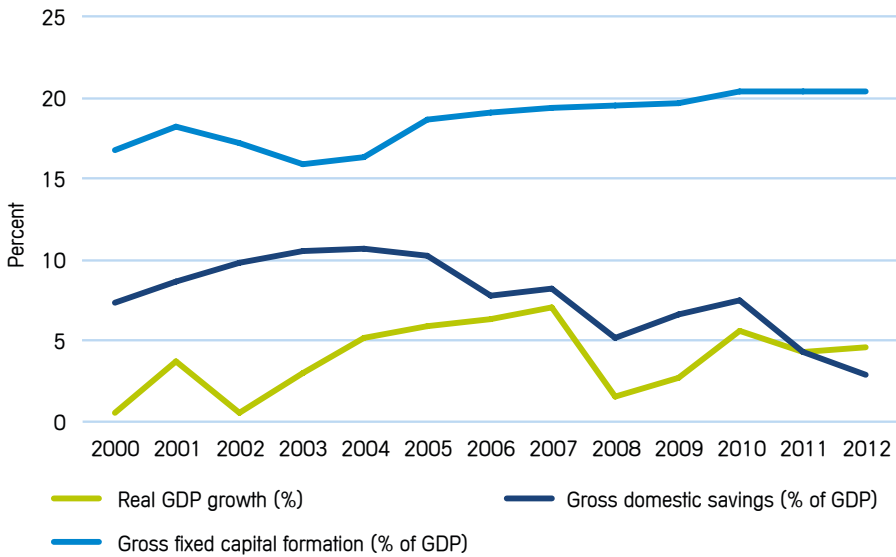
Kenya has experienced steady increases in GDP growth, with the exceptions of 2002 and 2008 when there was very low growth linked to election-related political instability (see Figure 1). Kenya has also experienced some increases in investment, with gross fixed capital formation as a percentage of GDP increasing from 16.71% in 2000 to 20.39% in 2012, with a dip between 2002 and 2004.

The key area for concern is the savings rate. The ratio of domestic savings to GDP increased from 7.28% in 2000 to 10.2% in 2005, but has fallen steadily since to 2.9% in 2012. As we will see below, the financial sector has steadily deepened since 2000, but this growth is not translating into an increase in gross savings. It should be noted that a key argument of the McKinnon-Shaw theories that formed the basis of financial liberalisation was that a freely determined market rate of interest would increase deposits and, in turn, savings (McKinnon, 1973; Shaw, 1973). However, the experience of most countries post liberalisation has been similar to that of Kenya – financial liberalisation and an increase in financial depth have not led to an increase in savings – and it has been recognised that the causal nexus between finance and savings still has to be clarified (Mavrotas, 2005).²⁹ This raises a key concern, as Kenya's Vision 2030 goals entail a significant increase in domestic savings to 30% by 2030 with an explicit view that this increase in savings will be propelled by the financial sector (Republic of Kenya, 2007).

Kenya has also experienced growth in all three main indicators of financial deepening (Figure 2). The liquid liabilities-to-GDP ratio steadily increased from 37.5% in 2000 to 47.4% in 2011. Similarly, the deposits-to-GDP ratio also increased from 29.5% in 2000 to 42.5% in 2011. The private credit-to-GDP ratio has not exhibited a similar increase. It hovered around 27% but experienced some growth from 2008, rising to 33.6% in 2011. Overall it can be argued that the country has made good strides in terms of increasing financial depth.

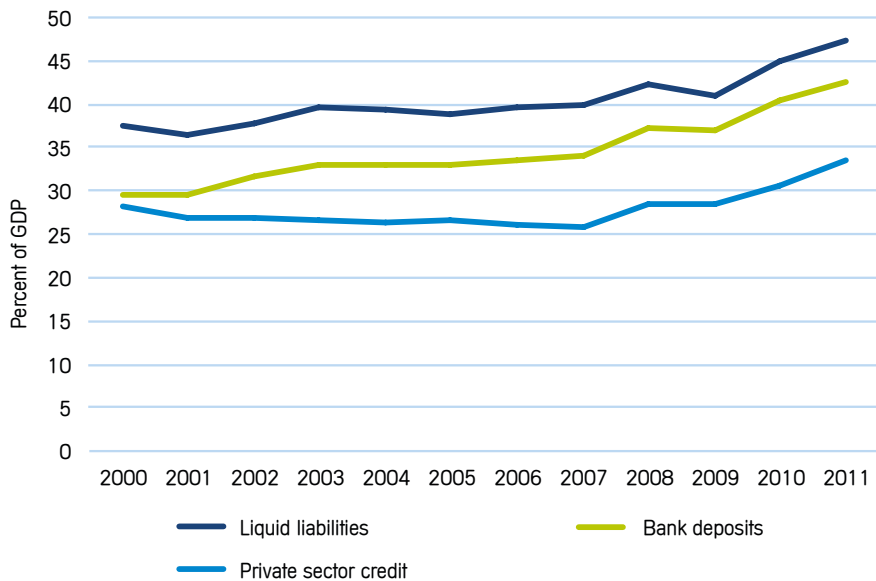
²⁹ The causal nexus between savings and growth has also been questioned, with some economists suggesting that the causation may run in the opposite direction – from growth to savings; see Mavrotas (2005) for a summary of the debates.

Figure 1: Trends in GDP growth, savings and investments, 2000–2012



Sources: World Bank META database.

Figure 2: Trends in financial sector depth, 2000–2011



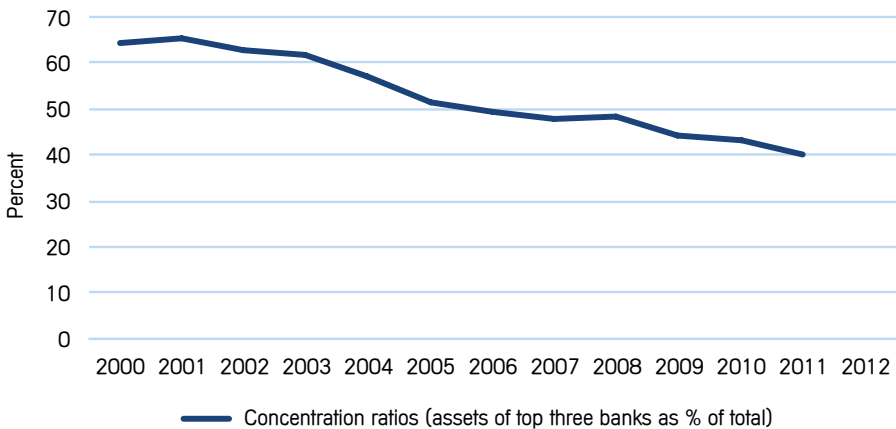
Source: World Bank Financial Sector Database (2000, updated 2009, 2012 and 2013).

3.3 Efficiency, profitability and concentration

A key measure of market structure and competition is the concentration of the banking sector. During the period 2000–2012, the share of the top three banks in Kenya in terms of total assets fell from 64.4% in 2000 to about 40% in 2012 (see Figure 3). Overall, this implies that competition has increased in the banking sector. The concentration ratios in Kenya are also low compared to global standards (see Table 5).

It should be noted that several authors have attributed the poor performance of the Kenyan banking system and African banking systems in general in the 1990s – in particular the high interest rate spreads – to their high concentration ratios and oligopolistic nature (Ncube and Senbet, 1997; Kamau et al., 2004). As the discussion below shows, despite the increase in competition, interest rate spreads in Kenya still remain high.

Figure 3: Banking concentration, 2000–2012



Source: World Bank Financial Sector Database (2000, updated 2009, 2012 and 2013).

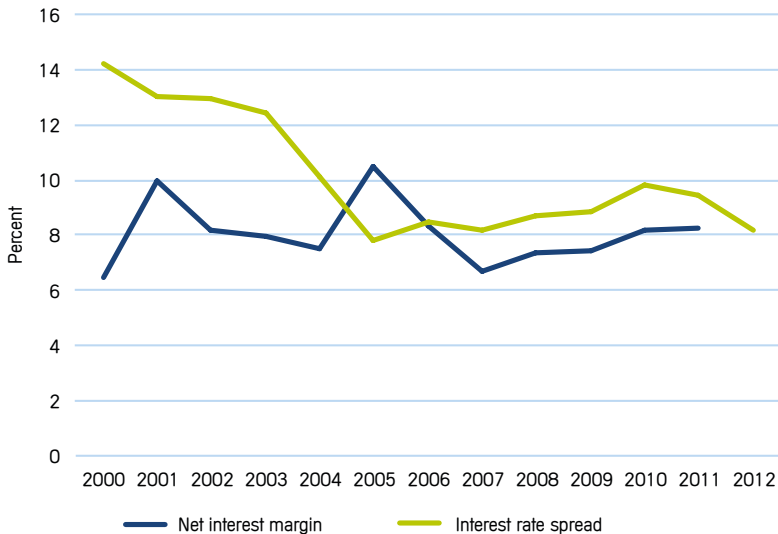
Table 5: Global data on mean bank concentration ratios

	2000	2005	2010
SSA	84.0	77.2	72.8
Upper-middle	64.4	64.1	61.1
High income	64.9	64.0	63.6
Kenya	64.4	51.6	42.9

Source: Authors' calculations from the World Bank Financial Sector Database (2000, updated 2009, 2012 and 2013).

Figure 4 displays the trend in banking sector efficiency. Interest rate spreads and interest rate margins are the most common measure of bank inefficiency. The spread is often thought of as a 'premium in the cost of external funds' introduced due to informational and enforcement frictions (Gertler and Rose, 1994; Honohan and Beck, 2007).³⁰ The lower the margin and the spread, the higher the efficiency of the banking system. It should be noted that there is a difference between bank-level efficiency and overall banking system efficiency. In using management theory, a more efficient bank would have higher margins and higher profitability. At an economy-wide level, however, theory suggests that in a competitive banking system, these profits should be competed away and hence lower margins and lower spreads are a sign of overall efficiency of the banking system.

Figure 4: Banking sector efficiency, 2000–2012



Source: World Bank Financial Sector Database (2000, updated 2009, 2012 and 2013).

The figure shows that the net interest margin increased from 6.43% in 2000 to 8.17% in 2011, and hence efficiency has worsened. Interest rate spreads decreased from 14.24% in 2000 to 7.8% in 2005, but have remained steady since then. In 2012, the interest rate spread was about 8.15%.³¹ This is the key intractable issue in the banking system. There is agreement amongst economists and policymakers that the interest rate spread in Kenya is high. Theory predicts that countries with greater financial depth have lower interest rate spreads,

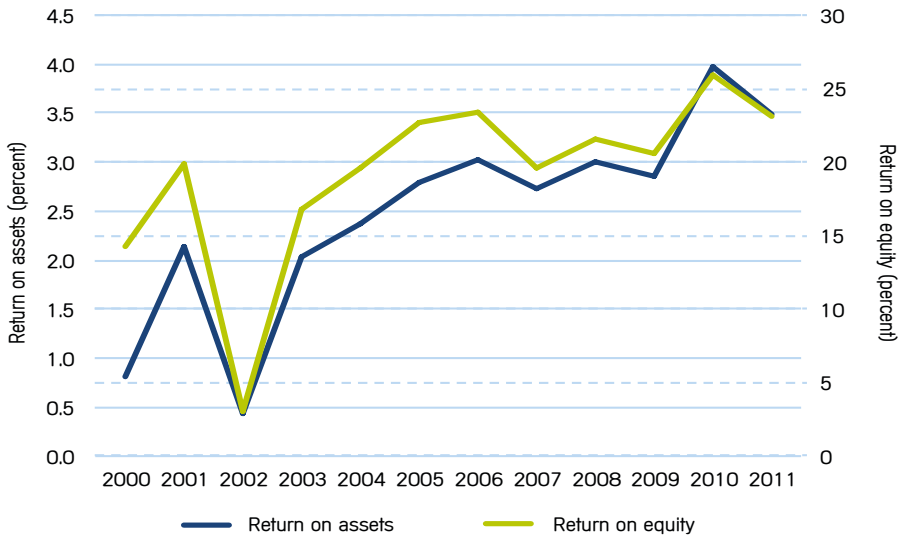
30 The net interest margin is the accounting value of a bank's net interest revenue as a share of its interest-bearing (total earning) assets.

31 Interest rate spread calculated as the difference between the lending rate and the deposit rate.

yet Kenya has achieved an increase in depth with a relatively minor decrease in spreads (World Bank, 2013). However, two recent papers have highlighted that the determinants of interest rate spreads in Kenya are still debated. While some authors argue that the unstable macro environment, including exchange rate volatility, contributes to the high spread (World Bank, 2013), others have argued that macroeconomic factors such as economic growth and inflation are not useful in explaining high spreads (Were and Wambua, 2013). Both studies emphasise the role of internal factors such as overhead costs and high profitability, and both indicate that the larger banks in Kenya enjoy a higher spread. We will discuss later in this chapter the segmented nature of the banking system in Kenya, as this partly explains why despite the increasing depth of the banking sector and reduced concentration, interest rate spreads still remain high.

The profitability of the banking sector (as measured by return on assets and return on equity) has been steadily increasing (except for dips in 2002 and 2008). Figure 5 shows that return on assets (ROA) increased from 0.8% in 2000 to 3.5% in 2011, and return on equity (ROE) increased from 14.2% in 2000 to 23.09% in 2011. Again, this shows that despite the reduction in concentration and the increase in competition, sustained interest rate margins and spreads have meant that banks are able to maintain high profit margins.

Figure 5: Banking sector profitability, 2000–2011



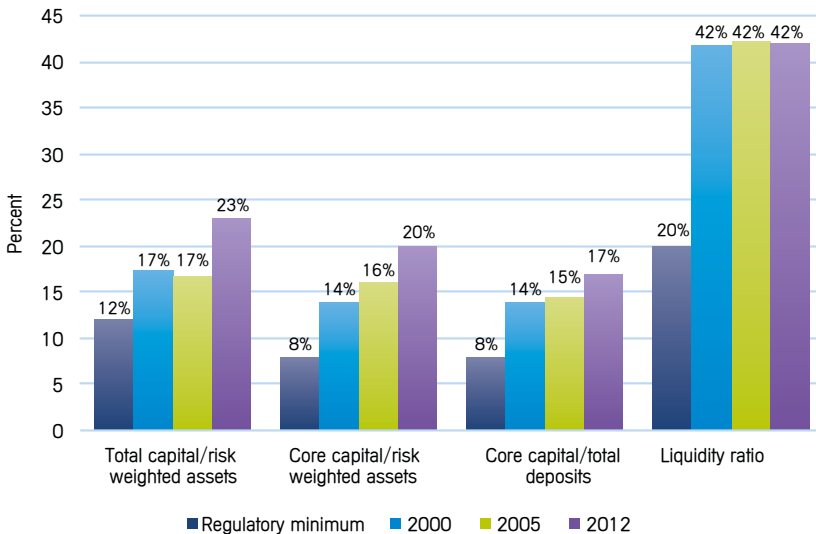
Source: World Bank Financial Sector Database (2000, updated 2009 and 2012 and 2013).

3.4 Banking sector stability

Banking sector stability is measured by looking at three factors: capitalisation, liquidity and absence of non-performing loans.

Figure 6 shows the changes in bank capitalisation ratios for the banking sector in Kenya for 2000, 2005, and 2012. It shows that there has been a small increase in all three important ratios: total capital to total risk-weighted assets, core capital to total risk-weighted assets, and core capital to total deposits. Furthermore, it shows that the banking sector in Kenya has a level of capitalisation well above the regulatory minimums. The figure also shows that banks in Kenya are very liquid. With an average liquidity rate of 42%, the banking sector is well above the minimum required liquidity rate of 20%.

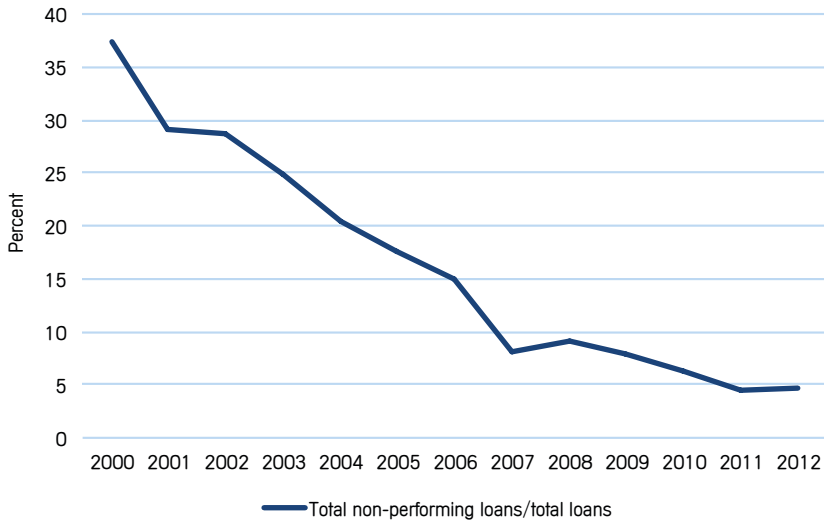
Figure 6: Banking sector capitalisation and liquidity, 2000, 2005 and 2012



Source: CBK Supervision Report (various years).

Figure 7 shows that the key improvement in the banking sector in Kenya between 2000 and 2012 was the large reduction in non-performing loans (NPLs). The NPL ratio fell from an average of 37% in 2000 to 5% in 2012. This can be attributed to the stricter regulatory regime that was put in place after 2000, the introduction of credit reference bureaus and consistent economic growth over the period.

Figure 7: Non-performing loans, 2000–2012



Source: CBK Supervision Report (various years).

Another study, which carried out stress tests on the Kenyan banking sector using data from 2007 and 2008, suggests that the banking sector is resilient to shocks such as an increase in bad debt provisions by 50% and a reduction in performing loans by 50%. However, the extreme shock of an increase in provisions by 100% would lead to 17 banks failing to meet the minimum capital standards (Beck et al., 2010).³² Furthermore, as the global financial crisis of 2008 showed, high liquidity in a banking system can be an illusion that can quickly dry up if all banks become illiquid at the same time (Davidson, 2008; Nesvetailova, 2010). While this may not be a concern for the moment, it may become more important as the Kenyan banking system becomes more integrated with the regional and global banking systems.

3.5 Access to finance

The most significant impact of the transformation of the banking sector has been on outreach and access. While Kenya's increase in financial inclusion is often told in terms of the mobile money revolution, the increase in commercial bank outreach has been just as important.

The latest FinAccess survey showed that the proportion of the adult population using different forms of formal financial services stood at 66.7% in 2013 compared to 41.3% in 2009 and 27.4% in 2006. Similarly, the proportion of

³² Data used to stress test the banking system are not in the public domain and therefore we cannot repeat these tests.

the adult population totally excluded from financial services declined to 25.4% in 2013 from 31.4% in 2009 and 39.3% in 2006 (CBK and FSD Kenya, 2013). Table 6 shows that bank access increased by 64% between 2006 and 2013.

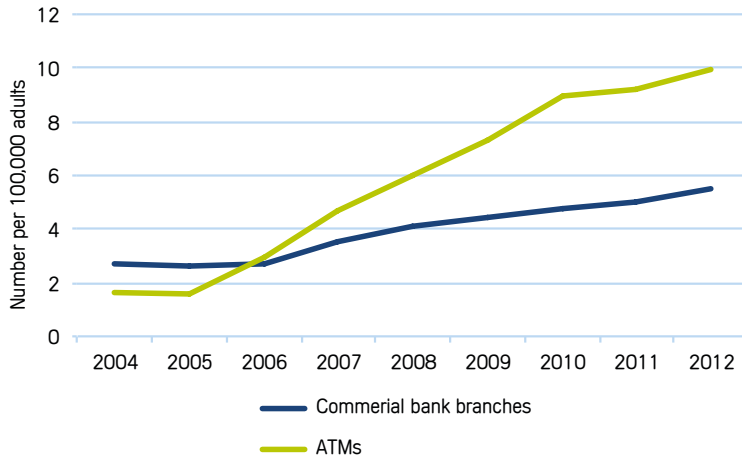
Table 6: Financial service use (percentage of adult population currently using)

Financial service	FinAccess 2006 (n=4,418)	FinAccess 2009 (n=6,343)	FinAccess 2013 (n=5,849)
Banks	17.8	21.5	29.2
SACCO	13.1	9.0	11.0
MFI	1.7	3.4	3.5
MMT registered	--	27.9	61.6
Government	1.1	0.3	1.0
ROSCA	29.3	31.7	21.4
ASCA	5.7	8.0	8.8
Local shop	22.8	24.3	5.6
Informal moneylender	0.7	0.4	0.4
Employer loan	0.9	0.5	0
Buyer loan	0.9	1.2	1.1
Family or friend (saving or loan)	17.5	17.5	11.0

Source: FinAccess Reports 2006, 2009 and 2013.

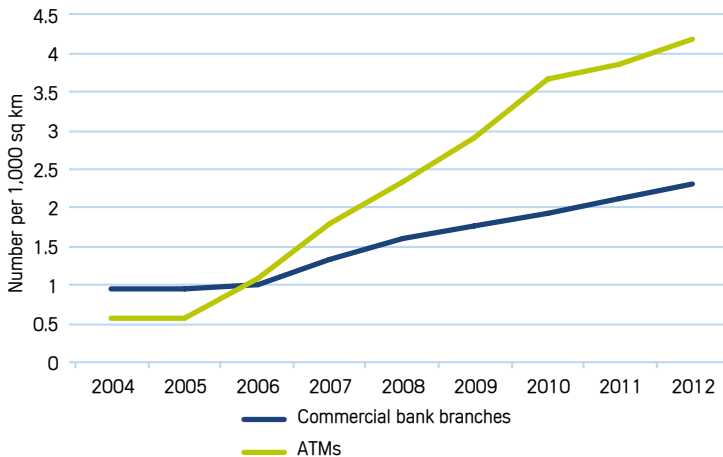
On the supply side, the increase in outreach can be assessed by looking at the availability of access points and the uptake of accounts. For access points, two common measures are bank branches and ATMs, while for accounts the key measure is the number of deposit accounts. In the period for which data are available (from 2004 to 2012), there was a marked increase in bank branches and ATMs both in terms of numbers and geographic coverage (see Figure 8 and Figure 9).

Figure 8: Increase in number of branches and ATMs (per 100,000 adults)



Source: IMF Financial Access Survey (various years).

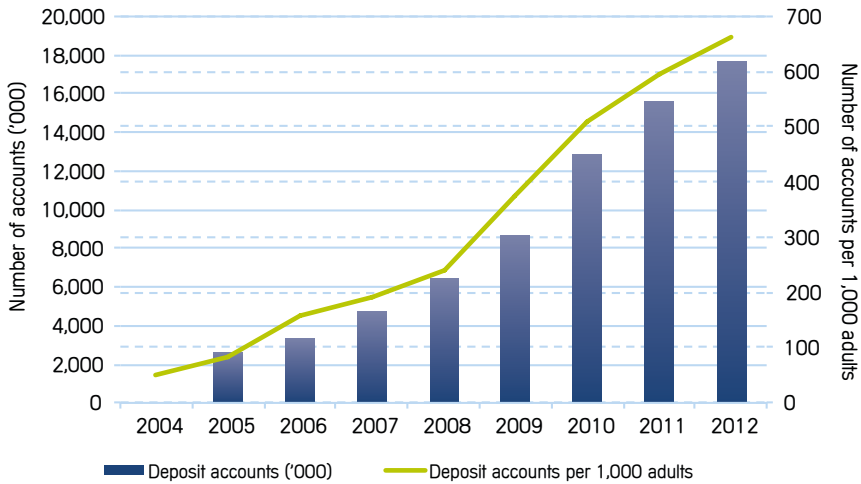
Figure 9: Increased geographic coverage of branches and ATMs (per 1,000 adults)



Source: IMF Financial Access Survey (various years).

During the same period there was also a six-fold increase in the number of deposit accounts – from 2.5 million accounts in 2005 to 17.6 million accounts in 2012 (Figure 10). This growth significantly exceeded the growth in population, with the number of deposit accounts per 1,000 adults therefore increasing from 50 to 662. As we will discuss in Section 4, this growth has mainly come from the large private banks.

Figure 10: Increase in deposit accounts

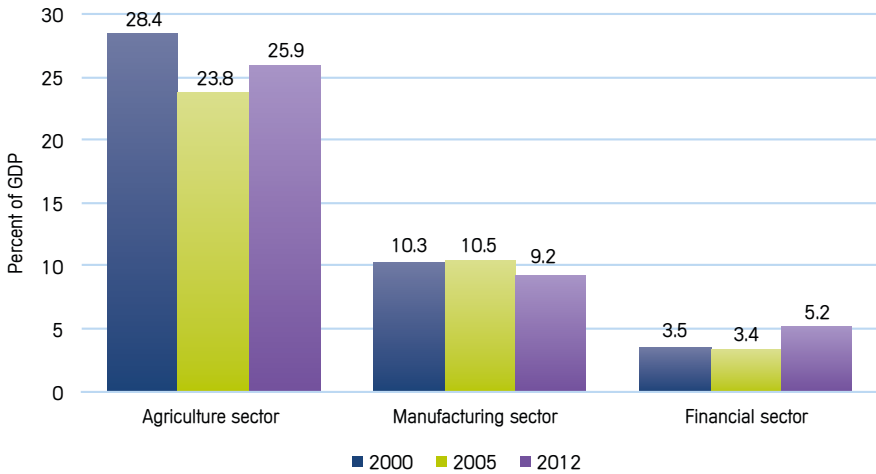


Source: CBK Supervision Reports (various years).

3.6 Patterns of lending

We now discuss the performance of the banking sector in terms of its contribution to the real economy. Figure 11 shows the contribution to GDP of three main sectors of the economy – agriculture, manufacturing and finance – for 2000, 2005 and 2012. It shows that despite growth in the last decade, there has been little structural transformation of the economy. The contribution of agriculture to GDP dropped slightly from 28.4% in 2000 to 25.9% in 2012. The contribution of the financial sector increased slightly from 3.5% to 5.2% in the same period. A key concern is that the contribution of the manufacturing sector dropped from 10.3% in 2000 to 9.2% in 2012. Meeting Kenya's Vision 2030 goals requires a structural transformation of the economy, in particular growth in the manufacturing sector. A recent government policy document stated that '[t]he overall goal for the [manufacturing] sector over the next five years will be to increase its contribution to GDP by at least 10 per cent per annum' (Republic of Kenya, 2012). However, it is not clear that the financial sector is supporting this goal.

Figure 11: Contribution of sectors of the economy to GDP in 2000, 2005 and 2012

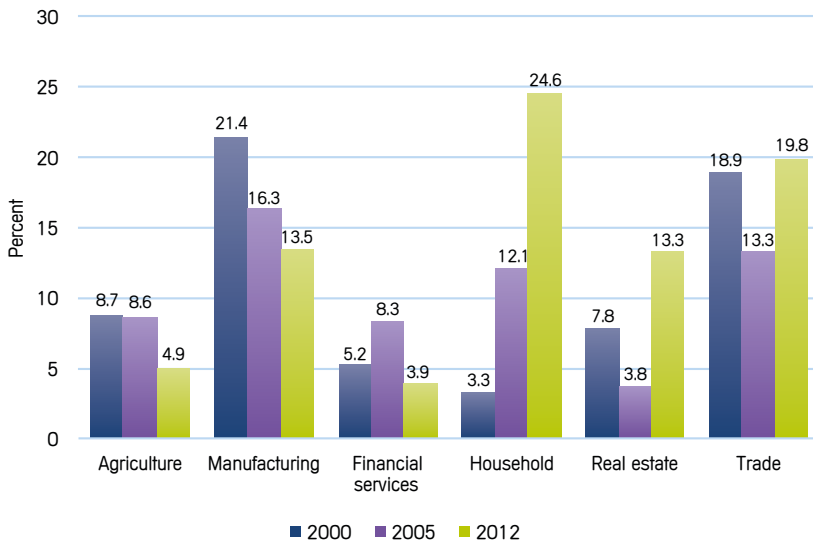


Source: Kenya Economic Survey (various years).

Figure 12 shows the change in structure of lending to different sectors of the economy. Though agriculture still represents 25.9% of GDP, lending to agriculture as a percentage of total lending dropped from 8.7% in 2000 to 4.9% in 2012. Furthermore, lending to manufacturing dropped from 21.4% in 2000 to 13.5% in 2012. The main growth in credit is reflected in lending to households, which increased from 3.3% in 2000 to 24.6% in 2012. It should be noted that in developing countries, not all lending to households should be considered as ‘consumption’ or unproductive lending. It is known that people leverage their borrowing (whether from banks, microfinance institutions or SACCOs) to invest in productive areas, including agriculture and small enterprises (Johnson, 2004). A more detailed analysis from both the demand and supply side would be needed to classify what proportion of household lending is used for consumption versus productive activities. However, overall the analysis does raise concerns that the changing structure of lending does not reflect the overall goals of the country.

Overall, this section shows that the banking sector has deepened, and has become less concentrated and more stable since 2000. Furthermore, financial access has increased significantly. The section also shows that lending to key sectors of the economy, including agriculture and manufacturing, has been decreasing. This raises the question of the extent to which the financial sector can assist in structurally transforming the Kenyan economy as envisioned in the Vision 2030 goals.

Figure 12: Changing structure of lending to different sectors in 2000, 2005 and 2012 (percentage of total lending)



Source: Kenya Economic Survey, CBK Supervision Report, CBK Statistical Bulletin (various years).

4 Segmentation in the banking sector in Kenya

It has been recognised that the banking sector in Kenya is segmented and that this segmentation is the source of low competition, inefficiency and fragility (Beck et al., 2010; Upadhyaya, 2011; Sichei et al., 2012). Upadhyaya (2011) shows that the poor performance of the banking sector in Kenya in 2005, in particular the high levels of non-performing loans and interest rate spreads, can be attributed to the segmented market. The analysis showed that each segment faced clients of different size and type, and that this segmentation has a strong impact on the performance of banks in each of the segments in terms of lending decisions and deposit mobilisation. The analysis further showed that segmentation is based partly on economic factors such as the size of banks and structure of ownership, but largely on social factors that determine the trust between banks and their clients.

In this section, we analyse the performance of each of the segments of the Kenyan banking sector in depth to understand their evolution from 2000 to 2005 and to 2012. We show that there have been significant changes to the segmented nature of the market. The gains in terms of access in the last ten years can be attributed to the innovative practices of banks in the

large privately owned banks segment. However, segmentation has not been completely eroded, and this partly explains structural features such as the persistent interest rate spread.

We use the same definition for segments used in Upadhyaya (2011) – foreign-owned banks (FOBs), government-owned banks (GOBs), large private locally owned banks (LPOBs), and small and medium private locally owned banks (SPOBs).³³ Foreign- and government-owned banks are classified as such if foreign or government shareholding is more than 50%.³⁴ Privately owned banks are classified as LPOBs or SPOBs based on an economic measure – the asset size of the bank. Banks with total assets of KSh50 billion (approximately US\$580 million) or more are classified as LPOBs.³⁵ This definition is based on the convention used by bankers in Kenya. The definition recognises that banks are segmented along both ownership and size lines. Furthermore, both size and ownership affect the perceived reputation of banks in the market, which affects their ability to raise deposits.³⁶ Key data points used are 2000, 2005 and 2012. The year 2000 is used as a starting point as data at the bank level are not available before then; 2012 is used as the end point as 2013 data were not available at the time the analysis of this chapter was initiated; and 2005 is a key middle point as significant transformation of the banking sector took place after this date, with Equity Bank converting from a building society in 2004.

4.1 Share of segments, 2000 to 2012

Figure 13 and Table 7 show the shares of the segments in 2012 and the change in shares in terms of total assets between 2000 and 2012. The figures highlight the stark contrast in terms of market share and number of banks in the different segments. In 2012, there were 12 banks controlling 32.8% of FOB market share. Even within the FOB segment there are differences, with the four main banks – Barclays Bank, Standard Chartered Bank, Citibank and CFC Stanbic – controlling 25% of the total market.³⁷ In the LPOB segment in 2012, there were six banks controlling 34.5% of the market and in the GOB segment, there were four banks controlling 17.3% of the market. However, in

33 A list of banks in each segment is given in Appendix 2.

34 In the case of Kenya Commercial Bank (KCB), government ownership is not more than 50% but the government has a controlling interest through other shareholders, including the National Social Security Fund (NSSF).

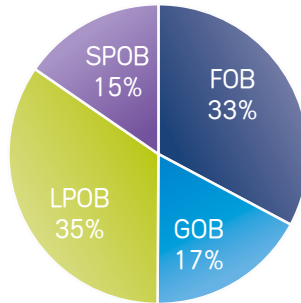
35 This is based on the mean exchange rate as at 31 December 2013 of KSh86.03 to US\$1.

36 The Central Bank of Kenya does not use ownership as a category but size. Large banks are those that control more than 5% of total assets; medium banks are those that control between 1% and 5% of the market; and small banks are those that control less than 1% of the market. Beck et al. (2010) do carry out analysis by ownership, though defined slightly differently from this chapter. They use four categories: foreign, private domestic, government owned and government controlled.

37 The other FOBs are smaller banks serving niche clients.

the SPOB segment, there were 18 banks controlling 15.4% of the market. This stark difference means that the concentration ratio (discussed above) reveals little about the true nature of competition in the banking sector.

Figure 13: Share of segments, 2012



Source: Authors' calculations from bank financial statements.

Table 7: Change in share of assets by segment, 2000–2012

	Share of segments	Share of segments	Share of segments	Difference in share	Total no. of banks in segment	Total no. of banks in segment
	2000	2005	2012	2000–2012	2005	2012
FOB	43.6%	40.4%	32.8%	-10.8%	10	12
GOB	25.5%	18.4%	17.3%	-8.2%	4	4
LPOB	19.7%	30.0%	34.5%	+14.8%	9	6
SPOB	11.2%	11.2%	15.4%	+4.2%	18	21
TOTAL	100%	100%	100%		41	43

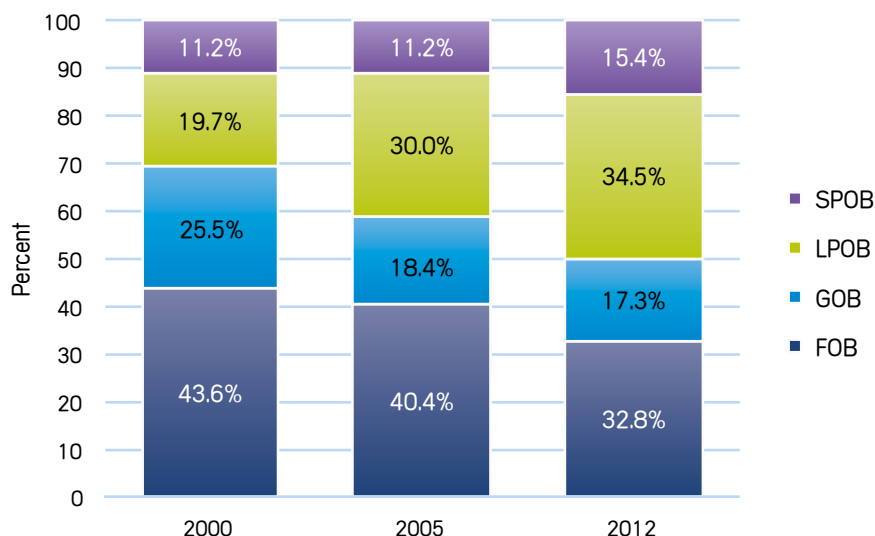
Source: Authors' calculations from bank financial statements.

The key change that has occurred is the rising share of the LPOB segment and the falling share of both the FOB and GOB segments (see Figure 14). In 2000, the LPOB segment controlled 19.7% of total assets in the banking sector. This grew to 30% in 2005, and 34.5% in 2012.³⁸ The FOB segment steadily lost its share, from control of 43.6% of the market in 2000 to 32.8% in 2012. Similarly, the GOB segment also saw its share fall from 25.5% in 2000, to 18.4% in 2005, to 17.3% in 2012. The SPOB segment, meanwhile, managed to marginally increase its share from 11.2% in 2000 to 15.4% in

³⁸ The number of banks in this segment has fallen as one bank was taken over by a bank in the FOB segment and two other banks were moved to the SPOB segment because they no longer met the classification criteria.

2012. Overall, while banks in Kenya have generally experienced growing balance sheets since 2000, banks in the LPOB segment have pursued strategies that have either increased or maintained their proportionate share of total assets. In the sections that follow, we discuss the portfolio characteristics of the segments at a broad level and then discuss each segment in detail.

Figure 14: Share of segments, 2000, 2005 and 2012



Source: Authors' calculations from bank financial statements.

4.2 Portfolio characteristics of segments, 2000 to 2012

We now discuss the portfolio characteristics of the different segments of the banking sector in Kenya. The dataset used for this analysis is individual bank balance sheets, with two data points: average for 2000–2005 and then 2012.³⁹ The indicators we focus on are return on assets, ratio of capital to risk weighted assets, ratio of loans to total assets, ratio of government securities to total loans, total loans on total deposits, non-performing loans and cost of funds.⁴⁰

Table 8, Figure 15 and Figure 16 show the portfolio characteristics of the segments and the changes in these characteristics between 2000–2005 and 2012.

³⁹ It should be noted that before 2000, banks followed different reporting standards and therefore financial statements are not comparable.

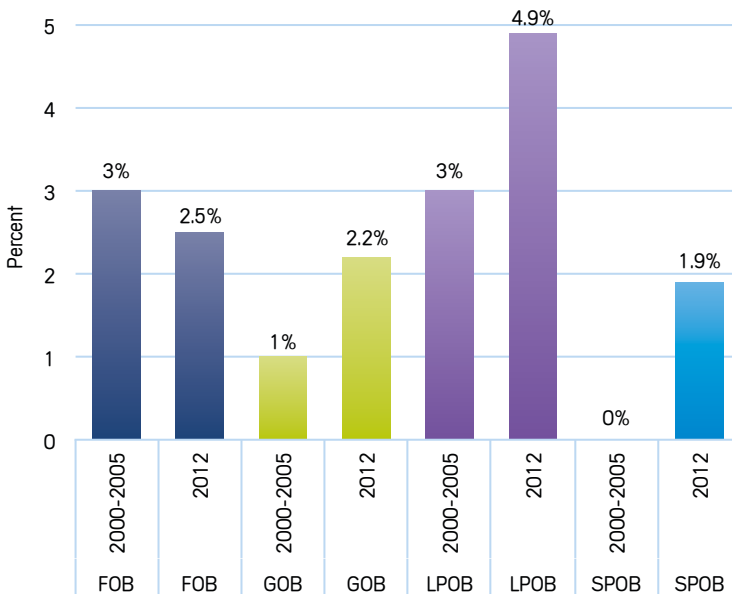
⁴⁰ Cost of funds is calculated as interest on customer deposits plus interest on borrowed funds divided by total deposits plus borrowed funds.

Table 8: Change in key indicators by segment, 2000–2005 and 2012

Segment	FOB		GOB		LPOB		SPOB	
	2000–2005	2012	2000–2005	2012	2000–2005	2012	2000–2005	2012
Return on assets	3%	2.5%	1%	2.2%	3%	4.9%	0%	1.9%
Core capital/ total risk- weighted assets	27%	32%	23%	20%	25%	18%	30%	26%
Total loans/total assets	40%	48%	53%	56%	50%	59%	52%	58%
Government securities/total loans	117%	91%	26%	50%	38%	27%	31%	42%
Total loans/total deposits	58%	64%	153%	76%	82%	77%	158%	77%
Total NPLs/total loans	9%	4%	46%	8%	16%	6%	28%	8%
Cost of funds	3%	6.3%	4%	7.5%	5%	5.8%	6%	8.40%

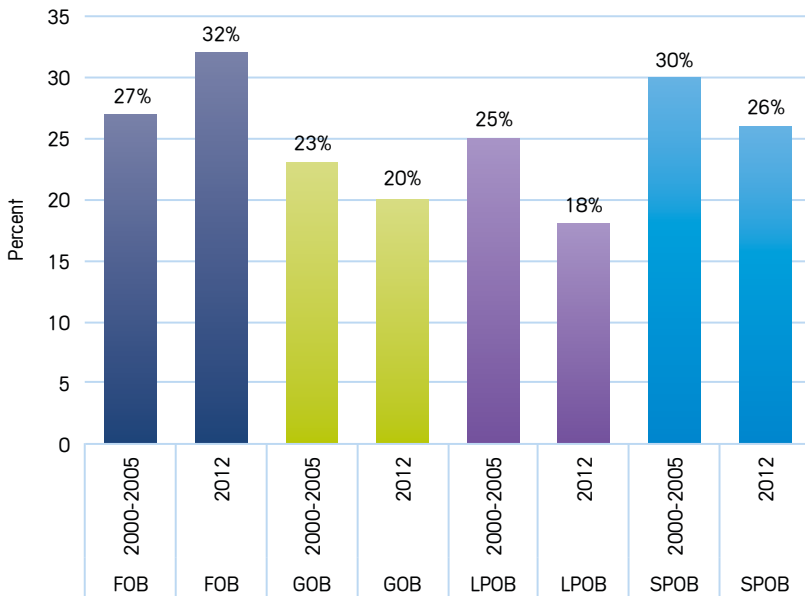
Source: Authors' calculations from bank financial statements.

Figure 15: Return on assets – comparison within and across segments, 2000–2005 and 2012



Source: Authors' calculations from bank financial statements.

Figure 16: Core capital/risk-weighted assets – comparison within and across segments, 2000–2005 and 2012



Source: Authors' calculations from bank financial statements.

4.3 Foreign-owned bank segment

The data show that the FOB segment has contracted both in terms of proportion of assets and also in terms of relative performance. For the period 2000 to 2005, ROA at 3% was highest for the FOB segment. In 2012, with ROA of 2.5%, it performs better than the GOB and SPOB segment but not as well as the LPOB segment. It should be noted that within the FOB segment, there is variation in performance. Two of the larger foreign-owned banks – Citibank and Barclays Bank – enjoyed ROA of 10.4% and 7%, respectively. UBA Bank, a new entrant with headquarters in Nigeria, has a very poor ROA performance of -13.6%. The FOB segment remains the most conservative with the highest level of capitalisation, the lowest level of lending on assets and the highest level of investment in government securities compared to the other segments in 2012. Due to conservative lending policies, the FOB segment has historically had the lowest non-performing loan ratio, and this is also evident in 2012. Finally, if we look at the cost of funds, we notice a change between 2000–2005 and 2012. At 3%, the cost of funds for the FOB segment was the lowest of all the segments in 2000–2005, but at 6.3% it was higher than the LPOB segment in 2012. This increase was due the new entrants in this segment and increased diversity of players. Barclays Bank, with its large

branch network and strong reputation, had a cost of funds of only 1.7% and Citibank had a cost of funds of 3.7%. UBA Bank and Bank of Africa, both new entrants to the markets and banks that are headquartered in West Africa, had very high costs of funds in 2012 of 9.72% and 9.48%, respectively. This may reflect their lack of reputation in the market.⁴¹

Overall, it can be said that the FOB segment maintains a significant if falling share of the market. The segment also changed between 2000 and 2005, as there is more diversity within this segment with some new entrants. The discussion shows that even within the FOB segment there is variation of performance based on size, length of presence in Kenya and location of the parent bank, all of which affect the reputation of the banks.

4.4 Government-owned bank segment

The data show that though the share of the GOB segment declined between 2000–2005 and 2012, the portfolio characteristics were much improved. In particular, the very high NPL ratio of 46% in 2000–2005 was reduced to 8% in 2012.⁴² This is still higher than the NPL ratio of the FOB and LPOB segments, but reflects the policy of the regulator to restructure the banks, in particular the Kenya Commercial Bank. The liquidity of the sector as measured by total loans/deposits also improved from 153% in 2000–2005 to 76% in 2012. The ROA for the sector, at 2.2% in 2012, also improved. The main change between 2000–2005 and 2012 was the increase in cost of funds. In 2000–2005, the cost of funds of GOBs, at 4%, was higher than that of FOBs but much lower than those of LPOBs and SPOBs. At 7.5% in 2012, the GOB segment now has a cost of funds lower only than the SPOB segment. There is variation within the segment, with the Kenya Commercial Bank, the largest bank in 2012, having a cost of funds of only 4.6%. In contrast, Consolidated Bank had a very high cost of funds of 11% and National Bank of Kenya had a cost of funds of 6.6%. In 2005, these two banks had a cost of funds of 1.61% and 2.6%, respectively.

Overall it can be said that the GOB segment between 2000–2005 and 2012 improved in terms of several performance ratios. However, its overall share of the market was reduced and the segment also had reduced ability to raise funds very cheaply as it could in the past.⁴³

41 It can be hypothesised that these smaller FOB banks are not viewed by the market as foreign-owned banks but small privately owned banks.

42 Refer to the historical section above for explanation of sources of high NPLs.

43 This was partly due to a change in government policy whereby it is no longer mandatory for government parastatals to keep funds in government-owned banks.

4.5 Large privately owned bank segment

This is the segment that experienced the most significant change between 2000–2005 and 2012. The segment's share of total assets increased from 19.7% in 2000 to 34.5% in 2012. In 2012, this segment had the highest ROA (4.9%) of all segments and the lowest cost of funds, at 5.8%. This is the key change within the segments between 2005 and 2012. In 2005, FOBs and GOBs had the lowest overall cost of funds, followed by LPOBs and SPOBs. In 2012, however, LPOBs has the lowest cost of funds followed by FOBs, GOBs and SPOBs.⁴⁴ The LPOB segment is also the least conservative with the highest total loans-to-total assets ratio of 59% and the lowest investment in government securities as a proportion of total loans (27%), but it still has a low NPL ratio of 6%. Most of the growth in this sector can be explained by the rise of Equity Bank. In 2005, Equity Bank was the 13th largest bank in Kenya with a market share of 1.8%. By 2012, it was the second largest bank in Kenya with 9.3% of the market.⁴⁵ Equity Bank started as a microfinance bank and has received numerous accolades due to its focus on making financial services available to the poor and the 'unbanked' (Equity Bank Ltd, 2009). Studies have attributed its success to developing innovative products, including changing its fee structure from monthly ledger fees to a transaction fee-based model, 'no-collateral' loans, a customer focus, investment in human resources and investment in technology (Coates, 2007; Wright and Cracknell, 2008). Furthermore, Equity Bank used the agency banking model to increase access to finance. However each of the banks in the LPOB segment has made strides in either growing or maintaining its market share in a growing market (see Appendix 3). For example, Diamond Trust Bank grew its asset share from 2.72% in 2005 to 4.06% in 2012 by focusing on small and medium-sized enterprises. Overall, there is a need to study the competitive strategies of other banks in the LPOB segment to understand how they have been able to build their reputation and asset base so as to break the historical dominance of the FOBs and GOBs.

4.6 Small privately owned bank segment

We now turn to the SPOB segment. As mentioned earlier, this segment has over 18 small banks. These banks were able to increase their share of the market from 11.2% in 2005 to 15.4% in 2012. Furthermore, they remain well capitalised. At 26%, the average core capital-to-risk-weighted ratio is

44 Again there are differences within this segment. Equity Bank, with its large branch network, has a cost of funds of 2.9% and I&M Bank has a cost of funds of 7.9%.

45 Refer to Appendix 3 for the changing shares of specific banks in the LPOB segment.

lower than for FOBs but higher than for GOBs and LPOBs. However, banks in this segment still experience difficulties. They are not conservative, with a total loan/total assets ratio and a total loans/total deposits ratio very similar to the LPOB segment. However, with a ROA of 1.9%, this segment has the lowest ROA and the highest cost of funds. Overall, this shows that the SPOB segment still faces significant barriers in terms of competing with banks in other segments. Their inability to exert competitive pressure on the other segments has implications for increasing access to financial services, and partly explains the persistence of high interest rate spreads in Kenya. While there have been changes in the nature of the segmentation of the banking sector in Kenya, it has not been completely eroded.

4.7 Financial access and segmentation

Table 9 shows the usage of different types of banks as reported in the FinAccess surveys of 2006, 2009 and 2013. It shows that the majority of respondents use banks in the LPOB segment, followed by the GOB segment. These data provide corroboration to the discussion above where we showed the increasing share of the LPOB segment and that this is primarily the result of Equity Bank pioneering access to a wider market.

Table 9: Financial service use by segment (percentage of adult population)

	2006	2009	2013
FOB	2.7	3.5	3.3
GOB	6.2	5.2	4.8
LPOB	6.8	14.3	19.9
of which equity	3.6	--	16.1
SPOB	0.7	1.6	2.8

Note: This represents the proportion of the adult population reporting that they are currently using a bank in the segment, it does not take account of multiple account use in the same sector. Respondents may also have an account in a different sector.

Sources: Authors' calculations from FinAccess surveys

Table 10 lists the top five banks and highlights changes in outreach between 2006 and 2013. It shows that while the largest increase in outreach can be attributed to Equity Bank, Co-operative also increasing its outreach. Postbank lost out to the competition (it do not offer loans) and KCB expanded its outreach marginally.

Table 10: Proportion using specific banks⁴⁶ (percentage of adult population)

	2006	2013
Equity	3.6	16.1
Co-operative	3.0	4.7
Postbank	5.6	5.1
KCB	3.3	3.8
Barclays	1.6	1.4

Sources: Authors' calculations from FinAccess surveys.

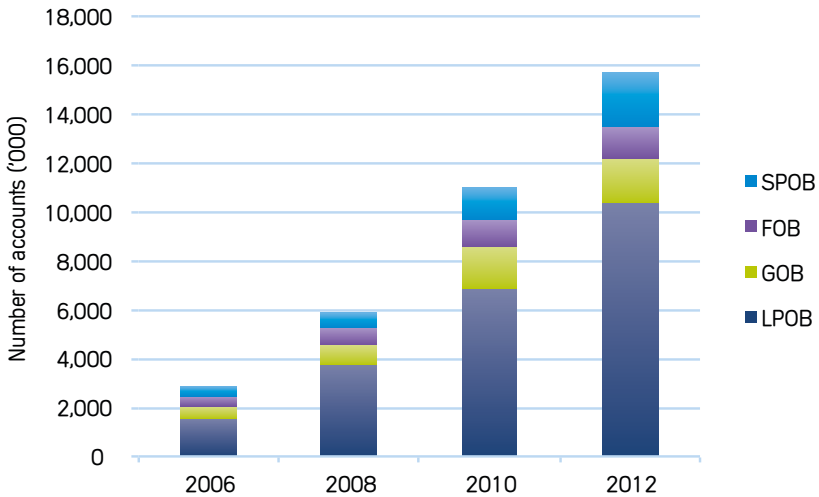
Supply-side data also reflect the fact that the increase in access, as discussed above, has been driven by the LPOBs, one GOB (KCB) and one SPOB (Family Bank) (see Figure 17). It should be noted that the agency banking model has been key to allowing banks to increase access to finance. As at December 2012, there were ten commercial banks that had contracted 16,333 active agents facilitating over 38 million transactions valued at Ksh195.8 billion (Central Bank of Kenya, 2012).⁴⁷

Since these data were collected, the Commercial Bank of Africa (CBA) has grown considerably in outreach through its M-Shwari product embedded into M-PESA. Recent data indicate that CBA has some 5.6 million deposit accounts, compared to Equity Bank's 7.4 million, with an average account balance of Ksh16,000 compared to Equity's average balance of Ksh21,445. However, CBA's number of loan accounts (879,000) now exceeds that of Equity Bank (840,000) (Ngigi, 2014b). Loan sizes are likely to be much lower, however, given M-Shwari's loan limit of approximately Ksh8,000, and costs are high at 7.5% per month. This is revolutionary in the low-end market, although the actual profile of borrowers remains to be established. However, CBA's enforcement mechanisms for these loans are currently weak and it reported in January 2014 that it had blacklisted 140,000 clients (16%) with credit bureaux (Ngigi, 2014a).

46 Data for individual banks in the 2009 dataset are not consistent with other years and we therefore do not present them here. Nevertheless, the data for the segments, which combine a number of banks, appear consistent and have therefore been presented.

47 The CBK does not provide a breakdown of the number of agents per bank. However, the three banks with the largest agent networks are Equity Bank and Co-operative Bank (in the LPOB segment) and Kenya Commercial Bank (in the GOB segment).

Figure 17: Growth of deposit accounts by segment



Source: Central Bank of Kenya supervision reports (various years).

5 Conclusions

This chapter has traced the evolution of the banking sector in Kenya from 2000 to 2012. It shows that at the macro level, there has been significant progress in terms of increased financial depth, reduced concentration, increased stability and increased access. However we note three main areas of concern: the low savings rates, the lack of credit to key sectors of the economy including agriculture and manufacturing, and the high interest rate spread and margin.

At the micro level, we focus on the evolution of four different segments of the banking sector – FOBs, GOBs, LPOBs and SPOBs. It had been noted in 2005 that the first three banks to be established in Kenya (between 1896 and 1910) remained the three dominant banks (Upadhyaya, 2011). Of these three banks, two were in the FOB segment and one was in the GOB segment. The analysis shows that there was a significant change in the strength of the segments between 2005 and 2012. Banks in the LPOB segment gained ground and managed to overcome the reputation barriers they faced in 2005. This can be mainly attributed to the phenomenal rise of Equity Bank, but other banks in the LPOB segment also increased or maintained their share of the market. This reduction in the historical dominance of the FOBs and GOBs is the positive story of the banking system in Kenya.

This change reflects the recognition, led by Equity, of under-banked markets and that banking these profitably requires new approaches to operating. Competition for the low-income unbanked is mainly between LPOBs (Equity, Co-operative), with the mobile-enabled technology of M-PESA now linked to banking with Commercial Bank of Africa (CBA) via M-Shwari offering initial signs of a significant shift in the landscape. This competition is likely to continue to drive growth in the LPOB segment, which should also drive improvements in efficiency and thus reduce costs to make mass banking outreach a reality. While disruptive innovation may arise from any quarter as mobile technology development continues apace, the current trend is producing a new segmentation between the LPOBs and the formerly dominant GOBs and FOBs, which appear unable to actively compete for this market, and raises the risk of the low-income market becoming an effective duopoly between Equity and CBA.

However, as reflected in the intractable interest rate spread, while segmentation of the sector has in many ways been eroded, it is still present and there is a need to increase the reputation of the banking sector as a whole, and in particular of banks in the SPOB segment, to encourage full competition.

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Appendix 1: Main sources of data

Main sources	Note	Acronym
World Bank Financial Sector Database (2000, updated 2009 and 2012 and 2013),	Data only up to 2011	WBFSDB
World Bank META database (http://data.worldbank.org/country/kenya , downloaded 15 Nov 2012 and 28 May 2014)	Data up to 2012	WBMETA
Think Business Database		TBD
Ashvir banks database		ABD
CBK Supervision Reports		CBKSV
CBK Statistical Bulletins		CBKSTB
KNBS Economic Surveys		EcoSurv
CBK and FSK Kenya FinAccess Surveys 2006, 2009, 2013		FinAccess
IMF Financial Access Survey (http://fas.imf.org/)		IMFFAS

Indicator	Note	Exact source
Real GDP growth	%	WBMETA (row 823 NY.GDP.MKTP.KD.ZG)
Gross domestic savings	% of GDP	WBMETA (row 840 NY.GDS.TOTL.ZS)
Gross fixed capital formation (gross investment)	% of GDP	WBMETA (row 733 NE.GDI.FTOT.ZS)
Liquid liabilities/GDP	%	WBFSDB (col G – llgdp)
Bank deposits/GDP	%	WBFSDB (col M – bdgdp)
Private sector credit/GDP	%	WBFSDB (col L – pcrdbogdp)
Net interest margin	%	WBFSDB (col R – netintmargin) 2013 data
Interest rate spread	%	WBMETA (row 495 FR.INR.LNDP)
Return on assets	%	WBFSDB (col T – roa) 2013 data
Return on equity	%	WBFSDB (col U – roe) 2013 data
Concentration ratios (assets of top 3 banks)	%	WBFSDB (col S – concentration) 2013 data
Total capital/risk-weighted assets	(min. 12%)	CBKSV for 2000, 2001, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012

Indicator	Note	Exact source
Core capital/risk-weighted assets	(min. 8%)	CBKSV for 2000, 2001, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012
Core capital/total deposits	(min. 8%)	CBKSV for 2000, 2001, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012
Liquid assets to deposit liabilities (liquidity ratio)	(min. 20%)	CBKSV for 2000, 2001, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012
NPLs/total loans		CBKSV for 2000, 2001, 2002, 2004, 2005, 2006, 2007, 2008, CBSV(2010) for 2009, 2010; CBSV(2011) for 2011; CBSV (2012) for 2012
Agriculture sector	% of GDP	EcoSurv (2013) for 2012; EcoSurv (2008) for 2005; EcoSurv (2005) for 2000
Manufacturing sector size	% of GDP	EcoSurv (2013) for 2012; EcoSurv (2008) for 2005; EcoSurv (2005) for 2000
Financial sector size	% of GDP	EcoSurv (2013) for 2012; EcoSurv (2008) for 2005; EcoSurv (2005) for 2000
Lending to agriculture	% (share of gross loans)	CBKSV (2012) for 2012; CBKSTB for 2005; EcoSurv (2005) for 2000
Lending to manufacturing	% (share of gross loans)	CBKSV (2012) for 2012; CBKSTB for 2005; EcoSurv (2005) for 2000
Lending to household	% (share of gross loans)	CBKSV (2012) for 2012; CBKSTB for 2005; EcoSurv (2005) for 2000
Lending to financial services	% (share of gross loans)	CBKSV (2012) for 2012; CBKSTB for 2005; EcoSurv (2005) for 2000
Lending to real estate	% (share of gross loans)	CBKSV (2012) for 2012; CBKSTB for 2005; EcoSurv (2005) for 2000
Lending to trade	% (share of gross loans)	CBKSV (2012) for 2012; CBKSTB for 2005; EcoSurv (2005) for 2000

Appendix 2: List of banks and segments, 2012

	Segment	No. in segment
Barclays Bank of Kenya	FOB	1
Standard Chartered Bank Kenya	FOB	2
Citibank N.A. Kenya	FOB	3
Bank of Baroda (Kenya)	FOB	4
Bank of Africa	FOB	5
Bank of India	FOB	6
Ecobank	FOB	7
Habib A.G. Zurich	FOB	8
K-REP Bank	FOB	9
Habib Bank	FOB	10
UBA Kenya Bank	FOB	11
CFC Stanbic Bank	FOB	12
Kenya Commercial Bank	GOB	1
National Bank of Kenya	GOB	2
Consolidated Bank	GOB	3
Development Bank of Kenya	GOB	4
The Co-operative Bank of Kenya	LPOB	1
Equity Bank	LPOB	2
Commercial Bank of Africa	LPOB	3
NIC Bank	LPOB	4
Diamond Trust Bank of Kenya	LPOB	5
I&M Bank	LPOB	6
Prime Bank	SPOB	1
Chase Bank (Kenya)	SPOB	2
Family Bank	SPOB	3
Imperial Bank	SPOB	4
Housing Finance	SPOB	5

Fina Bank	SPOB	6
Gulf African Bank	SPOB	7
African Banking Corporation	SPOB	8
Giro Commercial Bank	SPOB	9
Equatorial Commercial Bank	SPOB	10
Fidelity Commercial Bank	SPOB	11
First Community Bank	SPOB	12
Guardian Bank	SPOB	13
Victoria Commercial Bank	SPOB	14
Trans National Bank	SPOB	15
Credit Bank	SPOB	16
Oriental Commercial Bank	SPOB	17
Paramount Universal Bank	SPOB	18
Middle East Bank	SPOB	19
Dubai Bank	SPOB	20
Jamii Bora Bank	SPOB	21
TOTAL INDUSTRY		43

Appendix 3: Changing share of banks in LPOB segment

Market Share	2005	2012	Difference
Equity Bank	1.90%	9.26%	7.36%
Co-operative Bank of Kenya	8.59%	8.57%	-0.02%
NIC Bank	3.43%	4.37%	0.94%
Commercial Bank of Africa	4.90%	4.31%	-0.58%
Diamond Trust	2.72%	4.06%	1.34%
I&M Bank	2.99%	3.93%	0.94%

CHAPTER 2

The Geography of Financial Services Providers in Kenya

GIORGIA BARBONI



1 Introduction

Growing interest in the use and analysis of geospatial data and innovations in data collection technologies has led to significant investments in the ge-positioning of services in developing countries. The geo-spatial data revolution allows policymakers and development practitioners to rely on accurate data on access to health, education, transport and financial infrastructure. Geo-spatial data should facilitate the targeting of vulnerable segments and improve future investment decisions.

The data revolution also supports in-depth analysis and greater understanding of the dynamics of poverty. For instance, in identifying the impact of M-PESA, Jack and Suri (2014) make use of geospatial data from 2008 to 2010 to locate mobile money services providers and to compute distances between households and their closest M-PESA agent. The use of these data are essential when studying the determinants of financial access, as they are able to provide relevant information on a household's surrounding environment such as, for instance, the exact measure of the proximity to a cash outlet or local geographic characteristics.

More recently, the Bill & Melinda Gates Foundation's Financial Services for the Poor (FSP) team has launched a series of geo-spatial databases and associated interactive online maps that integrate financial services providers' locations and measures of poverty to help inform decision-makers on the best strategies to adopt to expand financial access across poor populations in countries like Bangladesh, Kenya, Nigeria, Tanzania and Uganda (Nielsen and Slind, 2013).¹

The geo-spatial datasets and the related financial access point maps greatly improve our understanding of how the presence of financial services providers in certain geographic units has differential impacts on an individual's level of financial inclusion. The data also allow us to understand the spatial strategies behind different forms of financial services and to highlight underserved areas.

This chapter studies how the outreach of financial services providers in Kenya relates to the population's socio-economic characteristics and level of financial inclusion. In doing so, we first focus on the role of the major actors in the domestic financial services scene, namely commercial bank branches, microfinance institutions, mobile money agents, savings and credit cooperatives

Author's note: I thank, without implicating, Tara Bedi, Amrik Heyer, Michael King and Paolo Martellini for helpful comments and suggestions. Kevin Loughheed and Ronan Lyons provided invaluable help with ArcGIS, while the guidance of Geraldine Makunda and Amos Odero to the data sources that are used in the chapter is gratefully acknowledged. All errors are my own.

¹ See www.fspmaps.com.

(SACCOs), bank agents and ATMs. We then consider the ownership of commercial bank branches and ATMs, and study how different densities of foreign, domestic and government-owned banks (measured at the county level),² as well as their proximity to an individual's place of residency, relate to the population's level of financial inclusion.³

The scope of this chapter is twofold. First, we exploit the geographical distance between Kenyan households and their closest financial services provider to analyse how proximity to the main formalised financial intermediaries is correlated with indicators of financial inclusion and wealth at the individual level. Second, we aim to complement Upadhyaya and Johnson's analysis in this book of the banking sector in Kenya by showing how the density of, and the distance to, banks characterised by different sizes and ownership affects an individual's level of financial inclusion.

Our analysis shows that proximity to financial service providers of any kind is positively related to measures of wealth, financial access and income. We then study and compare distances between different financial access points and find, as expected, that mobile money services providers and bank agents follow similar expansion strategies, by reaching out to the most underserved segments of the population in Kenya. Mobile money and bank agents indeed represent the closest financial access point for a large share of the population that reports having never used a credit product. Our analysis also looks at the role of SACCOs and microfinance institutions (MFIs) in promoting financial inclusion. These two categories, whose presence in the country is far more limited than that of mobile money and bank agents in terms of numbers of units, also target underserved populations, although within wealthier and more included counties.

We then focus our analysis on bank branches and ATMs, and study how differences in ownership relate to their expansion strategies. The rationale behind this exercise is to understand whether large privately owned banks and foreign banks have adopted different penetration strategies in Kenya. By performing a series of mean t-tests, we first find that counties with high shares of both foreign-owned and large privately owned bank branches are also characterised by high levels of financial inclusion. We then conduct an empirical analysis based on branch and ATM proximity to Kenyan households, and find that ATMs of foreign-owned banks are more likely to be located close

2 A potential drawback in conducting the analysis at the county level is that the market expansion of financial services providers is often at the town level. Still, we are able to find enough variability also across counties, as we will show throughout this chapter.

3 We measure financial inclusion through a series of variables that we derive from the FinAccess 2013 database. We explain these variables in greater detail in Section 6, Table 5.

to individuals characterised by higher levels of financial inclusion than ATMs of large privately owned banks (such as Equity Bank). This result suggests that large privately owned banks are more likely than foreign-owned banks to target less financially included populations.

In summary, the results highlight the fundamental role played by mobile money agents in enhancing financial access in Kenya. At the same time, when we consider banks only, the findings suggest that large privately owned banks represent the bank segment that is making the greatest effort to fight financial exclusion in Kenya, by targeting poorer, more underserved populations.

This chapter proceeds as follows. Section 2 provides an overview of the breadth of financial services providers in Kenya. Section 3 describes the data used in the chapter. In Section 4, a series of county-level density maps are presented for each type of financial service provider along with an analysis of the geo-spatial data. Section 5 provides insights from the nationally representative individual-level FinAccess 2013 survey within the context of geo-spatial data. Section 6 considers the different outreach strategies of commercial banks based on their ownership type. Section 7 concludes.

2 Financial services providers in Kenya

In this chapter, we focus on the main categories of financial services providers operating in Kenya: commercial bank branches, microfinance institutions, mobile money agents, SACCOs, bank agents and ATMs. Financial services providers in these categories accounted for about 96% of the total number of formalised financial intermediaries operating in the country in 2013 (Table 1).

It should be noted that the expansion of the financial services infrastructure is a relatively new phenomenon in Kenya. The spread of bank branches started in the late 1970s, but it was not until the last ten years that bank branches have become a dominant presence in towns and villages throughout the country. Data from King (2012), for instance, reveal that only between 2005 and 2008, the number of bank branches increased from 534 to 887, and reached more than 1,300 in 2013.⁴

Moreover, for some of these financial services providers, the transformation process has been much more recent and rapid. For instance, mobile money services, which started expanding in the country in 2007 with the introduction

4 Source: FinAccess 2013 study by the Central Bank of Kenya and FSD Kenya (dataset available on request by writing to finaccess@fsdkenya.org).

of M-PESA, grew rapidly to reach 28,000 agents in under five years. This service now accounts for more than 48,000 units, which corresponds to almost 80% of all financial intermediaries operating in Kenya (Gates Foundation, 2013).

Table 1: List of financial services providers in Kenya

Type of provider	Number	Share of total (%)
Mobile money services providers	48,061	79.19
Bank agents	7,052	11.62
Commercial banks and mortgage finance companies	1,314	2.17
Insurance service providers	878	1.45
Savings and credit cooperative societies (SACCOs)	706	1.16
Bus stands	613	1.01
Stand-alone ATMs	503	0.83
Microfinance institutions	500	0.82
Post offices	364	0.60
Money transfer services	209	0.34
Capital market service providers	139	0.23
Forex bureaus	121	0.20
Pension providers	93	0.15
Hire purchase/leasing/factory companies	82	0.14
Development finance institutions	57	0.09
Total	60,692	100

Source: FinAccess 2013 study by the Central Bank of Kenya and FSD Kenya (dataset available on request by writing to finaccess@fsdkenya.org).

3 Data sources

To conduct our analysis, we rely on various data sources. Our data on the Kenyan population is derived from the FinAccess 2013 survey, a nationally representative survey carried out by FSD Kenya and the Central Bank of Kenya. The FinAccess survey provides socio-demographic and financial literacy data, along with information on the use of the financial products available in the market. For each respondent, we also have household GPS coordinates, as well as details on the district and town of residence.

Our second data source, which is on financial services providers, is surveys carried out by the Gates Foundation in partnership with the Central Bank of Kenya and FSD Kenya.⁵ These data were collected by Brand Fusion and provide details on the locations of Kenyan financial services providers.⁶ From this dataset, we derive information on the financial operators' type (bank branch, bank agent, mobile money services provider, microfinance institution, ATM or SACCO), activity and geographic localisation. GPS coordinates allow us to identify the district and the county in which the financial services providers are located, and to construct measures of financial access at the sub-national level.

Our third source of data is Upadhyaya and Johnson's chapter in this book, from which we classify both bank branches and ATMs in our dataset as foreign owned, private owned or government owned. Finally, we derive data on Kenyan infrastructures from the Digital Chart of the World from the DIVA-GIS website (www.diva-gis.org).

By merging all these datasets, we end up with a sample of 6,447 individuals and 60,692 financial services providers (all our data refer to 2013). Having the exact location of each house and financial services provider through GPS coordinates allows us to compute the distance (measured 'as the crow flies', i.e. not considering infrastructure or land shape)⁷ from each FinAccess survey respondent to their nearest financial services provider, and to relate this distance to both the individual's and the financial provider's characteristics. Moreover, using data on roads, we can measure how far a financial services provider is from the closest road (which could be either a primary road, a secondary road or a trail), and use this information to further study the outreach of financial access points.

4 Mapping financial services providers across the territory

Mapping financial services providers is beneficial to both academics and policymakers for at least two reasons: (1) providing a visual output allows for a straightforward understanding of their expansion strategies and their relationship with individuals' levels of financial inclusion; and (2) new variables

5 www.fsdkenya.org

6 <http://www.brandfusion-africa.com>

7 This means that the actual distance by road may be longer.

can be constructed when geospatial data are combined with existing survey data to obtain more precise measures of the outreach of financial access points, as well as of financial inclusion.

The use of geospatial data becomes particularly important in contexts (like Kenya) where formalised financial institutions provide very different types of financial services, which are targeted at distinct categories of customers. By merging data on poverty or population distribution with densities of financial services providers, it is possible to study what segments of the population and which specific geographical areas financial services providers are more likely to target.

Similarly, the use of geospatial data allows us to measure distances (expressed here in kilometres) between households and financial services providers, and to study how the geographical proximity to financial access points varies across countries or across time.

For instance, 76.7% of the Kenyan population live within 5km of a financial access point; this is 1.8 times and 2.2 times higher than the corresponding figures for Uganda and Tanzania, respectively, according to the Gates Foundation (2013). Not surprisingly, the southern part of the country and, more specifically, the counties that are closest to the capital – where most of the financial and economic activities take place – display the highest rates of financial access. Yet, even in many rural areas of the country there are counties in which up to 50% of the population live within 5km of a financial services provider. It is therefore not surprising that the average density of financial access points in Kenya is much greater than in any other East African country. For example, there are on average 161.9 financial access points per 100,000 people in Kenya, which is more than 2.5 times higher than in Uganda, and more than three times higher than in Tanzania (Gates Foundation, 2013).

This picture becomes more nuanced if we distinguish between different types of financial services providers and study their density (measured as number of units per 100,000 people) across counties.⁸ The results from this breakdown are displayed in Figure 1. In line with existing evidence, mobile money services providers have the highest density among all the financial services providers, with the largest concentration being in the south-western part of the country. For instance, there are more than 200 mobile money agents per 100,000 people in the counties of Nakuru and Kiambu, and the number reaches almost 400 in Nairobi. Bank agents display a similar deployment pattern, although with

⁸ Data on the population refer to the 2009 population census and are taken from the Kenya National Bureau of Statistics and the final report by the IEBC (<http://www.geohive.com/cntry/kenya.aspx>). Counties represented in white are those in which there are no financial services providers in the specific category.

a smaller density (there are a maximum of 52 units per 100,000 people in Kirinyaga). Interestingly, bank branches never exceed 16 units per 100,000 people, but they operate, albeit with a small number of units, even in the remotest regions of the country.⁹ Finally, MFIs and SACCOs present very similar levels of outreach to each other, while the presence of ATMs in the territory appears far more limited.

As a second step, we analyse in greater detail the distribution of MFIs, SACCOs and ATMs (Figure 2) in order to capture any heterogeneity across counties for these three categories, which have a much smaller outreach than mobile money agents and bank agents, for instance. SACCOs and MFIs have very similar density patterns: there are 18 counties with less than one SACCO per 100,000 inhabitants, with the same exact figure holding for MFIs. Moreover, these two categories of financial services providers operate in the same counties, with the only exceptions being West Pokot (where there are no SACCOs) and Garissa (where there are no MFIs). At the same time, however, SACCOs display higher concentration rates than MFIs (and ATMs, as well), particularly in south-western counties. There are more than four SACCOs per 100,000 inhabitants in six counties (Embu, Kiambu, Kirinyaga, Nyandarua, Nyeri and Tharaka-Nithi); interestingly, in Nairobi County this share is ‘only’ 3.6. Conversely, only two counties (Kajiado and Taita Taveta) have more than three MFIs per 100,000 inhabitants, with the density reaching 4.5 for Kajiado. Heterogeneity in densities patterns is mainly driven by differences in the number of units between SACCOs and MFIs (there are 706 SACCOs, compared to 500 MFIs). Both financial services providers are spread across the same number of counties, thus resulting in lower density rates for MFIs.

In contrast, things appear quite different when we compare density rates of MFIs and ATMs. This is even more surprising, since these two categories have almost the exact same number of units (503 ATMs versus 500 MFIs). As emerges from Figure 2, in contrast to MFIs, ATMs are mainly concentrated in the counties of Nairobi (with more than 8 ATMs per 100,000 inhabitants), Kajiado and Mombasa (with 2.76 ATMs per 100,000 inhabitants). Thus, differences in density rates are the result of very different expansion strategies carried out by ATMs and MFIs. While the former (as we will also highlight later in the chapter) are mainly concentrated in fewer, wealthier areas of the country, the latter are more likely to operate in a larger number of counties, with a remarkable presence even in relatively poor counties.

9 Note that in Figure 1 we adopt the same scale for all categories of financial services providers. For a more detailed discussion of the density of bank branches in Kenya, we refer the reader to Section 6, Figure 15.

Figure 1: Density of financial services providers across counties

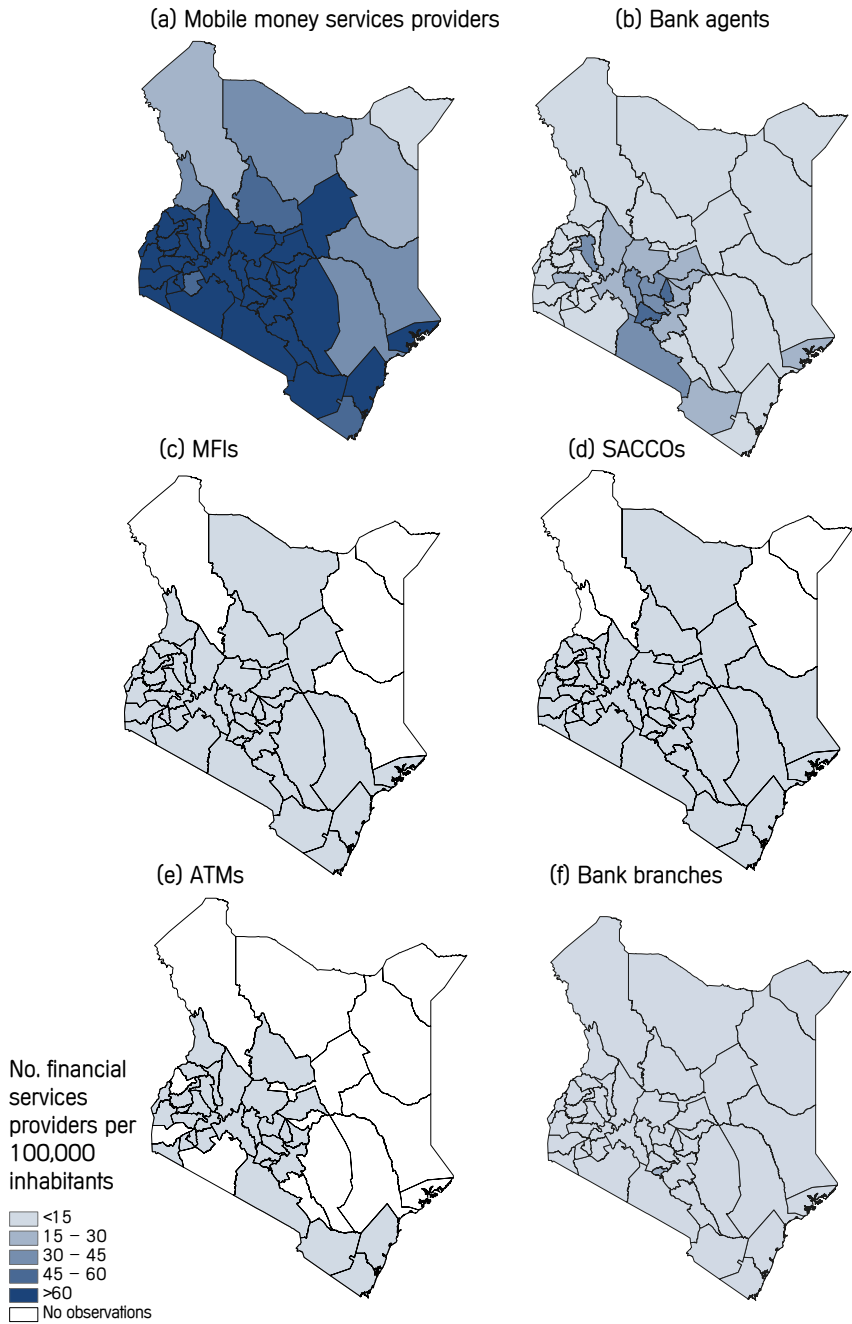
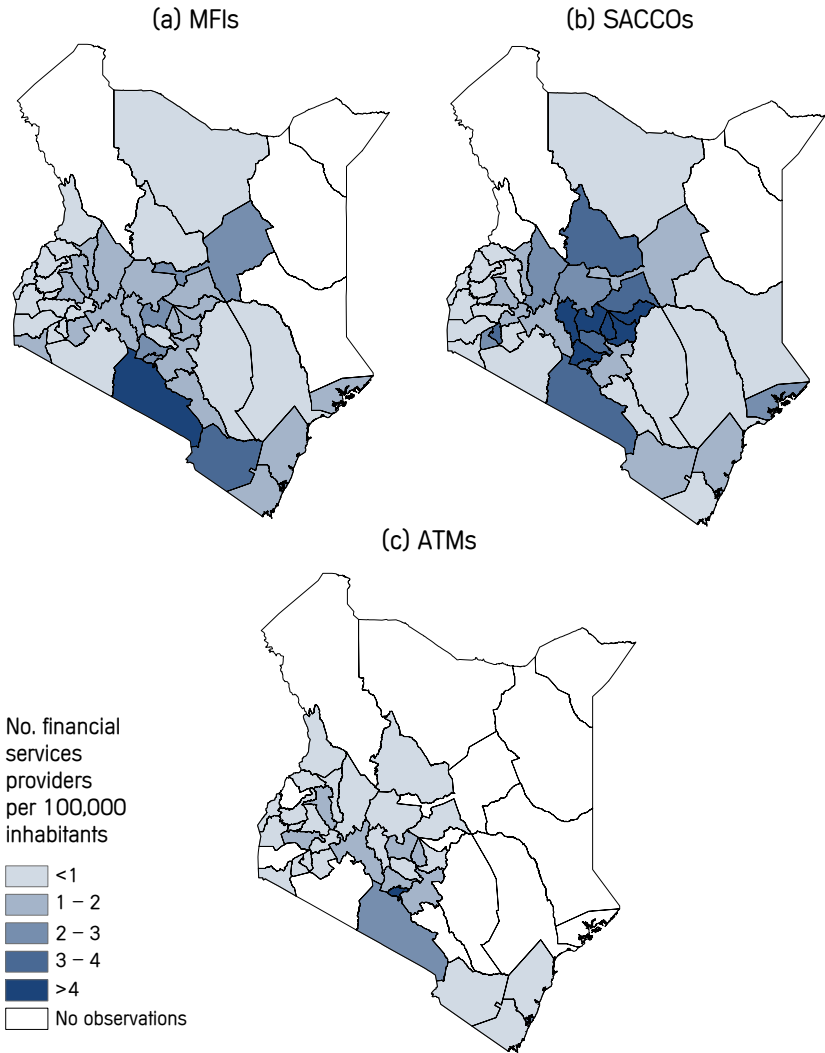


Figure 2: Density of financial services providers across counties: MFIs, SACCOs and ATMs



4.1 Distance to the nearest financial services provider

In order to achieve a full picture of the spatial distribution of financial services providers across Kenya, we analyse how the providers are located compared to other financial access points. To this end, in Figure 3 we show the distributions of ATMs, MFIs, mobile money agents and SACCOs, based on how far they are from other types of financial services providers. In doing so, we employ four different thresholds to measure distance, using a classification akin to Mas and Elliott (2014): 1km (which we interpret as proximity), 5km (the upper limit of walking distance), 10km (requiring travel) and 25km (requiring significant travel). Distances between financial services providers are measured as the crow flies.

The underlying idea is to study whether certain types of financial services providers are more likely to operate close to others (maybe because they have similar expansion strategies and benefit from their mutual presence) or, instead, whether they tend to be located far from any other category of financial services provider (because, for instance, their high number of units allows them to reach areas that no other category can reach).

The first chart shows the results for ATMs. Nearly all ATMs have a bank agent or a mobile money agent within walking distance, revealing that both mobile money and bank agents are highly concentrated in wealthier areas where ATMs are present, as shown in Figure 1.¹⁰ Interestingly, only 80% of ATMs have a bank branch nearby, suggesting that ATMs may also act as substitutes for bank branches in more urbanised regions.¹¹ We also find that ATMs are more distant from MFIs and SACCOs – only half of them have an MFI and slightly under 60% have a SACCO within 1km. These figures are consistent with the results from Figure 2 and thus reveal, once again, that compared to ATMs, MFIs and SACCOs have very different distribution patterns.

The second chart, for MFIs, shows that they are extremely close to SACCOs and bank agents, and also to bank branches, but that only 85% of MFIs are within 25km of an ATM, suggesting that they are more dispersed (as the first chart for ATMs also suggests). The third chart, for mobile money agents, shows that almost every mobile money agent has a bank agent nearby. This could be either because some financial services providers offer both services, or because these two categories have very similar expansion strategies. At the same time, only 40–50% of mobile money agents have at least one ATM, bank branch, MFI or SACCO within walking distance, once again suggesting that mobile

¹⁰ Although highly concentrated in wealthier areas, bank agents and mobile money agents are also widespread in areas that are less financially included, as shown by Figure 1.

¹¹ These are, by definition, 'stand-alone ATMs'.

money services providers reach out to more remote areas of the country, where none of these other financial access points operates with the same intensity.

Finally, the fourth chart, for SACCOs, shows that almost every SACCO is located in proximity to either a bank agent or a mobile money agent, but not necessarily in proximity to an MFI or a bank branch (and, to an even lesser extent, an ATM). This result is line with what we have previously seen in Figure 2 – SACCOs tend to target less included populations, although they are mostly present in richer areas. This means that they follow different penetration strategies compared to ATMs, which explains why fewer than 50% of SACCOs have an ATM nearby. What seems less obvious is why fewer than 60% of SACCOs are within 1km of the closest MFI. A possible explanation for this result is that SACCOs have high concentrations in areas where few MFIs operate. This is in line with what we have seen in Figure 2, and supports the idea that while all MFIs are located close to a SACCO (because the former are less concentrated), the opposite does not necessarily hold.

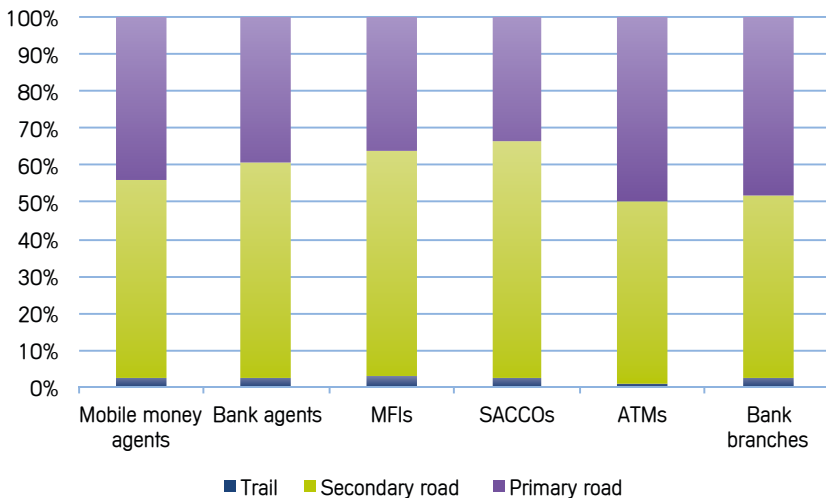
Figure 3: Distance between various financial services providers



4.2 Distance to the nearest road

We complement the findings in Figure 3 by looking at the distribution of each category of financial services provider in Kenya according to their proximity to roads (classified into primary roads, secondary roads and trails). The results are displayed in Figure 4. For each category, the figure shows the share of financial services providers that are closest to a primary road, a secondary road and a trail, respectively. Although a potential explanation for these findings is that the Kenyan infrastructure system mainly consists of secondary roads (primary roads are predominantly in the south-western region of the country), it also highlights differences in the outreach across categories. For instance, almost half of both ATMs and bank branches are located in proximity to primary roads – the highest share among the financial services providers we consider. This reveals that banks are more likely to operate along the main routes in the country, through branches and stand-alone ATMs. In contrast, as expected, more than 60% of MFIs and SACCOs have a secondary road as the closest road. This confirms that, although MFIs and SACCOs are concentrated in fewer areas compared to mobile money agents and bank agents (as also suggested by Figure 1), they are still concentrated more in the poorer regions than ATMs, for instance.

Figure 4: Distance of various financial services providers to the nearest road and trail



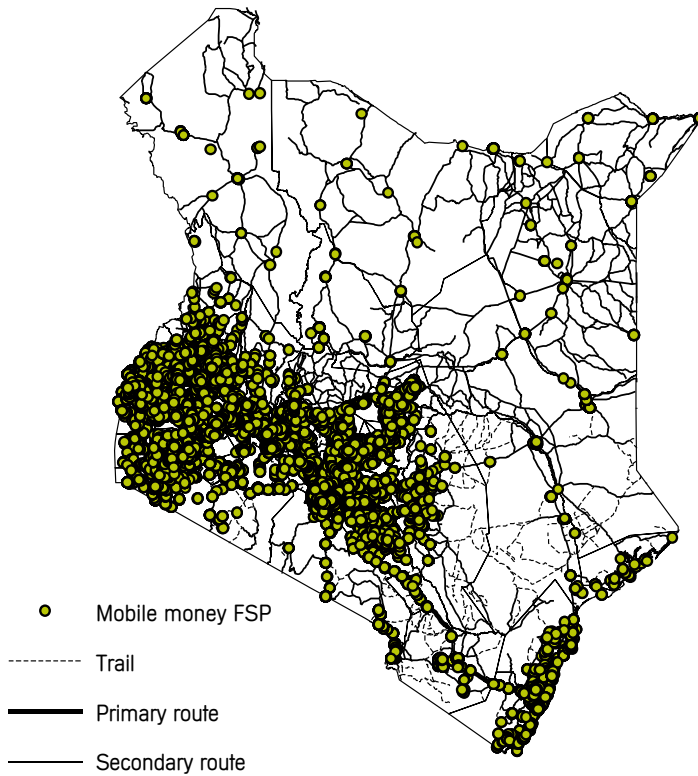
As a further check, we isolate bank branches owned by Equity Bank and look at their proximity to the Kenyan infrastructure system. Compared to other banks operating in the country, Equity Bank fosters financial inclusion more among the populations living in the poorest areas of the country. Therefore, we should expect Equity Bank's financial access points to be located in more remote areas than other financial services providers.¹² In line with our hypothesis, we find that only 36% of Equity Bank's branches are located in proximity to a primary road (compared to 48% of the entire sample), while 60% of them have a secondary road as the closest road (compared to 50% of the entire sample). Interestingly, these figures are very similar to those shown in Figure 4 for MFIs.

Our results thus confirm Equity Bank's so-called 'deeper poverty outreach'; compared to other banks operating in the country, Equity Bank targets financially excluded populations more, penetrating the remotest areas of the country.

In Figure 5, we look in greater detail at the location of mobile money financial services providers across Kenya. Their largest concentration is in the southwestern part of the country. At the same time, there are extensive areas, especially in the northern regions and the east, which are entirely uncovered. Figure 5 also plots the distribution of the road system in Kenya (again with a distinction between primary, secondary roads and trails). Not surprisingly, mobile money agents are located along the road system. Yet, there are many roads, again in the northern and eastern districts, where no mobile money agents are present. This can be accounted for by the lack of network coverage in many of those areas, which makes the access to any financial services provider very difficult, if not impossible, with heavy consequences for the local populations.

12 Founded in 1984, Equity Bank has significantly increased its size and its outreach since 2006 (Allen et al., 2013), becoming the second largest of the 43 commercial banks operating in Kenya in 2012 (for a detailed description of Equity Bank, see the chapter in this book by Upadhyaya and Johnson). Moreover, starting from 2010, Equity Bank was actively involved in the Hunger Safety Net Programme (HSNP), a social protection scheme established by the Kenyan government and funded by DFID with the scope of helping poor populations cope with poverty and vulnerability through cash transfers. The programme was implemented in the northern counties of Kenya (Mandera, Marsabit, Turkana and Wajir), which are the poorest areas of the country. To facilitate the delivery of payments, Equity Bank established a number of bank agents in the region, thus further strengthening its penetration in the most underserved areas of the country.

Figure 5: Location of mobile money agents across the national territory



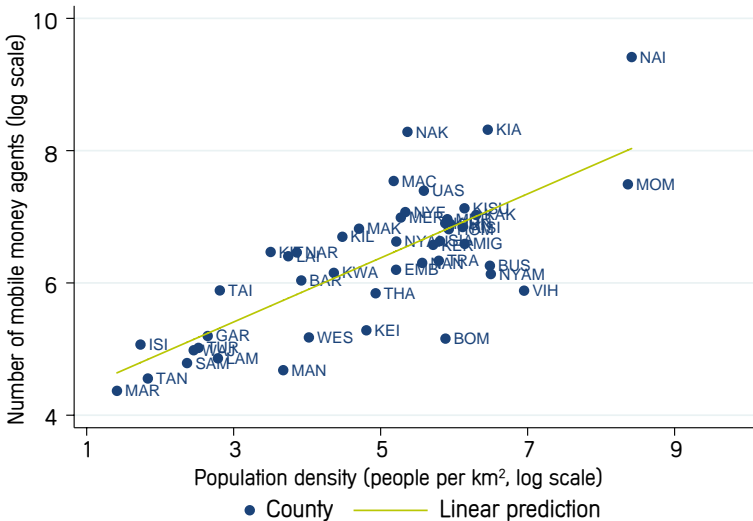
4.3 Relationship between number of agents and population density

Figure 6 displays the relationship between the number of mobile money agents in each county (where there is at least one mobile money agent) and the population density at the county level, measured as the number of people per square kilometre. The rationale is to provide further evidence on the expansion strategies followed by financial services providers in Kenya, and to understand how these strategies relate to the size (measured in terms of population density) of different Kenyan counties. A similar exercise to this was carried out for Tanzania by Mas and Elliott (2014), and in line with their results, we find a clear positive relationship between the number of mobile money agents in a county and the population density in that geographical unit. The results from Figure 6 complement what we have already seen in Figure

1 and Figure 5 – financial services providers are more likely to be located in more populated areas, which are also characterised by better infrastructure and lower levels of poverty.¹³

Indeed, counties like Nairobi, Kiambu, and Mombasa, with high population densities, also benefit from very large shares of mobile money services providers. Conversely, the presence of mobile money services providers in counties with a much more scattered population – like Marsabit, Isiolo or Tana River – is very limited. A potential explanation for the lack of mobile services providers in these areas is that, at present, there is no business case for setting up financial access points there. Figure 6 reveals that more efforts are needed by institutions to facilitate the penetration of financial access points, particularly in counties where the population density is very low.

Figure 6: Relationship between number of mobile money agents and population density at the county level (log-log scale)



Notes: BAR: Baringo; BOM: Bomet; BUN: Bungoma; BUS: Busia; EMB: Embu; GAR: Garissa; HOM: Homa Bay; ISI: Isiolo; KAJ: Kajiado; KAK: Kakamega; KEI: Keiyo-Marakwet; KER: Kericho; KIA: Kiambu; KIL: Kilifi; KIR: Kirinyaga; KIS: Kisii; KISU: Kisumu; KIT: Kitui; KWA: Kwale; LAI: Laikipia; LAM: Lamu; MAC: Machakos; MAK: Makueni; MAN: Mandera; MAR: Marsabit; MER: Meru; MIG: Migori; MOM: Mombasa; MUR: Murang'a; NAI: Nairobi; NAK: Nakuru; NAN: Nandi; NAR: Narok; NYAM: Nyamira; NYAN: Nyandarua; NYE: Nyeri; SAM: Samburu; SIA: Siaya; TAI: Taita Taveta; TAN: Tana River; THA: Tharaka-Nithi; TRA: Trans Nzoia; TUR: Turkana; UAS: Uasin Gishu; VIH: Vihiga; WAJ: Wajir; WES: West Pokot.

Source: Data on the area (sq. km) of counties in Kenya are taken from <http://www.geohive.com/cntry/kenya.aspx>.

13 A similar pattern, although less pronounced, exists for the other categories of financial services providers (ATMs, bank agents, bank branches, MFIs and SACCOs); the results for these are available upon request.

5 Insights from FinAccess survey data

In this section, we take a further step in the analysis of the expansion strategies of the main formalised financial institutions operating in Kenya by linking their geographical locations to those of the FinAccess 2013 survey respondents. This allows us to measure distances between the Kenyan population and its financial services providers, and to relate socio-economic information on individuals to the type of financial services providers located in proximity to their place of residency.

Table 2 provides information on the FinAccess 2013 survey's sample in terms of proximity to different financial services providers. To this end, we classify respondents based on the category of financial services providers they are closest to, and average their level of financial access by category (column two). In addition, column three displays the average distance, in kilometres, from respondents' place of residency to their closest financial services provider.

In line with our previous findings, more than 86% of the survey's sample (5,582 individuals out of 6,447) had a mobile money agent as their closest financial services provider, suggesting that mobile money represents the most widely accessible financial instrument (first row of Table 2). This result is not new in the literature; Johnson et al. (2012) report that money transfers are the most widely used financial service by the Kenyan population, even in poorer districts. Similarly, results from the Kenya Financial Diaries project highlight that poor people in Kenya manage a large share of their income flows through mobile money (Zollman, 2014). Interestingly, however, the average distance to the closest mobile money agent for the FinAccess 2013 survey respondents was 2.51km, far greater than the average distance for the respondents who have an ATM or a bank branch as the closest financial services provider (rows 5 and 6, respectively).

One potential explanation is that mobile money services providers reach the remotest areas of the country to a greater extent than other financial services providers. In these regions, where the distances become much larger than in more serviced areas, they represent the main financial access point for the local population. This is confirmed by the great variation in the distance of mobile money agents to the closest household – the standard deviation is more than 6km, the highest among all categories.

Table 2 also gives interesting insights in terms of access to different financial services providers. For instance, it appears that respondents that are closest to

ATMs are the least excluded from the formal financial system.¹⁴ In contrast, MFIs also target financially excluded clients. Taken together, these results confirm once again that ATMs are mainly concentrated in wealthier areas, while MFIs are much more dispersed (as also appears to be the case when looking at the average distance of the population from the closest MFI) and reach out to less financially included populations.

Surprisingly, individuals with a bank branch as the closest financial services provider are not characterised by very high rates of financial access, on average. What may be behind this apparent contradiction is the presence of bank branches in areas where the level of financial access of the population is relatively low. This effect is potentially driven by Equity Bank’s ‘deeper poverty outreach’ discussed in Section 4.2, which implies that Equity Bank’s financial access points are located at a greater distance from the main roads and – arguably – closer to poorer, less financially included populations.

Table 2: Level of financial access of population and distance to closest financial services provider (averages by category of financial services provider)

Closest financial services provider	Level of financial access	Distance (km)	Number of households
Mobile money services provider	2.71	2.51	5,582
Bank agents	2.62	2.19	695
Microfinance institutions	3.10	2.63	30
SACCOs	2.71	3.01	78
Stand-alone ATMs	1.79	0.64	14
Bank branches	2.81	0.99	48

In order to complement the picture provided by Table 2, we analyse respondents’ rates of credit product usage in relation to the type of financial services provider they live closest to. Figure 7 shows the breakdown of the ‘credit usage’ variable into the categories ‘never used’, ‘currently use’ and ‘have used’, respectively.¹⁵ Interestingly, it shows that 50% of the individuals who live closest to bank agents and mobile money access points report to never having used credit, suggesting once again that these financial services providers reach out to the most underserved segment of the population in Kenya. By contrast, individuals who live closer to ATMs than to any other financial services provider appear to have the highest rates of credit usage (currently or

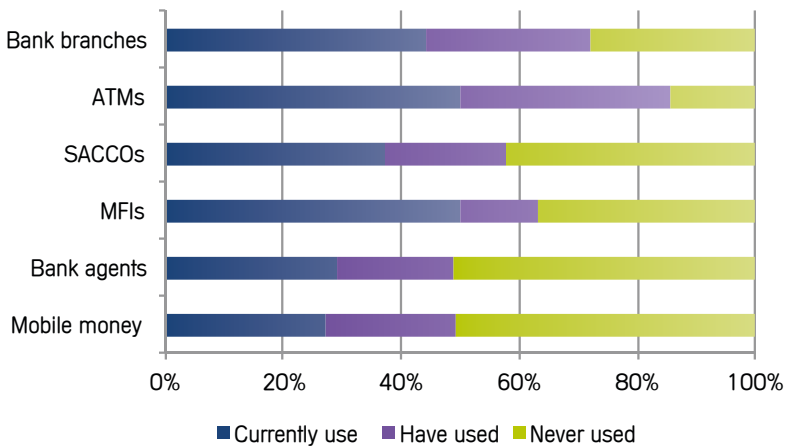
14 The variable ‘access’ is constructed from FinAccess data on a scale from 1 to 5, where 1 indicates the respondent has access to formal prudential financial services providers, and 5 indicates the respondent is financially excluded. More details on this variable are provided in Table 4.

15 These variables are discussed in Section 6.1, Table 4.

in the past). A potential interpretation of this result is that ATMs are mainly located among the most financially included segments of the population, which are also more likely, on average, to make use of credit products. Not surprisingly, respondents that live closer to bank branches also display high rates of credit usage.

Finally, we also find higher rates of credit usage (especially current usage) among individuals living closer to MFIs and SACCOs than to mobile money or bank agents. This result suggests that MFIs and SACCOs are more likely than mobile money or bank agents to target poor populations in terms of credit products.

Figure 7: Credit product usage, by closest financial services provider



Our analysis so far has shown how two characteristics of the FinAccess 2013 survey respondents (access to financial services and credit product usage) relate to the category of financial services providers they are closest to. As reported in Table 2, subjects' level of financial access varies widely depending on the average distance from the closest financial services provider; the shorter this distance, the more likely subjects are to be financially included (as in the case for ATMs, which tend to be concentrated in fewer, richer areas, as also shown in Figure 2).

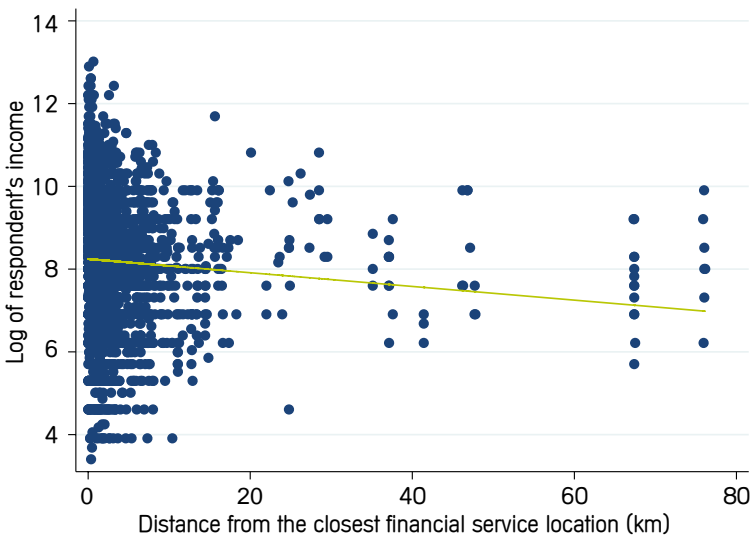
Proximity to a financial services provider thus appears to be positively related to the population's level of financial inclusion. Those who live close to any type of financial services provider benefit from the positive externalities generated by the presence of the mobile money agent, a bank agent, a bank branch, and so on. However, the causal relationship can go in the opposite direction –

financial services providers are more likely to target relatively wealthier areas, which would ensure a higher volume of activity and greater profits.

Figure 8 shows the relationship between FinAccess survey respondents' level of income from their primary source (expressed in log) and the distance from their place of residency to the closest financial services provider (expressed in kilometres). Each dot represents one respondent. It is important to note that previous studies focusing on the incomes of Kenyan households have highlighted that they often derive from multiple sources, and are highly subject to volatility.¹⁶ Thus, the relationship displayed in Figure 8 may not be exhaustive in explaining the diversity of incomes an average household may receive (which is strongly related to individual financial management capability).

Yet, the result is suggestive of a negative relationship between the distance to a financial services provider and the individual level of income. Individuals who live closer to a financial services provider are more likely to report a higher level of income.

Figure 8: Relationship between respondents' income (in log) and distance to closest financial services provider

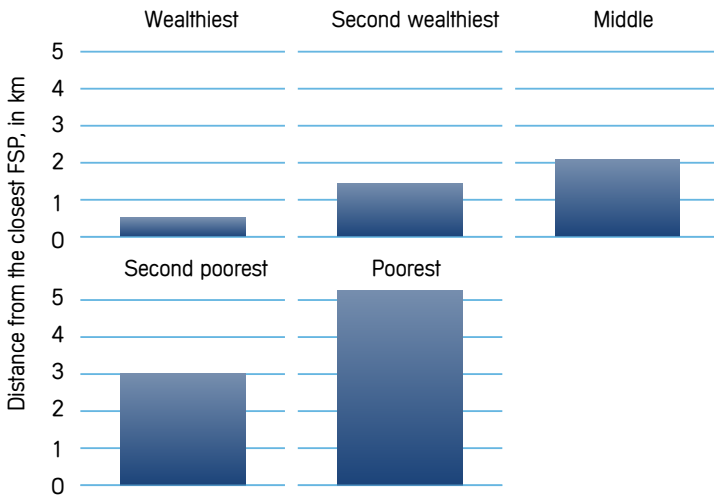


In order to corroborate this finding, we study the relationship between respondents' proximity to a financial services provider and their level of wealth. The wealth index considers a wide range of measures (including the type of

16 See, in particular, the Kenya Financial Diaries research project (http://www.fsdkenya.org/pdf_documents/14-08-08_Financial_Diaries_report.pdf).

toilet used, house material, cooking facility and number of sleeping rooms, among others) and ranges from 1 ('wealthiest') to 5 ('poorest'). We compute the average distance from each respondent's place of residency to their closest financial services provider by wealth category. The results are shown in Figure 9, and reveal that respondents in the wealthiest band of the population live, on average, within 1km (that is, at walking distance) from the closest financial services provider. The poorest individuals, in contrast, live more than 5km from the nearest financial access point.

Figure 9: Relationship between wealth and distance to the closest financial services provider



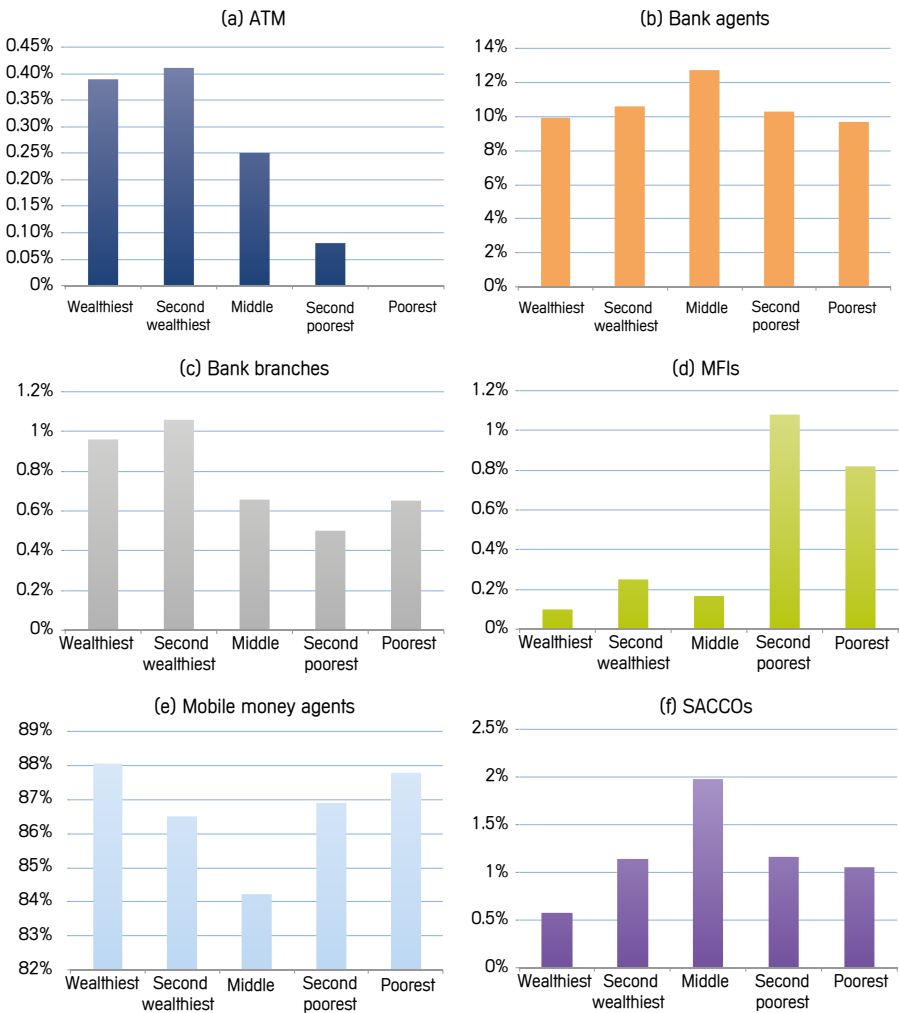
We then look at the relationship between individuals' wealth and their closest financial services provider in more depth. Figure 10 displays the population's wealth distribution, based on the type of financial services provider individuals live closest to. This allows us to study which type of financial services providers succeed in reaching out to different populations, as characterised by different levels of wealth.¹⁷

Not surprisingly, when we isolate individuals whose closest financial services provider is an ATM (Figure 10a), we find that most of these people belong to the wealthiest (and second wealthiest) quintiles of the population. Conversely, as individuals get poorer, the likelihood of having an ATM as the closest financial services provider becomes smaller (and becomes zero for the poorest

¹⁷ Since financial services providers operating in Kenya vary greatly in terms of the number of units (see Table 1) and the number of people they are closest to (see Table 2), the values for the population's shares displayed on the y-axis of the panels in Figure 10 do not use the same intervals.

segments of the population). A completely different picture emerges for bank agents (Figure 10b), which tend to be close to middle-wealth individuals. A similar trend can be identified for SACCOs (Figure 10f), although these financial services providers reach out, on average, to a significantly lower share of the population than bank agents. Interesting insights can also be found in Figure 10c for bank branches, which appear to reach out mainly to wealthier populations. MFIs, displayed in Figure 10d, appear instead to mainly target poor individuals, and the ‘second poorest’ to a greater extent in particular. This is also confirmed in Figure 2, where we show that MFIs target underserved populations, although within wealthier and more included counties.

Figure 10: Relationship between wealth and closest financial services provider



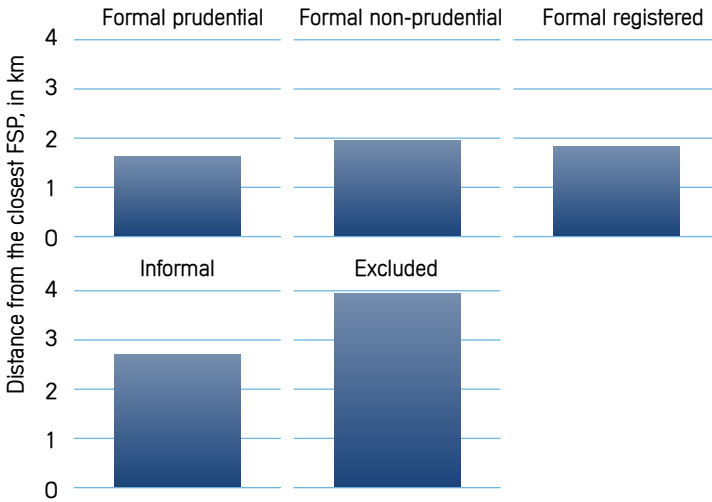
Finally, the population's distribution in terms of the wealth of individuals having a mobile money agent as their closest financial services provider appears bimodal (Figure 10e). Mobile money agents reach out to a greater extent to both the top and bottom quintiles of the wealth distribution. This is not entirely surprising, as we know, on the one hand, that the highest concentrations of mobile money agents are in the wealthiest counties. On the other hand, these financial services providers also serve the remotest areas of the country, where no other financial access points operate with the same intensity. They thus represent the closest financial services provider for both the wealthiest and for the poorest individuals.

We then compare respondents' levels of financial access to how far they live from the closest financial services provider (Figure 11). The 'financial access' variable ranges from 1, which indicates that the respondent reports having access to formal prudential financial institutions, to 5, which indicates that the respondent is financially excluded. Again, we average respondents' distance to their closest financial services provider by each category of this variable.

The results from Figure 11 show that individuals who have access to formal financial institutions (prudential, non-prudential, registered) live, on average, within 2km of the closest financial services provider. This distance increases for subjects who have access only to informal financial products (more than 2.5km, on average), and becomes much greater for financially excluded subjects (who live, on average, 4km from the closest financial access point).

Taken together, the results displayed in Figures 8, 9 and 11 highlight the positive relationship between proximity to any formalised financial services provider and the population's income, wealth and level of financial access. Although it is not possible to derive any causal link between distance and socio-economic variables, we can still argue that individuals who live at a greater distance from any financial services provider display very low levels of income, wealth and financial access. Figure 8 shows, indeed, that some respondents to the FinAccess survey live more than 40km from the closest financial services provider. In light of the results shown in Figures 9 and 11, these individuals are more likely to be financially excluded and less wealthy than individuals living closer to their nearest financial access point. It is worth noting that distance from the closest financial access point does not vary much between formal prudential, formal non-prudential or formal registered services.

Figure 11: Relationship between level of financial access and distance to the closest financial services provider



6 Bank ownership and financial inclusion

As a second step in our analysis, we consider just bank branches and ATMs and study differences in banks’ outreach based on their ownership.¹⁸ Despite the high concentration of bank branches and ATMs in the wealthier areas of the country, our objective is to study whether differences in banks’ outreach strategies can be associated to differences in their ownership. As shown by Upadhyaya and Johnson in this book, Kenya has experienced a large increase in the level of financial inclusion due to the deepening of its banking sector over the last ten years, thanks in particular to the driving role of Equity Bank. It is thus particularly worthwhile studying whether specific bank segments have adopted more inclusive strategies towards less served populations in Kenya.

Adopting the same classification used by Upadhyaya and Johnson, we distinguish between foreign-owned banks (FOBs), (domestic) government-owned banks (GOBs), (domestic) large privately owned banks (LPOBs) and (domestic) small privately owned banks (SPOBs). Table 3 reports the distribution of bank branches and ATMs across the four categories.¹⁹ For ATMs, we also include a fifth category, ‘Other’, which includes ATMs owned by MFIs and SACCOs.

¹⁸ We consider here only ‘stand-alone’ ATMs.

¹⁹ In the following analysis we include Postbank as a government-owned bank. However, we also perform our empirical analysis without Postbank. The results are very similar to those shown in this chapter, and are available upon request.

Table 3: Distribution of bank branches and ATMs, by ownership

Category	Bank branches	ATMs
FOB	270	112
GOB	327	90
LPOB	409	216
SPOB	308	12
Other (MFIs and SACCOs)	-	73
Total	1,314	503

We first look at the geographical distribution of bank branches and ATMs in Kenya. Figure 12 displays the location of bank branches by type of ownership. Interestingly, we observe that foreign-owned banks are located only in central and western Kenya, and in particular in the region of the capital (see also Figure 13 for a detailed breakdown of the density of banks across the Kenyan territory). Not surprisingly, there are fewer bank branches in more remote areas, and those that are there are mainly government owned or privately owned.

Figure 12: Geographical distribution of bank branches, by ownership

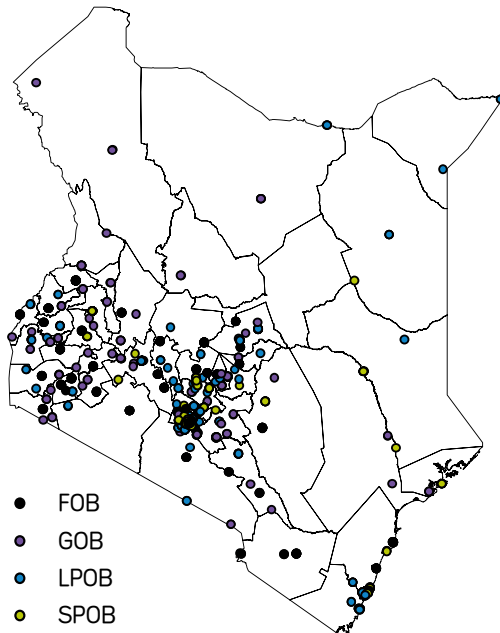


Figure 13: Density of bank branches across counties

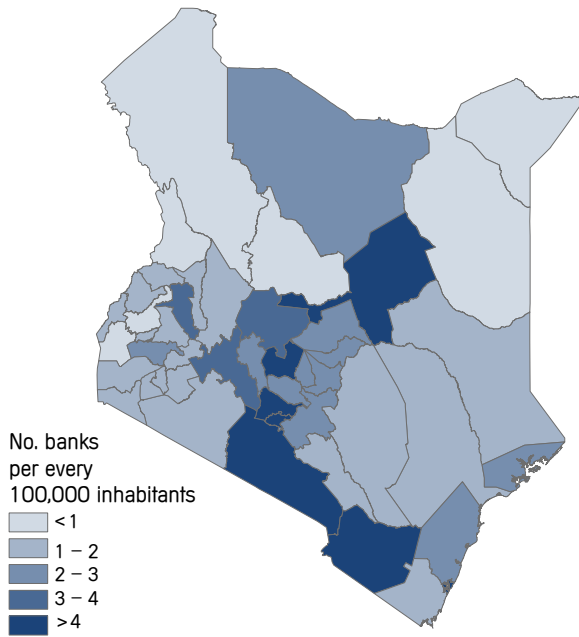


Figure 14: Geographical distribution of ATMs, by ownership

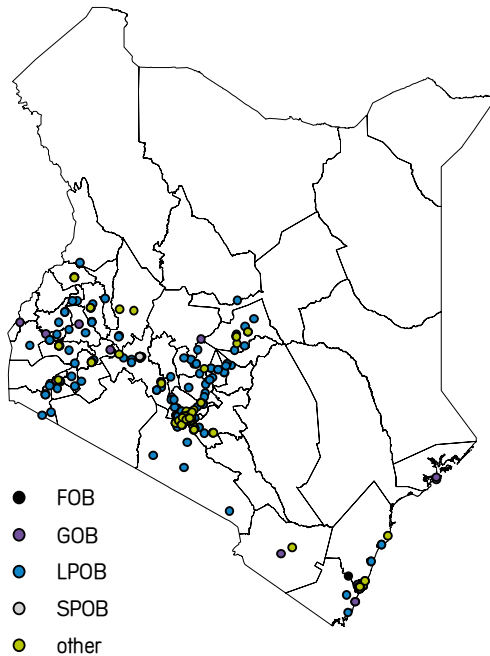


Figure 14 shows the distribution of ATMs, again based on type of ownership. In line with Table 3, almost half of ATMs belong to large privately owned banks, with a greater presence outside the region of the capital compared to the other banks' segments. ATMs of foreign-owned and government-owned banks, as well as ATMs belonging to MFIs and SACCOs, are mostly predominant in Nairobi and neighbouring areas.

Taken together, Figures 12, 13 and 14 suggest that foreign-owned banks serve areas where we would expect financial access to be the highest; conversely, government-owned, domestic-owned and, especially, large privately owned banks operate in less urbanised areas characterised by lower levels of financial inclusion. It should be noted, however, that the numbers of government-owned and domestic-owned banks in poorer areas are very limited, as Figure 12 and 13 reveal. In what follows we study, by means of both paired t-tests and a more thorough empirical analysis, whether significant differences emerge in the type of expansion strategies adopted by the bank segments we consider. In doing so, we use both the densities of bank segments at the county level and their proximity to the FinAccess survey respondents' place of residency.

6.1 Empirical analysis

To understand how Kenyan counties differ in terms of individuals' characteristics and the outreach of financial services, we derive a series of financial inclusion measures, averaged at the county level.²⁰ These variables are shown in Table 4. We include both a set of variables taken from the FinAccess survey (access, credit usage, transaction usage, and also age, income and education), averaged by county, and densities of financial services providers (measured by the number of financial access points in a county per 100,000 inhabitants), which we construct using geospatial data. Table 5 provides further details on the variables we derive from the FinAccess survey that we will also use in our empirical analysis.

²⁰ While there are 47 counties in Kenya, data from the FinAccess survey refer to only 44 counties (Garissa, Mandera and Wajir are not present).

Table 4: Descriptive statistics at the county level

County	Access	Credit usage	Transactions usage	Income	Education	No. of mobile money agents per 100,000 inhabitants	No. of mobile bank agents per 100,000 inhabitants	No. of MFIs per 100,000 inhabitants	No. of SACCOs per 100,000 inhabitants	No. of ATMs per 100,000 inhabitants	No. of bank branches per 100,000 inhabitants
BARINGO	2.34	2.13	1.61	8,079,568	2.68	72.90	16.38	1.62	2.16	0.72	1.62
BOMET	3.28	2.64	2.06	4,816,778	2.15	48.35	10.41	1.37	0.82	0.14	1.23
BUNGOMA	3.14	2.31	1.91	8,152,527	2.37	71.56	8.15	0.73	0.29	0.00	1.09
BUSIA	2.84	2.29	1.78	9,110,111	2.20	69.76	11.96	0.54	0.13	0.13	1.61
ELGEYO (KEYYO) MARAKWET	3.00	2.56	1.87	12,958,999	2.43	54.59	12.97	1.08	1.62	0.27	1.08
EMBU	2.17	1.85	1.57	7,587,899	2.23	92.40	17.63	1.74	5.42	0.97	2.32
HOMABAY	2.94	1.92	1.78	4,010,225	2.02	95.25	9.86	0.52	0.31	0.00	1.25
ISIOLO	3.27	2.51	2.08	8,720,008	1.89	106.77	6.28	2.79	1.40	0.00	4.89
KAJIADO	2.56	2.37	1.61	12,322,278	2.34	272.95	37.54	4.51	3.93	2.76	5.67
KAKAMEGA	2.76	2.09	1.77	7,699,994	2.34	64.43	8.79	0.42	0.42	0.24	0.60
KERICHO	2.16	2.02	1.56	10,224,322	2.42	67.38	8.77	0.53	1.20	0.93	1.59
KIAMBU	1.91	1.95	1.30	13,494,800	2.68	25.77	45.71	2.83	4.37	1.54	4.44
KILIFI	3.31	2.55	2.05	7,790,833	1.98	90.02	9.28	1.44	1.35	0.72	2.88
KIRINYAGA	2.31	2.09	1.66	7,702,220	2.31	182.75	50.18	1.70	5.49	1.51	2.84
KISII	2.92	2.23	1.83	3,635,966	2.48	849.62	10.50	0.43	2.34	0.43	1.91

County	Access	Credit usage	Transactions usage	Income	Education	No. of mobile money agents per 100,000 inhabitants	No. of mobile bank agents per 100,000 inhabitants	No. of MFIs per 100,000 inhabitants	No. of SACCOs per 100,000 inhabitants	No. of ATMs per 100,000 inhabitants	No. of bank branches per 100,000 inhabitants
KISUMU	2.85	2.08	1.73	8,197.36	2.26	131.49	15.89	0.52	0.10	1.86	2.37
KITUI	2.99	2.24	1.85	4,490.84	2.03	63.59	9.78	0.79	0.59	0.00	1.38
KWALE	3.06	2.55	1.90	5,755.60	1.87	48.62	7.85	1.08	0.31	0.62	1.85
LAIKIPIA	2.24	2.30	1.44	13,364.96	2.52	113.22	23.80	1.00	2.50	0.25	3.01
LAMU	3.15	2.59	1.92	5,979.74	2.03	108.33	18.71	1.97	2.95	0.00	2.95
MACHAKOS	2.44	2.04	1.59	6,639.04	2.34	155.93	22.57	1.09	1.73	1.27	2.46
MAKUJENI	3.01	2.32	1.90	4,269.23	2.17	96.77	13.57	1.47	0.90	0.00	1.47
MARSABIT	4.10	2.64	2.55	5,838.03	1.29	32.63	4.81	0.34	0.34	0.00	2.06
MERU	2.62	2.03	1.82	8,109.66	2.19	82.58	15.93	1.77	3.91	0.88	2.73
MIGORI	2.99	1.82	1.95	5,833.96	2.13	85.37	8.29	1.09	0.55	0.65	1.53
MOMBASA	2.39	2.48	1.51	11,916.69	2.56	177.89	11.82	2.34	2.87	2.77	11.18
MURANGA	2.10	2.11	1.60	6,568.49	2.34	112.03	35.86	0.85	3.61	0.42	2.44
NAIROBI	1.89	2.04	1.29	17,025.53	2.80	377.11	41.61	3.00	3.66	8.25	15.65
NAKURU	2.19	2.08	1.44	10,699.25	2.42	167.71	26.38	1.62	1.68	1.93	3.62
NANDI	2.74	2.57	1.70	7,119.48	2.25	70.52	13.81	1.46	1.06	0.40	1.59
NAROK	3.78	2.83	2.28	8,139.03	1.80	76.39	10.46	0.59	0.71	0.00	1.29
NYAMIRA	2.48	1.72	1.70	2,224.65	2.38	67.03	13.21	0.50	3.51	0.33	1.00
NYANDARUA	2.24	2.30	1.43	7,381.58	2.33	161.17	30.52	1.17	5.20	0.17	2.35

County	Access	Credit usage	Transactions usage	Income	Education	No. of mobile money agents per 100,000 inhabitants	No. of mobile bank agents per 100,000 inhabitants	No. of MFIs per 100,000 inhabitants	No. of SACCOs per 100,000 inhabitants	No. of ATMs per 100,000 inhabitants	No. of bank branches per 100,000 inhabitants
NYERI	1.77	2.01	1.33	7,500.64	2.42	159.76	38.35	2.02	4.61	1.15	4.04
SAMBURU	5.00	3.00	2.98	5,317.31	1.29	55.82	8.48	0.89	3.13	0.45	0.89
SIAYA	3.03	2.04	1.86	4,528.15	2.21	90.23	13.18	0.71	0.36	0.24	0.95
TAITA TAVETA	2.63	2.51	1.66	4,459.56	1.93	133.49	15.46	3.86	1.41	0.70	4.22
TANA RIVER	3.17	2.53	1.95	8,359.48	1.73	38.32	8.75	0.83	0.83	0.00	1.25
THARAKA NITHI	2.35	1.85	1.73	9,303.15	2.46	96.62	15.60	1.64	5.47	0.00	2.74
TRANS-NZOIA	2.81	2.52	1.74	8,260.17	2.40	68.76	9.04	0.37	0.12	0.37	1.59
TURKANA	4.79	2.91	2.89	1,480.43	1.17	17.54	1.99	0.00	0.00	0.00	0.35
UASIN GISHU	2.64	2.40	1.57	13,821.98	2.44	186.99	31.31	1.79	0.78	1.34	3.91
VIHIGA	3.25	2.34	2.01	3,667.56	2.26	65.27	8.65	0.36	0.36	0.18	1.26
WEST POKOT	4.03	2.80	2.48	8,385.17	1.67	34.91	7.41	0.20	0.00	0.20	0.98

Table 5: Description of variables

Variable	Type	Definition
Access	Categorical variable	The variable is constructed taking into account different types of financial products currently being used (which correspond to different levels of financial access). It takes 5 values: 1 – the respondent currently has access to formal prudential financial services providers, like financial commercial banks, DTMs, DTSs, insurance, or capital markets; 2 – the respondent currently has access to formal non-prudential financial services providers, like MFS, Postbank, NSSF, NHIF, or DFI; 3 – the respondent currently has access to formal registered financial services providers, like formal registered - non DTM, non DTS, or hire purchase; 4 – the respondent currently has access to informal financial services, such as informal groups, shopkeepers/supply-chain credit, employers, or moneylenders/shylocks; 5 – the respondent is currently excluded from any of the above-mentioned categories.
Credit usage	Categorical variable	The variable is constructed taking into account different credit products the respondent is using, has used in the past or has never used. It takes 3 values: 1 – the respondent is currently has an outstanding loan from a bank, SACCO, MFI, government, employer, etc.; 2 – the respondent has had an outstanding loan from the above-mentioned categories in the past but no longer has one; 3 – the respondent has never had an outstanding loan.
Savings usage	Categorical variable	The variable is constructed taking into account different savings products the respondent is using, has used in the past or has never used. It takes 3 values: 1 – the respondent currently has a savings account at a bank, SACCO, MFI, friends, family, etc.; 2 – the respondent has had a savings account from the above-mentioned categories in the past but no longer has one; 3 – the respondent has never had a savings account.
Transactions usage	Categorical variable	This variable is constructed taking into account different transactions products the respondent is using, has used in the past or has never used. It takes 3 values: 1 – if respondent is currently has a Postbank account, a current account with a cheque book, a current account for everyday needs without a cheque book, an ATM/Debit card, or a registered mobile money account; 2 – the respondent has had a service/product from the above-mentioned categories in the past but no longer has one; 3 – the respondent has never had any of these services/products.

Not surprisingly, the descriptive statistics shown in Table 4 reveal that the richest counties are also characterised by higher levels of financial inclusion. The county of Nairobi, for instance, displays the highest level of income, as well as of financial access.²¹ Much lower levels of income can be detected, instead, in the county of Makueni, characterised by a rural economy and a history of food insecurity (as also pointed out in the Kenya Financial Diaries research project). The results become less clear-cut for the county of Mombasa, where we observe higher levels of income along with modest levels of financial access. Again, as emphasised in the Kenya Financial Diaries, Mombasa is

21 This is individual income averaged by county.

characterised by both urban and rural areas. Our data thus reflect the high rates of poverty and inequality in the county.

Table A1 in the Appendix complements the results of Table 4. It shows, for each county, the share of the population living within 2km and within 5km of the closest ATM, bank agent, bank branch, MFI, mobile money agent and SACCO. Notably, the share of the population living within 2km of an ATM is very low, and this result is very similar across counties, with the exception of the counties of Nairobi and Mombasa. When we look at the share of population living within 5km of an ATM, although the figures increase, there are still some counties where none of the population has an ATM within a distance of 5km. This is not surprising, as ATMs are very limited in number (compared, for instance, to mobile money and bank agents) and are mostly concentrated in Nairobi and neighbouring counties, as shown in Figure 2.

Compared to ATMs, MFIs and SACCOs have been more successful in reaching out to the populations in more remote areas. In the county of Marsabit, for instance, almost 20% of the population live within 5km of either an MFI or a SACCO. In contrast, the outreach of MFIs and SACCOs is much more heterogeneous in the county of Lamu; while only 10% of the population live within 5km of an MFI, almost 40% of the residents can find a SACCO within 5km of their place of residency.

The results change considerably when we look at bank agents and mobile money agents. In two counties (Nairobi and Mombasa), more than 97% of the population live within 2km of the closest mobile money agent; moreover, in more than half of the counties, 90% of the population live within 5km of a mobile money agent. The figures are very similar for bank agents. In Nairobi and Mombasa we find that 98% and 93% of the population live within 2km of the closest bank agent, respectively. At the same time, in more than a third of the counties, individuals have a bank agent within 5km.

We then focus on how bank ownership relates to individuals' levels of financial access. To this end, we compute the densities, at the county level, of each bank segment (FOB, GOB, LPOB and SPOB) and then study, through paired t-tests, whether counties with high shares of large privately owned banks or foreign banks are also characterised by high levels of financial access (see 'Access' in Table 5 for details). The underlying aim is to analyse whether the presence of banks in a county is positively correlated with the population's level of financial access, and whether this result holds across different bank segments.

We thus create two dummies, *dlpob* and *dfob*, which take the value of 1 if the share of large privately owned banks and foreign-owned banks is above the

median of the distribution and 0 otherwise, and perform paired t-tests, as shown in Table 6.

The results from Table 6 suggest that the larger the share of either large privately owned banks or foreign-owned banks, the higher the level of financial access at the county level. The figures for foreign-owned banks are not statistically significant, but display the expected sign. Once again, the results stress the positive relationship between the presence of formalised financial services and households' levels of financial inclusion that we have observed throughout this chapter. Still, the findings from Table 5 do not tell us what type of individuals large privately owned banks are more likely to target compared to foreign-owned banks.

Table 6: Mean difference tests of individuals' levels of financial access (averaged by county) based on the share of different bank segments in a county

Access – large privately owned banks	Mean	Std. dev.
Access $d_{lpob}=0$	3.179	0.162
Access $d_{lpob}=1$	2.585	0.110
Difference	0.594	0.191
Ha: mean(diff) \neq 0	p-value	0.003
Ha: mean(diff) $>$ 0	p-value	0.002
Access – foreign-owned banks	Mean	Std. dev.
Access $d_{fob}=0$	2.915	0.118
Access $d_{fob}=1$	2.814	0.158
Difference	0.594	0.214
Ha: mean(diff) \neq 0	p-value	0.640
Ha: mean(diff) $>$ 0	p-value	0.320

In order to get a more precise idea of banks' outreach, we study how individuals' proximity to either bank branches or stand-alone ATMs, either foreign or domestic owned, relates to the set of dependent variables displayed in Table 5. The rationale behind this exercise is to see whether, even with similar density patterns, some of the banks' segments we study are more likely to be close to less financially included individuals. This would give us a more complete understanding of the expansion strategies of these banks, and would also complement Upadhyaya and Johnson's study of the banking sector in Kenya.

We thus estimate the following regression equation:

$$y_i = \beta_0 + \beta_1 distance_i + \beta_2 FOB_i + \beta_3 GOB_i + \beta_4 SPOB_i + \alpha_i + \varepsilon_i \quad (1)$$

Where y_i is the outcome of interest for individual i , measured via the FinAccess 2013 questionnaire, $distance_i$ is the distance ‘as the crow flies’, expressed in kilometres, from individual i to the closest bank branch to his place of residency, which could be either foreign owned (FOB), (domestic) government owned (GOB), (domestic) small private owned (SPOB) or (domestic) large private owned (LPOB).

We include binary variables for each of these categories (the omitted dummy is the LPOB category, so the other variables should be interpreted in reference to this dummy), and run each regression with district fixed effects (α_i). For the ATM specification, we also include the $other_i$ variable for stand-alone ATMs that are owned by either SACCOs or MFIs. Moreover, we control for individuals’ age, income and education.

We estimate equation (1) using $access_i$, $transactions\ usage_i$ and $savings\ usage_i$ as dependent variables.²² The results are displayed in Table 7. The first two columns estimate the relationship between individuals’ level of financial access ($access_i$) and proximity to different bank branches and ATMs, respectively. Surprisingly, we do not detect any different impact on financial access across different segments of bank branches. As shown in Figures 12 and 13, only very few bank branches operate in the remotest areas of the country, where we would expect individual’s levels of financial access to be lower. It follows that the low degree of variability across bank branches does not translate into significant differences in terms of penetration strategies, as also shown by the paired t-tests in Table 6.

Interestingly, however, our results show that those with the closest ATM that belongs to a foreign-owned, a government-owned or a small privately owned bank have a higher rate of financial inclusion than those living closest to an ATM owned by a large privately owned bank, although the effect is significant only for foreign-owned banks.²³ Although ATMs operate in relatively wealthier areas of the country, foreign-owned ATMs are only concentrated in Nairobi, while ATMs belonging to large privately owned banks also have a significant presence outside of the capital region (Figure 14). This ‘dispersion’ allows us

22 We also test (1) with deposit account ownership as the dependent variable; the results are available upon request.

23 We do not show marginal effects for the ordered logistic regression displayed in Table 7, as it would require predicting the probability for each of the values of the dependent variables. However, they are available upon request. For instance, we find that the predicted probability of having access to a formal prudential financial services provider ($access$ variable is equal to 1, as indicated in Table 5) is 0.29 if the closest ATM is owned by a large privately owned bank, while it is 0.35 if the ATM is owned by a foreign-owned bank. Conversely, the predicted probability of being financially excluded ($access$ variable is equal to 5, as indicated in Table 5) is 0.28 if the closest ATM is owned by a large privately owned bank, while it is 0.23 if the ATM is owned by a foreign-owned bank. Hence, if the closest ATM belongs to a large privately owned bank, the predicted probability of being financially excluded is higher than if the closest ATM belongs to a foreign-owned bank.

to capture differences in terms of individuals' financial access, and to relate these differences to the ATM segment that individuals live closest to.

Columns (3) and (4) report estimates using as dependent variable *transactions usage*, which indicates whether the respondent currently has a Postbank account, a current account with a cheque book, a current account for everyday needs without a cheque book, an ATM/debit card, or a registered mobile money account. Surprisingly, we do not detect any significant effect of different ownership of bank branches. Instead, individuals with a foreign-owned ATM as the closest ATM are more likely to hold one of the above-mentioned products than those living close to an ATM owned by a large privately owned bank.

Finally, columns (5) and (6) look at the likelihood of the respondent holding a savings product. The results show that individuals living in proximity of an ATM owned by an MFI or a SACCO are more likely to be using a savings product than those with a foreign-owned ATM as the closest ATM to their place of residency.

The findings from Table 7 show that ATMs owned by large privately owned banks are more likely to be in proximity to less financially included populations than ATMs of any other bank segment, although this effect is significant only when we compare large privately owned banks to foreign-owned banks. In other words, large privately owned banks are correlated to a greater extent with lower levels of financial access, of transaction product usage and of savings product usage than other bank segments.

While we find that the presence of foreign-owned banks is associated with higher levels of financial access and usage of transaction products, our findings also show, interestingly, that ATMs owned by SACCOs and MFIs are positively correlated with savings usage. A potential explanation for this result is that individuals living closer to MFIs and SACCOs, who are likely to get credit from these institutions (as shown in Figure 7), are also likely to rely on the same institutions for savings purposes.

Table 7: The impact of bank branch ownership on financial inclusion: Distance to the nearest bank branch and stand-alone ATM

Dep. Var.	(1) Access	(2) Access	(3) Transactions usage	(4) Transactions usage	(5) Savings usage	(6) Savings usage
Distance	0.018 (0.002)	-0.001 (0.001)	0.004 (0.003)	-0.0004 (0.002)	0.001 (0.002)	0.001 (0.001)
FOB	-0.047 (0.090)	-0.263** (0.115)	-0.160 (0.108)	-0.250* (0.142)	-0.071 (0.098)	0.002 (0.126)
GOB	0.029 (0.061)	-0.032 (0.069)	-0.062 (0.071)	-0.024 (0.080)	-0.043 (0.066)	-0.028 (0.074)
SPOB	0.065 (0.091)	-0.373 (0.498)	-0.093 (0.108)	-0.256 (0.620)	-0.002 (0.099)	-0.779 (0.667)
Other		-0.070 (0.080)		-0.074 (0.095)		-0.232*** (0.89)
Socio-economic controls	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,717	5,535	5,717	5,535	5,717	5,535
Pseudo R ²	0.159	0.159	0.178	0.178	0.115	0.117

Notes: This table reports estimates of the determinants of individuals' levels of financial access (Columns (1) and (2)), transactions usage (Columns (3) and (4)) and savings usage (Columns (5) and (6)). The dependent variables are all derived from the FinAccess 2013 survey. Socio-demographic controls include respondent's age, income, and education level. All columns show ordered logit estimates and include district fixed effects. Standard errors in brackets. *** coefficient significant at 1%; ** at 5%; * at 10%.

All in all, these results are suggestive of a different penetration strategy adopted by large privately owned banks compared to foreign-owned, government-owned and small privately owned banks. In particular, the results reveal that large privately owned banks are more likely to reach out to areas where the population displays lower levels of financial inclusion. We can interpret this finding as an 'active' attempt by large privately owned banks to target more underserved areas of the country. In this respect, our findings appear to be in line with Upadhyaya and Johnson's analysis of the Kenyan banking sector, which shows how large privately owned banks (and Equity Bank, in particular, as also shown by Allen et al., 2013) are making growing efforts to increase their financial depth across Kenya.

7 Conclusions

This chapter contributes to the literature on financial inclusion in developing countries along two main dimensions. First, we use GPS coordinates to map the locations of 6,447 individuals and 60,692 financial services providers in Kenya to explore in detail the geography of financial access points operating in the country. Second, we exploit these locations to achieve new insights on the outreach strategies of the main formalised financial services providers in the country (namely, commercial bank branches, microfinance institutions, mobile money agents, SACCOs, bank agents and ATMs), and to understand how these strategies relate to the socio-economic characteristics and the levels of financial inclusion of the Kenyan population.

In line with existing evidence (e.g. Johnson et al., 2012), we find that mobile money financial services providers and bank agents target the most underserved segments of the population, which are also the poorest and the most vulnerable. We also find that a non-negligible share of mobile money agents are located far from banks – 20% of them operate more than 10km from a commercial bank branch. At the same time, we show that more than 40% of mobile money agents are located in proximity of a primary road. This suggests that greater efforts need to be made to enable these agents to penetrate into more rural communities.

Our analysis also looks at the role of SACCOs and MFIs in promoting financial inclusion. These two categories, whose numbers of units in the country are far lower than mobile money and bank agents, also target underserved populations, although within wealthier and more financially included counties.

We also relate the geographical position of financial services providers across the country to the FinAccess survey respondents' places of residency. We find that the proximity to financial services providers relates not only to the type of financial products individuals have access to, but also to their income and wealth. Our results indeed highlight the positive relationship between proximity to any formalised financial services provider and the population's income, wealth and level of financial access. This suggests that individuals who live at a great distance from any financial services provider display very low levels of income, of wealth and of financial access.

We then narrow our focus to the ownership of commercial bank branches and ATMs, and study how proximity to foreign-, domestic- or government-owned banks relates to individuals' levels of financial inclusion. We find that compared to other bank segments, large privately owned banks are more likely to be the closest financial services provider to less financially included people,

though this result is significant only when we compare ATMs of large privately owned banks with ATMs of foreign-owned banks. Our findings are in line with Upadhyaya and Johnson's analysis of the evolution of the Kenyan banking sector, and support the view that large privately owned banks are increasingly targeting poor, financially excluded populations.

All in all, our results highlight the fundamental role played by mobile money agents in enhancing financial access in Kenya, which we measure as the type of financial services individuals have access to. Interestingly, we do not find the same effect when we look at rates of credit usage, which suggests that other financial services providers – like MFIs and SACCOs – are more likely to target poor populations in terms of credit products.

At the same time, when we consider banks only, our findings suggest that large privately owned banks represent the bank segment that is making the greatest effort to fight financial exclusion in Kenya, particularly among poorer, more underserved populations. Yet, the analysis of the geography of financial services providers in Kenya also points to a need for much greater effort by institutions to fully target financially excluded populations. This is particularly important for those living in areas characterised by low population densities, and where the lack of infrastructure makes the penetration of financial services providers extremely difficult.

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Appendix

Table A1: Shares of population living within 2km and 5km of the closest financial services provider, by county

County	<2km from ATM	<5km from ATM	<2km from bank agent	<5km from bank agent	<2km from bank branch	<5km from bank branch	<2km from MFI	<5km from MFI	<2km from mobile money agent	<5km from mobile money agent	<2km from SACCO	<5km from SACCO
BARINGO	0.08	0.49	0.31	0.93	0.08	0.49	0.08	0.49	0.35	0.93	0.08	0.38
BOMET	0.00	0.06	0.13	0.51	0.03	0.17	0.03	0.17	0.19	0.58	0.03	0.19
BUNGOMA	0.00	0.00	0.26	0.86	0.06	0.25	0.06	0.25	0.37	0.90	0.01	0.20
BUSIA	0.00	0.07	0.30	0.80	0.11	0.25	0.11	0.31	0.40	1.00	0.00	0.00
ELGEYO (KEIYO) MARAKWET	0.05	0.16	0.26	0.70	0.12	0.31	0.22	0.48	0.31	0.70	0.22	0.48
EMBU	0.25	0.55	0.45	0.94	0.24	0.50	0.26	0.36	0.58	1.00	0.26	0.72
HOMABAY	0.00	0.00	0.15	0.78	0.09	0.24	0.08	0.28	0.23	0.91	0.03	0.10
ISILO	0.00	0.00	0.03	0.30	0.00	0.14	0.00	0.14	0.08	0.30	0.00	0.14
KAJIADO	0.16	0.54	0.54	0.74	0.15	0.50	0.12	0.45	0.65	0.74	0.24	0.61
KAKAMEGA	0.05	0.17	0.29	0.86	0.12	0.26	0.11	0.29	0.45	0.96	0.05	0.20
KERICHO	0.00	0.10	0.20	0.98	0.08	0.08	0.08	0.16	0.31	0.98	0.11	0.42
KIAMBU	0.10	0.59	0.63	1.00	0.12	0.75	0.14	0.76	0.76	1.00	0.19	0.86
KILIFI	0.05	0.35	0.24	0.71	0.05	0.35	0.10	0.19	0.39	0.82	0.08	0.32
KIRINYAGA	0.03	0.40	0.40	0.98	0.15	0.64	0.14	0.48	0.50	0.98	0.20	0.76

County	<2km from ATM	<5km from ATM	<2km from bank agent	<5km from bank agent	<2km from bank branch	<5km from bank branch	<2km from MFI	<5km from MFI	<2km from mobile money agent	<5km from mobile money agent	<2km from SACCO	<5km from SACCO
KISII	0.10	0.18	0.24	0.91	0.07	0.30	0.04	0.28	0.41	0.96	0.08	0.64
KISUMU	0.03	0.36	0.31	0.73	0.04	0.33	0.01	0.31	0.49	0.97	0.00	0.01
KITUI	0.00	0.00	0.13	0.42	0.08	0.13	0.07	0.12	0.24	0.67	0.08	0.13
KWALE	0.10	0.35	0.36	0.60	0.12	0.35	0.12	0.39	0.38	0.68	0.05	0.34
LAIKIPIA	0.05	0.16	0.30	0.70	0.14	0.39	0.19	0.44	0.39	0.82	0.22	0.49
LAMU	0.00	0.21	0.21	0.67	0.21	0.31	0.00	0.10	0.36	0.67	0.21	0.38
MACHAKOS	0.07	0.15	0.25	0.87	0.12	0.31	0.05	0.26	0.36	0.88	0.07	0.30
MAKUJENI	0.00	0.00	0.23	0.72	0.06	0.15	0.09	0.21	0.24	0.79	0.09	0.19
MARSABIT	0.03	0.05	0.38	0.66	0.21	0.24	0.16	0.19	0.45	0.71	0.16	0.19
MERU	0.14	0.55	0.41	0.89	0.13	0.42	0.07	0.26	0.55	0.96	0.20	0.77
MIGORI	0.08	0.21	0.17	0.76	0.13	0.33	0.14	0.40	0.31	0.85	0.04	0.29
MOMBASA	0.29	1.00	0.93	1.00	0.26	1.00	0.19	0.88	0.97	1.00	0.21	0.70
MURANGA	0.02	0.03	0.21	0.95	0.03	0.18	0.02	0.23	0.29	0.95	0.07	0.51
NAIROBI	0.47	1.00	0.98	1.00	0.69	1.00	0.45	1.00	0.98	1.00	0.29	1.00
NAKURU	0.19	0.41	0.54	0.96	0.11	0.41	0.13	0.41	0.65	0.97	0.09	0.42
NANDI	0.05	0.26	0.34	0.99	0.11	0.28	0.10	0.41	0.42	0.99	0.14	0.52
NAROK	0.00	0.00	0.14	0.41	0.06	0.08	0.12	0.17	0.21	0.48	0.06	0.08
NYAMIRA	0.12	0.36	0.34	1.00	0.04	0.36	0.01	0.24	0.47	1.00	0.14	0.77

County	<2km from ATM	<5km from ATM	<2km from bank agent	<5km from bank agent	<2km from bank branch	<5km from bank branch	<2km from MFI	<5km from MFI	<2km from mobile money agent	<5km from mobile money agent	<2km from SACCO	<5km from SACCO
NYANDARUA	0.00	0.01	0.24	0.99	0.00	0.22	0.00	0.06	0.34	0.99	0.12	0.58
NYERI	0.09	0.51	0.29	1.00	0.05	0.36	0.05	0.37	0.42	1.00	0.11	0.66
SAMBURU	0.00	0.02	0.87	1.00	0.85	0.88	0.71	0.88	0.87	1.00	0.69	0.88
SIAYA	0.02	0.10	0.27	0.84	0.07	0.32	0.07	0.38	0.40	0.88	0.05	0.15
TAITA TAVETA	0.10	0.27	0.16	0.68	0.04	0.43	0.11	0.52	0.38	0.87	0.04	0.18
TANA RIVER	0.00	0.00	0.42	0.66	0.16	0.42	0.09	0.34	0.52	0.66	0.19	0.41
THARAKA	0.07	0.11	0.44	0.90	0.27	0.60	0.27	0.60	0.67	0.90	0.31	0.79
TRANS-NZOIA	0.07	0.34	0.10	0.72	0.07	0.38	0.06	0.37	0.28	0.79	0.00	0.00
TURKANA	0.00	0.00	0.59	0.90	0.31	0.70	0.00	0.00	0.64	0.90	0.00	0.00
UASIN GISHU	0.04	0.36	0.51	0.86	0.05	0.35	0.02	0.35	0.68	0.92	0.04	0.31
VIHIGA	0.00	0.31	0.08	0.90	0.00	0.31	0.00	0.15	0.23	0.98	0.00	0.29
WEST POKOT	0.09	0.29	0.36	0.61	0.09	0.29	0.09	0.30	0.29	0.62	0.00	0.00

CHAPTER 3

Formal Financial Inclusion in Kenya: Understanding the Demand-Side Constraints

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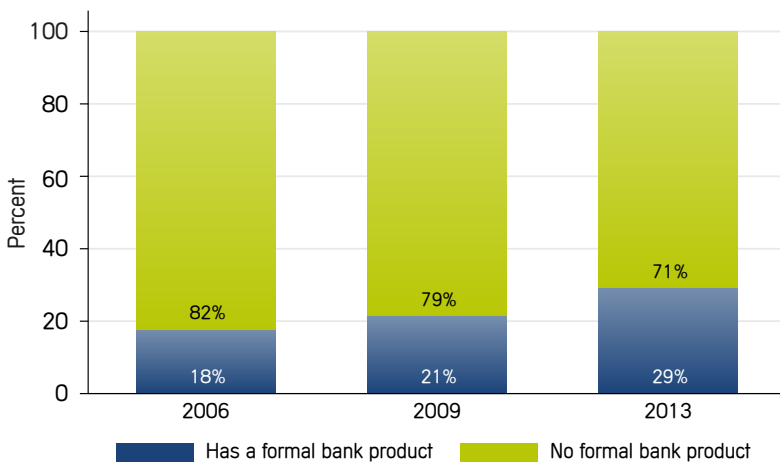
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1 Introduction

Despite a significant expansion of financial sector infrastructure in Kenya in recent years and improvements in levels of formal financial inclusion, the majority of Kenyans remain outside the formal banking system, often depending on informal approaches and mobile money for financial management. In 2013, 71% of Kenyans remained outside the formal prudentially regulated banking system. While many supply-side improvements will be required to make the formal bank products relevant to middle- and low-income households, an understanding of demand-side dynamics constraints can play a complementary role in designing effective financial inclusion policy.

Great progress has been made. The reach of formal bank products across Kenya has steadily increased since 2006 (see Figure 1).¹ In 2006, around 18% of respondents were formally banked. By 2009 this had increased to 21% and by 2013 it had increased again to 29%. Regardless of an individual’s economic, socio-cultural and demographic characteristics, the likelihood that they are formally included has increased since 2006. While the growth in transaction/savings products mirrors the overall picture, the use of formal credit products remained the privilege of 5% of the population in 2013, albeit up from 3% in 2009 (Figure 2).

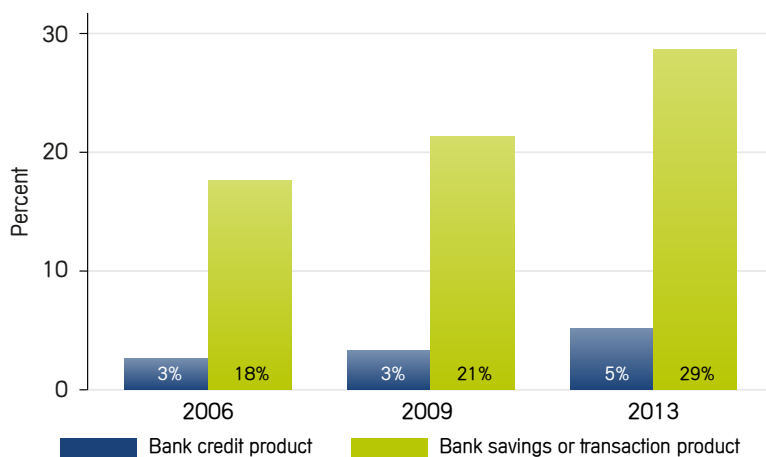
Figure 1: Formal bank access over time, 2006–2013



Source: FinAccess 2006, 2009 and 2013 data.

1 When we refer to formal financial products, we include products from a bank that help an individual either carry out transactions, save resources or get credit; we do not include insurance products from banks.

Figure 2: Type of bank products over time, 2006–2013



Source: FinAccess 2006, 2009 and 2013 data.

Part of this growth can be linked to the ongoing supply-side expansion of formal financial products in Kenya. Since the first FinAccess survey in 2006, there have been significant changes in the structure of the banking sector in Kenya, resulting in important progress on the accessibility of banking products. Between 2006 and 2009, the number of bank branches in Kenya increased by over 46%, from 581 to 849 (King, 2012b). By 2013, the number of branches had increased even more to over 1,314, a 126% increase compared to 2006.²

Complementing this greater physical access to branches, in May 2010 the Central Bank of Kenya gave the green light for agency banking. By March 2013, for Equity Bank alone, over 2.3 million customers had already signed up through agency banking (Ventaka and Mishra, 2013). Along with this increased access, the cost of opening and maintaining a bank account in Kenya has decreased due to technology advances, increased numbers of suppliers and increased competition from alternative products. Led by Equity Bank, a number of banks have promoted no-frills transaction accounts to non-traditional customers.

Yet even with these changes in the cost and accessibility of formal banking products, only 29% of Kenyans have a formal banking product. Part of the reason for this low number is the absence of a value proposition for formal banking for many ordinary Kenyans. For example, Dupas et al. (2012) find that lack of trust, unreliable service and expensive withdrawal fees were the main reasons people did not save more in their bank accounts. However, this

² Source: FSP Kenya Dataset 2014 (<http://fspmaps.org/>).

chapter assesses the demand-side constraints for the set of formal banking products available in Kenya. Specifically, using FinAccess data from 2006 to 2013, we analyse the demand constraints for increasing formal financial inclusion in Kenya based on the conceptual framework presented in Section 3. There is a need to study why demand for formal banking products has not responded to the supply-side expansion outlined above. This analysis has important implications for the providers of formal financial products. Unless formal bank products address user constraints and tailor products to user needs, it will be hard to overcome the formal financial inclusion gap in Kenya. As Claessens (2006) states, ‘availability of services is a necessary, but not sufficient, condition for use’.

This chapter contributes to the literature on financial inclusion by applying a supply and demand model to analyse the penetration of formal banking products in Kenya since 2006. Building on the theoretical papers by Beck and de la Torre (2007) and Claessens (2006), the chapter focuses specifically on the demand-side components of these theoretical frameworks. Ossei-Assibey (2009) performs a similar type of analysis on Ghana, while Clamara et al. (2014) look at which issues matter for financial inclusion in Peru. Both of these papers focus on a country context and analyse national household surveys to assess what drives formal financial inclusion. Using the FinAccess data from Kenya, this chapter draws on the extensive and growing body of financial inclusion research in Kenya, including work done by Schaner (2013), Beck (2011), Cullen et al. (2012), Dupas et al. (2012) and King (2012a).

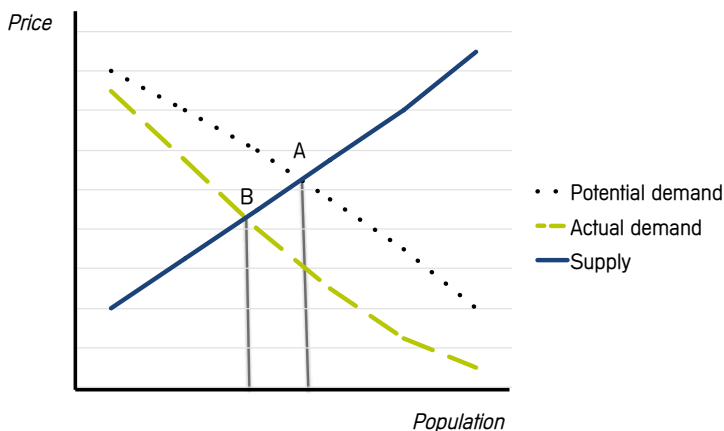
The chapter is structured as follows. Section 2 lays out the conceptual framework, while Section 3 identifies the methodology employed. Section 4 looks at the role of economic factors in determining demand for formal banking products, and Section 5 focuses on the socio-cultural factors that may cause a gap between actual and potential demand for formal banking products. Section 6 reviews the demographic factors that affect the active use of formal banking products. We conclude in Section 7 with the policy implications from the analysis.

2 Conceptual framework

To help analyse the demand-side constraints to formal financial access at the individual level, this chapter relies on a basic consumer theory or supply and demand framework, as depicted in Figure 3. Beck and de la Torre (2007) develop an analytic framework that defines the access frontier for the supply and demand of payment and savings services from banks. King (2012c) further

develops this framework, which helps to unbundle the factors that lead to people being excluded from the formal banking sector. The framework outlined in this chapter identifies what factors should influence the uptake of financial services, based on the findings of previous research and the models mentioned above.

Figure 3: Potential versus actual demand for formal bank products



Source: Based on Figure 2 from Beck and de la Torre (2007).

From a demand perspective, both economic and non-economic factors have a crucial role to play in determining whether someone has a formal banking product. If demand were purely determined by economic factors, particularly the price of a product and the income of an individual, we would find ourselves at point A in Figure 3.

Given the potential versus actual demand for formal bank products depicted in Figure 3, as income (I) increases, the demand curve for formal banking products would shift out, resulting in an increase in overall demand for formal banking products. This is relevant to the Kenyan context as the country's GDP per capita in constant prices grew annually between 2006 and 2013, pushing out the potential demand curve for formal banking products (Kenya National Bureau of Statistics, 2012). Price (P) is also central in determining the potential demand curve for formal banking products. If the price of a bank product decreases, we would see a shift along the demand curve, with greater demand for formal banking products at this lower price.³

The economic factors that affect actual demand are depicted in Equation 1.

³ Even if the relative price of bank products, compared to the price of other financial goods, goes down, one should see an increase in demand for formal banking products (Claessens, 2006).

$$D_{\text{potential}}(\text{FormalBanking}) = f(P, Y) \quad (1)$$

Yet, as Beck and de la Torre (2007) point out, demand for formal banking products is also determined by socio-cultural factors. Therefore, as seen in Figure 3, the actual demand curve for formal banking products is to the left of the potential demand curve. This is due to self-exclusion driven by non-economic factors, such as a person's financial literacy. In addition, Beck and de la Torre (2007) underline the need to separate pure demand factors from demand reductions that are driven by a user's expectation of supply constraints, such as expected rejection due to discrimination or documentation requirements.

People's level of financial literacy (*FinL*) can help expand formal financial inclusion (Dermirgüç-Kunt and Klapper, 2012). Their understanding of the benefits of formal banking products and the returns from them can influence their demand for such products. Greater levels of financial literacy should therefore increase the demand for formal banking products (Beck and Brown, 2011), narrowing the gap between actual and potential demand.

Cultural norms can also influence demand for formal banking (Dermirgüç-Kunt and Klapper, 2012). Minority (*M*) groups may have a different understanding of formal banking processes and may face specific barriers in accessing formal banking products. For example, minority groups may self-select out of formal banking. Supply-side changes, such as Equity Bank's approach of hiring employees that speak minority languages, can help overcome these barriers.⁴

In addition, if people have behavioural biases such as trust (*T*) or mistrust in institutions, this will also influence the demand for formal banking (Claessens, 2006). A 2010 OECD report on access to financial services in emerging economies found that the demand for financial services depends on the trust that people have in the real value of payment and savings instruments being preserved (Rojas-Suarez and Gonzales, 2010). The authors found that higher levels of trust in banking institutions increased the likelihood of people using formal banking products.

Formality of occupation (*Occ*) could also have an important role in determining the demand for formal banking products, with people in more formal occupations – with predictable regular incomes – having a greater probability of using formal banking products. As Claessens (2006) outlines, employers may even be willing to subsidise the use of formal bank products in order to be able to make payments electronically.

4 Equity Bank's approach in reaching out to new markets is outlined in a 2013 article on The Wharton School website, "The Research Roundup: The Financial Impact of Social Impact" (<http://knowledge.wharton.upenn.edu/article/research-roundup-the-financial-impact-of-social-impact/>).

Finally, intra-household dynamics may play a key role in determining which household members can access and maintain the use of formal bank accounts. Members who have more decision-making power (*DP*) in a household may have greater demand for a formal bank account (Klawitter and Fletschner, 2010). In a study on the use of ATM cards, Schaner (2013) finds that both men and women with higher levels of bargaining power responded positively to access to ATM cards, while those with lower levels did not.

Equation 2 summarises the economic and socio-cultural factors affecting actual demand.

$$D_{\text{actual}}(\text{FormalBanking}) = f(P, Y, \text{FinL}, M, T, \text{Occ}, DP) \quad (2)$$

Osei-Assibey (2009) argues that it is also important to factor in an individual's ability to use and maintain a formal banking product. Demographic characteristics, such as gender (*G*) and age (*A*), play a critical role in determining the active use of formal bank products. For instance, people at different life stages may face different effective costs to having a bank account, and men and women may face different supply and demand constraints, including legal discrimination and gender norms (Dermirgüç-Kunt et al., 2013). This then can affect the type of financial tool they use. Equation 3 includes the aforementioned demographic characteristics.

$$D_{\text{actual}}(\text{FormalBanking}) = f(P, Y, \text{FinL}, M, T, \text{Occ}, DP, G, A) \quad (3)$$

Graphically, we can see the gap between potential and actual demand in Figure 3. Demand *potential* is the demand curve for formal banking products at the aggregate level, if demand were purely determined by economic factors. Yet *actual* demand may be below this level due to socio-cultural and demographic factors. Therefore we find ourselves at point B in Figure 3. As Beck and de la Torre (2007) specify, this gap between the two demand curves can be broadly interpreted as self-exclusion from formal banking services. This can be driven by user expectations of supply-side constraints, such as discrimination, documentation requirements or account costs. Yet, as financial literacy increases, transactional costs decrease, trust in banks increases, individuals get older and there is more equal financial decision-making in the household, this gap between actual and potential demand should decrease – at least up until the age of retirement. The gap could also be reduced by first understanding and then addressing user beliefs of supply-side constraints, particularly around discrimination, the relative cost of products and documentation requirements.

Claessens (2006) offers a complementary model to analyse why people self-exclude from having formal financial products, and this classification is also employed in this chapter. He divides the financially excluded population into

two categories: voluntary and involuntary exclusion (see Table 1). Factors such as lack of awareness of formal bank products and individual expectations of rejection based on beliefs on income and price requirements, in addition to lack of need, can lead to voluntary self-exclusion. On the other hand, discrimination and supplier requirements for customers in terms of income, price and riskiness can lead to involuntary exclusion. These concepts are in line with Beck and de la Torre’s (2007) classification of demand-reducing factors that arise from expectations of supply-side constraints.

Table 1: Difference between access and use

A	B		C		
Current consumers of financial services	Voluntary exclusion		Involuntary exclusion		
	B1	B2	C1	C2	C3
	No need	Assumed rejection	Rejected: High risk/bad credit = no access	Rejected: Discrimination = no access	Excluded due to price, product, income or respondent features = no access
	No awareness	Inability to use due to price/income			

As we understand which demand factors are acting as constraints to formal bank products, this framework helps us understand if this self-exclusion is being driven by voluntary or involuntary factors. In understanding the difference between these two, we are better able to build a strategy to address the demand factors. For instance, to address involuntary exclusion, developing anti-discrimination policy and pricing options for lower-income households may be much more effective, as it would provide a credible value proposition to users.

3 Methodology and variables

While demand for formal banking products is not observable, we can observe the outcome variable of whether someone is formally banked. This chapter outlines a model to estimate the probability of having a formal bank account. Based on the demand factors outlined in Equation 3 that influence an individual’s demand for formal banking products, Table 2 lays out the variables used to estimate this model.⁵ Equation 4 depicts the probability of an individual *i* having a formal account (Formally Banked: FB = Yes):

5 In addition to Table 2, a description of these variables and their summary statistics are included in Table A2 in the Appendix.

$$Pr\{FB_{i,n} = Yes_{i,n}\} = f(Econ_{i,n}, Socio_{i,n}, Demo_{i,n}, Opp_{i,n}) \quad (4)$$

where $Econ_{i,n}$ is the individual's income, taken as the log of their income, as well as the price of the good. As we do not have data on prices at the individual or bank level, we try to address this gap in two ways. First, we include regional binary variables (dummies) to control for any location variation in the cost of goods. Second, we include the opportunity cost of using the products on the basis that the effective price for a bank account is influenced by the transaction cost – in terms of time and distance – of using formal banking products. Therefore, the proximity to and ease of accessing banking services will have a crucial role in determining the demand for formal banking products (King, 2012b). This variable is measured by the time it takes to get to a bank branch or agent.⁶

$Socio_{i,n}$ captures an individual's socio-cultural characteristics. As the FinAccess 2013 survey does not include a measure of financial literacy, two proxy measures are used to capture an individual's financial literacy skills, their financial numeracy skills and their awareness of formal financial products.⁷ For trust, we use a binary variable for whether banks are the financial provider the respondent trusts the most. To proxy for cultural/ethnic factors, we include a binary variable for their preferred language. We also include a binary variable for whether or not the individual is in formal employment. In addition, a dummy variable is included if the individual is a junior or the main financial decision-maker to capture intra-household decision-making power.

The $Demo_{i,n}$ component captures the demographic characteristics of the individual. We include both their age and the square of their age to capture the diminishing effect of age, as well as a gender binary variable.

6 We use this instead of an urban/rural binary variable as used in other papers as they did not have access to this type of information, which we feel captures the concept of opportunity cost in accessing and maintaining a bank account.

7 The chapter by Johnson, Li, Storch and Vujčić in this book looks at the role of financial literacy in formal financial inclusion in much greater detail.

Table 2: Hypothesised relationship between demand-side constraints and formal banking

Constraints	Factors	Variable in regression	Hypothesised relationship
Economic	Income	Log of income	(+)
	Price	Opportunity cost of using formal bank product measured by time taken to get to bank branch or agent	(-)
		Regional dummies to control for price differences across location	(-)
Socio-cultural	Financial literacy	Financial numeracy skills	(+)
		Financial awareness of formal bank products	(+)
	Formality of occupation	Dummy variable of being formally employed	(+)
	Cultural/ethnic barriers	Primary language spoken	(-)
	Trust in formal financial institutions	Formal banks is must trusted financial provider	(+)
	Decision-making	Main, junior or not a financial decision-maker.	(+)
Demographic	Gender (female)	Dummy variable where value of 1 means the individual is a woman	(-)
	Age	Actual age	(+)
		Age squared	(-)

As a first step to understanding this model, we carry out simple cross-tabulations and three-way tabulations analysing which characteristics are more likely to be associated with the observed outcome of being formally banked. We then conduct a number of multivariable probit regressions through which we isolate the marginal effects of these characteristics, controlling for all other variables, on the likelihood of someone being formally banked.

The marginal effect enables us to see how a variable changes the probability of someone being banked, while holding all other variables constant. This multivariable probit allows us to estimate correlations between constraints and the likelihood of being banked, falling short of the identification of causal effects.

We also analyse the self-reported reasons why people are not banked. Using cross-tabulations, we analyse these reasons across different individual characteristics. We do this with caution, as self-perceived barriers can be misleading in some cases.

Finally, one issue of concern is multicollinearity between variables in our model, as this can affect the standard errors of our results and therefore which variables are significant in the model. We address this issue by, first, running correlation tables between groups of variables that may have multicollinearity.⁸ As the next check, we regress the independent variables that we suspect may be correlated on each other, calculating the tolerance and variance inflation factor (VIF) values. The VIF measures the increase in the variance of the estimated coefficient compared to a case where there is no correlation among the independent variables.⁹ The literature suggests that high tolerance values (above at least 0.2) and low VIF values (below 2.5) signal acceptable levels of multicollinearity. As our final check, we run a number of similar regressions leaving out one of the correlated variables to see how this changes the level of significance on the other correlated variables. If the level of significance does not change dramatically and neither of the first two steps indicates high levels of multicollinearity, we include the variables in our final regression if there is a theoretical justification for doing so.

4 Economic determinants of demand: Income and wealth

Income level is a central determinant of whether an individual is formally banked. Honohan and King (2012) find that income is one of the main demand-side determinants in sub-Saharan Africa of a person's access to formal banking. Demirgüç-Kunt and Klapper (2012) find that in developing countries, those in the lowest income quintile are half as likely to have a formal bank account as those in the highest quintile. Furthermore, Beck and Brown (2011) also find that in transition countries, the likelihood of having a bank account increases with income.

The price of formal bank products also has a determining role to play in demand. In a study on Indonesia and India, Cole et al. (2009) find that small subsidies for banking products significantly increased demand. Providing households with a subsidy to open a savings bank account increased the share of households with a bank account from 3.5% to 12.7%.

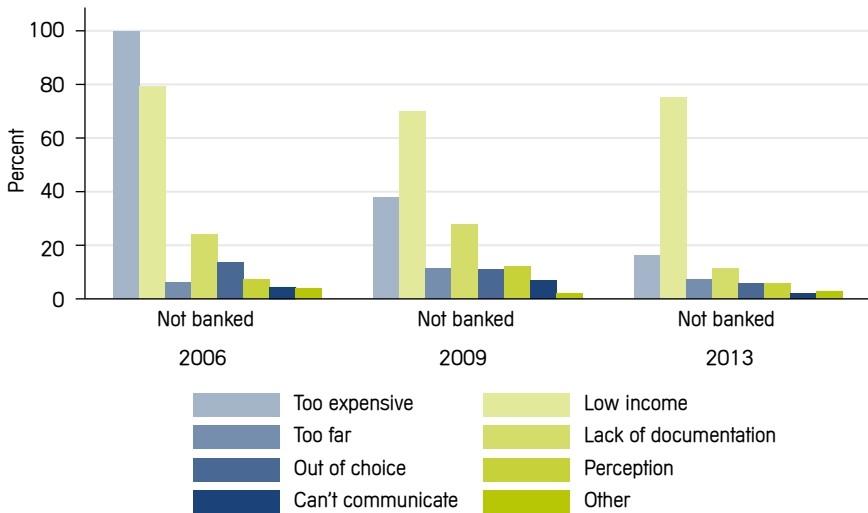
8 As a general rule of thumb, we take correlation coefficients above 0.5 to suggest high levels of correlation. For a more detailed discussion of this, please refer to Mukaka (2012) and the University of Strathclyde website (<http://www.strath.ac.uk/aer/materials/4dataanalysisineducationalresearch/unit4/correlationsdirectionandstrength/>).

9 If there were no correlation among the variables of concern, the VIF would be 1, informing us that there is no inflation in the variance of the coefficients. Tolerance is also used to indicate multicollinearity – it is estimated as $1-R^2$. VIF is directly calculated from the tolerance, as it is $1/(1-R^2)$.

Income and price are also the two leading global self-reported barriers to having a bank account. Demirgüç-Kunt and Klapper (2012) find that over 65% of people globally without a bank account identified lack of money as the primary reason for not having an account, with 30% identifying this as the sole reason. The next most common reason is that a bank account is too expensive, with over 25% identifying this as a critical barrier to having an account.

Kenya is no different. In Figure 4 we see that over 75% of the non-banked respondents in the FinAccess 2013 survey cited lack of a regular income or money to save as a barrier to having a bank account. This is similar to the figures from both 2006 (79%) and 2009 (70%). Regardless of the year, variability in or lack of income is the most frequent reason given across all income, wealth and education ranges for not having a bank account.¹⁰

Figure 4: Reasons for not having a bank account, 2006–2013



Source: FinAccess 2006, 2008 and 2013 data.

Interestingly, though, the Kenya Financial Diaries project found that respondents prefer to use financial products that generate some form of future benefit, such as the ability to access credit in the future (Zollmann, 2014). Similarly, Johnson et al. (2012) find that users of financial products are attracted to saving in products that enable borrowing. Therefore, one would think that credit barriers might also be an important reason for non-take-up

10 It would be helpful if future FinAccess surveys could cross-check whether this answer is based on actual rejection due to income or is due to assumed income requirements for formal bank products.

of bank products. It would be interesting to investigate this further in the next FinAccess survey by including a question on whether perceived lack of credit from banks is a driving reason for not having a formal bank product.

The conceptual framework outlined in this chapter also predicts that price is a major determinant of an individual's demand for formal banking products. From Figure 4, we see the cost of having a bank account ('too expensive') is the second most frequent barrier given for not having an account.

Underlying all of this, it is also very important to understand whether we are seeing voluntary or involuntary exclusion, as this will provide policymakers with a clearer direction for how to stimulate demand. This is especially important as, given the option, most people who are unbanked would not choose to be. According to Figure 4, only 5% of non-banked respondents said they did not have a bank account as a matter of choice.

Income

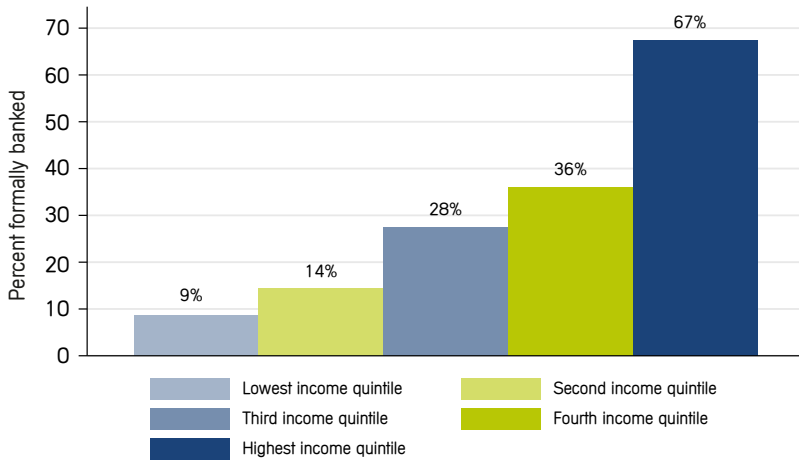
When looking at income, the story from Kenya on access to formal banking echoes the existing literature and is in line with our conceptual framework.¹¹ In Kenya, as income increases, the likelihood of having a bank account also increases. From Table 3 we see that among those earning under KSh1,000 per month, only 6.8% have a formal bank account. In contrast, over 68% of those earning between KSh20,000 and KSh49,000 per month have a formal bank account. The clear relationship between income and formal financial access can also be observed by looking at the percentage formally banked by income quintile in Figure 5.

Table 3: Access to formal banking products by income category

KSh	1– 999	1000– 2999	3000– 4999	5000– 9999	10,000– 19,999	20,000– 49,999	50,000– 99,999	100,000+	Total
Unbanked	93.2%	87.3%	82.5%	66.3%	49.3%	31.3%	24.8%	13.7%	70.3%
Banked	6.8%	12.7%	17.5%	33.8%	50.7%	68.7%	75.2%	86.3%	29.7%

¹¹ FinAccess 2013 was the first of the three Kenyan datasets to ask individuals about their income and their expenditure; the 2009 survey only collected expenditure data.

Figure 5: Formal bank access by income quintiles, 2013

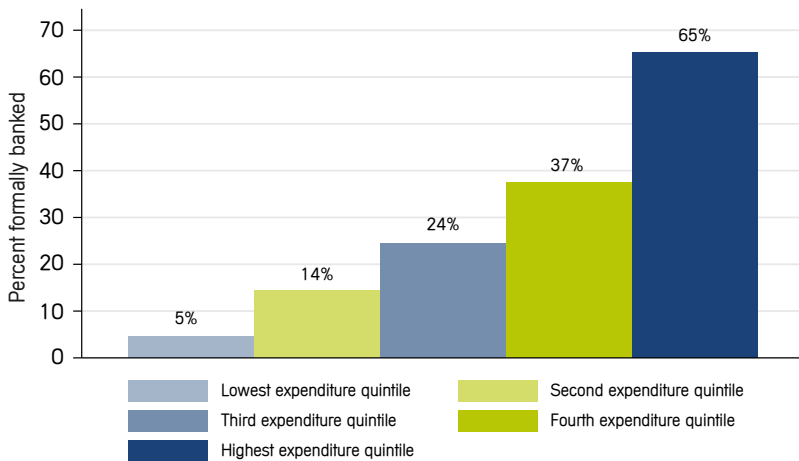


Notes: Q1 = Ksh0–1,000; Q2 = Ksh1,200–3,000; Q3 = Ksh3,100–5,000; Q4 = Ksh5,200–10,000; Q5 = Ksh10,200+

Source: FinAccess 2013 data.

Given that the 2013 FinAccess survey gathered both income and expenditure data, we can also look at this relationship using reported monthly expenditure instead of income. As would be expected, we can see from Figure 6 that a very similar result is found. As the quintile cut-offs are slightly different, however, we see a smaller percentage formally banked in the lowest expenditure quintile compared to the lowest income quintile.

Figure 6: Formal bank access by expenditure quintiles, 2013

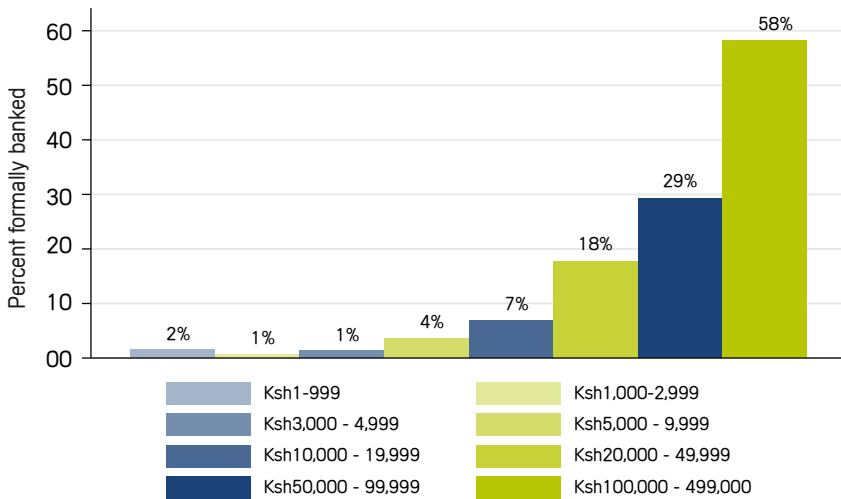


Notes: Q1 = Ksh0–750; Q2 = Ksh755–2,600; Q3 = Ksh2,620–5,700; Q4 = Ksh5,740–12,080; Q5 = Ksh12,100+

Source: FinAccess 2013 data.

If we differentiate between types of formal banking products, as would be expected the role of income is also very important in the demand for formal credit products. In Figure 7, generated from a simple cross-tabulation, it would appear that there is a threshold above which access to credit seems to take a big jump up. Among those earning under KSh20,000, only 7% have access to formal credit products, while for those earning above KSh20,000 this figure is over 18%. The level of access keeps increasing with each income threshold, suggesting that the relationship between income and access to credit products is non-linear. While widely enjoyed economic growth will continue to drive financial inclusion, there remains a need to make formal products more relevant for lower income groups.

Figure 7: Formal credit by income categories, 2013



Source: FinAccess 2013 data.

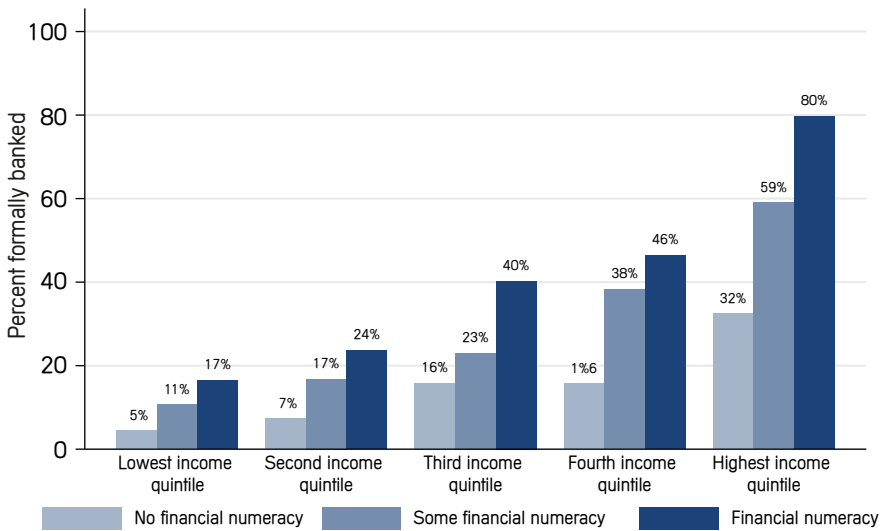
Interestingly, within each income quintile, financial numeracy plays a key role in determining financial access. From Figure 8 we see that individuals in lower income brackets but with financial numeracy skills are three times more likely to have a bank account compared to those in the same income category with no financial numeracy skills.¹² For those earning above KSh10,000 per month, this gap narrows slightly. A very similar relationship is captured in the 2009 data.

Finally, the relationship between income and access to formal banking is tested through a multivariate probit regression. When controlling for all other

¹² For financial numeracy, individuals get one point for each financial numeracy question answered correctly. The questions asked are: 1) You are in a group and win a promotion or competition for KSh100,000. With five of you in the group, how much do each of you get? 2) You take a loan of KSh10,000 with an interest rate of 10% a year. How much interest would you have to pay at the end of the year?

variables, a 1% increase in income results in an 8.5% increase in the likelihood of a person being banked. This result is slightly higher than the finding of Beck (2011) using the 2009 FinAccess data, where a 1% increase in expenditure led to a 7% increase in the likelihood of a person being banked.¹³ This result is in line with what our conceptual framework would suggest. From a policy perspective, this tells us that this increase in income is changing the demand of those involuntarily excluded and increasing their access to formal bank products. Again, however, it is important to remember that changing the value proposition of bank products for different income groups is also critical to the uptake of these products. Focusing solely on income without tailoring these bank products to better fit the needs of lower income individuals misses an important opportunity to increase access.

Figure 8: Formal bank access by income quintile and financial numeracy, 2013



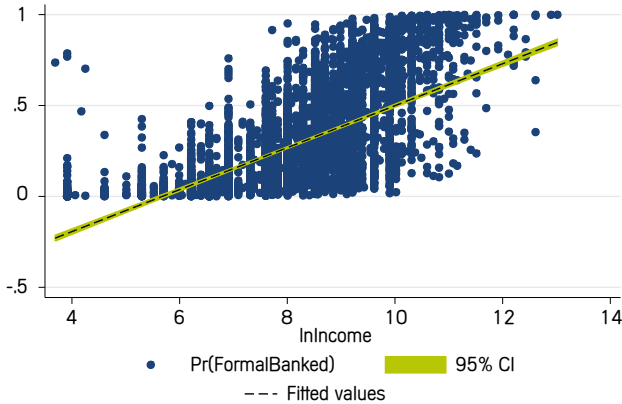
Source: FinAccess 2013 data.

In Figure 9 we plot the predicted values of being formally banked from Regression 3 (Demographic Factors) in Table A1 in the Appendix against the actual log incomes of survey respondents from the FinAccess 2013 data, giving us a visual representation of the relationship. This shows us that there is a positive relationship between income and being formally banked – as income increases, especially at the higher end of income levels, an individual has a higher probability of being formally banked.¹⁴

¹³ Expenditure versus income data is used for the 2009 analysis.

¹⁴ Figure 9 also suggests that the relationship between income and being formally banked is not necessarily linear, therefore our approach of using log income is the right one.

Figure 9: Formal bank access and log income



Price

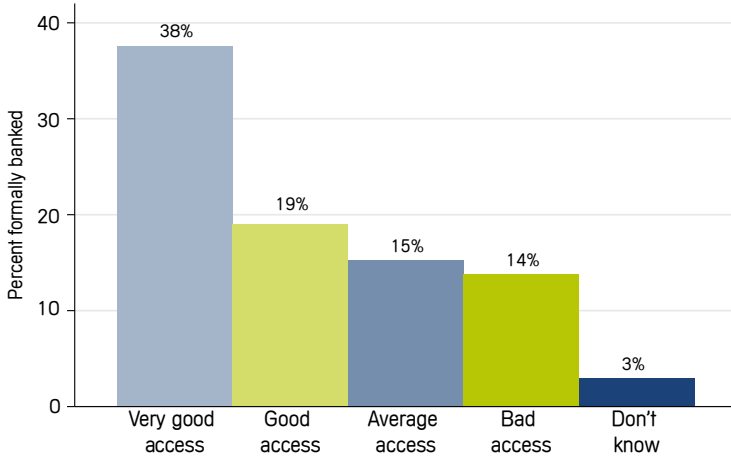
One weakness in the financial inclusion data landscape in Kenya is in supply-side price data, though a forthcoming CGAP project, ‘Cost to Customer Framework’, will help address this weakness. As a result, this chapter does not address the price of banking services directly. Instead, we use two proxies. First, we use regional dummies to control for any price differentials across regions. Second, we use distance to a bank branch or agent to capture the opportunity cost of accessing a bank account. If a bank is too far or too costly to get to, it increases the effective cost that an individual faces in opening and maintaining a bank account. The importance of this cost should have lessened in Kenya since the first FinAccess survey due to the exceptional growth in the number of bank branches.

The data seem to confirm this relationship between the time to bank branch (a proxy for opportunity cost) and the use of bank products. From Figure 10 we see that those who were within 30 minutes of a bank or agent, i.e. with a low opportunity cost, were the most likely to have a formal banking product, at 38%. On the other hand, those who lived three hours or more from a bank or agent, i.e. with a high opportunity cost, were least likely to be formally banked. Among those who are unbanked, only 7% of respondents selected geographic barriers as one of the reasons why they do not have a formal bank account.

Given the recent rapid expansion of the agency banking model, as well as the increased number of branches, we would expect a much higher percentage of people to live within 30 minutes of a bank compared to 2009. As we can see from Figure 11, in 2009 this figure was at 39% and by 2013 it was up to

64%. This is decreasing the effective cost for people accessing and using a bank account, as they spend less time and money in getting to a bank. This is also reducing the gap between the actual and potential demand curves.

Figure 10: Formal bank access by reported bank distance, 2013



Source: FinAccess 2013 data.

Figure 11: Reported bank distance by year, 2006–2013



Note: Information applies to 2009 and 2013 data.

Source: FinAccess 2006, 2009 and 2013 data.

As time to bank branch or agent is related to many other important socio-economic characteristics, we turn to a regression analysis. When we only analyse the economic factors outlined in the conceptual framework, the marginal effect of the time it takes to get to a bank from Regression 1 (Economic Factors) was positive and more significant the closer the individual was to a bank branch or agent. Yet, once all other factors were controlled for, distance to a bank branch or agent, while still positive, was no longer significant. This signals that increasing physical access alone, and thus reducing the time spent accessing services, is not enough to stimulate demand. Understanding user needs and tailoring formal bank products to meet their needs will help create a stronger product that incentivises use.

5 Socio-cultural characteristics of demand for formal banking products

As discussed in the conceptual framework section, the demand for formal banking products is not solely determined by economic factors. People's level of financial literacy, their cultural or ethnic backgrounds, the formality of their occupation, their level of trust in banks as a financial provider and intra-household decision-making power can all play a determining role in their preference for formal banking products, and therefore their demand. In this section, we will analyse these socio-cultural factors and their role in determining the actual demand for formal banking products.

Financial literacy¹⁵

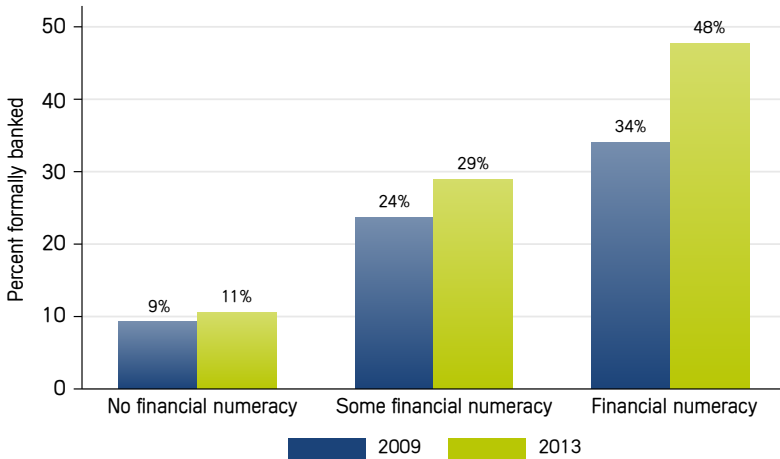
Research has found that low levels of financial literacy are negatively related to saving, credit and investment practices (Hilgert et al., 2003). Financial literacy is also positively related to borrowing at higher costs (Lusardi and Tufano, 2009). Beck and la Torre (2006) argue that greater understanding of the benefits of financial services can lead to greater demand for formal banking. Furthermore, as outlined by Claessens (2006), a lack of awareness and understanding of formal banking products can result in voluntary exclusion.

In measuring financial literacy, researchers have predominately used a measure of individuals' financial numeracy skills. Carpena et al. (2011) argue, however, that a measure of financial literacy should also include questions on financial

¹⁵ As mentioned earlier, the chapter by Johnson, Li, Storchi and Vujić in this book looks at the issue of financial capability in much greater detail and develops a measure to look at this concept and its role in formal financial inclusion.

awareness and attitudes towards financial products. In analysing the role of financial literacy as a demand-side determinant, this chapter uses financial numeracy skills and financial product awareness as a proxy for financial literacy.

Figure 12: Formal bank access and financial numeracy, 2009 and 2013



Source: FinAccess 2009 and 2013 data.

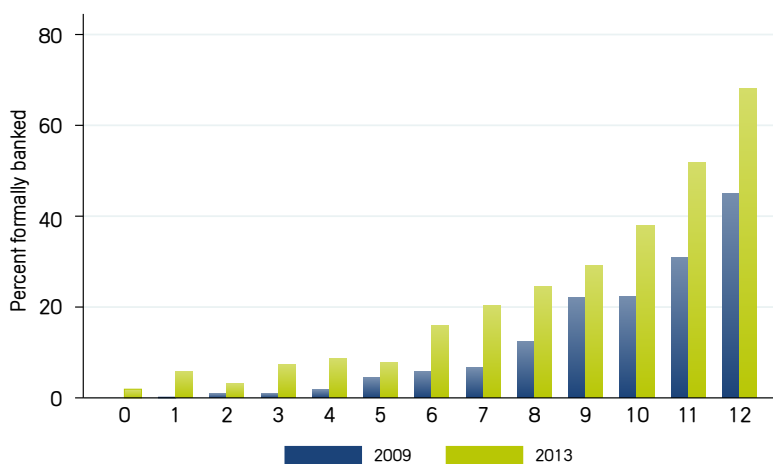
Financial numeracy skills affect the probability of a person being formally banked. From Figure 12 we see that 48% of the survey respondents who answered the two numeracy questions correctly in 2013 were formally banked, compared to only 11% of those who got both questions wrong. Since 2009, the biggest increase in formal banking has been among those with financial numeracy skills – an increase of 15 percentage points. Among those with little or no financial numeracy skills, the increase from 2009 was only 2 percentage points. King (2012c), building on Beck and de la Torre (2007), shows how financial literacy can change a person’s indifference curve such that they have an increased preference for financial services. This may help explain why we see this increase in the percentage banked among those with financial numeracy skills. Claessens’ (2006) analysis of voluntary exclusion also points to increased awareness and understanding resulting in increased demand.

Again, regardless of income, people with financial numeracy skills are more likely to be banked. This is confirmed by the probit regression. Controlling for everything else, answering one of the numeracy questions correctly increases the likelihood of being banked by 5.3 percentage points.

Similarly, when analysing the relationship between awareness of formal financial terms (or 'terminology') and being formally banked, Figure 13 shows that the greater the awareness, the more likely a person is to have a formal

bank product. In addition, from the probit regression the marginal effect of being aware of one more financial term increased the likelihood of being formally banked by 3.3% (significant at the 1% level). Of course, in terms of causality it is not clear whether being banked improves your knowledge of financial terms, or knowledge of financial terms improves your likelihood of being banked. Karlan and Mordoch (2009) highlight the importance of establishing the counterfactual when examining the impact of financial literacy on formal financial inclusion. They highlight how the correlation between these two variables does not necessarily imply causation due to issues such as omitted variables (for example, the motivation to succeed) or reverse causality.

Figure 13: Formal bank access by financial terms individual is aware of, 2009 and 2013



Source: FinAccess 2009 and 2013 data.

Yet from a policy perspective, the relationship between financial numeracy and awareness of financial terms does suggest that targeted programmes that help develop people's ability to calculate things like the monetary value of an interest rate over a year, or the probability of an individual getting a high return from investing in short-term schemes, may improve understanding of costs and returns to bank products, thus affecting the demand for these products.

Minority factors

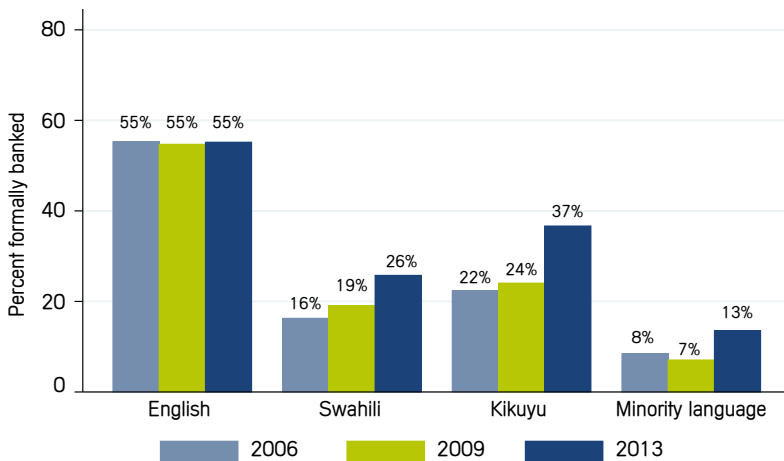
People from different cultural backgrounds may have different preferences for, as well as barriers to, how they handle their financial resources. They may have different preferences for the types of institutions they use and trust, or

they may face higher barriers to accessing formal banking products due to language constraints, resulting in their involuntary exclusion. These factors influence their demand for formal banking products.

While the preferences and constraints of people from different backgrounds may not necessarily be observable, the FinAccess 2013 survey did collect data on the language in which people wished to be interviewed, so we can use language as a proxy for capturing this heterogeneity.

From Figure 14, we see that among those who preferred to be interviewed in English, Swahili or Kikuyu, between 26% and 55% were formally banked in 2013. These three languages constituted over 72.5% of all the respondents. In the remaining group, which constituted individuals who spoke at least eight different minority languages between them, only 13% were formally banked. While this was a 5% increase from 2009, it was still smaller than the increases seen by those that speak Swahili or Kikuyu.

Figure 14: Formal bank access by preferred language, 2006–2013



Source: FinAccess 2006, 2009 and 2013 data.

When we look at this relationship through a multivariate probit, with English as the base language group and controlling for all other variables, speaking any other language than English decreased the likelihood of someone being formally banked. This result is significant at the 1% level for all other languages, but the size of the effect is largest for those speaking minority languages.

From a policy perspective, there is a need to understand what preferences and constraints shape the demand of these groups, as well as any barriers they face that result in them being involuntarily excluded. Based on this understanding, a strategy designed to meet their existing preferences and to overcome their

constraints may help increase their demand for formal banking products. Finally, if formal financial inclusion is to be increased, especially among households with different backgrounds, then strategies like those of Equity Bank – targeting underprivileged and underserved households (Allen et al., 2012) and hiring speakers of minority languages – need to be supported so that they can be scaled up at a more rapid pace.¹⁶

Occupation

A person's main occupation affects their demand for formal banking products. One way the formality of one's occupation affects the likelihood of being formally banked is by affecting how wages and income are received. Formal jobs often involve receiving a monthly salary through a formal bank account, which increases the need for a formal bank product. Those in less formal jobs, such as day labourers, may receive their wages through cash in hand. Recent research in transition countries found that the use of banking products is more common among those in formal employment, while those dependent on income transfers are less likely to use these products (Beck and Brown, 2011).

Another reason why the formality of one's occupation is important is supply-side requirements. Most banks require a number of documents to verify identity, place of residence, occupation, income, and for forth in order to open a new account. The more formal an occupation is, the more likely there is to be associated documentation that can verify that the person has the job and what their income level is. People in the informal sector, such as agricultural workers, may be unable to provide such documents and even if they were able to, the documents may not be accepted as they are not from a known business entity. Over 61% of the entire population of sub-Saharan Africa are often unable to provide proof of where they live (World Bank, 2008).

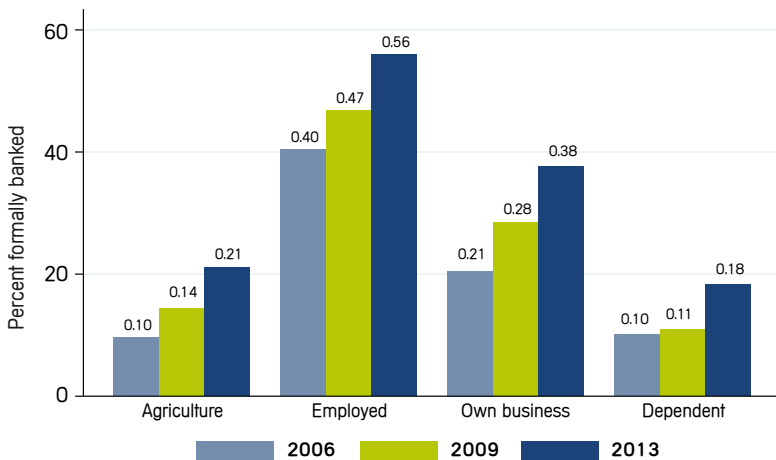
Beck et al. (2009) found that one of the main barriers to having a formal bank account is having to provide the necessary documents to open the account. King (2012a) found that in Nigeria, the four-fifths of the population that are unbanked have fewer formal documents in their name compared to the remainder of the population. He also found that for individuals with four documents, an additional document increases the probability of being formally banked by 17%.

16 This point about its strategy for speakers of different languages is taken from: <http://knowledge.wharton.upenn.edu/article/research-roundup-the-financial-impact-of-social-impact/>.

One would expect this relationship between occupation and access to formal banking to hold in Kenya.¹⁷ It is important to note, though, that this relationship can be more complicated, as individuals often have more than one source of income. The Kenya Financial Diaries found that the median number of income sources for a household was five (Zollmann, 2014), and over 3,300 respondents to the FinAccess 2013 survey listed two main occupation sources for their income.

Research by Dupas et al. (2012) found that only 8% of farmers had savings accounts, compared to 23% of non-farmers. This gap in access to formal banking products across occupations is also reflected in the FinAccess 2013 data, as can be seen from Figure 15. People who gave agriculture as their main occupation, or who were dependent on income transfers, were least likely to be formally banked. Only 18-21% of people in these categories had access to formal banking products, while 56% of those in formal employment had a formal bank account.

Figure 15: Formal bank access by occupation, 2006–2013



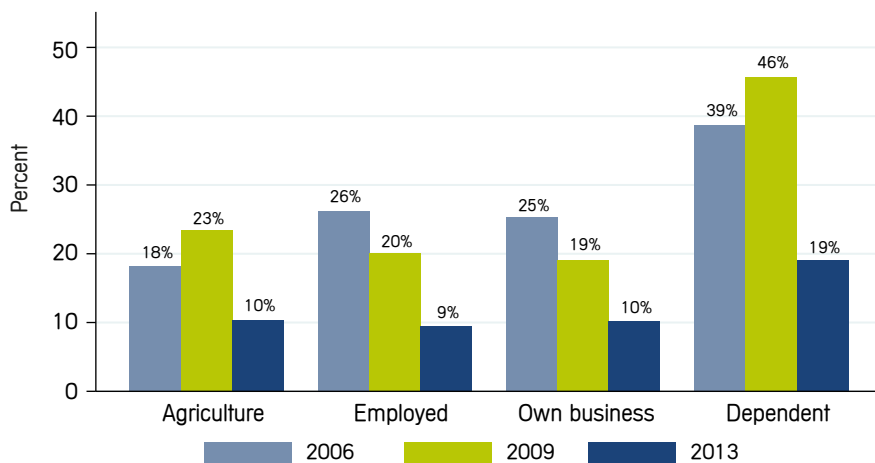
Source: FinAccess 2006, 2009 and 2013 data.

In 2013, over 19% of adults who were dependent on income transfers within households cited required documentation as a reason why they do not have a bank account (Figure 16), while only 9–10% of people in income-generating occupations mentioned documentation as a barrier. This is not an unexpected result – between 39% and 46% of people in the ‘dependent’ occupation category cited this as a barrier in 2006 and 2009 – but it does represent a fall

17 We do not look at the number of documents individuals have, as the FinAccess survey does not collect this type of information.

in numbers. One of the possible reasons for this decrease is that banks, such as Equity Bank, have reduced the documentation required when opening a new account.

Figure 16: Documentation as a barrier to formal banking by occupation, 2006–2013



Source: FinAccess 2006, 2009 and 2013 data.

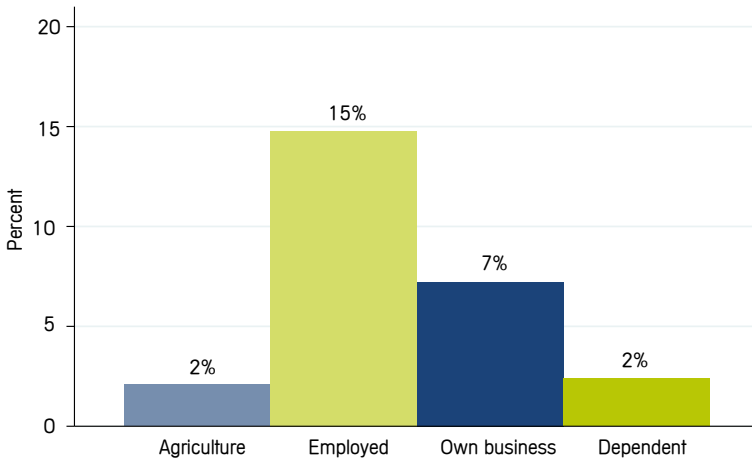
What has changed is that the percentage banked across all occupation categories has increased since 2006, as captured in Figure 15. Only 10% of people in the dependent category were formally banked in 2006, compared to over 17% in 2013. Even among those in formal employment, the percentage banked grew from 40% in 2006 to over 49% by 2013. It is important to recognise that progress is being made, though there is still significant room for increased coverage.

In terms of the marginal effects, being in formal employment has a positive and significant effect on being formally banked – it increases the likelihood of being formally banked by 10.7%.

At the policy level, there is a need to consider how formal banking products, particularly formal credit products, can also work for those outside of the formal sector. In Figure 17 we see that only 2% of those in agriculture and just over 7% of those with their own business had formal credit products. In order to increase formal financial inclusion across all occupations, on one level it is important for policymakers to understand what financial tools are used by people in different occupations, how they access them and why they use them. On another level, there is a need to simplify the documentation requirements for opening a bank account. This is especially important for dependents, as

they have the highest reported incidence of documentation requirements being a barrier (Figure 16). Again, it would be important to highlight the approach of Equity Bank, which now only requires a national ID as the main document when opening an account.¹⁸

Figure 17: Percentage with formal credit products by occupation, 2013



Source: FinAccess 2013 data.

Trust

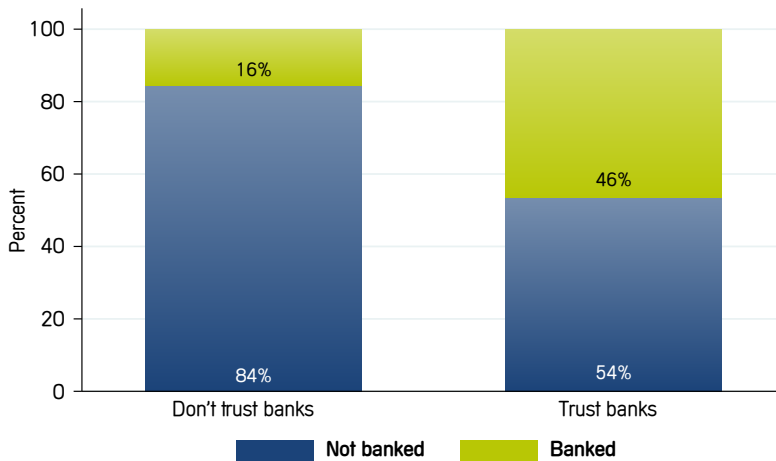
Households need financial tools that are affordable, accessible and trustworthy in order to improve their savings and consumption behaviour (Kendall, 2010). Yet the supply of and access to a bank product is not enough to ensure demand. As discussed in the conceptual framework section, issues such as trust have a fundamental role to play in determining individuals’ demand for formal banking products.

In a field experiment in Kenya’s Western Province, Dupas et al. (2010) found that while 63% of people took up the offer to open a free basic savings account, only 18% actively used the account. One of the main reasons they found for this lack of active use was that people do not trust banks. The role of trust is interesting here, as the banking sector in Kenya has been relatively free of scandal. Dupas et al. (2012) argue that the lack of trust could be a result of non-bank-related financial scandals.

¹⁸ This point is highlighted in <http://knowledge.wharton.upenn.edu/article/research-roundup-the-financial-impact-of-social-impact/>.

Trust in institutions can affect people's preferences, and thus how they access and use financial tools. When we look at the FinAccess 2013 data in Figure 18, we see that over 46% of individuals who responded that the financial provider they trust the most are banks had formal bank accounts. On the other hand, only 16% of those who did not select banks in this response were formally banked. This seems to suggest that the role of trust is important in people's demand for formal bank products.

Figure 18: Formal bank access by trust in banks, 2013



Source: FinAccess data 2013.

When we analyse this effect through a multivariate probit regression, controlling for all other factors, trust in banks increases the likelihood of being formally banked by 16.9%. The issue of trust is therefore an important area for policymakers to review. There is a need to understand what is driving this trust and how it can be increased in the 57% of respondents that did not select banks as the financial provider they trusted most. One way to understand this better is to look at which financial tools people actually use, as experience may lead to greater levels of trust. There is also a need to review the types of problems people have experienced with banks, as this could be undermining trust.

Another way to look at this is to investigate what other individual characteristics are correlated with trusting a bank. For instance, being female is negatively correlated with selecting a bank as the most trusted financial provider, while having financial numeracy skills is positively correlated with trusting a bank.¹⁹

¹⁹ It is important to note, though, that the correlation values are below the outlined threshold to signal high levels of multicollinearity.

Finally, if lack of trust in banks is actually due to a lack of trust in non-bank-related financial issues, as suggested by Dupas et al. (2012), then there is a need to look across all financial providers and identify the common types of problems people have had with these institutions. Through addressing these issues, there is then the potential to build greater trust across the sector. Even engaging the public in this process could be one way for them to know that the process is happening and could act as a first step towards building trust.

Financial decision-making

One additional socio-cultural angle to formal banking access that we explore is who holds the financial decision-making power in the household.²⁰ In a study from Kenya that looked at the treatment effect of increased access to ATM cards on bank account use, Schaner (2013) found that individuals with greater bargaining power respond positively to the treatment, while those with lower levels of bargaining power do not.

We would expect that people with greater financial decision-making power would also be the ones in control of the financial tools used by a household. Leading on from this, we would expect that such individuals would be more likely to have demand for formal banking products. Therefore, we would expect that once all other factors are controlled for, individuals who self-report higher levels of financial decision-making power are more likely to be formally banked. Klawitter and Fletschner (2010) found that women with greater bargaining power are more likely to be banked.

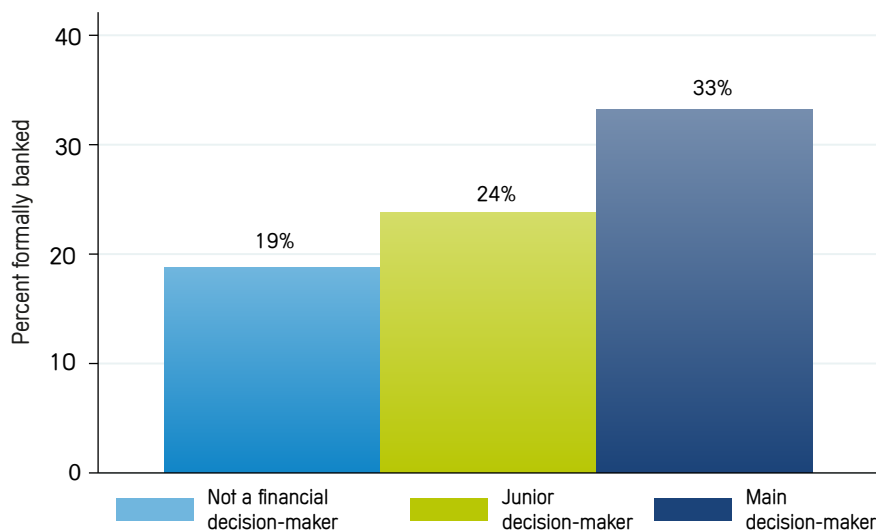
The FinAccess 2013 survey asked respondents what their role was in their household's financial decision-making process. From this question, we capture the respondents' self-perceived financial decision-making role. This information is important as it captures potential bargaining power within the household.

As we can see from Figure 19, 33% of the respondents that identified themselves as the main financial decision-maker in the household were formally banked. Over 24% of those who said they were not the main financial decision-maker, but were involved as a junior partner in the decision-making process, were formally banked. On the other hand, just 19% of those who were not involved at all in the financial decision-making process were formally banked.

²⁰ We check potential multicollinearity between gender and financial decision-making, as one's gender may have a role in determining financial decision-making. When we run a correlation table, gender was negatively correlated to being the main decision-maker by 0.32 and positively correlated to being the junior decision-maker by 0.33. While higher than a number of our relationships, this is still below the threshold of 0.5. When we regress the financial decision-making variables on gender, we get tolerance levels above .88 and VIF values below 1.13.

From the multivariate probit regression, we find that individuals who were the main financial decision-maker were 12.3% more likely to be formally banked compared to those who were not involved at all in the financial decision-making process. Those who identified themselves as junior decision-makers were 7.8% more likely to be formally banked than those not involved. Both the coefficients were significant.

Figure 19: Formal bank access by financial decision-making, 2013



Source: FinAccess 2013 data.

From these results, perceiving oneself as a financial decision-maker in the household seems to be correlated to being formally banked. If this perception is at least some partial reflection of bargaining power and the control of resources, then this finding signals that there is a need to build greater understanding that a bank account benefits all household members, not just those involved in the financial decision-making process.

Finally, as mentioned previously we recognise that these data on financial decision-making are self-reported and therefore may not reflect actual household financial decision-making. However, from both the previous literature and the results here, it seems important to include intra-household decision-making power in an analysis of demand factors for formal banking products. There is potential to explore the role of financial decision-making further in future FinAccess surveys, with one possible avenue involving collecting information to build a bargaining power index that helps look at this effect further.

6 Demographic determinants of the demand for formal banking products

Honohan (2008), in research carried out on over 160 countries, found that age dependency was the most significant demographic variable associated with financial access. A demographic transition is underway in developing countries, with a growing proportion of young people as well as a lengthening of life expectancy. This demographic change has implications for financial inclusion because a person's demographic profile has a central part to play in their financial access. A person's profile, particularly their age and gender, changes the likelihood of them being formally banked.

A person's demographic characteristics affect demand for formal bank products by influencing the suitability of the product for the user. Demand for financial services changes across the life cycle – working-age individuals will engage in savings and investment, while older individuals will divest to maintain consumption levels. Furthermore, access to credit in developing countries often varies across gender lines, with women accessing more informal credit.

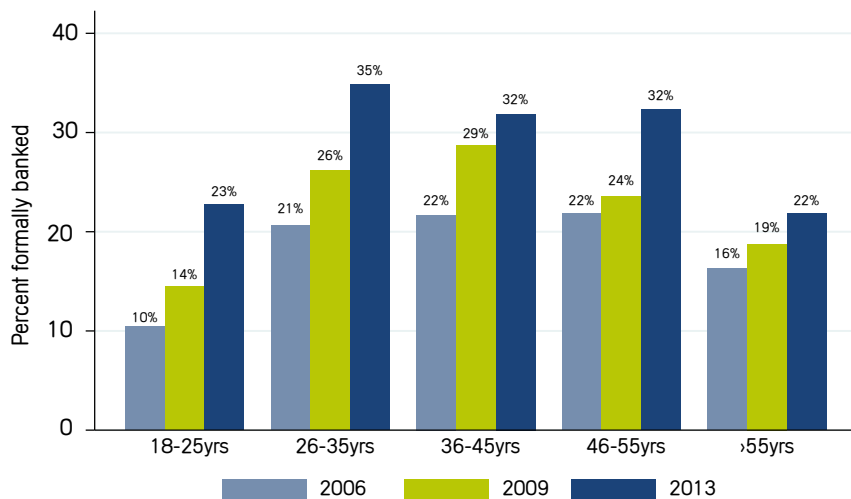
In this section, we analyse the age and gender characteristics of FinAccess survey respondents to see how they affect the demand for formal bank products (Anderson and Baland, 2002).

Age

Demirgüç-Kunt and Klapper (2012) find that age is a significant predictor for having a bank account. Those aged between 25 and 64 are more likely to have an account compared to younger or older people. Anzoategui et al. (2013) find that the likelihood of a household having a bank account is positively and significantly affected by average age.

In Kenya, the relationship between age and being formally banked suggested by the existing literature and the conceptual framework seems to hold. From Figure 20 we see that those between the ages of 26 and 54 are the most likely to be formally banked, at 32-35%. Across all age groups, however, the percentage formally banked has increased over time. If we look at Figure 20 again, we see that all age groups under 55 have seen a significant increase in the overall percentage formally banked.

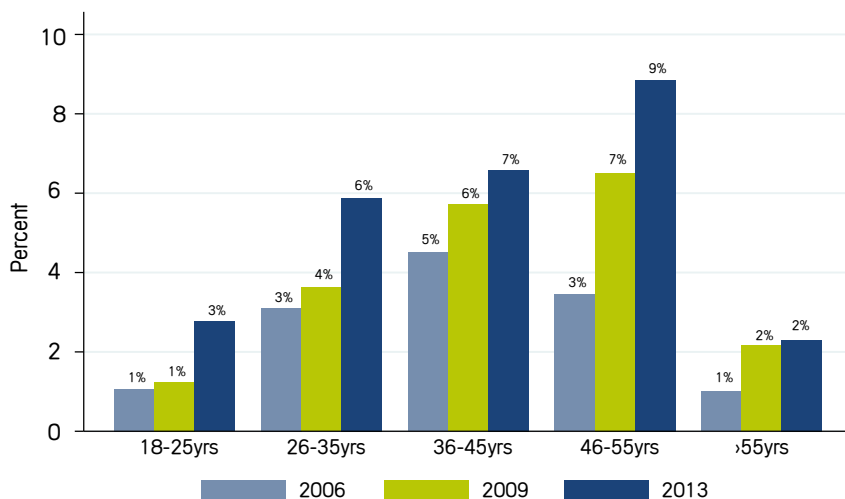
Figure 20: Formal bank access by age category, 2006–2013



Source: FinAccess 2006, 2009 and 2013 data.

When we differentiate by type of formal product (Figure 21), those between the ages of 26 and 54 are again the most likely to have credit products – between 5.8% and 8.8% of individuals in these age groups have a credit product. Among those younger than 26 or older than 54, the share of people with access to formal credit products decreases substantially to fewer than 3%.

Figure 21: Percentage with formal credit by age category, 2006–2013



Source: FinAccess 2006, 2009 and 2013 data.

When we analyse the marginal effects of age in a multivariate probit model, we find that it has a positive but diminishing effect on the likelihood of having a formal bank account. The result is significant at the 10% level for age, but not significant for age squared. This is in line with the theory and empirical research on the demand for formal banking products.

It is important for policymakers to consider how they can increase the demand for formal banking products for those outside of the 26–54 age range. This would involve promoting savings behaviour among younger cohorts through the use of banks, and promoting the use of banks among older cohorts as a safe place to store money that can be easily accessed.

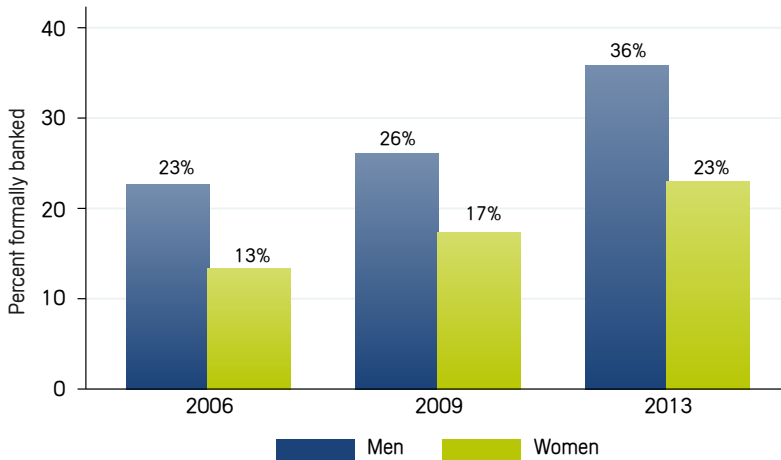
Gender

Previous research has highlighted the importance of access to finance for women as a means of economic empowerment (Cheston and Kuhn, 2002). Recent research found that for female entrepreneurs, enabling access to savings could increase enterprise investment, as well as savings (Dupas and Robinson, 2013). In an experiment carried out in Nepal that provided free savings accounts to women, Prina (2015) found that increased access affected women's ability to save, as reflected in the increased monetary and total assets of the household.

Yet women are less likely to be banked than men. Data from the Global Findex database found that women in developing countries are less likely than men to have an account in a formal financial institution, with over 1.3 billion women globally outside of the formal financial system (Demirgüç-Kunt et al., 2013). While this gender gap is smaller in sub-Saharan Africa, where 22% of women have a bank account versus 27% of men, the gap is still statistically significant (Demirgüç-Kunt et al., 2013).

The conceptual framework predicts a gender gap in formal financial inclusion, and we find that such a gap is prevalent in Kenya. In a recent study on rural banking in Western Kenya (Dupas et al., 2012), the authors found that only 10% of women have bank accounts, compared to 21% of men. This finding is echoed in the recent FinAccess 2013 survey in Kenya, as can be seen in Figure 22.

Figure 22: Formal bank access by gender, 2006–2013



Source: FinAccess 2006, 2009 and 2013 data.

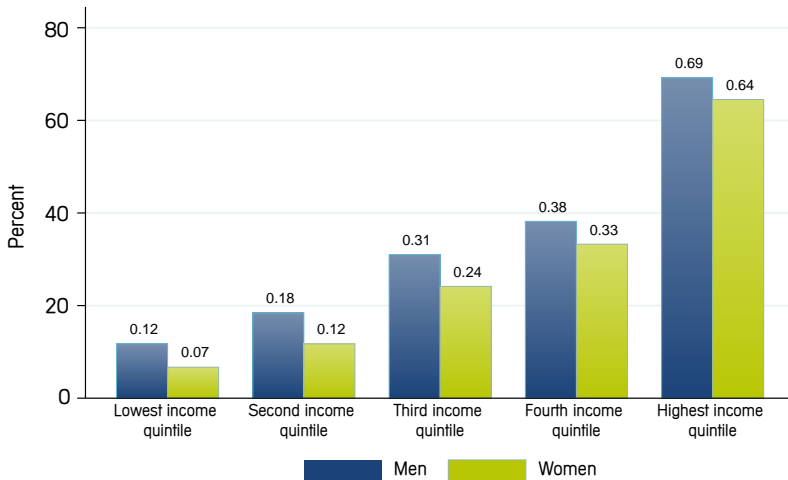
From the 2006 FinAccess data, 18% of all survey respondents were formally banked. Women were below this average, with only 13% having access to formal banking products, while men were above the average at 23%. The 2009 FinAccess survey saw an increase in these numbers and by the 2013 survey, over 23% of women and over 36% of men were formally banked. While both men and women have increased their access to formal banking products, the gap between the two has also increased by 3 percentage points from 2006.

The critical question, therefore, is, 'What is driving this gender gap in Kenya?'. Is it that women have a lower demand for formal banking products, or that just being female is in itself a barrier to being formally banked? Looking across the FinAccess 2013 data, the gender gap in access to formal banking is persistent across income, education, marital status and household decision-making factors. When we look across income quintiles, however, the gap narrows slightly (Figure 23).

Another way to understand this gender gap is to look at the marginal effect of gender on the likelihood of someone being formally banked. Through the use of multivariate regression analysis, we hope to control for the other characteristics correlated to formal banking to look at whether being a women increases or decreases the likelihood of being formally banked. We find that once all other factors are controlled for, gender does not have a significant effect on the likelihood of being formally banked. This finding is in line with Aterido et al. (2013), who find that while there is a gender gap in access to finance in sub-Saharan Africa, when key observables such as income, education and employment status are controlled for, this gap disappears. In

contrast, Demirgüç-Kunt et al. (2013) find that even when these individual characteristics are controlled for, gender is still a significant determinant of owning a formal banking account. What both of these bodies of research and the analysis here point to, however, is that women do face barriers – such as for example lower pay, for example – that prevent their access to formal banking.

Figure 23: Formal bank access by income quintile and gender, 2013



Source: FinAccess 2013 data.

7 Conclusion and policy implications

In the last seven years, Kenya has broadened access to formal banking products across ages, incomes and gender. Decreasing opportunity costs for accessing and maintaining a bank account due to increased numbers of bank branches and agents have played a role in facilitating this increase. Today, more Kenyans are formally financially included than ever before.

Even with this progress, over 71% of Kenyans still do not have a savings, transaction or credit product from a formal prudentially regulated institution. Given the improved access to banks and decreasing costs to access and maintain formal bank products, why have we not seen an even greater increase in demand for such products? This chapter has addressed this question by analysing the factors that affect the demand curve for formal banking products. It is worth noting that we specifically take the current suite of formal products as given, but subscribe to the view that the set of products available (as of 2013) does not represent a value proposition for many ordinary Kenyans.

Through laying out the economic, socio-cultural and demographic factors that determine demand, this chapter has analysed how these factors affect the likelihood of an individual being formally banked in Kenya. Using the FinAccess data from 2006, 2009 and 2013, we lay out below some of the key demand-side findings and policy recommendations.

The influence of income on the likelihood of someone being formally banked is consistently significant at the 1% level across all the various multivariate probit regressions. A 1% increase in income results in an 8.2% increase in the likelihood of being formally banked. There is therefore a need to ensure that formal bank products are meeting the needs of individuals across all income categories, especially low-income households. The analysis of socio-cultural factors helps provide greater detail on the nature of these barriers.

As outlined by Beck and de la Torre (2007), socio-cultural factors also play a role in determining demand for formal banking products. From the analysis of the FinAccess 2013 data, we see that socio-cultural factors create a gap between the actual and potential demand for formal banking products. Greater financial numeracy skills and awareness of formal financial terms and products increase the likelihood of being formally banked, even among those in lower income categories. The formality of one's occupation also increases the probability of being formally banked and having a credit product. Not speaking English decreases the likelihood of being formally banked, while having greater trust in banks as a financial provider increases the likelihood.

From a policy perspective, investing in financial numeracy skills and building awareness of financial concepts – particularly among those who are less educated or belong to minority groups – will aid financial inclusion efforts. At the same time, policymakers need to understand what preferences and constraints shape the demand for formal banking products among individuals from different language backgrounds and build a strategy around this. A core part of this strategy should be supporting business strategies, like those of Equity Bank, that target underprivileged and underserved households, as well as households that speak languages other than English.

The formality of one's occupation also has a key role to play in whether someone is formally banked. Policymakers should also support efforts to make formal bank products more accessible to those in the informal sector and agriculture sectors.

Initiatives to build trust in financial institutions should help drive further formal financial inclusion. For instance, the Kenya Financial Diaries project revealed that price transparency is important for building trust and increasing the use of a particular financial service (Zollmann, 2014).

Finally, regarding the demographic factors, two areas for policymakers to focus on are promoting formal bank products for those in younger or older age cohorts, and reducing the gender gap in formal financial inclusion. Addressing particular barriers that women face, such as income, is critical to tackling this gap.

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Appendix

Table A1: Regression results from multivariate probit from FinAccess 2013 survey data

Variables	Having a formal bank product			Having formal credit product
	Economic factors	Sociocultural factors	Demographic factors	
InIncome	0.129*** (0.009)	0.081*** (0.008)	0.082*** (0.008)	0.008*** (0.003)
Central	0.028 (0.038)	0.047 (0.043)	0.047 (0.045)	0.003 (0.008)
Coast	-0.096*** (0.033)	-0.043 (0.036)	-0.043 (0.037)	-0.008** (0.004)
Eastern	-0.065** (0.033)	0.022 (0.038)	0.022 (0.040)	0.003 (0.007)
Nyanza	-0.088*** (0.031)	-0.032 (0.035)	-0.038 (0.035)	0.000 (0.006)
Rift Valley	-0.106*** (0.029)	-0.024 (0.031)	-0.031 (0.032)	0.003 (0.006)
Western	-0.123*** (0.029)	-0.051 (0.035)	-0.055 (0.035)	-0.005 (0.005)
VGoodBankAccess	0.192*** (0.025)	0.048* (0.028)	0.037 (0.028)	0.012** (0.006)
GoodBankAccess	0.126*** (0.036)	0.033 (0.033)	0.025 (0.033)	0.017 (0.013)
Formal occupation		0.099*** (0.024)	0.107*** (0.025)	0.016** (0.007)
Swahili		-0.073*** (0.021)	-0.075*** (0.022)	-0.012** (0.005)
Kikuyu		-0.068** (0.032)	-0.089*** (0.031)	-0.011*** (0.004)
MinorityLang		-0.125*** (0.022)	-0.135*** (0.023)	-0.015*** (0.005)
Financial Numeracy		0.046*** (0.010)	0.048*** (0.010)	0.07*** (0.002)
Fin. Product Awareness		0.032*** (0.003)	0.034*** (0.003)	0.003*** (0.001)
TrustBanks		0.165*** (0.016)	0.169*** (0.017)	0.004 (0.003)

Variables	Having a formal bank product			Having formal credit product
	Economic factors	Sociocultural factors	Demographic factors	
Main Decision-maker		0.139*** (0.024)	0.123*** (0.026)	0.013* (0.007)
Junior Decision-maker		0.089*** (0.030)	0.078** (0.031)	0.011 (0.011)
age			0.005* (0.003)	0.002** (0.001)
age_2			-0.000 (0.000)	-0.000* (0.000)
Gender Dummy			0.013 (0.015)	0.003 (0.003)
Observations	5,928	5,928	5,600	5,600

Notes: Standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A2: Summary statistics of variables from FinAccess 2013

Variable	Description	Obs	Mean	Std. dev.	Min.	Max.
FormalBanked	This is a binary variable that takes the value of 1 if a person has at least one of the following: loan from a bank; loan to buy/build house/land from bank or building society; postbank account; bank account for savings or investment; current account; bank account for everyday needs; overdraft; ATM/debit card; credit card; bank account for savings or investment. The value is 0 otherwise.	6186	0.292	0.455	0	1
FSavingsTransactions	This is a binary variable that takes the value of 1 if a person has at least one of the following: postbank account; bank account for savings or investment; current account; bank account for everyday needs; or ATM/debit card. The value is 0 otherwise.	6186	0.287	0.452	0	1
FormalCredit	Person is classified as having a FormalCredit product if they have have one of the following: loan from a bank; loan to buy/build house/land from bank or building society; overdraft; or credit card.	6186	0.051	0.221	0	1
Income	This is the income reported. If someone didn't report an exact amount but reported the range within which their income fell, the mid-point of the range was taken as their income.	5928	9,744.99	23788.519	40	4.50E+05
Expenditure	This was the sum of the monthly expenditure items respondents were asked about: mobile, education, household bills, medical expenses, paying off debts, rent, savings, supporting others.	6186	9,828.73	22456.392	0	4.10E+05
GenderD	This is a binary variable that takes the value of 1 if a person is a woman and a value of 0 if a person is a man.	6186	0.517	0.5	0	1
age	This is the age of the respondent. Those under 18 are dropped from the analysis.	5849	37.458	15.179	18	97
age_2	This is the age squared.	5849	1,633.45	1,411.81	324	9,409.00
FinNumeracy	This is an index for which the person is given a value of 0 if they answer none of the financial numeracy questions asked correctly, 1 if they answered one question correctly, and 2 if they answered both correctly.	6186	1.003	0.849	0	2

Variable	Description	Obs	Mean	Std. dev.	Min.	Max.
FinPAwareness	Count variable of total financial terms respondent is aware of, including: savings account, insurance, interest, shares, cheque, collateral, budget, investment, ATM card, inflation, pension, mortgage.	6186	7.5	3.62	0	1212
VGoodBankAccess	This is a binary variable taking the value of 1 if a person within 30 minutes of a bank and 0 otherwise.	6186	0.644	0.479	0	1
GoodBankAccess	This is a binary variable taking the value of 1 if a person lives between 30 – 60 minutes away from a bank and 0 otherwise	6186	0.19	0.392	0	1
AvgBankAccess	This is a binary variable taking the value of one if a person lives between 1 and 2 hours away from a bank and 0 otherwise.	6186	0.053	0.224	0	1
BadBankAccess	This is a binary variable taking the value of 1 if a person lives over 3 hours away from a bank and 0 otherwise.	6186	0.114	0.318	0	1
Agriculture	This is a binary variable that takes the value of 1 if a person responded that the most important income generator was agriculture related (food crops, cattle/livestock, fishing, employed on another's farm, etc.). It takes the value of 0 otherwise.	6186	0.442	0.497	0	1
OwnBusiness	This is a binary variable that takes the value of 1 if a person responded that the most important income generator was their own business. It takes the value of 0 otherwise.	6186	0.156	0.363	0	1
Formal Occupation	This is a binary variable that takes the value of 1 if a person responded that the most important income generator was not agriculture related and was through employment for someone else (domestic chores, government, private sector). It takes the value of 0 otherwise.	6186	0.162	0.369	0	1
Dependent	This is a binary variable that takes the value of 1 if a person responded that the most important income generator was their pension, money from family or aid assistance. It takes the value of 0 otherwise.	6186	0.186	0.389	0	1
Central	This is a binary variable for the Central region.	6186	0.136	0.343	0	1
Coast	This is a binary variable for the Coast region.	6186	0.094	0.292	0	1

Variable	Description	Obs	Mean	Std. dev.	Min.	Max.
Eastern	This is a binary variable for the Eastern region.	6186	0.156	0.363	0	1
Nyanza	This is a binary variable for the Nyanza region.	6186	0.137	0.344	0	1
RiftValley	This is a binary variable for the Rift Valley region.	6186	0.265	0.442	0	1
NairobiProvince	This is a binary variable for the Nairobi region.	6186	0.107	0.31	0	1
Western	This is a binary variable for the Western region.	6186	0.104	0.305	0	1
TrustBanks	This is a binary variable that takes the value of 1 if a person responded that the financial providers they trust the most are banks and a value of 0 otherwise (in 2013 this is question is d8a)	6186	0.438	0.496	0	1
HHead	This is a binary variable that takes the value of 1 if a person is the household head and a value of 0 otherwise.	6186	0.529	0.499	0	1
MDecisionmaker	This is a binary variable that takes the value of 1 if a person is the main household financial decision-maker and a value of 0 otherwise.	6186	0.618	0.486	0	1
JuniorDecisionmaker	This is a binary variable that takes the value of 1 if a person is a junior household financial decision-maker and a value of 0 if otherwise.	6186	0.293	0.455	0	1
NonFDecisionmaker	This is a binary variable that takes the value of 1 if a person is not involved in household financial decision-making and a value of 0 if a person is.	6186	0.089	0.285	0	1
English	This is a binary variable that takes the value of 1 if a person's preferred language is English and a value of 0 otherwise.	6186	0.189	0.391	0	1
Swahili	This is a binary variable that takes the value of 1 if a person's preferred language is Swahili and a value of 0 otherwise.	6186	0.459	0.498	0	1
Kikuyu	This is a binary variable that takes the value of 1 if a person's preferred language is Kikuyu and a value of 0 otherwise.	6186	0.094	0.291	0	1
MinorityLang	This is a binary variable that takes the value of 1 if a person's preferred language is any of the remaining language options and a value of 0 otherwise.	6186	0.259	0.438	0	1

Variable	Description	Obs	Mean	Std. dev.	Min.	Max.
NBAAccessCosts	"Access - Costs of Bank Account". This is a binary variable that takes the value of 1 if a person does not have a bank account and if they select that they don't want to pay the service fees, because they have to keep a minimum balance in the bank or because they can not afford to. It is 0 otherwise.	3228	0.161	0.368	0	1
NBAIncome	"Income too variable or low". This is a binary variable that takes the value of 1 if a person does not have a bank account and if they select that they don't have money to save or don't have a regular income. It is 0 otherwise.	3228	0.752	0.432	0	1
NBAAccessGeography	"Access - Geography of Bank". This is a binary variable that takes the value of 1 if a person does not have a bank account and if they select that the bank is too far away or it takes too long to get their money. It is 0 otherwise.	3228	0.072	0.258	0	1
NBAAccessDocumentation	"Access - Documentation needed by Bank". This is a binary variable that takes the value of 1 if a person does not have a bank account and if they select that they don't want to pay the service fees, because they do not have a job, don't have a national ID, can't read or write or don't qualify to open an account. It is 0 otherwise.	3182	0.115	0.32	0	1
NBAChoice	"Choice". This is a binary variable that takes the value of 1 if a person does not have a bank account and if they select that they prefer dealing in cash or that they prefer to use other options than a bank. It is 0 otherwise.	3228	0.056	0.231	0	1
NBAPerception	"Perception". This is a binary variable that takes the value of 1 if a person does not have a bank account and if they select that they don't need a bank account, don't trust banks or they can do all their transactions using a different kind of institution.	3227	0.058	0.234	0	1
NBAOther	"Other". This is a binary variable that takes the value of 1 if a person does not have a bank account and if they select another reason for not having a bank account or they don't have a reason.	3228	0.03	0.169	0	1
NBACommunication	"Communication". This is a binary variable that takes the value of 1 if a person does not have a bank account and if they select that they don't know how to open an account.	3228	0.02	0.139	0	1

CHAPTER 4

The Digitisation of Financial Services: M-PESA and the Evolution of Financial Inclusion in Kenya

ALEV GÜRBÜZ AND WILLIAM JACK



1 Introduction

This chapter uses FSD Kenya's FinAccess datasets to explore the extraordinary evolution of financial inclusion in Kenya over the last decade. The supply of financial services has expanded significantly across a number of dimensions, including through formal institutions that provide banking, insurance, credit, and retirement and other saving, and informal institutions that provide similar functions on an often smaller and more geographically circumscribed scale. In tandem with this expansion, there has been a steady fall in the rate of financial exclusion over the seven-year period spanned by the three FinAccess surveys – from about 40% in 2006 to 25% in 2013. Still, this deepening of participation in the financial sector has left an estimated quarter of the population without access to even informal financial services that many believe are an essential component of meaningful and sustained poverty reduction. Thus, understanding the process by which adoption has spread, and how this can be continued and accelerated, is important for achieving the country's long-term development goals.

Arguably, the most profound force in the evolution of financial inclusion has been the advent and spectacular adoption of M-PESA, Safaricom's mobile money platform launched in 2007 which now reaches 18.1 million subscribers.¹ Between 2009 and 2013, the share of Kenyan adults using M-PESA jumped from 27.6% to 61.6%. During the same period, the FinAccess data suggest that bank account access rose minimally, from 23.1% to 24.9%. Similar services have been rolled out by all the other mobile network operators and by some of the banks, but M-PESA's stranglehold on the market for internal remittances remains tight. As it expands into more formal banking services (first through M-Kesho and now with M-Shwari), and as its competitors innovate in parallel, the mobile money revolution and the digitisation of financial services promise to play historically transformative roles in Kenya's economic development. Learning how to replicate these successes in other countries is nothing short of a moral imperative.

But two features of the landscape pose challenges for our attempts to understand fully the role of M-PESA in the evolution of financial inclusion in Kenya. First, the multi-dimensional nature of financial services, both substantively (e.g. as means of allocating consumption, capital and risk) and organisationally (e.g. through the public or private sectors, formally or informally, regulated or not) means that growth in financial inclusion is not necessarily a linear process.

1 See Jack and Suri (2011, 2014), and Jack et al. (2012) for background information on M-PESA.

One contribution of this chapter is to provide a potentially useful means of visualising the data in such a context.

Second, the FinAccess surveys, while rich and comprehensive, nonetheless lack a panel structure, so it is not possible to track people over time. Who transitioned into the financial sector, and which kinds of services they adopted, is thus difficult to tell. We propose a number of approaches to address this limitation, first by making certain simple assumptions about transition dynamics, and then by modelling the determinants of financial inclusion in each survey round and using the results to simulate the evolution of inclusion from one round to the next.

In the next section, we review the dynamics of financial inclusion using FSD Kenya's 'financial access strands', and examine the extent to which individuals could have leap-frogged from exclusion to formal inclusion by adopting M-PESA. We follow this with a discussion of a methodology for estimating the probability of M-PESA and bank use, and financial inclusion in general, and use these techniques to dig deeper into the adoption of the former and the evolution of the latter. Our analysis consistently suggests that between 2009 and 2013 to first order, mobile money facilitated a transformational move from informal financial inclusion to formal financial inclusion, but that the financially excluded population saw more limited gains.

2 Financial inclusion in Kenya

The FinAccess surveys in 2009 and 2013 covered a total of 6,010 and 6,186 individuals, respectively. A first-order take-away from the 2013 report is captured in Figure 3.3 in the 2013 report,² reproduced below as Figure 1. M-PESA users constitute most of those included in the 'Formal non-prudentially regulate' category, but also exist in the 'Formal prudentially regulated' category (occupied mostly by those with bank accounts).³

One way to understand the role of M-PESA in this evolution is to focus on the second category only, for example by re-arranging the bars in Figure 1 so they are centred on that category, as in Figure 2. Alternatively, the co-evolution of access to M-PESA and banking services might be highlighted as in Figure 3.

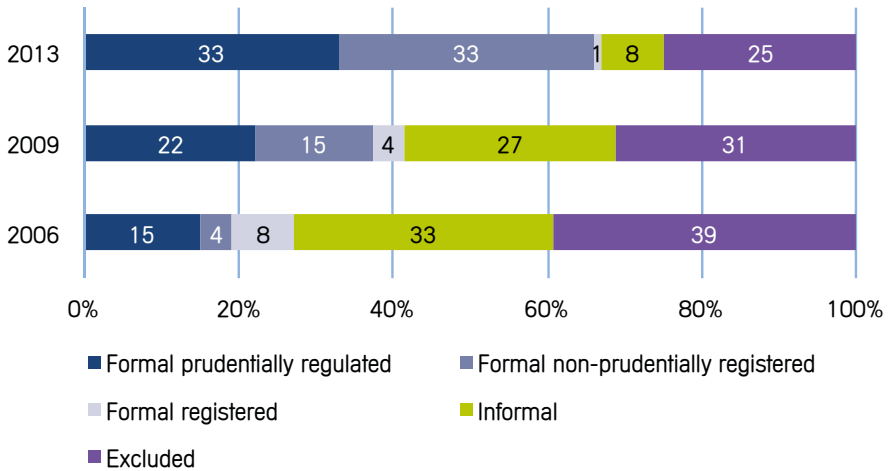
But the deeper and perhaps more interesting question is how people moved from one part of the distribution to another. Does the step-by-step upward

2 CBK and FSD Kenya (2013).

3 Membership in a category is determined by the highest level of financial service used by an individual, with banking services ranked above mobile money.

movement illustrated in Figure 4 accurately reflect the dynamics, or is Figure 5 closer to the reality?

Figure 1: Financial inclusion



Source: CBK and FSD Kenya (2013).

Figure 2: Financial inclusion – the growth of M-PESA

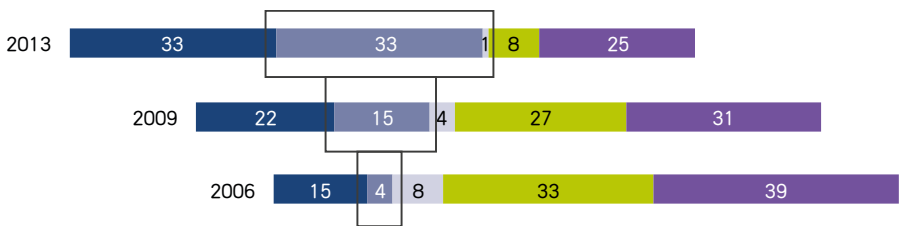


Figure 3: Co-evolution of access to banking and M-PESA services

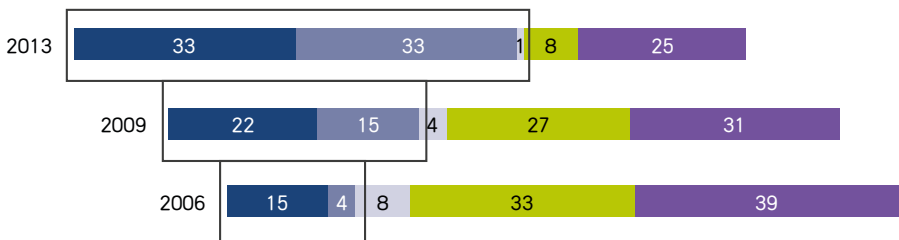


Figure 4: Step-by-step improvement in financial access

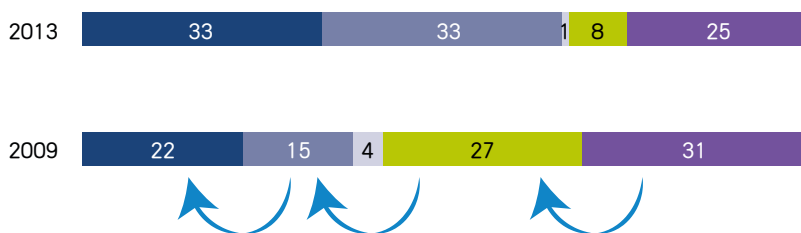
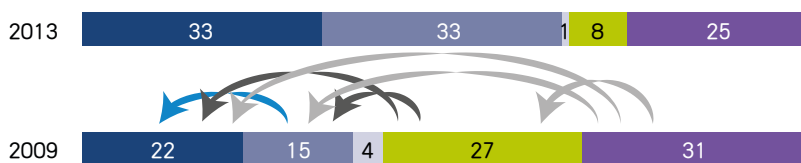


Figure 5: Leap-frogging improvement in financial access



Of course, some people could have moved down the spectrum of financial services while others moved up. Without a panel it is difficult to judge, but we can make some progress in answering these questions with some mild assumptions. For this purpose, and for what follows below, we collapse the three strands of formal financial inclusion (prudentially regulated, non-prudentially regulated, and registered) into a single ‘formal’ inclusion category, and maintain the other two.

With these definitions, Table 1 summarises the shares of the population in each of nine mutually exclusive categories (that sum to one), according to an individual’s financial inclusion status in 2009 and 2013. We first assume that individuals do not move *down* the financial inclusion ladder – they either move up, or remain at the same level. This means that the entry in the top left-hand corner is equal to the share of the population who were formally financially included in 2009, and that the other two entries on the top row are zero. It also implies that the entry in the bottom right-hand corner (not including the totals) is equal to the share of the population in 2013 who were financially excluded (25%), and that the other entries in that column are zero. The entries in the bottom-left of the table depend on the extent to which individuals might have leap-frogged from excluded status in 2009 to formal inclusion in 2013. One assumption is simply that they did not, in which case the bottom-left cell would be zero, and the other cell entries would follow arithmetically. This possibility is shown in Table 1.

Table 1: Financial inclusion transitions with no leap-frogging

2009	2013			
	Formal	Informal	Excluded	Total
Formal	41%	--	--	41%
Informal	25%	4%	--	29%
Excluded	--	5%	25%	30%
Total	67%	8%	25%	100%

On the other hand, the potential for M-PESA to have catapulted previously excluded individuals into the formal financial sector suggests that we should question the assumption of no leap-frogging. An alternative assumption is that no-one transitioned from exclusion to informal inclusion, that is, that anyone who was financially excluded in 2009 but not in 2013 exited the exclusion state by adopting M-PESA or another formal financial service. In Table 2, this means that the cell representing exclusion in 2009 and informal inclusion in 2013 is zero. The maximal share of the population that leap-frogged from exclusion to formal inclusion is thus about 4%.

Table 2: Financial inclusion transitions with maximal leap-frogging

2009	2013			
	Formal	Informal	Excluded	Total
Formal	41%	--	--	41%
Informal	21%	8%	--	29%
Excluded	4%	--	25%	30%
Total	67%	8%	25%	100%

Table 3 shows the results of this kind of exercise by sub-group. In particular, the table reports the maximal share of the population that could have leap-frogged from exclusion to formal inclusion across a number of categories, including gender, rural/urban residence and age. The potential to transition directly from exclusion to formal inclusion was highest for men and for people under 45, and lowest for urban dwellers.

Table 3: Maximal leap-frogging by population sub-group

Population sub-group	Maximal leap-frogging
All	4.2%
Women	3.4%
Men	5.0%
Rural	2.3%
Urban	1.9%
Under 45	4.6%
Over 45	2.5%

3 Modelling the adoption of financial services

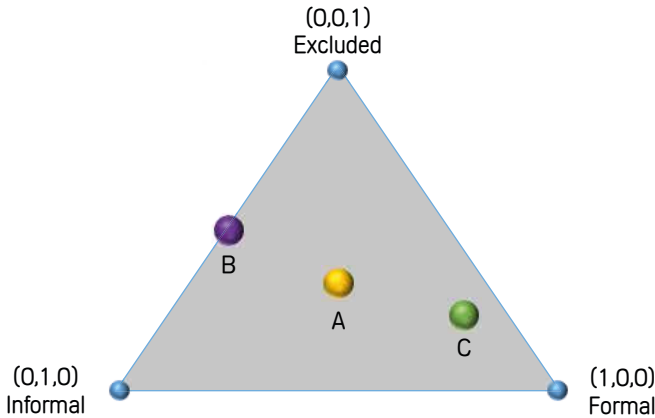
Until now, we have simply reported the share of the population in each of three states of financial inclusion, but have not correlated financial inclusion with other observable characteristics. In this section, we statistically model the use of specific financial services in each survey round, and more generally financial inclusion as defined in the FinAccess reports, as a function of observable characteristics X , such as gender, age, residence, and so on.⁴ This allows us to characterise any given individual in terms of her probability of using a particular financial service, and the extent to which she is financially included. And by applying our model parameters generated in one survey round to individuals observed in the other, we can speak more precisely about the evolution of financial inclusion over time, even in the absence of a panel dataset.

⁴ See the Appendix for a list of financial products and services included in each strand as defined by FSD Kenya.

Modelling financial inclusion

To start, we group people by observable characteristics – such as gender, urban/rural location, occupation, etc. – and estimate the shares of each group that are formally or informally financially included, or excluded.⁵ Members of each group will of course be in one and only one state of inclusion, but the group as a whole can be visualised as being located in a triangle, or simplex, as shown in Figure 6. Each point in the simplex is defined by three numbers that sum to one, and can be thought of as probabilities of an individual being in one of the three states.

Figure 6: Probabilistic financial inclusion



5 Formally, we model the three states of financial inclusion using a multinomial logistic specification in which the probability of individual i observed at time t being in either of the three mutually exclusive states, $s = 1$ (Formal inclusion), 2 (Informal inclusion), or 3 (Exclusion), is assumed to take the form

$$prob(s_{it} = s) = F(\beta_s^t X_i) = \frac{e^{\beta_s^t X_i}}{\sum_s e^{\beta_s^t X_i}}$$

where $F(z) = ke^z$ is the logistic cumulative distribution function and, by construction,

$$\sum_{s=1}^3 prob(s_{it} = s) = 1.$$

Although these models are estimated using data only from a given survey round, we can use the parameters to probabilistically predict the financial inclusion status of individuals observed in the other round. The estimated values of the parameters, denoted β_t^s , allow us to calculate the predicted probability that individual i is, or would have been, in state s in period t as

$$\hat{p}_{it}^s = F(\hat{\beta}_t^s X_i) = \frac{e^{\hat{\beta}_t^s X_i}}{\sum_s e^{\hat{\beta}_t^s X_i}}.$$

Note that even if individual i is observed in a different period $t' \neq t$, we can still use the estimated coefficients in period t to predict the probability of being in each financial inclusion state in period t using those coefficients. Individual i can thus be characterised by the vector of probabilities $\hat{p}_{it} = (\hat{p}_{it}^1, \hat{p}_{it}^2, \hat{p}_{it}^3)$, which lies in the two-dimensional simplex, as illustrated in Figure 6.

Each vertex represents one of the states of financial inclusion – for example, an individual located at the top of the figure, with $\hat{p}_{it} = (0, 0, 1)$, is predicted with certainty to be financially excluded, while an individual at the bottom-right corner is predicted with certainty to be formally financially included. Point A, on the other hand, represents an individual with equal probability of being in each of the three states, that is $\hat{p}_{it} = (1/3, 1/3, 1/3)$, while point B represents an individual with a zero predicted probability of being formally financially included, and a probability of 0.5 of being either informally financially included or excluded. An individual at point C is relatively likely to be formally financially included, but has some probability of being informally included or excluded.

We will use this graphical representation of financial inclusion later in the chapter.

Modelling the adoption of specific financial services

We adopt a similar approach to modelling the use of specific financial services. In particular, we will be interested, on the one hand, in the use of M-PESA itself, and, on the other hand, in the use or co-use of M-PESA and formal banking services. In the first case, it is straightforward to estimate a simple logit model of M-PESA use by individual i at time t , $m_{it} = 1$ or 0, based on observable characteristics, of the form:

$$\text{prob}(m_{it} = 1) = F(\mu_t X_i)$$

The predicted probability that individual i is, or would have been, an M-PESA user in period t is simply:

$$\hat{p}_{it} = F(\hat{\mu}_t X_i)$$

To estimate the use of both M-PESA ($m_{it} = 1$ or 0), and banking services ($b_{it} = 1$ or 0), by individual i at time t , the model must accommodate four possible states.⁶ Under this constraint, the probability of being in state $(m, b) \in \{(0,0), (1,0), (0,1), (1,1)\}$, is:

$$\text{prob}(m_{it} = m; b_{it} = b) = F(\gamma_i^{m,b} X_i)$$

6 Bank access is defined as having at least one of the following: a Postbank account, a bank account for savings, a current account with a cheque book or a bank account for everyday needs.

The parameter estimates can be used to compute the predicted probability that individual i is, or would have been, an M-PESA user in year t as:

$$\hat{\pi}_{it}^m = F(\hat{\gamma}_i^{1,0} X_i) + F(\hat{\gamma}_i^{1,1} X_i)$$

Similarly, the probability that she has, or would have had, a bank account is:

$$\hat{\pi}_{it}^b = F(\hat{\gamma}_i^{0,1} X_i) + F(\hat{\gamma}_i^{1,1} X_i)$$

As above, estimates of the model obtained in one survey round can be applied to the (non-varying) characteristics of individuals in the other to derive simulated probabilities of use of M-PESA and banking services across years.

As a purely descriptive exercise in a given year, we would include as many potential explanatory variables on the right-hand side of the regression equation above as we have available. However, as we plan to use the estimated coefficients to predict financial inclusion across the survey years, we include only X characteristics that we expect to change little if at all over time. This way, if we know the relationship between X and financial inclusion in a given year t , then we can estimate what the financial inclusion status of an individual observed at a *different* time would be in year t . This is only the case, however, if we know that her X s would have been the same in year t as they are when we observe her, or if we could infer what they would have been in that year with certainty (as for example is the case with age).

For this reason, for example, we do not include distance from M-PESA agents, bank branches, or providers of other financial services in modelling financial inclusion. Although these variables certainly can be expected to influence the likelihood of an individual being financially included in a given year, they changed rapidly over the period under consideration in Kenya. Of course, the estimated relationship between time-invariant characteristics and financial inclusion (as manifest in the parameters) *is* expected to have changed over time.

4 Understanding the expansion of M-PESA

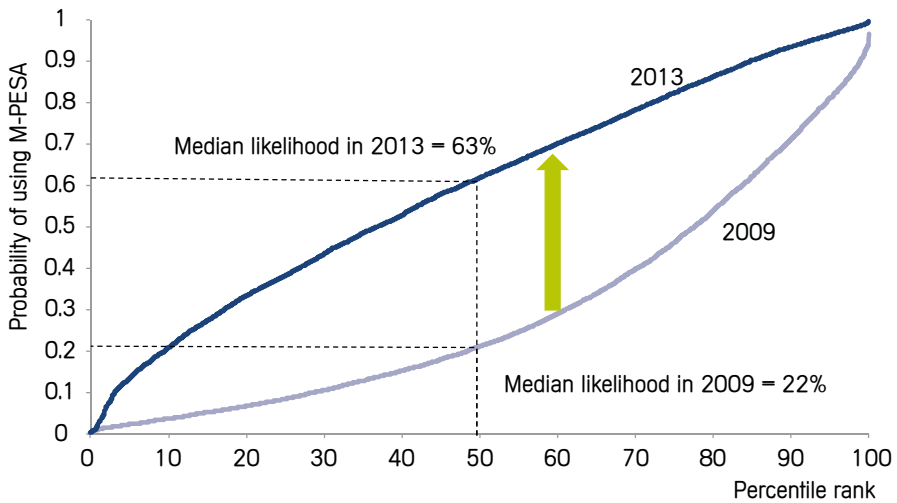
We next shed light on the evolution of M-PESA use – a crucial element of increased financial inclusion – by different segments of the population over time. In particular, we use the approach described above to estimate the probability that any given individual observed in a given year would have used M-PESA in that, or the other, survey year. We calculate these probabilities

separately for different strata of the population – by gender, location, and age – and compare them over time. The drivers behind this expansion in access were on both the supply side, especially the explosion in the number of M-PESA agents, and the demand side, as network effects increased the value of the service and hence the willingness of individuals to adopt it.⁷

Growth in the probability of using M-PESA

We first estimate the coefficients $\hat{\mu}_{2009}$ and $\hat{\mu}_{2013}$, and use these to predict the probability of M-PESA use for individuals in each year, $\hat{\rho}_{i,2009}$ and $\hat{\rho}_{i,2013}$. We reorder the estimated probabilities in each vector, and plot the predicted values as a function of their rank, as shown in Figure 7. The graph of predicted probabilities in year t at rank r is denoted by $\hat{\rho}_t(r)$.

Figure 7: Distribution of predicted probability of using M-PESA, 2009–2013



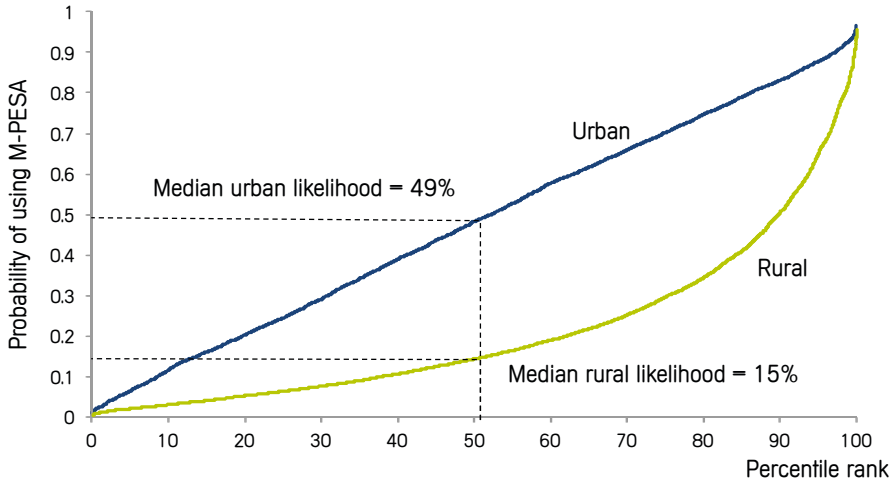
Under the assumption that the ordering does not change over time, – that is, that an individual at the p th percentile in 2009 would be at the same percentile in 2013 – this figure illustrates how access to and use of M-PESA changed over time. All but those with the very highest and very lowest predicted probabilities in 2009 saw their predicted probability increase in 2013. The predicted median probability of using M-PESA increased from about 22% to about 63%. The change in convexity of these functions (from convex to concave) from 2009 to 2013 reflects broad gains in access across the distribution.

⁷ By April 2011, the number of M-PESA agents was about 28,000 across the country, all deployed in the space of four years. By contrast, the number of bank branches across the country grew from 887 in 2008 to just 1,063 in 2010, during which time the ATM network expanded from 1,325 to 2,203.

Rural versus urban differences

To understand this growth in access further, we restrict attention to certain strata. To start, we calculate the distributions of access for rural and urban populations separately. The 2009 distributions are presented in Figure 8 – the median probability of using M-PESA amongst urban residents was about 50%, while it was only 15% in rural areas.

Figure 8: Rural-urban divide in 2009



Figures 9 and 10 depict the changes in rural and urban usage between 2009 and 2013. The distribution in rural areas in 2013, $\hat{\rho}_{2013}^R(r)$, closely matches that of urban areas in 2009, $\hat{\rho}_{2009}^U(r)$, but the continued deepening of access in urban areas meant that rural residents were not able to catch up.

Figure 9: Change in rural M-PESA use, 2009–2013

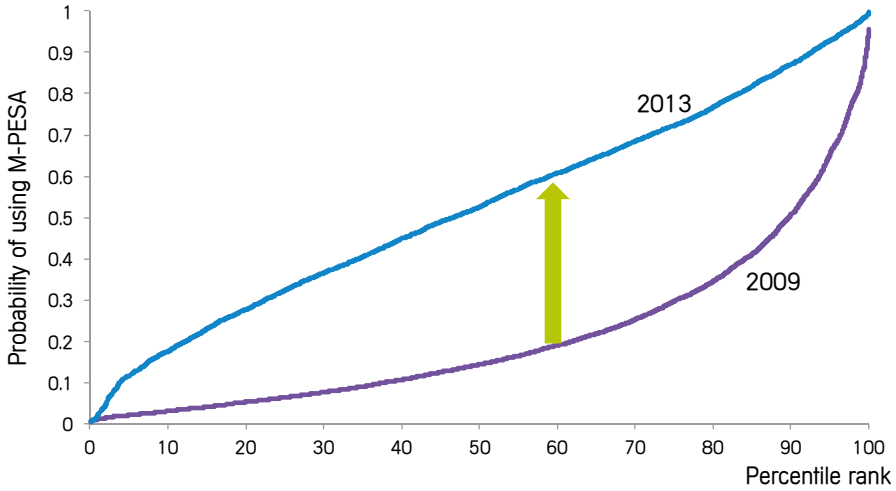


Figure 10: Change in urban M-PESA use, 2009–2013

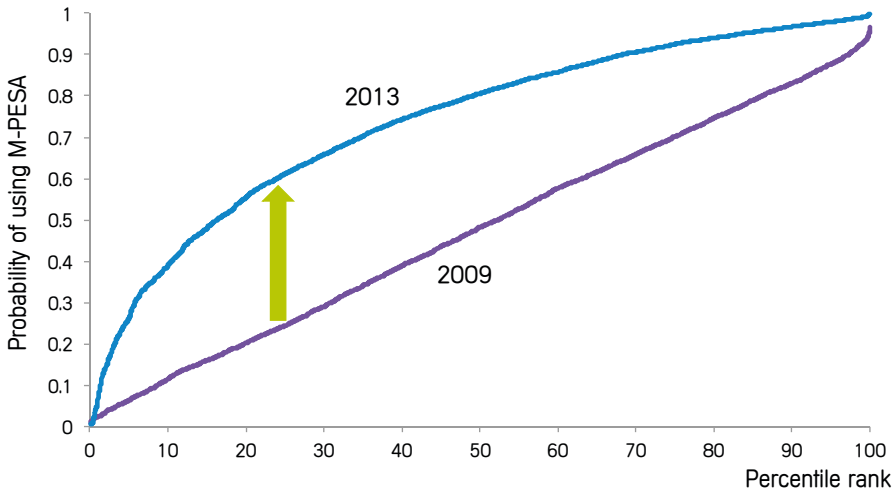


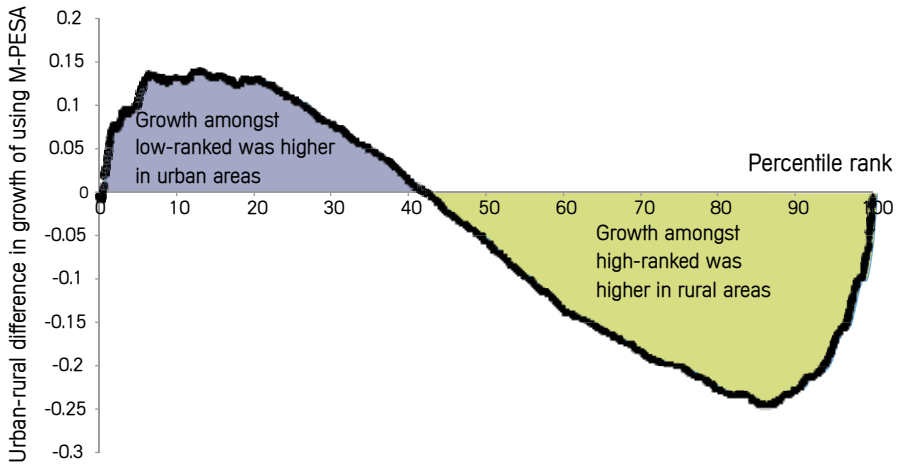
Figure 11 combines Figures 9 and 10 to show the double difference of rural and urban distributions between 2009 and 2013, comparing changes over time for people at a given percentile rank within urban areas with changes for people at the same percentile rank in rural areas. In particular, the figure shows the graph of the function:

$$\delta(r) = [\hat{\rho}_{2013}^U(r) - \hat{\rho}_{2009}^U(r)] - [\hat{\rho}_{2013}^R(r) - \hat{\rho}_{2009}^R(r)]$$

where r is the percentile rank.

Comparing individuals with a given relatively low rank, growth in adoption of M-PESA was higher in urban areas than in rural areas. For example, for those in the 10th percentile, the increase in the probability of using M-PESA was about 15 percentage points higher in urban areas than in rural areas. On the other hand, at higher percentile ranks, the growth was greater in rural areas. For people in about the 43rd percentile, the growth rates were the same in the two populations.

Figure 11: Urban-rural diff-in-diff M-PESA use, by rank



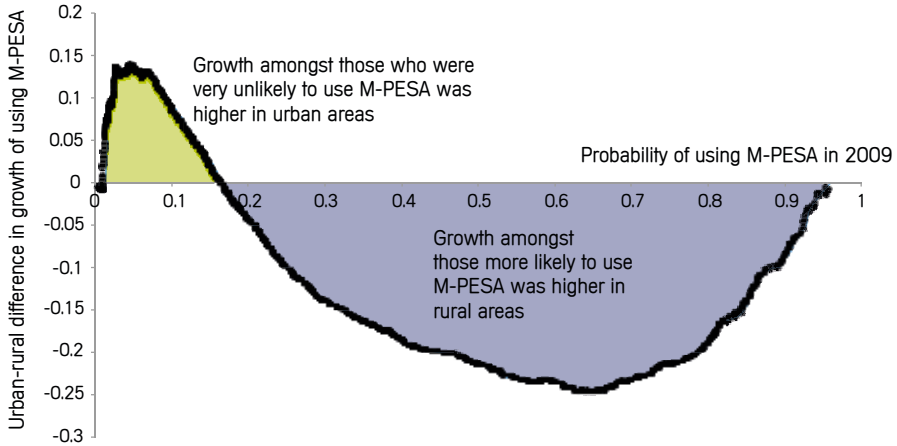
Comparing rural and urban residents at the same rank in the probability distribution may not be appropriate, however, as these people could be quite different due to the difference in rates of M-PESA use between the two areas.⁸ Instead we compute the double difference according to the probability of having M-PESA in 2009, not the rank.⁹ The results are shown in Figure 12.

Amongst individuals who had a very low probability of using M-PESA in 2009 (say, less than 15%), those in urban areas saw their use increase more than those in rural areas. For the rest, however, growth was higher in rural areas. One interpretation of these patterns is that 2009 non-adopters in rural areas faced challenges in gaining access (or didn't value the service) over the following four years, while similar individuals in urban areas were more easily brought into the M-PESA network. Amongst early adoptions (i.e. those with a probability of using M-PESA in 2009), perhaps those in rural areas were particularly

8 Indeed, Figure 8 illustrates just how different they were in 2009.
 9 For a given probability of M-PESA use in 2009, p , let $r_{2009}^U(p)$ be the corresponding percentile rank of urban residents in that year. Then let $\tilde{\rho}_{2013}^U(p) = \hat{\rho}_{2013}(r_{2009}^U(p))$. Similarly define $r_{2009}^R(p)$ and $\tilde{\rho}_{2013}^R(p) = \hat{\rho}_{2013}(r_{2009}^R(p))$ for rural areas. Then the graph in Figure 12 is of the function $\Delta = \tilde{\rho}_{2013}^U(p) - \tilde{\rho}_{2013}^R(p)$.

well connected (both economically and in terms of mobile technology) and thus saw their use increase relatively more compared with those urban areas who did not experience as large an increase in their utilisation of M-PESA.

Figure 12: Urban-rural diff-in-diff by probability of M-PESA use in 2009



Gender gaps

Figure 13 conducts a similar exercise to that in the previous section, but with regard to gender differences instead of the rural-urban divide. It shows the adoption of M-PESA in 2009 by gender – men are more likely to have adopted, although the difference is less pronounced than it is between rural and urban individuals. Still, the median man was twice as likely to use M-PESA as the median woman that year.

The female-male double difference, based on 2009 probability of using M-PESA, is shown in Figure 14. The patterns exhibited bear a resemblance to those in Figure 12 (except at the very lowest probabilities). The relative growth in adoption by women over time compared with that of men mirrored the evolution of use by rural residents vis-à-vis urbanites, reflecting both the early adoption by men and a partial catching-up by women.

Figure 13: M-PESA adoption by gender, 2009

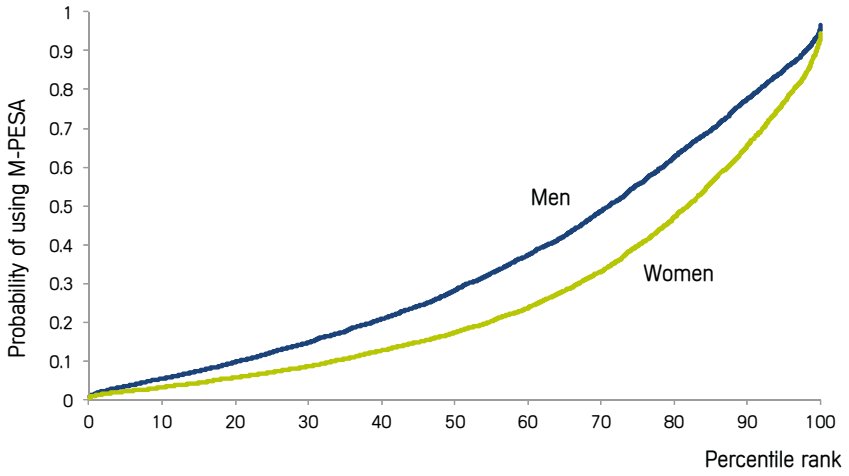
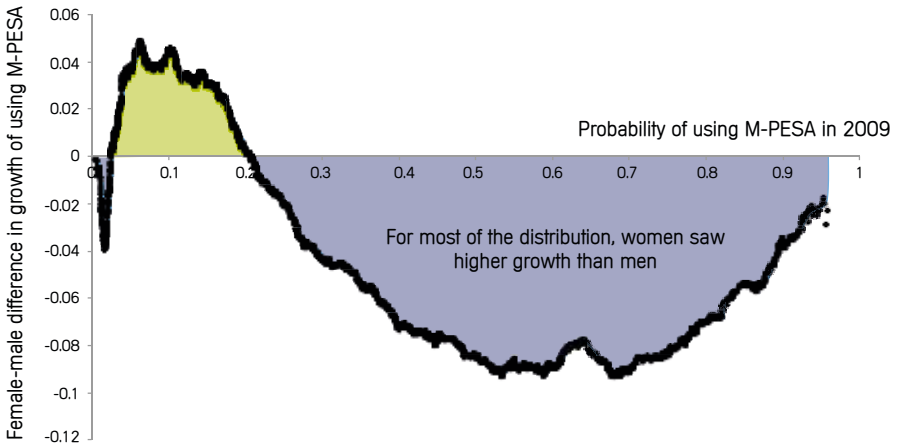


Figure 14: Female-male difference-in-difference gender gap, 2009–2013



Education and M-PESA

Education status correlates strongly with M-PESA adoption. Without estimating probabilities of adoption by education level, we simply report the share of individuals using M-PESA at each education level in the two survey years (see Table 4). The relatively high levels of adoption early on by those with secondary and tertiary education meant that proportional increases amongst these groups were small compared with those with no or only primary education, who saw their adoption rates double over the period. There remained, however, a strong educational gradient to M-PESA adoption.

Table 4: M-PESA use by education level of respondent

	None	Primary	Secondary	Tertiary	Total
M-PESA users in 2009	9.1%	27.6%	54.6%	70.8%	27.6%
M-PESA users in 2013	21.1%	58.4%	78.9%	91%	61.6%

5 Co-evolution of M-PESA and formal financial services

Early on, M-PESA was seen by many as a route into the formal financial services sector – banking for the unbanked. An alternative assessment was that M-PESA could potentially draw customers away from traditional banking services – a view that presumably lay behind Kenyan banks' fierce opposition to the early expansion of mobile money. In this section, we shed some light on this debate using the methodology outlined above.

First, we calculate the probabilities, $\hat{\pi}_{it}^b$ and $\hat{\pi}_{it}^m$, that individual i observed in period t had a bank account or used M-PESA, respectively (recall Section 3). Figure 15 presents scatter plots of these pairs of probabilities in 2009 and in 2013. In 2009, there is a clear positive gradient, with a heavy mass in the lower left-hand corner, and a second agglomeration in the upper-right. The area between these two concentrations is relatively sparsely populated by comparison, supporting, to a first approximation at least, the second view above – that M-PESA represented a new competitive alternative for users of traditional banking services. There is, however, little evidence of a shift from banking to mobile money – it is more likely that the overall use of financial services by people with bank accounts increased, as M-PESA opened up peer-to-peer transaction capability that the banks had previously not provided.

By 2013, while the overall positive relationship was maintained, a clear concavity had arisen. Amongst those with a low probability of having a bank account, a large share was very likely to use M-PESA. This change in the pattern of financial inclusion could have been driven either by a shift out of banking services holding M-PESA use constant (a leftward shift in the scatter plot), or the adoption of M-PESA holding bank account access constant (an upward shift).

Figure 15: Joint distribution of predicted M-PESA and bank account use, 2009 and 2013

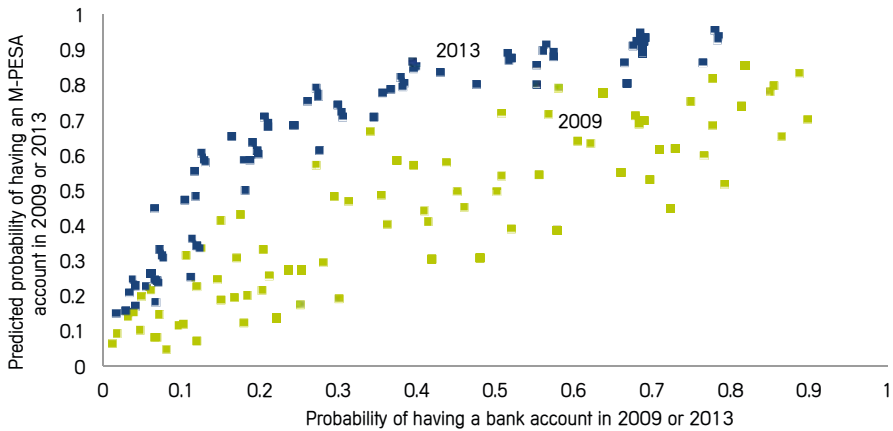
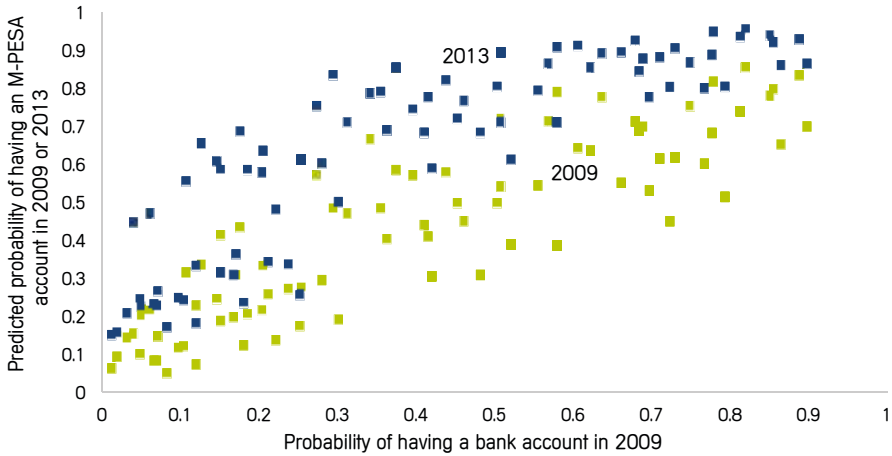


Figure 16, which includes all respondents in 2009 and 2013, attempts to clarify the nature of the shift. The predicted probability of having a bank account in 2009 is measured on the horizontal axis, while on the vertical axis we measure the probability of using M-PESA, for all respondents, first in 2009 and then in 2013. The 2013 series can properly be interpreted as a vertical shift in the 2009 series, suggesting large increases in M-PESA use across most degrees of bank access in 2009. There appears to be significant heterogeneity at low levels of bank access, however. Indeed, individuals with a probability of having a bank account of less than about 0.25 in 2009 fall into two groups: some saw their likelihood of using M-PESA increase from around 15% to 50–70%, while a second group who started in the same position saw little change in M-PESA adoption. Having a bank account was not a necessary condition for the adoption of M-PESA, but a significant proportion of those without bank access remained digitally disconnected.

Figure 16: Joint distribution of predicted M-PESA use in 2009 and 2013 and predicted bank account use in 2009



6 The evolution of financial inclusion

Finally, we document the evolution of financial inclusion more broadly defined by the distribution of the vectors of probabilities $\hat{p}_{it} = (\hat{p}_{it}^1, \hat{p}_{it}^2, \hat{p}_{it}^3)$. We first illustrate the shift in financial inclusion using Figure 6, and subsequently attempt to bound the welfare and distributional consequences of this change.

Mapping financial inclusion

We assign to each individual in the 2009 survey a vector of predicted probabilities, and locate these on the unit simplex. To maintain a manageable visualisation, we limit the number of explanatory variables to just four – gender, rural/urban residence, age, and education – giving a total of $2 \times 2 \times 5 \times 4 = 80$ different categories.¹⁰ In Figure 17, we show the location of each category of individual in 2009, with the size of the bubble representing the number of individuals in that category.

As well as showing the number of individuals at each point in the financial inclusion landscape, we also juxtapose a bubble with size proportional to the number of individuals in that category using M-PESA. In 2009, the bulk of the population is located in a sizeable bulge in the left half of the figure, where

¹⁰ See Appendix for variable definitions.

the prevalence of M-PESA use is relatively limited. As we move towards the formal inclusion vertex, the share of each group with M-PESA increases.

Figure 17: Financial inclusion in 2009

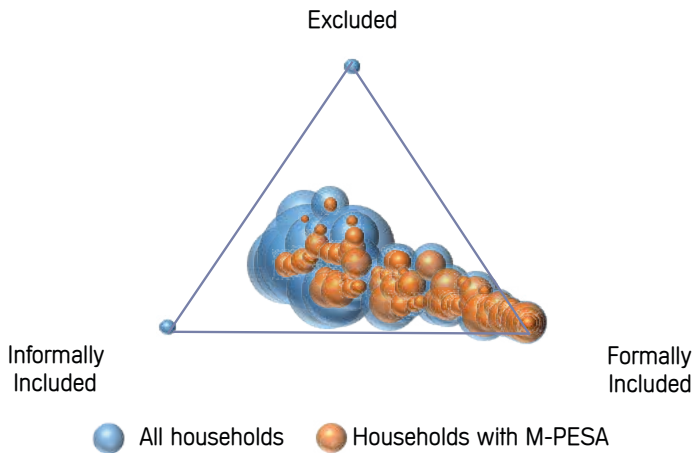
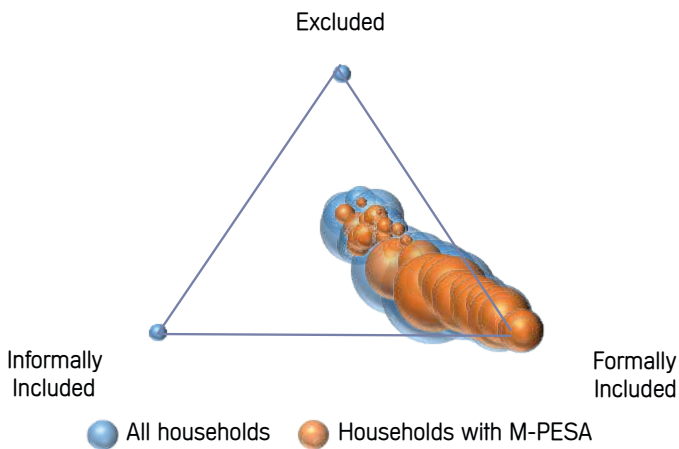


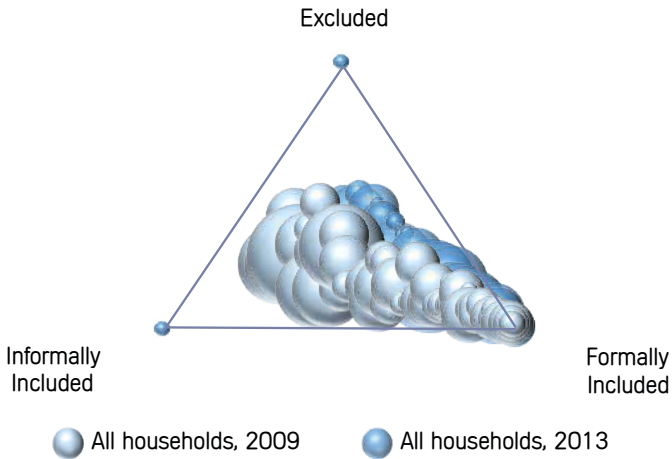
Figure 18 shows that by 2013, a large share of the population has migrated towards formal financial inclusion, and a bulge is observed more in the middle of the distribution. Those in the left tail, who are the least likely to be formally financially included, are less likely to use M-PESA, but the share of M-PESA users in most categories has increased.

Figure 18: Financial inclusion in 2013



The shift in the pattern of financial inclusion over time is illustrated in Figure 19, where we include both the 2009 and 2013 distributions (M-PESA users are not shown separately). We observe a more or less horizontal shift in the distribution, which can be interpreted as a move out of informal inclusion in the direction of formal inclusion, but while maintaining the likelihood of exclusion. This pattern suggests that it was difficult for individuals who had not entered the financial system to move up the ladder of financial inclusion, but that the integration of those who were already included in 2009 deepened over time.

Figure 19: Change in financial inclusion, all individuals, from 2009 to 2013



Assessing the welfare impacts of changes in financial inclusion

We care about changes in the distribution of financial inclusion only to the extent that they have welfare impacts. In this sub-section, we develop a simple framework to assess these welfare impacts.

Let u^s be the utility derived from being in financial inclusion state $s = 1$ (Formal inclusion), 2 (Informal inclusion), or 3 (Exclusion). Note that to simplify, we assume this utility is independent of other individual characteristics. Then individual i 's expected utility at time t is

$$U_{it} = \sum_{s=1}^3 \hat{p}_{it}^s u^s$$

and we let aggregate welfare be the weighted sum of expected utilities across individuals,

$$W_t = \sum_{i=1}^n \omega_{it} U_{it}$$

where ω_{it} is the sample weight of individual i , with $\sum_{i=1}^n \omega_{it} = 1$. Thus

$$W_t = \sum_{s=1}^3 \alpha_{st} u^s$$

where $\alpha_{st} = \sum_{i=1}^n \omega_{it} p_i^s$ and $\sum_{s=1}^3 \alpha_{st} = 1$. Welfare at time t is constant for α_{st} satisfying

$$W_t = \alpha_{1t} + \delta \alpha_{2t} = k$$

where

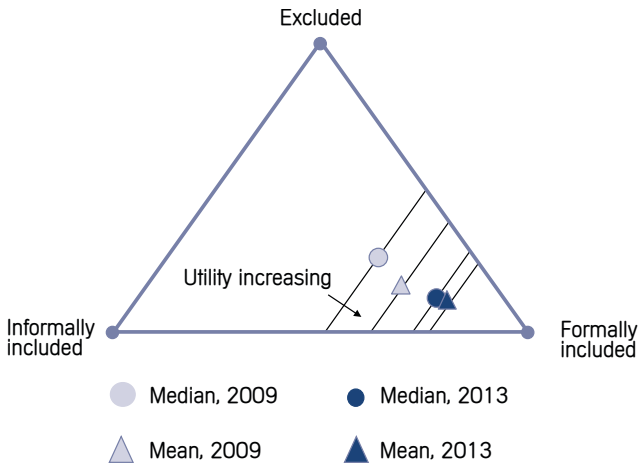
$$\delta = \frac{u^2 - u^3}{u^1 - u^3}$$

and k is a constant. If being informally financially included provides as much utility as being formally financially included, so $u^2 = u^1$, then $\delta = 1$, and indifference curves are horizontal straight lines in the simplex. On the other hand, if informal financial inclusion provides no more benefits than exclusion, so $u^2 = u^3$, then $\delta = 0$, and indifference curves are straight lines parallel to the side of the simplex opposite vertex 1 corresponding to full formal inclusion. A negative value of δ means that either informal or formal financial inclusion is worse than exclusion, but not both. A value larger than 1 would indicate that individuals gained greater utility from informal financial inclusion than from formal inclusion. Neither of these seems likely to be the case in practice.

We now calculate the value δ^* that would maintain welfare at a constant level between 2009 and 2013. In fact, we find that in order for welfare to have remained fixed, it would be necessary that $\delta^* > 1$. Thus, only if a move from informality to formality were to decrease utility could welfare have remained constant between 2009 and 2013. We infer then, under the assumption that formal financial inclusion increases utility, that average welfare must have increased.

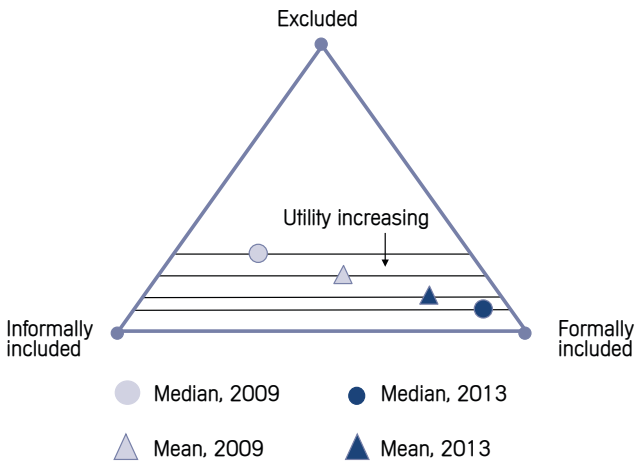
Our observations above, however, suggest that it is important to understand the distributional changes that took place in this window. One approach is to calculate the locations of both the average individual and the median individual in each of the two survey years. Of course, in order to do so, we need to make an assumption about the utility value of financial inclusion. Instead of choosing a single value of δ , we carry out this exercise under the two extreme assumptions identified above, that is $\delta = 0$ and $\delta = 1$. The results are shown in Figures 20 and 21.

Figure 20: Mean and median utility levels in 2009 and 2013, when informal inclusion is no better than exclusion ($\delta = 0$)



If it is the case that informal financial inclusion provides no real benefits to individuals, then in both survey years we find the median utility to be lower than the mean, suggesting some individuals are especially likely to be formally included. However, the difference between the mean and median narrowed between 2009 and 2013, reflecting the fact that those at the top could not go higher, resulting in a compression of the distribution.

Figure 21: Mean and median utility levels in 2009 and 2013, when informal inclusion is as good as formal inclusion ($\delta = 1$)



On the other hand, under the assumption that both formal and informal inclusion are equally welfare-improving, Figure 21 shows, if anything, a reversal of the skewness of the distribution of utilities over time. While in 2009 the median utility was lower than the mean, in 2013 the median was larger than the mean. This pattern is consistent with a general move towards greater financial inclusion, but in a context in which a sizeable share of individuals remain excluded.

These observations are developed in further detail in Figures 22 and 23, which plot the whole distribution of utility or financial well-being across the population in the two years, again under the extreme assumptions of $\delta = 0$ (informal inclusion is no better than exclusion) and $\delta = 1$ (informal and formal inclusion are equally good), respectively. In the figures, we normalise utility, measured along the horizontal axis, to lie between zero and one. When $\delta = 0$, as it is in Figure 22, utility is effectively equal to the probability of being formally financially included; and when $\delta = 1$, as in Figure 23, utility is equal to the probability of not being financially excluded. Each series of points, and the associated smooth fitted line (a simple local moving average), show the share of the population that experiences each level of utility. They can thus be interpreted as probability density functions, the area under which sums to one. For example, in Figure 22, the density is skewed to the left in 2009 and to the right in 2013.

Figure 22: Utility distributions in 2009 and 2013, when informal inclusion is no better than exclusion ($\delta = 0$)

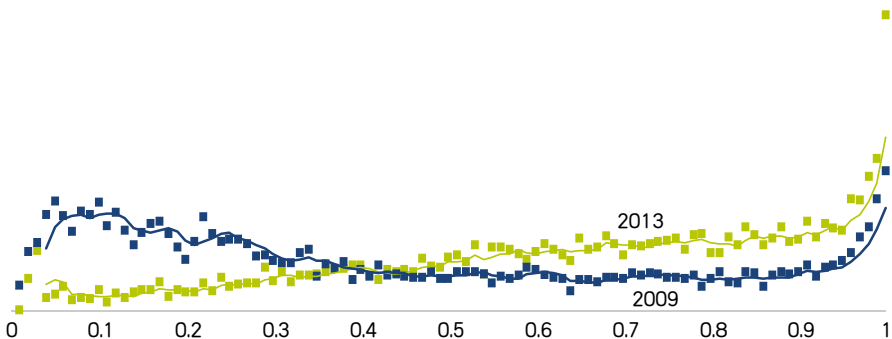
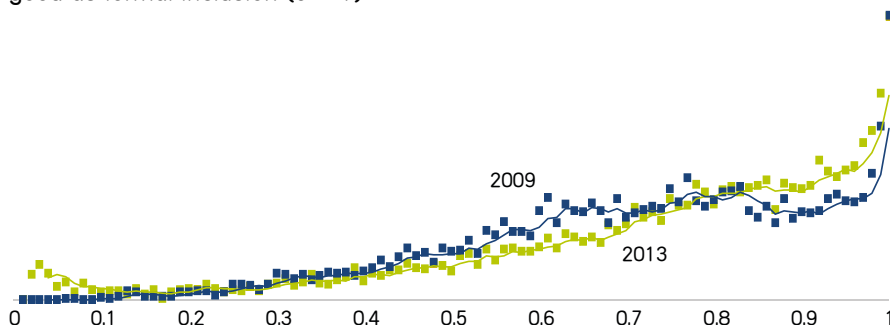


Figure 23: Utility distributions in 2009 and 2013, when informal inclusion is as good as formal inclusion ($\delta = 1$)



The distributions of utilities in Figure 22, with $\delta = 0$, differ markedly, driven largely by the adoption of M-PESA as a route into formal financial inclusion. On the other hand, the distributions in Figure 23, with $\delta = 1$, suggest relatively little changes in the patterns of utility, notwithstanding the movements in the means and medians identified in Figure 21 above. Again this is consistent with a general deepening of financial inclusion, but in a context in which it was difficult to break out of the exclusion state.

7 Some conclusions on causation and policy implications

Our analysis has documented the evolution of financial inclusion in Kenya, and the role of digitised financial services such as M-PESA, between two rounds of FSD Kenya's FinAccess survey. We find that gender, urban-rural and age gaps between M-PESA users and non-users narrowed over the period 2009–2013, and that while there was a large and important movement into formal financial services, a sizeable share of the population remained financially excluded.

Our simulations of changes in the distribution of well-being across the population support the proposition that a deepening of financial integration has had positive overall effects, but that a non-negligible share of the population is yet to reap the benefits of financial inclusion. Whether there is a role for active public policy to remedy this distributional imbalance, and what that role might be, depends on the underlying dynamics of the financial inclusion landscape, and the drivers of change.

For example, did digitisation and the advent and spread of M-PESA *cause* the expansion and formalisation of financial inclusion? On the one hand, it seems obvious that it did. But we don't know if higher rates of adoption of more traditional financial services would have occurred in the absence of M-PESA. In order to draw this conclusion, we would need to discover and exploit exogenous variation in accessibility to mobile banking, variation that was orthogonal to exogenous variation in access to other formal financial services.

Even if we were to establish causation, the question of whether this reflected complementarities on the demand side (say, because people who adopt M-PESA value other financial services more) or competition on the supply side (say, because innovation in one industry promotes innovation in other close substitutes) would remain. That is, our understanding the mechanisms behind such broader effects of mobile money would likely remain incomplete.

Both mechanisms point to the need to maintain a robust and competitive market for financial services. The promotion of mobile money (through subsidies, light regulation, etc.) could have especially high social returns in the presence of demand-side complementarities, but only if those complementary services exist; and if such returns only arise in the context of stiff competition, the policies that afford MNOs monopoly power could prove less effective than hoped.

In any case, an accelerated expansion of mobile money amongst the financially excluded population, and the deployment of a suite of financial services that protects them from risks and promotes growth while limiting their exposure to unsustainable debt, is necessary if the full economic and social benefits of digitisation are to be reaped.

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Appendix

Elements of financial inclusion status

Formal financial products and services
Saving account at SACCO
Personal loan/business loan from a bank
Loan from a SACCO
Loan from a microfinance institution
Loan from a government institution, e.g. Joints Loans Board, HELB or Youth Fund
Loan to buy/build a house or to buy land from a bank or building society
Postbank account
Bank account for savings or investment
Current account with a cheque book
Bank account for everyday needs but no cheque book
Overdraft
ATM card/debit card
Credit card
Hire purchase (e.g. ART, Amedo, Kenya Credit Traders)
Registered mobile money user
Car insurance
House (building or contents) insurance
Government medical insurance, e.g. NHIF
Private medical insurance, e.g. AAR, Mediplus
Life insurance policy
Education policy
Retirement
Government social security, e.g. NSSF
Other insurance
Informal financial products and services
Savings with an ASCA
Savings with a ROSCA/ Merry-go-round
Loan from an employer
Loan from an ASCA
Loan from an informal money lender/Shylock
Loan/credits from buyer (of your harvest, e.g. tobacco, vegetables)

Explanatory variables for modelling financial inclusion

A. Limited stationary variables

Variable	Values
Gender	Male/female
Geography	Urban/rural
Age group	18–25, 26–35, 36–45, 46–55, above 55
Education level	None, primary, secondary, tertiary

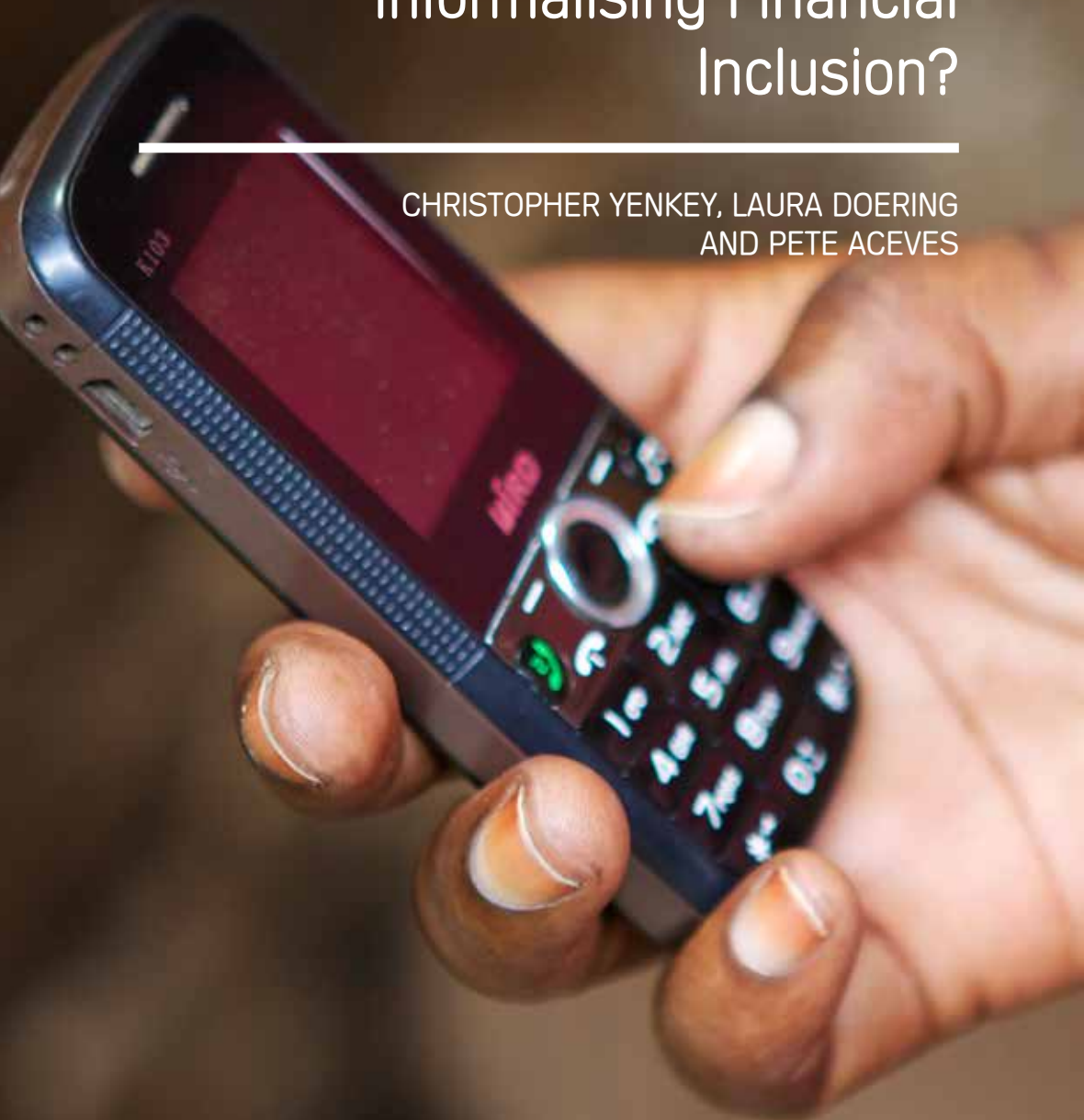
B. Additional explanatory variables

Housing attributes	Employment and income
Type of dwelling	Gross earnings
Type of permanent dwelling	Pension
Material of main dwelling	Family/friends/spouse
Material of the walls of the main dwelling	Cash crops
Main source of cooking fuel	Food crops
Main source of lighting	Output from cattle/livestock
Main source of water	Sell your livestock
Type of toilet facilities	Fish farming/fishing
Items they own:	Employed on other people's farm
Radio	Employed to do others' domestic chores
Black and white TV	Employed by the government
Color TV	Employed in private sector – with 50+ people
Bicycle	Employed in private sector – with 10–49 people
Motorcycle	Employed in private sector – with <10 people
Desktop/laptop computer	Own business – trading/retail
Built-in kitchen sink	Own business – services
Refrigerator	Subletting of land
Electric stove and oven	Subletting of houses/rooms
VCR/DVD player	Investment
Electric iron	
Camera	
Microwave oven	
Hi-fi/music centre	
Vacuum cleaner	
Free standing deep freezer	
Car	
Number of habitable rooms	
Owner of the residence	

CHAPTER 5

Is Kenya's Digital Revolution Informalising Financial Inclusion?

CHRISTOPHER YENKEY, LAURA DOERING
AND PETE ACEVES



Introduction

This chapter uses FinAccess data to provide an alternative accounting of mobile money's contribution to formal financial inclusion and explores how this powerful new financial tool enables informal as well as formal financial action. The chapter argues that the access strand framework employed in Kenya's financial inclusion reporting (CBK and FSD Kenya, 2007, 2011, 2013) places too much emphasis on a supply-side perspective that concentrates on institutional formality, rather than the underlying *behaviours and functions* which financial products enable. In the development lexicon, it is the latter that is of interest, rather than the former. Financial sector development initiatives rest on the understanding that financial solutions can improve the capacity of individuals and institutions to manage liquidity, invest productively, pool risk effectively and transact efficiently, with consequent impacts on livelihoods and growth. For households (and, to an extent, businesses) these benefits can be delivered through informal as well as formal institutions, with their differing attributes of flexibility, security, cost, value addition, and so forth. The increasing trend exhibited by Kenyans towards diverse financial portfolios that encompass formal and informal products (CBK and FSD Kenya, 2013) demonstrates the value that many Kenyan's see in formal institutions as well as institutions that are currently classified as 'informal' or even 'excluded'. If savings, credit, and investment are positive financial actions, and these actions can be enacted in both the formal and informal institutions, then the goal of our analysis is to start a larger dialogue about the impact of mobile money as a tool for stimulating beneficial financial activity, without limiting the conversation to activity in the formal sector.

Financial services provided by the formal sector are often viewed as more secure, more efficient and more effective in intermediating value than informal institutions. Following Kenya's digital revolution, therefore, considerable attention has been given to the role of mobile money in fostering formal financial inclusion, either directly because mobile money can be classified as a formal financial product, or indirectly as a means of stimulating increased use of other formal financial products. As Porteous (2006, p. 9) describes, '(t)he sheer momentum behind the take-up of mobile phones raises the prospect that financial services provided via mobile phones, in other words, mobile payments and banking, will similarly take off'. Scholars suggest that formalising effects of mobile money stem partly from the fact that mobile money helps low-income users feel more comfortable interacting with formal financial institutions. Gross et al. (2012) note that 'unbanked' individuals often report avoiding the financial sector because they 'don't like dealing with

banks'. They argue that mobile money provides a means of accessing formal services without face-to-face interactions with a financial institution. Further, Yaron (1994) suggests that mobile phone technology reduces the transaction costs associated with accessing the formal sector, thus making formal sector participation more feasible for traditionally excluded users. In the same way that microfinance initiatives revolutionised credit provision to the poor, many view mobile banking as having the potential to alter how the poor interact with the formal financial sector (Cull et al., 2013).

These perspectives implicitly suggest a linear process through which a population evolves into higher degrees of formal sector engagement. However, as we look at the uses of mobile money, this directionality is not quite so evident. For users, the formal elements of mobile money are a clear benefit, such as the security features that protect deposits or ensure delivery of remittances, and the efficiency benefits that support scale and lower transaction costs. At the same time, the use of mobile money to immobilise cash or enable saving and borrowing through social networks suggests that we need to pay more attention to its effects on informal financial practice. Aker and Wilson (2013) find that individuals often keep small amounts of money stored in their mobile accounts, but the fact that users do not earn interest on the money they store, and nor is the money linked to a formal financial institution, makes it inappropriate to classify savings on a mobile device as 'formal'. There have been a number of studies which highlight the ways in which mobile money elucidates 'the extensive array of inter-personal transactions that [...] operate in circuits of give and take which effectively allow for "saving" and "borrowing" in informal mechanisms—that is, with other people' (Johnson et al., 2012, p. 8);¹ and the way in which mobile money generally provides a technology that better facilitates the enactment of many of the financial activities that the poor were already familiar with (Donner and Tellez, 2008). Scholars have also examined the effects of mobile-enabled informal financial intermediation on consumption smoothing and risk pooling (Jack and Suri, 2014), enabling households to weather shocks.

Like cash, mobile money is inherently fungible, increasing the efficiency of transactions across space, and enabling a range of other financial activities such as saving, lending, and risk pooling in both the formal and informal sectors. A mobile money user can just as easily pay down her mortgage or receive wages from a formal sector employer as she can send an informal remittance to a member of her social network or use her phone to store cash in place

1 Saving and borrowing through informal networks yields value over and above the amount transacted, in the form of social and/or financial capital. In this sense, the network itself can be viewed as a structure (like the formal financial sector) which intermediates value to create a return on the additional amount.

of a wallet or a secret hiding place. In this chapter, we focus on the extent to which mobile money may be viewed as a *tool* to enable financial action in formal and informal financial institutions, rather than on its role in stimulating formal inclusion per se. Our perspective bridges the literature on financial inclusion and more recent work by FSD researchers on financial capabilities. The former have a strong focus on stimulating a population into participation in the formal sector, while the latter attend to the myriad ways that Kenya's poor enact personal finance.

Our analysis is presented in two parts. First, we question mobile money's contribution to the recent trend towards financial inclusion in Kenya by reanalysing FinAccess data to determine how much of the recent surge in formal financial inclusion can be accounted for by mobile money registration. Our reanalysis suggests that the majority of the growth in formal financial inclusion in Kenya in recent years is attributable to the assumption that all registered mobile money users are formally included regardless of how they use the product, with especially inflated rates of financial inclusion for women and rural residents. Second, we consider how the more formal features of mobile money might increase both formal and informal financial action. This analysis is based on the idea that mobile money is perhaps best conceived as a tool for financial action rather than the action of direct interest. Our results confirm findings from earlier work that links uptake of mobile money to increased use of formal sector savings and credit products. At the same time, we find that uptake of mobile money is positively related to savings and credit in the informal sector, especially for traditionally excluded groups of women and rural users, who are significantly more likely to pair mobile money with *informal* savings and credit activities. These two reanalyses of FSD statistics are intended to provide a broader perspective on what is meant by formal financial inclusion in Kenya today by showing the basis upon which the metrics are formed and how the technology is used by particular sub-populations.

1 What does mobile money mean for financial inclusion? Provider and user perspectives

In reports on the changing financial inclusion landscape, the access strand, which is the main measure of inclusion produced by the FinAccess studies,² categorises mobile financial services as a formal financial activity. Specifically, the access strand places mobile money in the 'formal non-prudential' category. It defines formal non-prudential activity as encompassing 'individuals whose highest level of reported usage of financial services is through service providers which are subject to non-prudential oversight by regulatory agencies or government departments/ministries with focused legislation' (FSD Kenya and Central Bank of Kenya 2013, p. 12). Other financial activities in the formal non-prudential category include Postbank accounts, accounts with the National Social Security Fund (NSSF), and accounts with the National Health Insurance Fund (NHIF).

In categorising mobile money as a formal tool, the access strand adopts the perspective of the *provider*. For instance, firms like Safaricom are corporate institutions governed by formal rules and routines, and are legally registered with the Kenyan government. Formal mobile money providers offer standardised products, certain legal protections, and a highly developed technological platform via which users conduct transactions. By comparison, informal institutions like Rotating Savings and Credit Associations (ROSCAs) facilitate transactions among informal social contacts, and these transactions are likely to be less secure and have less oversight by formal governance regimes. Thus, in categorising mobile money as a formal non-prudential product, the access strand focuses on the ways in which providers offer formal financial experiences.

2 The access strand, produced using FinAccess (and associated surveys in other countries), measures people's financial inclusion status according to the most regulated form of service that they use. Thus, someone with a formal bank account would be in the highest access strand and be classed as 'formally prudentially included'. This does not tell us what other services they use (formally regulated but not prudentially regulated, such as mobile money, informal services such as ROSCAs, and so forth). Someone whose most regulated financial service is a ROSCA, on the other hand, would be classified in the 'informal' access strand. Those whose financial interactions are confined to financial transactions between friends and family, or savings under the mattress, are classified as 'excluded'. However, what we are increasingly learning is that the 'excluded' access strand encompasses significant financial activity rooted in local structures that have important implications for poverty and growth, as well as for the development of formal financial markets.

Table 1: Financial inclusion access strand categories

Access strand classification	Definition	Institution Type
Formal prudential	Individuals whose highest level of reported usage of financial services is through service providers which are prudentially regulated and supervised by independent statutory regulatory agencies (CMA, CBK, IRA, RBA and SASRA)	Commercial banks
		DTMs (Deposit taking MFIs)
		Forex bureaux
		Capital markets
		Insurance providers
		DTSs (Deposit taking sacco's)
Formal non- prudential	Individuals whose highest level of reported usage of financial services is through service providers which are subject to non-prudential oversight by regulatory agencies or government departments/ ministries with focused legislation	MFSP (mobile financial service providers)
		Postbank
		NSSF
		NHIF
Formal registered	Individuals whose highest level of reported usage of financial services is through providers that are registered under a law on government direct interventions	Credit only MFIs
		Credit only SACCOs
		Hire purchase companies
		Government of Kenya
informal	Individuals whose highest level of reported usage of financial services is through unregulated forms of structured provision	Informal groups
		Shopkeepers/Merchants
		Employers
		Moneylenders/shylocks

Source: CBK and FSD Kenya (2013), p. 12.

In our analysis of the contribution of mobile money to financial inclusion in Kenya, we adopt a *user-led* perspective, focusing on the cases of use of mobile money rather on than the regulatory status of the provider. The underlying reasoning behind this is that mobile money services such as M-PESA increase the efficiency and security of transactions between parties, but do not in themselves offer interest-bearing savings, credit and insurance options.³ It is only when mediated by other institutions, either formal and informal – such as banks, ASCAs, informal social networks, and so on – that mobile money facilitates the benefits of full financial inclusion. For example, the impacts on

3 Mobile money has increasingly facilitated liquidity management through its usage to 'store' money. However, mobile money deposits are non-interest bearing, have minimal protection and are not subject to prudential oversight. The use of mobile money to store money is therefore often underplayed, as its 'savings' properties are contentious from a regulatory perspective.

household vulnerability found by Jack and Suri (2014) have been achieved through the use of M-PESA to facilitate transactions within social networks. These benefits should therefore be properly ascribed to informal financial intermediation infrastructures as much as the efficiencies generated by mobile payments platforms.

Our reanalysis is motivated by other data within FinAccess that indicate the uses of mobile money. For this analysis, we separated these cases of use into three groups, signifying their relationship to institutions classified as 'excluded', 'informal', or 'formal' in the FinAccess access strands discussed above. As we see in Table 2, the most common use of mobile money is to send or receive domestic remittances, a practice associated with the 'excluded' access strand in FSD's current financial inclusion accounting. Almost 94% of Kenyans who are registered mobile money users made use of the product in this way in 2013, up from 34% in 2009. The second most common use of mobile money was 'to store value' – a practice associated with the 'excluded' access strand due to its commonality with 'hiding cash in a secret place' – and another common use of mobile money is to immobilise cash during travel. We will return to a discussion of the security features of mobile money that drive these two uses later. A similar percentage of respondents reported using mobile money for making contributions or repayments to informal savings groups as reported immobilising funds on their phones. These uses of mobile money linked to institutions classified as 'informal' and 'excluded' in the access strand model far outnumber any use of mobile money to enable more formal financial transactions.

The third grouping of uses in Table 2 shows more formal uses of mobile money, although it is worth noting that a great number of these uses can easily be informal. For example, all of the transactional uses, such as 'buy goods/services', and several forms of paying or receiving wages or payments from customers or business associates could be informal sector activity if the respondent is active in the informal economy. But even with this bias towards defining uses of mobile money as 'formal', the percentages of registered users employing mobile money for these reasons are far below those for uses that are unquestionably 'informal' or 'excluded'. In 2013, fewer than 10% used mobile money to pay for goods or services, and fewer than 3% used it to interact with a commercial bank.

Table 2: Reported uses of mobile money

	2009	All 2013	2013					
			Female	Male	F:M	Rural	Urban	R:U
Uses associated with 'excluded' access strand								
Send or receive money domestically, family and friends*	34.1	93.5	95.11	91.33	1.04	93.37	93.7	1.00
To save	36.5	39.4	38.09	41.19	0.92	35.21	44.9	0.78
Deposit when travelling so you don't carry cash	25.6	20.0	17.95	22.66	0.79	14.64	26.92	0.54
<i>Average ratio within this category</i>					0.92			0.77
Uses associated with 'informal' access strand								
Informal savings groups contributions or repayments**		20.1	17.25	26.78	0.64	15.13	28.57	0.53
Make donations	8.9	8.6	6.98	10.69	0.65	6.22	11.62	0.54
<i>Average ratio within this category</i>					0.65			0.53
Any use potentially associated with 'formal' access strand								
Buy goods/services	4.4	9.3	8.79	10.07	0.87	7.76	11.4	0.68
Pay bills, e.g. Postpaid account, electricity, DSTV	3.7	7.9	6.61	9.74	0.68	4.51	12.45	0.36
Receive payments from customers	7.1	7.4	5.88	9.57	0.61	5.05	10.58	0.48
Receive payments from business associates		6.0	3.62	9.23	0.39	4.13	8.44	0.49
Receive salaries/wages	2.1	4.3	3.33	5.65	0.59	3.3	5.65	0.58
ATM withdrawals	5.3	4.2	2.42	6.6	0.37	2.25	6.74	0.33
Transfer money to/from bank account		4.2	2.71	6.16	0.44	2.46	6.41	0.38
Pay salaries/wages	2.5	3.1	2.47	3.92	0.63	2.29	4.11	0.56
Pay MFI or bank loans		0.6	0.58	0.62	0.94	0.33	0.93	0.35
Receive MFI or bank loans		0.3	0.25	0.39	0.64	0.25	0.38	0.66
<i>Average ratio within this category</i>					0.62			0.49

Notes: * Question asks about "most often" source/target (H6 and H9), so this is underestimated; ** FinAccess 2013 K14, conditional on respondent reporting participation in an informal group.

Source: CBK and FSD Kenya (20011, H17) and CBK and FSD Kenya (2013, H17).

The classifications in Table 2 could be contended and refined. What we present here is aimed at facilitating a dialogue on the role of mobile money with respect to financial inclusion that recognises the importance of the informal as well as the formal institutions through which financial practices are enacted for many Kenyans. Our contention is that the access strand, as it is currently constructed, obscures rather than elucidates these relationships.

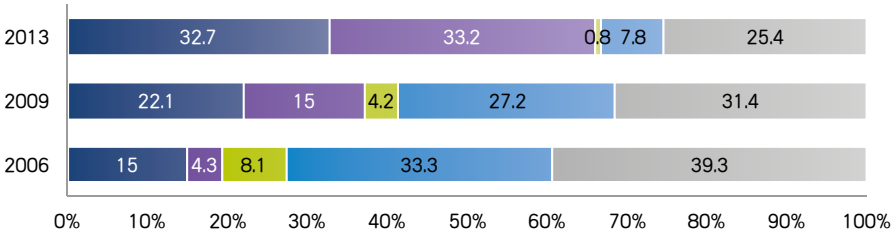
Returning now to the access strand as a measure of financial inclusion, Figure 1 presents descriptive statistics on financial inclusion in Kenya from 2006 to 2013 from the perspective of the provider of each financial product, using the five categories from the 2013 FinAccess report (CBK and FSD Kenya, 2013). Panel A reproduces earlier FinAccess results (see Figure 3.3 in FinAccess Report 2013) on the most formal access strand reported by respondents, categorising each product according to formality of provider as shown in Table 1. The figure shows a clear trend towards increased access to the 'formal prudential' category (resulting from increased use of commercial bank accounts), increasing participation in the 'formal non-prudential' category (as a result of dynamic growth in mobile money products that are provided by non-prudentially regulated telecoms), and accompanying declines in the 'informal' and 'excluded' access strands.

Panel B of Figure 1 is a thought experiment whereby the access strand is reconstructed on the premise that mobile money is more properly viewed as a tool that enables financial action in both informal and formal spheres, rather than as a distinct financial activity in and of itself. This leads us to consider what the access strand would look like if we omit mobile money entirely.

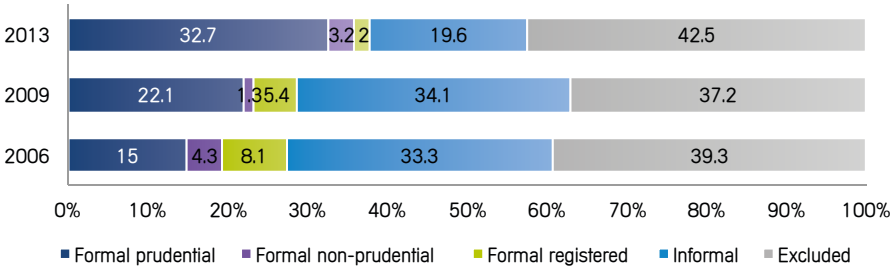
As we can see from Panel B, growth in the 'formal prudential' category remains strong when omitting mobile money, showing that the number of Kenyans using commercial bank products is not dependent on mobile money registration. However, the difference in other categories is dramatic. When we omit mobile money, the 'formal non-prudential' access strand falls to low single digits, with no pattern of increases since 2006. This reduction in the 'formal non-prudential' category is almost entirely transferred to the 'informal' and 'excluded' access strands, with 17 of the 33 percentage points reallocated to the 'excluded' category and 12 percentage points reallocated to the 'informal' category. This shift from 'formal non-prudential' to the 'excluded' category also results in slight growth in the 'excluded' category across the period, instead of a sharp decline.

Figure 1: FSD access strands, by provider

Panel A: Including mobile financial services



Panel B: Mobile financial services omitted



Source: Panel A taken from CBK and FSD Kenya (2013); panel B based on authors' calculations.

A comparison of Panels A and B suggests how much of the current understanding of financial inclusion is attributable to growth in the number of registered mobile money users and the assumption that all mobile money users are meaningful members of the formal sector. When the practice of merely registering a mobile money account is omitted, growth in participation in the 'formal non-prudential' category is eliminated. Affiliation with other non-prudential financial service providers, such as PostBank, or participation in government programmes like NHIF and NSSF do not show increases since 2006. In contrast, when mobile money is omitted from the access strand, the percentage of Kenyans that fall under the 'excluded' sector grows rather than falls from 2006 to 2014. Combined participation in the 'informal' and 'excluded' categories is roughly twice as high when mobile money is omitted. This result demonstrates that registering for mobile money is the sole practice tying a large percentage of Kenyans to financial inclusion, since their use of the product is limited to financial actions that would otherwise be coded as 'informal' or 'excluded', as we can see from Table 2.

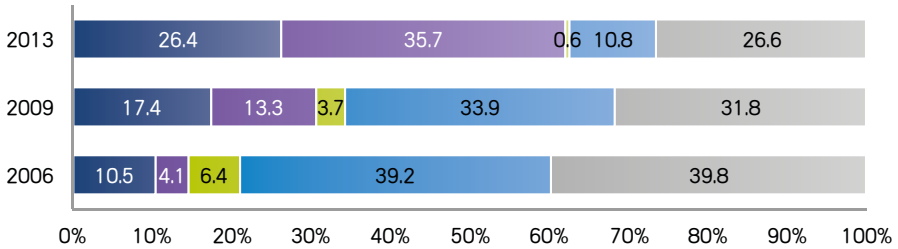
Following on from Figure 1, Figures 2 and 3 compare financial inclusion status with and without registered mobile money users for two key user groups: women compared with men, and rural residents compared with urban residents. Both figures show the same overall trend for the two user groups, with overall

financial inclusion being much higher when mobile money is categorised as a formal financial product. Figure 2 shows that including mobile money in the financial inclusion accounting has somewhat more impact for women than for men. Categorising mobile money registration as a formal sector access strand increases rates of formal financial inclusion among women in 2013 to 63% (panel A), compared to 31% when mobile money is excluded (panel B). In contrast, the level of financial inclusion among men in 2013 is 71% when mobile money is included (panel C), compared to 45% when it is not (panel D). Although the shift is significant for both groups, these data suggest that mobile money registration is the sole link into formal sector participation for a larger portion of women than men.

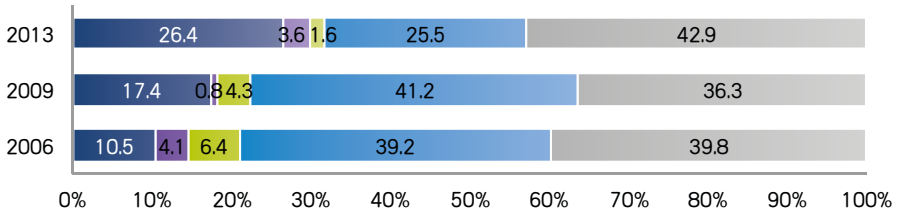
Figure 3 provides the same comparison for rural and urban Kenyans. In 2013, 60% of rural residents are formally included when mobile money registration is included as a formal sector access strand, but this rate is cut in half to 30% when mobile money registration is omitted. Mobile money's contribution to financial inclusion is still significant but less pronounced for urban residents, with 80% of urban residents financially included in 2013 when mobile money registration is included in the accounting, falling by about one-third to 52% when mobile money is omitted. This suggests that categorising mobile money as a formal financial activity overinflates our perception of formal financial inclusion for women and rural users in particular.

Figure 2: FSD access strands, by provider and gender

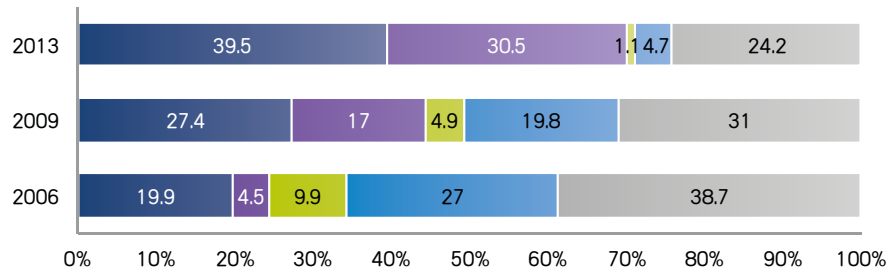
Panel A: Female with mobile financial services



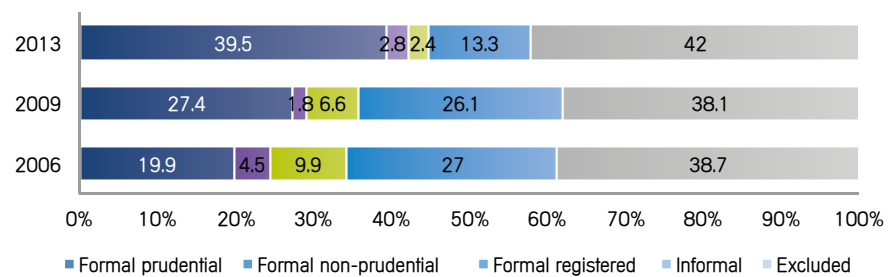
Panel B: Female with mobile financial services omitted



Panel C: Male with mobile financial services



Panel D: Male with mobile financial services omitted

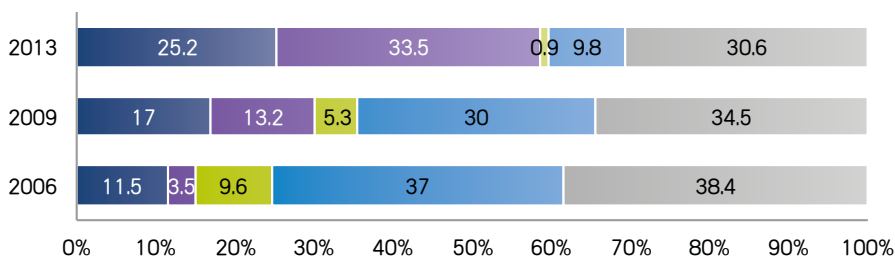


■ Formal prudential ■ Formal non-prudential ■ Formal registered ■ Informal ■ Excluded

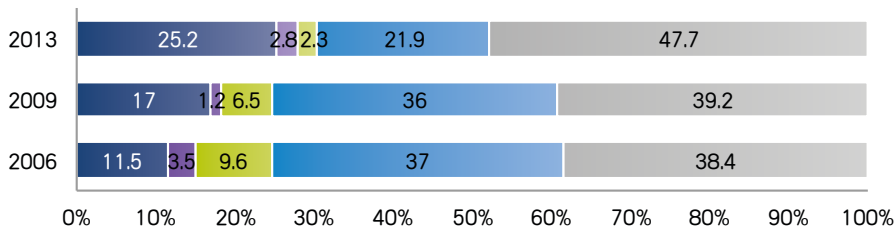
Source: Panels A and C taken from CBK and FSD Kenya (2013); panels B and D based on authors' calculations.

Figure 3: FSD access strands, by provider and rural versus urban

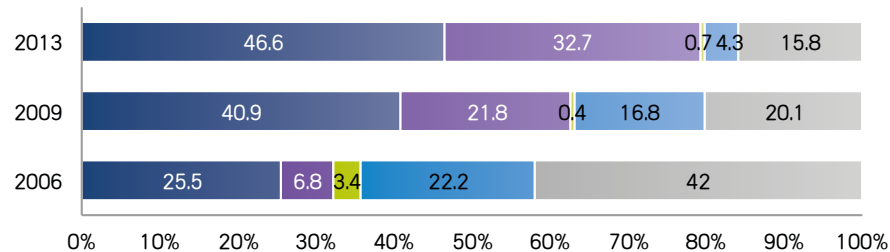
Panel A: Rural with mobile financial services



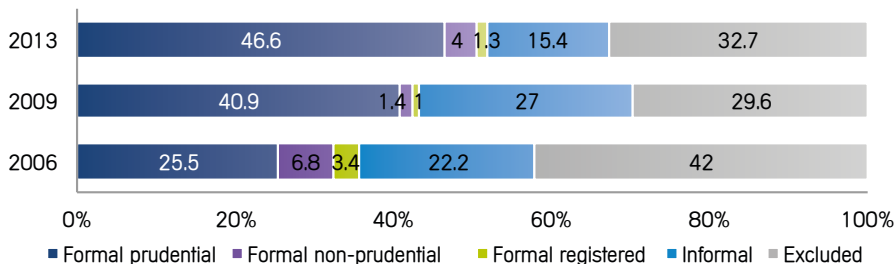
Panel B: Rural with mobile financial services omitted



Panel C: Urban with mobile financial services



Panel D: Urban with mobile financial services omitted



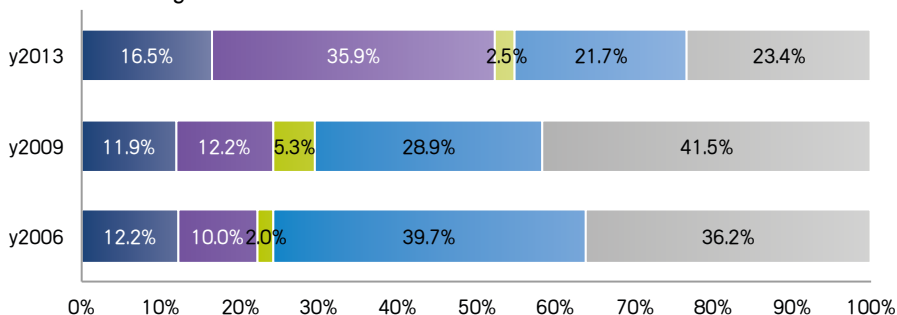
Source: Taken from FSD and Central Bank of Kenya (2013).

We extend this thought experiment in our next reanalysis by exploring what financial inclusion looks like when we account for the total basket of products used by each respondent rather than just their most formal product. Figure 4 presents the same analyses as above using the proportions of each respondent's total reported financial products used that fit into each access strand. For example, if respondents on average reported using five financial products, one from each access strand, then all five categories would equally show 20% participation (note that all financial actions are weighted equally, so that using a bank account has the same weight as saving under the mattress, for example). Panel A of Figure 4 shows this proportional product usage with mobile money in the accounting of financial inclusion, while panel B shows usage with mobile money omitted.

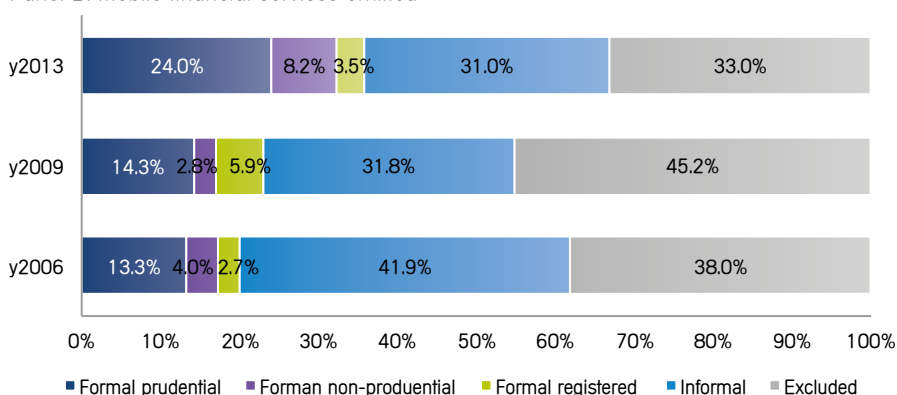
The results in Figure 4 are consistent with those in Figure 1, showing that the increase in proportional use of formal financial products is disproportionately the result of counting merely the registration of mobile money as a formal practice. Panel A shows that the average Kenyan's basket of financial products is almost 36% 'formal non-prudential' when mobile money is included in the accounting, while about 45% of all financial products used fall under the 'informal' or 'excluded' categories. But Panel B shows a sharp difference when mobile money is excluded from the accounting: only 8.2% of all financial products used are 'formal non-prudential', and the proportion of 'informal' and 'excluded' products used jumps to 64%. Not only does the inclusion of mobile money suppress the levels of use of 'informal' and 'excluded' financial actions, but looking at financial inclusion from the perspective of the total basket of financial products used also shows that the proportional use of 'formal prudential' products is also suppressed when mobile money is counted as a financial practice in itself. When mobile money is included in the accounting, the average Kenyan's basket of financial products used is 16.5% 'formal prudential' (i.e. bank accounts, insurance policies, capital market share ownership, deposits at SACCO's, and so on). However, when mobile money is excluded in the analysis, the growth in this most formal category is also more pronounced.

Figure 4: FSD access strands, by provider and proportional use

Panel A: Including mobile financial services



Panel B: Mobile financial services omitted



Source: Authors' calculations.

Next, we reanalyse the financial inclusion statistics for the proportional composition of users' total baskets of financial products for women versus men, and for rural versus urban residents. We find similar results to those presented in Figures 2 and 3 (to conserve on length, we will not include additional figures here). The story is consistent: the inclusion of mobile money in the proportional financial inclusion accounting has a larger bias for women compared to men, and for rural compared to urban residents. Whether the analysis looks at the most formal access strand used or the proportional use of all financial products, counting mobile money registration as a formal financial activity in and of itself results in an upward bias in our estimates of formal financial inclusion, especially for the traditionally excluded user groups of women and rural residents. The reanalysis of proportional financial inclusion also highlights that counting mobile money itself as a formal financial product obfuscates the proportional use of both the most formal and least formal financial products. Accordingly, we next turn our attention to our second set of analyses, where

we examine the extent to which mobile money is associated with higher rates of use of both formal and informal financial products.

The results from Figure 4 suggest that the mix of financial products used by Kenyans is becoming more formal over time, a finding consistent with earlier work on the growth in financial inclusion and FSD research (CBK and FSD Kenya, 2011, 2013). In the next section, we model the association between this trend and the growth of mobile money. Earlier work, including the contribution by Gurbuz and Jack in this book, suggests that mobile money has a positive influence on the adoption of other formal financial products. We extend this line of inquiry to ask if mobile money is also correlated with increased use of *informal* financial products and practices. We find evidence of both, which leads to a concluding discussion about the value of focusing on providing financial tools that enable positive financial actions in any sector.

2 To what extent is mobile money formalising financial activity for Kenyans?

In this final analysis, we consider how the more formal features of mobile money might increase both formal and informal financial actions, furthering our overall perspective that mobile money is perhaps best seen as a tool for financial action rather than an action of direct interest.

FSD survey data from 2009 and 2013 offer detailed information about the kinds of financial actions that Kenyans use mobile money for, and the organisations or products used to complete these actions. We use these data to extend our user-focused perspective by offering a more complete picture of the range of activities for which users engage with mobile money. We created two separate dependent variables to measure respondents' use of both formal and informal savings and credit products; we refer to these indicators as the respondent's formality score and informality score, respectively. These scores reflect the extent to which an individual's total basket of reported savings- and credit-related financial actions is enacted in the formal or informal sector. Of course, some actions can be enacted via organisations with elements of both sectors, and in order to avoid biasing results with a subjective coding decision, we also create a 'mixed' category. Table 3 summarises the coding of financial products into these three categories.

Table 3: Savings and credit products categorised as formal, informal, and mixed

Formal	Informal	Mixed
Personal loan/business loan from a bank	Sent domestic remittance in the past 12 months	Savings account at an organisation which requires you to be a member, e.g. agricultural co-op or workplace co-op
Loan from a government institution	Received domestic remittance in the past 12 months	Loan from an organisation which requires you to be a member, e.g. agricultural co-op or workplace co-op
Loan to buy/build a house, or to buy land from a bank or building society	Savings with as ROSCA/merry-go-round (a rotating savings group that collects money from each member and gives it to one person in turn)	Savings with an ASCA (a group that lends to its members or to other people with interest)
Loan given by government or government-related institution to buy a house or land	Savings with a group of friends	Loan from an ASCA (a group that lends to its members or to other people with interest)
Postbank account	Savings given to a family or friend to keep	Layaway purchase
Bank account for savings or investment	Savings you keep in a secret hiding place	
Current account with cheque book	Loan from family/friends/ neighbour	
Bank account for everyday needs but no cheque book	Local shop/supplier that allows you to take goods/services on credit	
Credit card	Loan from shopkeeper	
Shares, stocks, bills and bonds	Loan from an employer	
	Loan/credits from buyer (of your harvest, e.g. tobacco, vegetables)	
	Loan from an informal moneylender/Shylock	

Notes: Mixed products include savings and lending activity at SACCOs. ASCAs are classified as mixed products since they are more formally organised than ROSCAs, but less formally organised than lending and savings institutions.

The formality and informality scores are a simple ratio of the number of (in) formal products used to the total number of products used:

$$\text{FormalityScore}_i = (1*FP_i) + (0.5*MP_i) + (0*IP_i) / (FP_i + MP_i + IP_i)$$

$$\text{InformalityScore}_i = (1*IP_i) + (0.5*MP_i) + (0*FP_i) / (IP_i + MP_i + FP_i)$$

Where FP_i , MP_i and IP_i represent counts of person i 's formal, mixed, and informal products used, respectively.

As an example, imagine that an individual uses five financial products, four of which are formal and one of which is informal. To calculate the formality score, we assign each of the four formal products a value of one and assign the informal product a value of zero. Products that are neither formal nor informal are assigned a value of 0.5. We then divide the number of (in)formal products by the total number of products used. This hypothetical individual would have a formality score of 0.8 $[(4*1 + 1*0 + 0*.5)/5]$ and an informality score of 0.2 $[(4*0 + 1*1 + 0*.5)/5]$.

The (in)formality scores range in value from 0 to 1. We believe this continuous measure reflects a methodological improvement over binary measures of (in) formal sector participation used in previous research (Beck and Brown, 2011; Demirgüç-Kunt and Klapper, 2012; and the contribution by King in this book). Binary indicators of formal sector participation are problematic because they do not capture the array of financial products that respondents use. This is particularly problematic for low-income households, since research demonstrates that such households employ more informal than formal financial products to hedge daily financial risks (Collins et al., 2009). Rather than simply categorising respondents as either participators in or abstainers from the (in) formal sectors, we measure the depth of a respondent's use of products from either sector, normalised to the total number of products used.

Use of mobile money is measured as the respondent's indication that she is a current registered user of a mobile money product, regardless of the particular organisation providing the product. Respondents could also indicate if they were past users of the technology, but we restricted our analysis to current users only.

Beyond mobile money use and the demographic indicators mentioned above, we control for two additional factors that are likely to be associated with greater use of formal financial products: the formality of the respondent's employment, and her geographic proximity to a bank. The latter is a primary focus of financial inclusion programmes, with academics and policymakers both arguing that distance to a formal financial institution is a key constraint to participation in the formal sector (Allen et al., 2012; and see also the

contribution by Barboni in this book). Similarly, employment in the formal financial sector is considered to be directly related to formal savings and credit products. Formal sector wage-earners are more likely to require bank accounts in which to deposit wages paid as cheques. They are also more likely to use bank loans to make large purchases, such as buying a home or automobile. Finally, all models include survey year and district fixed effects to control for yearly macroeconomic fluctuations and regional differences. The construction of all variables is summarised in Table 4.

We employ a generalised linear model (GLM) to measure the relationship between mobile money use and (in)formal financial activity; we use the GLM to account for the censored nature of the dependent variables. The (in)formality scores span values between 0 and 1, and cannot fall above or below those points. Models estimating value-censored dependent variables must account for the bounded distribution of the data (Papke and Wooldridge, 1996; Baum, 2008). Following previous work, we use the logistic transformation of the dependent variable and a binomial distribution to ensure the predicted values fall between 0 and 1 (Baum, 2008).

Table 5 presents summary statistics and a correlation matrix for all variables used in the analysis, and Table 6 presents GLM estimates of the formality and informality scores for the total baskets of financial products used by individuals. In models 1a and 2a, we estimate the relationship between these demographic and control variables and the respondents' degree of financial (in)formality. Models 1b and 2b introduce mobile money usage. Models 1c and 2c interact mobile money usage with gender, and models 1d and 2d interact mobile money usage with location.

Several results from the demographic and control variables reveal trends consistent with earlier studies and are worth mentioning before we discuss the specific results around mobile money and gender and location. All models consistently show that the two older age groups have more formal baskets of products used than the under-25 year-old reference groups. Similarly, less educated Kenyans unsurprisingly have lower formality scores and higher informality scores. The high household expenditure group has higher formality scores and lower informality scores than the low expenditure reference group, while the middle expenditure group has higher formality and informality scores than the reference group. Bank access, measured as geographic proximity and cost of travel, is positively related to higher values in both scores, as is formality of employment.

Table 4: Summary of variables

Variable	Type	Additional Information
Dependent variables	Continuous	0-1 proportion of an individual's basket of financial products sourced from the formal sector
	Continuous	0-1 proportion of an individual's basket of financial products sourced from the informal sector
Mobile money	Binary	Individuals who report being a current, registered mobile money user
Demographic groups	Binary	Survey administrator observed gender
	Categorical	Group 1: Under 25 years
		Group 2: 25-39 years
		Group 3: 40+ years
	Binary	Group 1: Up to primary school, inclusive
		Group 2: Beyond primary school
	Categorical	Group 1: At or below median monthly expenditure value (~US\$2.50/day)
		Group 2: Between median and upper quartile of monthly expenditures (~\$2.50 – \$5/day)
		Group 3: Upper quartile of monthly expenditure (>~\$5/day)
	Binary	Classification determined by the Kenya National Bureau of Statistics.
Controls	Continuous	0-1 proportion of an individual's basket of income streams derived from formal sector employment. Respondents report sources of income in the past 12 months; formal sector employment coded as employee of the state, a formal commercial organisation, or otherwise likely to be taxed.
	Binary	Categorises respondents as having close access to a bank if they can reach a bank in less than 30 minutes or at a cost of less than 50 Kenyan shillings (approximately \$0.75).
	Categorical	Respondent's location in one of Kenya's 69 administrative districts, generally equivalent to counties in the US.
	Categorical	Year respondent answered the survey

Table 5: Descriptive statistics and correlation matrix

Variable	N	Mean	SD	1	2	3	4	5	6	7	8	9
1. Formality Score	13,039	0.11	0.19									
2. Informality Score	13,039	0.77	0.34	-0.35								
3. Mobile Money User	13,039	0.43	0.50	0.26	0.08							
4. Gender (1=female)	13,039	0.59	0.49	-0.14	0.07	-0.06						
5. Age Category	13,039	2.14	0.80	0.09	-0.07	-0.08	-0.08					
6. Education Category (1= up to primary)	13,039	0.64	0.48	-0.28	0.02	-0.34	0.09	0.17				
7. Location (1=rural)	13,039	0.68	0.47	-0.15	0.00	-0.27	0.00	0.14	0.29			
8. Household Expenditure Category	13,039	1.75	0.83	0.35	0.02	0.28	-0.09	-0.04	-0.34	-0.27		
9. Formal Employment Score	13,039	0.83	0.66	0.24	0.04	0.16	-0.15	0.10	-0.10	0.07	0.16	
10. Bank Access (1=yes)	13,039	0.55	0.50	0.16	0.04	0.25	-0.02	-0.08	-0.25	-0.45	0.22	0.01

Table 6: Generalised linear model predicting formality and informality scores

	Formality Score				Informality Score			
	1a	1b	1c	1d	2a	2b	2c	2d
Mobile money user		0.44***	0.38***	0.37***		0.54***	0.46***	0.45***
		(0.04)	(0.06)	(0.07)		(0.04)	(0.05)	(0.06)
Female	-0.29***	-0.28***	-0.34***	-0.28***	0.18***	0.19***	0.12*	0.19***
	(0.03)	(0.03)	(0.06)	(0.03)	(0.03)	(0.04)	(0.05)	(0.04)
Rural location	-0.13**	-0.11*	-0.11*	-0.18*	0.05	0.08	0.08	0.00
	(0.05)	(0.05)	(0.05)	(0.08)	(0.05)	(0.05)	(0.05)	(0.07)
Age group 2: 25-40 years	0.52***	0.48***	0.48***	0.48***	0.02	-0.03	-0.03	-0.03
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Age group 3: 40+ years	0.76***	0.77***	0.77***	0.77***	-0.28***	-0.28***	-0.28***	-0.28***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	-0.05	(0.05)	(0.05)
Low education	-0.60***	-0.52***	-0.52***	-0.52***	0.18***	0.28***	0.28***	0.28***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Middle expenditure group	0.50***	0.44***	0.44***	0.44***	0.36***	0.27***	0.27***	0.27***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
High expenditure group	1.05***	0.94***	0.94***	0.94***	-0.13**	-0.26***	-0.26***	-0.26***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Formal employment score	0.33***	0.31***	0.31***	0.31***	0.16***	0.12***	0.12***	0.12***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Bank access	0.16***	0.13**	0.13**	0.13**	0.23***	0.20***	0.20***	0.20***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Mobile money X female			0.11				0.16*	
			(0.07)				(0.07)	
Mobile money X rural location				0.11				0.15*
				(0.08)				(0.07)
Log pseudo-likelihood	-3,162	-3,144	-3,144	-3,144	-5,869	-5,817	-5,815	-5,816
N	13,039	13,039	13,039	13,039	13,039	13,039	13,039	13,039

Notes: All models include year and district fixed effects. Robust standard errors are in parentheses. *** p<.001; **p <.01; * p<.05

Models 1b and 2b introduce mobile money as an independent predictor of formality and informality in a respondent's use of formal and informal sector savings and credit products. Net of control and demographic variables, Kenyans who use mobile money are predicted to have formality scores that are 0.44 higher than those who do not use mobile money. Similarly, mobile money users are predicted to have informality scores that are 0.54 higher than non-users. These results are consistent with the notion that mobile money is a tool for facilitating both formal and informal transactions.

In order to explore differential effects in the relationship between mobile money and (in)formality for the traditionally excluded user groups, we next interact mobile money registration with each of the demographic groups of interest. Models 1c, 1d, 2c, and 2d present these interactions. The interaction between female and mobile money registration is insignificant in predicting formality scores (1c), suggesting that women are no more likely to have more formal baskets of savings and credit products when they are also mobile money users. However, the same interaction predicting informality scores (2c) shows a positive and significant relationship. In other words, women increasingly pair mobile money with informal savings and credit activities, but are no more likely to pair mobile money with formal savings and credit activities. Women who use mobile money have predicted informality scores that are 0.16 higher than non-users. This result is suggestive that mobile money does not help Kenyan women achieve higher levels of formal financial inclusion, but that they do use this new tool to enact similar financial actions in the informal sector.

The same pattern is seen for rural residents. Model 1d shows no significant interaction of rural residency and mobile money on predicted formality score, but model 2d shows a positive and significant effect of this interaction on informality scores. Similar to Kenyan women, rural residents are not found to pair mobile money with formal sector savings and credit product use to a significant degree, but they do appear to pair it with informal sector versions of these financial actions. These results suggest that women and rural dwellers are inclined to pair mobile money with informal activity, but not with formal activity.

We note the limitations in our models linking mobile money with formal and informal sector savings and investment actions. The FinAccess data are rich in their measurement of products used and respondents' demographic information, but they are cross-sectional data incapable of supporting causal arguments. We intend our results to simply demonstrate correlations between mobile money use and informal savings and credit actions that mirror such actions in the formal sector. Our analysis is aimed at stimulating future research

on ways that mobile money can support these positive financial actions and future discussions around an alternative concept of financial inclusion.

3 Conclusion

Many researchers and policymakers view access to the formal financial sector as an essential means of bolstering financial equity. As Kimenyi and Ndung'u (2009, p. 1) write, '[w]ithout formal financial services, households rely on informal services that are associated with high transaction costs. Thus, increasing access to formal financial services to the majority of households in developing countries remains an important policy goal.' According to this approach, individuals who do not have access to the formal financial sector are seen as financially isolated and excluded from effective means of saving and transferring money. However, our analysis of the FSD survey data – along with research from other scholars – suggests that individuals who use informal financial tools may not be as excluded and isolated as such a perspective would assume. Indeed, armed with mobile money, individuals have much of the security and efficiency typically associated with formal financial transactions. As Aker and Wilson (2013, p. 9) explain, mobile money 'might reduce the transaction costs associated with receiving money transfers, as well as allow households to save, a key strategy for rural households to smooth consumption in response to shocks'.

In this chapter, we have used FinAccess data to conduct two analyses of the role of mobile financial services in formal financial inclusion. Supported by the fact that the vast majority of mobile money transactions are for financial actions that fall into the 'informal' and 'excluded' access strands, we first reanalysed FSD statistics on financial inclusion to show what the financial inclusion landscape in Kenya looks like when we omit mobile money, viewing it as a tool to enable financial activity rather than as a financial activity in its own right. Next, to explore the extent to which mobile money is associated with both informal and formal financial activity, we extended earlier work by FSD researchers and others that shows how Kenyan households in particular use mobile money to enable a range of informal as well as formal financial behaviours.

In both analyses, we find support for the concept of mobile money not as a financial product or practice in its own right but rather as a financial tool capable of enabling a wide range of financial actions. Rather than focusing on mobile money per se, we advocate paying closer attention to the myriad ways in which mobile money is used. Our perspective prioritises financial actions over

financial inclusion. Savings, credit and investment are all potentially positive financial actions capable of being enacted in both the formal and informal sector. We believe that limiting research to the role of the formal financial sector in providing access to such products diverts attention from considering how to best provide the tools such that these behaviours can be enacted in any sector. That is not to suggest that formal sector participation is not beneficial or desirable; rather, we take seriously earlier work showing the positive effects of informal social networks in supporting poor households, and geographic and financial impediments to access (Allen et al., 2012) to formal sector institutions, as reasons to carefully consider access to tools rather than particular products.

This perspective provides a platform for greater discussion around how the overwhelming pattern of cases of mobile money use that relate to institutions categorised as 'informal' or 'excluded' conflicts with existing notions of what 'informal' and 'excluded' mean in the context of financial inclusion measures. In particular, the 'excluded' category suggests financial *isolation*, although our results combined with a range of earlier work clearly demonstrate that Kenyans use mobile money to strengthen their financial ties with members of their informal social network (Johnson et al., 2012; Jack and Suri, 2014). We know that the world's poor are anything but financially isolated, as they employ a wide range of financial practices to organise scarce resources in order to hedge against a complex set of risks (Collins et al., 2009). If the benefit of a savings account at a commercial bank is that it stimulates changes in savings behaviour, it may be possible that saving via a mobile money account could provide a similar benefit. If mobile money is a technology that facilitates greater financial connectivity between members of a social network such that risk is hedged and consumption is smoothed across negative household shocks (Jack and Suri 2014), then the association of the practice of domestic remittances with financial exclusion comes into question. Accordingly, we advocate for bridging research on financial capabilities, and the myriad ways that poor households informally enact financial management, and the development of financial solutions that stimulate more positive financial behaviours.

Clearly, there are formal components of mobile money that are beneficial to poor households who use it to enact informal or excluded financial actions (Johnson et al., 2012; Aker and Wilson 2013). Sending and receiving domestic remittances, storing cash in a secure location while at home or travelling, and keeping informal savings group payments and distributions safe and transparent are all better accomplished and more desirable as a result of the formal security features of mobile money. But categorising all financial behaviours enacted with mobile money products as formal biases our understanding of the trend towards financial inclusion in Kenya. It also keeps the focus of researchers

and policymakers on the goal of sector participation rather than on the encouragement of beneficial financial behaviours.

The labels we use to classify financial behaviour have a strong impact on our perception of the financial landscape. And importantly, the way policymakers view that landscape is likely to shape their response to it. When policymakers see that a large proportion of the Kenyan population is 'excluded' from the formal financial sector, they may seek to rectify this imbalance by finding pathways to 'inclusion'. This response – although well intended – would overlook the fact that many Kenyans have active financial lives outside the formal sector, facilitated by mobile financial services that provide enough formality to be secure and effective but retain enough flexibility to be used in any desired way. In light of this fact, policymakers might broaden their efforts to include improving exchange in the informal sector, rather than viewing financial formality as the only path to achieving equitable financial access.

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CHAPTER 6

Measurement of Financial Inclusion: Beyond the Binary Measure

MICHAEL KING

1 Introduction

Improving access to financial services has become a priority for many international donors in the last ten years. Investments in large-scale data initiatives and impact evaluations have accelerated the development of knowledge on financial inclusion and financial sector depth, while direct donor investments in microfinance and other informal financial services, financial literacy training, and, in some cases, the formal financial sector have helped spur increasing financial inclusion across the developing world.

According to FinAccess data, the rising tide of financial inclusion brought 4.35 million additional adults into the formal financial system in Kenya between 2006 and 2013, with the total at 7.76 million in 2013, or 32.7% of the adult population. By any historical standards this is an unprecedented rate of change in six years, and is one that can be seen across sub-Saharan Africa. For example, in South Africa almost 6 million adults became formally included between 2006 and 2012, with inclusion rates increasing from 53.7% to 67%. And this trend is not confined to the more financially developed sub-Saharan African countries, with significant increases in formal financial inclusion across the region and most obviously demonstratable in countries with multiple rounds of FinScope surveys, such as Tanzania, Uganda and Rwanda.

Academic research has tended to view financial inclusion through the lens of binary indicators for the use of both formal and informal financial products (Beck and Brown, 2011 Demirgüç-Kunt and Klapper 2012; Honohan and King, 2012). However, binary indicators of financial inclusion, while informative, fall short of a true indication of the depth of financial access. First, individuals may have an account but may not use it regularly or it may have become dormant. Second, individuals are likely to rely on an array of financial products across formal, informal and mobile providers, so a focus on formal financial access alone can give a misleading picture of financial inclusion. Third, individuals may have access to an account through a family member to share the fixed costs of having a bank account. As a result, consideration needs to be given to the level of financial cooperation at the household level and whether surveys should focus on the individual inclusion rate (as an individual or through a family member) or the household inclusion rate (Cull and Scott, 2010). Fourth, having a transaction account may lead to you being considered formally 'included', but you may be denied access to savings products, loans, or insurance products that are important for your future well-being.

In contrast to binary indicators, access strands represent an approach to displaying a hierarchy of financial inclusion pioneered by the national bodies

responsible for the FinScope surveys. The access strands generally comprise of four mutually exclusive categories and take different forms depending on the country. For example, South Africa divides the population into 'formally banked', 'informal only', 'other informal' and 'excluded', while Kenya divides the population into 'formal regulated', 'formal other', 'informal' and 'unbanked'.

In an attempt to move away from binary and categorical measures, this chapter presents a more meaningful scorecard of financial inclusion that incorporates non-formal and mobile financial products, specifically takes frequency of usage into consideration, and looks at access to products by function rather than by type of financial institution; thereby opening up the black box of financial inclusion. In addition, an alternative approach focused on the ability to manage financial challenges and opportunities is discussed. The chapter makes the best use of data already available from the 2013 FinAccess survey, but recommendations are made on what additional information would be required to improve the index in future surveys.

The chapter is structured as follows. Section 2 reviews the meaning of financial inclusion, while Section 3 reviews related attempts to develop more sophisticated measures of financial inclusion at both the individual and the country level. Section 4 discusses the issues inherent in both portfolio and composite approaches to indicators. Section 5 presents the proposed new financial inclusion scorecard based on FinAccess 2013, alongside the ideal version if data availability were not constrained. Section 6 then presents 14 respondent profiles using the proposed new financial inclusion index: five individuals, seven regional averages, and averages for males and females. Section 7 discusses potential approaches to creating a composite or aggregate financial inclusion measure at the individual level, and Section 8 concludes.

2 Understanding financial inclusion

The term 'financial inclusion' was first mooted by geographers in 1993 in relation to the closure of bank branches in developed countries, and the subsequent decline in physical access to services (Leyshon and Thrift, 1993). Financial inclusion can be defined as the ability to access appropriate financial products and services. Making reference to important potential supply-side constraints, a more comprehensive definition is provided in AFI (2012): 'full financial inclusion is a state in which all people who can use them have access to a full suite of quality financial services, provided at affordable prices, in a convenient manner, and with dignity for the clients'.

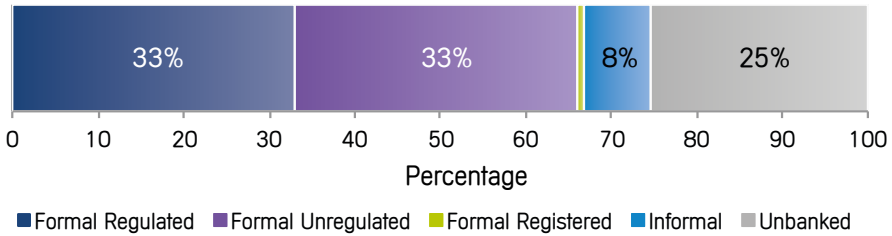
Individuals with access to formal financial services include those who currently use formal financial products and those who are voluntarily excluded (i.e. who choose not to use these services for religious, ethnic or preference reasons). Thus, while usage and access rates may be similar in some contexts, usage is a definite subset of access. As a result of this distinction, a pure measure of access would include individuals who have sufficient purchasing power, can meet all documentary requirements and enjoy sufficient proximity to banking services, but simply prefer to remain financially excluded. A dedicated set of survey questions may well be able to decipher the exact difference between usage and access at the micro level. While this distinction is not maintained throughout the entire financial inclusion literature, the difference is acknowledged by some (e.g. World Bank, 2008).

3 Alternative attempts at financial inclusion measurement

Access strands

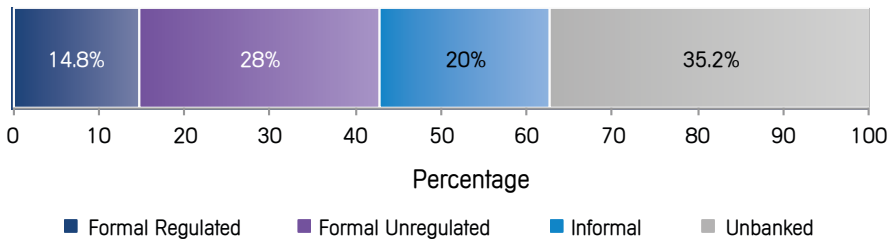
The access strands developed by the FinScope country secretariats in Africa were the first attempt at a more sophisticated measure of financial inclusion. Countries have adopted mildly different versions of the access strands and updated their classifications over the years. The access strand approach specifically recognises the importance of informal financial services to the pursuit of financial inclusion, and in the case of Kenya the access strand differentiates between formally regulated financial services and those outside of the remit of the central bank (see Figure 1). Individuals are categorised by their most formal financial product, irrespective of the frequency of usage and the importance of the financial product in their financial management strategies. It is possible that a formally included individual may use their formal product irregularly while at the same time being highly active across a number of informal products. This underestimates the role of informal financial in household financial management strategies. The access strand approach also ignores the functionality of the products used. For example, an individual may be considered formally banked but may only have access to a transactions account. They may specifically be excluded from savings products (perhaps due to minimum balances) and credit products.

Figure 1: FSD Kenya 2013 access strand



Rather than basing the access strands on usage of the most ‘formal’ product, it is possible to redo the access strands based on the question: ‘What is the most important financial product you use?’. This produces quite a different looking access strand, which illustrates the fact that for many Kenyans the most important financial ‘device’ is actually friends/family or under the mattress.¹ Comparing Figure 2 with Figure 1, a number of noticeable differences can be observed. First, the share of individuals formally included, in particular those currently possessing formally regulated products, has fallen significantly. Second, the share of individuals classified as informally included increases from 8% to 20%.

Figure 2: Alternative access strand



1 For the purposes of this alternative access strand, the categories are as follows. ‘Formal regulated’ includes bank account for everyday needs, ATM/debit card, credit card, bank account for savings or investment, current account with a cheque book, Postbank account, loan given by government, loan to buy/build a house or land, loan from a government institution, personal/business loan from a bank, shares, stocks, bills and bonds, car insurance, National Hospital Insurance Fund (NHIF), other medical insurance policy, life insurance policy, education policy, retirement/pension and National Social Security Fund (NSSF). ‘Formal unregulated’ includes mobile money, supermarket smartcards and loan/credit from buyer. ‘Informal’ is made up of savings account or loan from a SACCO, ASCA, ROSCA, chama or microfinance institution, loan from a shopkeeper or chama group investments. The ‘excluded’ category is made up of savings with friends/family, savings in a secret hiding place, loans from family/friends/neighbour/money lender or shylock, other investments and arrangement with local shop/supplier.

Financial Summary Measure (FSM) South Africa

The closest measure to the scorecard presented in this chapter is the Financial Summary Measure (FSM) produced using South African data by David Porteous in 2003. The FSM consists of four broad components that yield five diagnostic classification measures for any individual. The FSM classifies a person into one of eight tiers for each of these five measures. The measures are as follows: (1) financial penetration (usage); (2) physical access; (3) financial knowledge; (4) financial discipline; and (5) connectedness and optimism. A final (sixth) summary classification, the FSM itself, is the sum of these five measures rescaled back into eight tiers, so that each measure contributes with the same weight to the final measure.

Financial penetration is measured as an average of the score of the three most formal financial products used, where the score for each financial product is found using a tier allocation table (TAT). The TAT gives an arbitrarily chosen score of 1 to 8 for each of 57 banking, savings and investment products and insurance/assurance services, spanning formal and informal financial services. For example, an overdraft, medical insurance and household contents insurance received an 8, a credit card or personal loan from a bank received a 5, whereas a loan from a friend/family or involvement in a savings club received a 2.

Physical access to banks is measured in part by the time it takes to reach a bank for the banked population and the reasons provided for not having a bank account. See Porteous (2003) for further details.

Attitudes to money is broken down into financial knowledge and financial discipline, where scores are provided for responses to a series of questions used in an early FinScope South Africa survey under each heading. In many ways, the score system for each category is artificially imposed on the survey questions and yields some interesting scenarios. Under financial knowledge, answering 'yes' to the statement 'You usually read the finance pages in newspapers and magazines' yields a score of 14, answering 'yes' to 'People often ask your advice on financial matters' achieves a score of 10 points, whereas answering 'yes' to 'You know quite a bit about money and finances' gets a score of 7. A 'yes' to 'you can easily live without having a bank account' received a score of -8, the lowest score.

For financial discipline, the lowest score is achieved when you answer 'yes' to the statement 'You love spending money to buy things even if you have to use credit to do so', while the top scores are for statements like 'You hate owing money to anyone', 'You do not like carrying cash' and 'When you make financial decisions, you like to get advice from family/friends'.

Connectedness and optimism are considered part of the FSM because, as Porteous (2003) argues, 'any understanding of financial take-up must be influenced not only by wealth issues but also by an understanding of people's life circumstances, the major influences in their lives, their happiness levels and their level of connectedness with the world'. Again, the scores given to survey questions are arbitrarily chosen and confined to the questions in the FinScope survey rather than questions designed with the FSM in mind. The top score given was for 'My life is close to ideal', with 'I consider myself physically fit', 'I have a varied life with lots of different activities', 'I feel alive and energetic', 'I feel well and in good health' and 'My life has meaning and purpose' close behind. The lowest scores were for 'My life is not at all close to my ideal', 'I feel lonely', 'I don't feel I really belong' and 'I don't have a really close relationship with anyone'. Significant question marks exist over the rationale for the inclusion of connectedness and optimism as part of a financial inclusion index.

AFI's core set of indicators

At the country level, endeavours to produce a set of commonly measured financial inclusion indicators to inform global data collection efforts have been made. In 2012, the Bangkok-based Alliance for Financial Inclusion (AFI) suggested five indicators under two headings: access and usage.

Defining usage as the ability to use formal financial services, they suggest three indicators: (1) number of access points per 10,000 adults at the national level and segmented by type and relevant administrative unit; (2) percentage of administrative units with at least one access point; and (3) percentage of total population living in an administrative unit with at least one access point. It seems obvious that the size of the local administrative unit would make the latter two indicators difficult to compare across countries. Under usage, while acknowledging that the key dimension of this is frequency of usage, the AFI was forced to rely on two less than ideal indicators that fail to take frequency into account, namely: (1) percentage of adults with at least one type of regulated deposit account; and (2) percentage of adults with at least one type of regulated credit account.

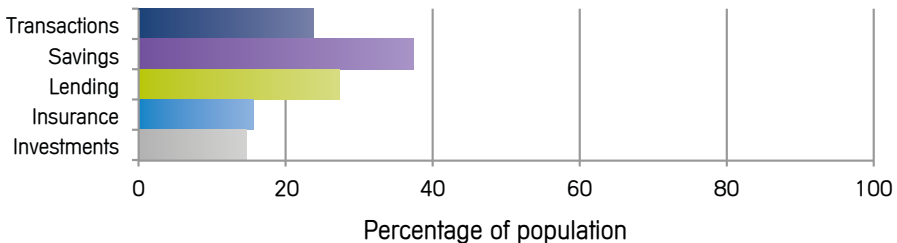
4 Measuring financial inclusion: Alternative approaches

Defining the financial inclusion status of an individual or a household by the type of financial provider behind their account has a number of drawbacks, as previously discussed. In this section, we discuss two alternative approaches: a focus on product functionality irrespective of the type of financial institution; and a focus on financial management opportunities enjoyed by the individual. In addition, consideration is given to alternative approaches to presenting measures of financial inclusion.

Product functionality approach

Agnostic to the type of financial product provider, a focus on the functionality of products used arguably provides a clear indication of whether an individual can save, borrow and transact through financial products. For example, well-run savings groups can have a higher rate of return than savings products from banks, and the ability to borrow small amounts at short notice through informal channels is extremely important to vulnerable households that are unlikely to access structured bank finance. Figure 3 illustrates the proportion of the population who currently use five different types of financial products.² Given that one individual is likely to have multiple accounts at one time, it is not meaningful to develop a similar access strand. This approach is included in the scorecard presented in Section 6.

Figure 3: Usage of products by functionality



² 'Savings' is made up of savings at a SACCO, microfinance institution, ASCA, ROSCA, having a Postbank account or a bank account for savings or investment. 'Lending' is made up of having a personal loan from a bank, a SACCO, a microfinance institution, a government institution, an employer, an ASCA, a chama, family/friend or neighbour, a shopkeeper or a buyer of agricultural produce, an overdraft, a credit card, or loan by government to buy a house or land or a local shopkeeper that allows you to take goods/services on credit. 'Transactions functionality' comprises of a current account with a cheque book, a bank account for everyday needs but no cheque book, or an ATM/debit card. 'Insurance' comprises of car insurance, house/contents insurance, agriculture insurance, NHIF, other medical insurance, life assurance or other insurance.

Financial management opportunities

An alternative approach would be to ask very specific questions of respondents regarding their opportunities for financial management. The exact design of these questions could draw heavily from the recent Financial Diaries exercise (Zollmann, 2014). Respondents could be asked questions such as:

1. How many months' worth of income do you have saved in an institution, with friends/family or under the mattress?
2. If your income stopped completely (e.g. you were made unemployed, or experienced poor business returns or bad weather), how many months would you be able to survive by selling assets, using savings or borrowing?
3. If you needed 5,000 shillings for family expenses, would you be able to get this within three days?
4. If you needed 5,000 shillings for an investment, would you be able to get this within two weeks?
5. If you unexpectedly received 5,000 shillings, do you have a safe place you could save this money?
6. If you wanted to save 100 shillings per week in a safe place, would you be able to do this?

Alternative options for presentation of indicators

There are two alternative approaches to presenting multiple financial inclusion measures: composite inclusion indicators, and a portfolio approach. Composite measures are the combination of several indicators into a summary measure such as that of the FSM or the Centre for Global Development's Commitment to Development Index (CGD, 2010). An alternative approach is to present a portfolio of measures per individual respondent or for the average respondent in a certain category (male/female, a particular administrative unit, etc.). An example of this at the country level is the annual tracking of the Millennium Development Goals (MDGs).

Composite indicators are more easily understood than a portfolio of individual indicators as they combine diverse measures into a single digestible measure. In contrast, a portfolio of indicators can result in information overload. In a fast-moving and media-influenced policy environment, indicators arguably should deliver short concise messages to stakeholders in the policy process.

Further analysis of the construction of composite indicators raises some concerns. Composite indicators involve a two-stage process, namely,

standardisation and aggregation (including value weighting). We examine each in turn. Standardisation imposes uniform units on disparate indicators. For example, the FSM forces a variety of different indicators that do not lend themselves naturally to ordinal ranking into a scale from one to eight. This process can hide information and can serve to dumb down the contribution of individual disaggregated indicators to financial inclusion discourse. Unless stakeholders commit to tracking such a composite indicator to benchmark performance, its lack of usefulness in research spheres renders it not particularly valuable.

Aggregation of standardised indicators into a composite indicator opens up the question of value weighting. When value weighting different indicators, there are two options: weighting the indicators based on a subjective ratio of importance; or remaining agnostic and simply leaving the indicators unweighted and calculating a simple average of the scores. Value weighting is a highly subjective exercise and it can be difficult for researchers to reach a consensus on the relative importance of the component indicators. Nevertheless, there are a number of examples in the social sciences of composite indicators using predetermined value weighting, such as the CGD's CDI index. The environment score in the CDI, for example, is made up of standardised indicators for climate change (60%), biodiversity and global ecosystems (30%) and fisheries (10%). The CDI overall country score weights the standardised scores for aid, trade, environment, security, technology, migration and investment as equal, transferring the weighting to the choice of sectors for inclusion. It is noteworthy that the FSM summary measure did not become a useful measurement term pursued by policymakers.

An alternative approach is to present the set of component indicators and stop short of aggregating them into a summary measure. This approach allows observers to understand the multi-dimensionality of financial inclusion and to encourage informed debate on what it means to be financially included. In this chapter, the portfolio approach is recommended.

A separate but important issue relates to the assumptions made with the choice of indicator. Indicators have normative connotations. Every indicator is based on the assumption that 'things are getting better' if performance in the indicator improves year on year. For example, the number of lending products a person may have is not something to be maximised, while at the same time one or two products (if used properly) is preferable to no borrowing.

5 Individual-level financial inclusion scorecard

This section proposes an individual-level financial inclusion scorecard based on the possibilities presented by the FinAccess Kenya 2013 dataset. The scorecard is built on four pillars: (1) formal, informal and mobile account ownership; (2) frequency of usage; (3) functionality available through those products (transactions, savings, lending, insurance); and (4) constraints to formal banking. Under each of the pillars, an attempt to define what it means to be fully formally included is made. Although such an exercise is not without serious hazard, it is an important component of the scorecard.

Formal, informal and mobile account ownership

Account ownership has been the starting point for financial inclusion surveys and research to date. The FinScope/FinAccess and Global Findex surveys ask respondents whether they 'have had or currently have an account' to ascertain whether the respondent is formally or informally included or is a mobile money subscriber. Establishing whether someone has an account is the first step in any attempt to measure financial inclusion.

In building the index around usage, we are specifically downplaying the position of the voluntarily excluded population. FinAccess surveys in the past have asked respondents why they do not have a bank account. Respondents can highlight a number of reasons for their exclusion, so despite the fact that some respondents indicate a preference for remaining unbanked, with positive responses to prompted statements like 'I prefer to use other options rather than a bank', 'I prefer dealing in cash', 'I don't need a bank account' and 'I do not have a bank account due to religious reasons', it is not possible to fully distinguish the voluntarily excluded through the FinScope/FinAccess surveys due to the inaccurate picture self reported reasons often provide. Unbanked respondents tend to cite a number of reasons for being excluded across the spectrum of involuntary exclusion and supply constraints, as well as voluntary exclusion reasons. A corollary is the inaccurate picture resulting from self-reported reasons given by SMEs in surveys for lack of access to finance.

Frequency of usage

Many 'financially included' individuals in sub-Saharan Africa have dormant or inactive accounts, set up in the past when they had a regular income or were in receipt of payments (in some cases, one-off payments from a government scheme). In other cases, the increasing cost or opportunity cost of reaching a bank has led to accounts falling dormant. In FinAccess 2013, frequency of

usage is measured on a sliding scale of daily usage, weekly usage, monthly usage, once or twice a year, or infrequently.³

Depending on the formality of employment, income levels and engagement with the modern economy, the optimal level of usage of financial products will vary across individuals. For example, a few times a year may be optimal for a farmer engaged in seasonal agricultural activity, whereas for a salaried worker in Nairobi, weekly usage will likely be 'optimal'. It is tentitively taken that monthly or more regular usage of formal, informal and mobile products represents full inclusion.⁴

Functionality available

An individual may regularly use formal products but may still not have access to savings, lending and insurance products. As a result, it is important to scope out the type of financial products used by the respondent. Ideally, individuals will have access to transactions, savings, lending and insurance products. For the purpose of developing the scorecard, it is assumed that it is optimal for individuals to have one transaction, one lending, two insurance and two savings products. Of course, individuals may not demand lending products and in many cases it is inappropriate for households to have borrowings, so this assumption is open to criticism.

The role of mobile money is contested and discussed elsewhere in this book. In many ways, access to mobile money is an important capability in the household financial management strategies of Kenyans. While it is considered in a binary fashion here, one could break down the ways in which the users use mobile money; it is possible to use mobile money as a transactions account, a savings account or an account to access inter-group lending.

Constraints to formal banking

The myriad of constraints to access are treated elsewhere, but for the purposes of this scorecard we focus specifically on geographic constraints to formal financial services, affordability of formal financial services, and financial literacy. Geographic constraints are considered as time to branch/ATM and cost to travel to branch, both of which are recorded as catagorical variables

3 Future surveys should also ask whether certain accounts have been used in the last year, as well as questions on frequency of usage.

4 An improved frequency of usage catagorical variable may be considered for the next FinAccess survey that addressed the lack of clarity between 'once or twice a year' and 'infrequently'; perhaps something like weekly usage, monthly usage, a few times a year, once a year and less than once a year.

in FinAccess 2013. The ideal time to bank branch/ATM is under 30 minutes, while the ideal cost to branch is under 200 shillings.

Affordability is calculated as the ratio of gross monthly income to a suggested cost of using and getting to formal financial services on a monthly basis of 500 shillings per month. Respondents with a gross monthly income more than 20 times greater than 500 shillings are deemed able to afford formal financial services. In light of improved estimates of the cost of using formal bank accounts, this figure of 500 shillings could be revised.

Finally, financial literacy is made up of two measures: financial sector knowledge, and basic financial numeracy. Financial sector knowledge is measured by familiarity with 13 financial sector terms, while financial numeracy is measured on a scale from zero to two points, with one point given for each correct answer to a simple question on division and a question about calculating the repayment due when a 10% interest rate is applied on a loan of 10,000 shillings.

Significant improvements could be made in data collection for financial inclusion constraints. First, a full set of GPS coordinates for formal, informal and mobile financial access points would allow for the calculation of distance to various financial services (see Chapter 3). Second, the collection of supply-side data on the average monthly cost of using different types (transactions, savings, lending and insurance where appropriate) of formal, informal and mobile financial services at an assumed 'ideal' usage rate would improve the depth of the affordability ratio and allow for development of a ratio by channel and product type. Third, FinAccess 2013 does not ask respondents what official documents they have in their name. Previous FinScope surveys in Nigeria have, for example, asked respondents whether they have each of up to 16 different documents, from utility bills and title deeds to a passport and a drivers licence (King, 2012). Such a question would help estimate the role played by informality in financial exclusion in Kenya. Finally, the area where the most improvement can be made is financial literacy. Perhaps due to time constraints, the questions used in FinAccess designed to capture financial literacy and numeracy are elementary. Improvements in this section of the questionnaire could help underpin improvements to the proposed index. The recent Financial Capabilities (FinCap) survey in Tanzania, for example, could provide guidance on how to restructure this part of the questionnaire.

Table 1 presents the 15 components of the proposed financial inclusion index; Tables 2 and 3 present the detailed definitions of the 15 elements.

Under the scorecard, two normative approaches are taken to determine what it means to be formally included: an aspirational line of inclusion, and a minimum level of inclusion. In reality, depending on the context and the

motivation, the threshold to be considered financially included may be altered. The higher threshold, an aspirational line of inclusion, is set as having two formal accounts, two informal accounts and one mobile account. Although the target of two formal accounts may arguably be too high, it is reasonable to suggest that having both a formal transaction account and a savings account, for example, is necessary to be considered formally included, and FinAccess makes a distinction between different types of formal account. In similar fashion, involvement in a savings group and having an account at a microfinance organisation, or membership of two savings clubs, may not be too high a bar to set for financial inclusion. In terms of functionality, the aspirational line of inclusion can be set at two savings, two insurance, one transaction and one lending account. The rationale for two savings accounts comes from the need to spread risk across savings devices, perhaps between formal and informal, while two insurance products are required to cover the myriad of risks households face. However, it should be noted that depending on the purpose of the analysis, it may make sense to focus solely on the formality of the products or the functionality, rather than on both.

Table 1: Dimensions of the KFIS

Number of accounts	Frequency of usage
1. Number of formal accounts	2. Frequency of usage of most important formal account
3. Number of informal accounts	4. Frequency of usage of most important informal account
5. Have mobile money account	6. Frequency of usage
Number of accounts by function	
1. Number of transaction accounts (both formal and informal)	
2. Number of savings accounts (both formal and informal)	
3. Number of lending accounts (both formal and informal)	
4. Number of insurance policies (both formal and informal)	
Constraints to formal banking	
1. Geographic access to formal services	
2. Low-cost access to formal services	
3. Affordability of formal services	
4. Financial knowledge	
5. Financial numeracy	

Table 2: Account usage definitions

	FinAccess 2013	Ideal approach
Formal banked	0-12 range with one point given for each of: <ol style="list-style-type: none"> 1. Postbank account 2. Bank account for savings or investment 3. Current account (with cheque book) 4. Bank account for everyday needs (no cheque book) 5. Overdraft 6. ATM/debit card 7. Credit card 8. Personal/business loan from bank 9. Savings at microfinance institution 10. Loan from a microfinance institution 11. Savings account at SACCO 12. Loan from a SACCO 	<ol style="list-style-type: none"> 1. Maintain the focus on 'currently have' when asking questions on financial inclusion. 2. Survey questions should be designed in such a way as to allow for a differentiation between formal and informal transactions, savings, lending and insurance products used.
Informally banked	0-5 range with one point for each of: <ol style="list-style-type: none"> 1. Savings at ASCA 2. Savings at ROSCA 3. Loan from ASCA 4. Loan from a Chama 5. Other Chama investments 	<ol style="list-style-type: none"> 3. Improvement possible in the way the categorical variable for frequency of usage is constructed. Suggestion: weekly usage, monthly usage, a few times a year, once a year, and less than once a year.
Savings products	Score of 0 to 8, with one point for each of: <ol style="list-style-type: none"> 1. Postbank account 2. Savings account at SACCO 3. Savings at ASCA 4. Savings at ROSCA 5. Bank account for savings or investment 6. Education policy 7. Retirement/pension 	<ol style="list-style-type: none"> 4. Needs to be updated to include new products in next FinAccess.
Transactions products	Score of 0 to 5, with one point for each of: <ol style="list-style-type: none"> 1. Current account (with cheque book) 2. Bank account for everyday needs (no cheque book) 3. Overdraft 4. ATM/debit card 5. Credit card 	<ol style="list-style-type: none"> 5. Needs to be updated to include new products in next FinAccess.

Table 2 (contd.)

	FinAccess 2013	Ideal approach
Lending products	Score of 0 to 11, with one point for each of: <ol style="list-style-type: none"> 1. Personal/business loan from bank 2. Loan from a SACCO 3. Loan from a microfinance institution 4. Loan from ASCA 5. Loan from a Chama 6. Loan from a government institution 7. Loan to buy/build a house or to buy land from building society 8. Loan given by government to buy house or land 9. Overdraft 10. Credit card 11. Loan from employer 	6. Needs to be updated to include new products in next FinAccess.
Insurance products	Score of 0 to 7, with one point for each of: <ol style="list-style-type: none"> 1. Car insurance 2. House/building/contents insurance 3. Agriculture insurance 4. NHIF 5. Other medical insurance policy 6. Life insurance policy 7. Other insurance 	7. Needs to be updated to include new products in next FinAccess.
Mobile products	Binary – registered mobile money user (e.g. M-PESA, Airtel Money, Orange Money, YuCash, etc.)	8. Needs to be updated to include new products in next FinAccess.
Frequency of formal Usage	Thinking of the bank account you use most frequently, how often to you use this account? 0 = N/A; 1 = Irregularly; 2 = Once or twice a year; 3 = Monthly; 4 = Weekly; 5 = Daily	9. Change to weekly usage, monthly usage, a few times a year, once a year, and less than once a year.
Frequency of informal usage	Thinking of the SACCO account you use most frequently, how often to you use this account? Thinking of the microfinance account you use most frequently, how often to you use this account? Highest response taken. 0 = N/A; 1 = Irregularly; 2 = Once or twice a year; 3 = Monthly; 4 = Weekly; 5 = Daily	10. Change to weekly usage, monthly usage, a few times a year, once a year, and less than once a year.
Frequency of mobile usage	How often to you use mobile money (e.g. M-PESA, Airtel Money, Orange Money, YuCash, etc)? 0 = N/A; 1 = Irregularly; 2 = Once or twice a year; 3 = Monthly; 4 = Weekly; 5 = Daily	11. Change to weekly usage, monthly usage, a few times a year, once a year, and less than once a year.

Table 3: Constraints to formal banking

	FinAccess 2013	Ideal approach
Geographic access to formal services	<p>If you had to go to nearest bank branch/ATM/bank, how long would it take to get there directly?</p> <ol style="list-style-type: none"> Under 10 minutes 10 to 30 minutes 30 minutes to 1 hour About 2 hours or longer 	<ol style="list-style-type: none"> A full set of GPS coordinates for formal, informal and mobile financial access points would allow for the calculation of distance to various financial services.
Low-cost access to formal services	<p>On average, how much would it cost for you to get there (if you go directly)?</p> <ol style="list-style-type: none"> No cost Less than 50 shillings 51-100 shillings 101-200 shillings 201-500 shillings More than 500 shillings 	<ol style="list-style-type: none"> No improvements necessary.
Affordability of formal services	<p>Gross monthly income to average cost of monthly transactions account (assumed to be 500 shillings); range of .06 to 900. Respondents with ratios greater than 20 are deemed able to afford formal financial services. Natural log scale used in graphs.</p>	<ol style="list-style-type: none"> Collection of supply-side data on the average monthly cost of using different types (transactions, savings, lending and insurance where appropriate) of formal, informal and mobile financial services for an assumed 'ideal' usage rate would improve the depth of the affordability ratio.
Financial knowledge	<p>Number of financial services/terms heard of from following list:</p> <ol style="list-style-type: none"> Savings account Insurance Interest Shares Cheque Collateral Budget Guarantor Investment ATM card Inflation Pension Mortgage 	<ol style="list-style-type: none"> Improvements to the financial literacy/numeracy section of the questionnaire could help underpin improvements to the proposed index. See recent Financial Capabilities (FinCap) Tanzania.

Table 3 (contd.)

	FinAccess 2013	Ideal approach
Basic Numeracy	<p>Score of 0 to 2, where one point is gained for getting each of the following two questions correct:</p> <ol style="list-style-type: none"> 1. You are in a group and win a promotion or competition for 100,000 shillings. With five of you in the group, how much does each of you get? 2. You take a loan of 10,000 shillings with an interest rate of 10% a year. How much interest would you have to pay at the end of the year? 	<p>5. Improvements to the financial literacy/numeracy section of the questionnaire could help underpin improvements to the proposed index. See recent Financial Capabilities (FinCap) Tanzania.</p>

Table 4 shows the summary statistics for each element of the index. With the aspirational line of inclusion in mind, we note that only 17.2% of respondents have two or more formal accounts, while 12.3% have two or more informal products. In contrast, 58.7% have direct access to at least one mobile money platform. In terms of frequency of usage, respectively, 18.6%, 9.4% and 40.8% of all respondents use formal, informal and mobile financial products more frequently than monthly. Examining the types of products, 23.8% have one or more transaction account and 12.5% have one or more lending product. In terms of savings products, 12.4% have two more products (38.1% have one savings account), while only 2.2% have two or more insurance products. In contrast, with the minimum line of inclusion in mind, we note that 29.1% of respondents have access to one formal account and 34.2% have access to one informal account.

Table 4: Summary statistics

Number of products	Zero	1	2	3	4	5	6	7
Formal Products	67.8%	12.3%	10.9%	5.0%	2.4%	0.9%	0.5%	<0.3%
Informal Products	72.0%	19.8%	6.0%	1.6%	0.4%	0.2%	0.0%	0.0%
Transaction products	76.2%	13.0%	9.6%	1.0%	0.2%	<0.1%	0	0
Savings products	62.0%	25.7%	8.9%	2.4%	0.8%	0.3%	<0.1%	0
Lending products	87.6%	9.4%	2.06%	0.7%	0.2%	0.1%	<0.1%	<0.1%
Insurance products	84.6%	13.23%	1.58%	0.4%	0.2%	<0.1%	<0.1%	0
Have mobile account	41.3%	58.7%						
Frequency of usage	N/A	Infrequency	Once/twice a year	Monthly	Weekly	Daily		
Most important formal product	72.9%	6.6%	1.8%	14.8%	3.3%	0.5%		
Most important informal product	87.2%	1.7%	1.5%	8.4%	1.0%	<0.1%		
Mobile account	34.6%	22.6%	2.5%	21.5%	15.1%	4.2%		
Constraints	N/A	Under 10 mins.	10 mins. to 30 mins.	30 mins. to 1 hour	2 hours or longer			
Time to branch or agent	9.6%	23.2%	39.7%	20.2%	7.3%			
Cost to branch or agent	Don't know	No cost	< KSh 50	KSh 51-100	KSh 101-200	KSh 201-500	> KSh 500	
Cost to branch or agent	0.5%	36.4%	24.1%	21.9%	11.9%	4.2%	0.9%	
Affordability ratio	<=5	>5 & <=10	>10 & <=15	>15 & >=20	>20 & <=30	>30 & <=50	>50	
	39.7%	24.3%	9.0%	9.2%	5.9%	6.0%	6.0%	
FSKknow	Zero	1-2	3-4	5-6	7-8	9-10	11-12	13
	8.3%	6.2%	6.6%	9.8%	16.2%	24.2%	18.5%	10.4%
Numeracy	Zero	1	2					
	38.1%	28.0%	34.0%					

6 Sample profiles

In this section, five individual respondent profiles are considered, as well as average profiles for seven provinces and for males and females. These are of course chosen as examples, and the profiles of all respondents can be generated on request along with average profiles for any sub-segment of the FinAccess sample. The sample statistics for provinces and by gender are presented in the Appendix to this chapter.

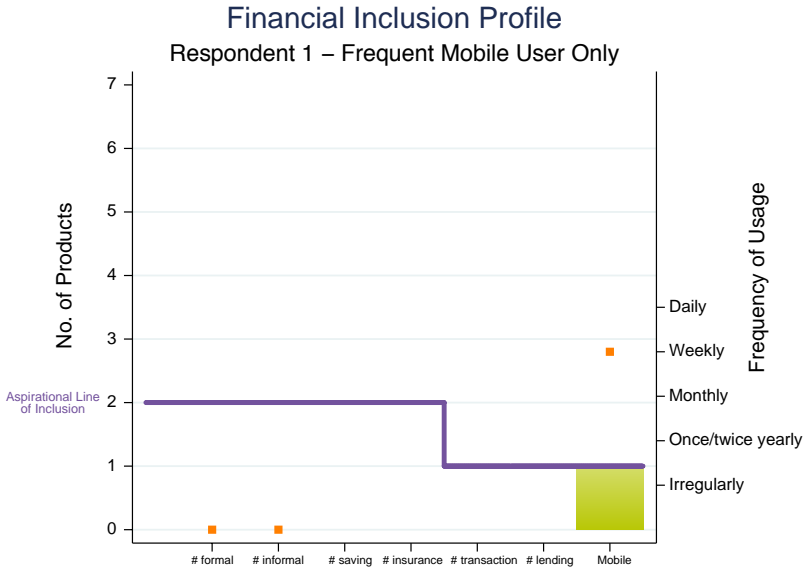
Scorecard considerations

First, the issue of universality versus specific local thresholds for financial inclusion can be debated. Is it meaningful to impose the same criteria for being ‘financially included’ on someone in Nairobi and someone in North Eastern Province? While an argument can be made for specificity, taking different levels of economic development into consideration, it can be argued that what it means to be financially included is in many ways similar, irrespective of local conditions.

Second, an associated concern relates to the exact definition of what it means to be ‘financially included’. Arguments can be made to adjust this downwards, perhaps on the basis that as long as an individual has access to one good savings and transactions account, they may not need a second one. This of course is a very reasonable critique. Changing the criteria is something that can be easily done in future adaptations of the scorecard.

Respondent 1

A 51 year-old male from the Kibera slum, Respondent 1 has a common financial profile: formally and informally financially excluded, but with weekly usage of mobile money. Affordability and low financial numeracy represent the biggest constraints facing Respondent 1, with affordability the most significant.

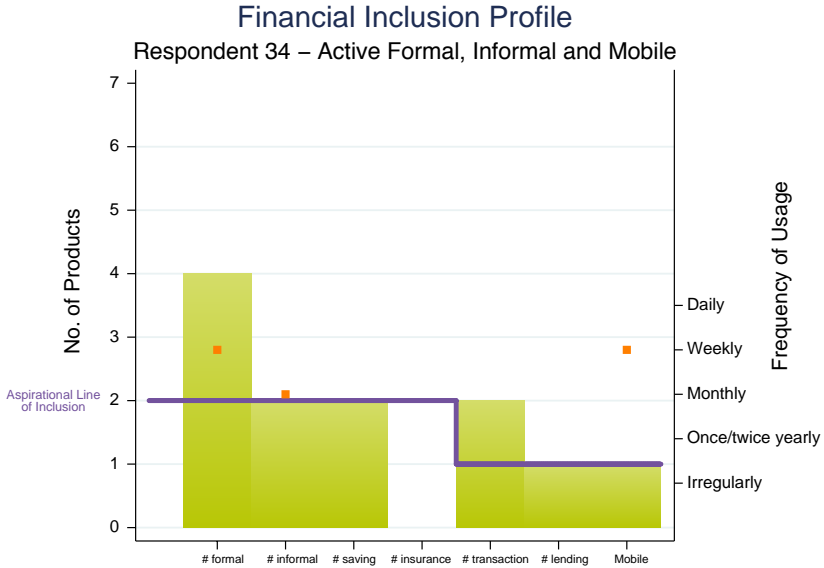


Financial Constraints Profile: Respondent 1

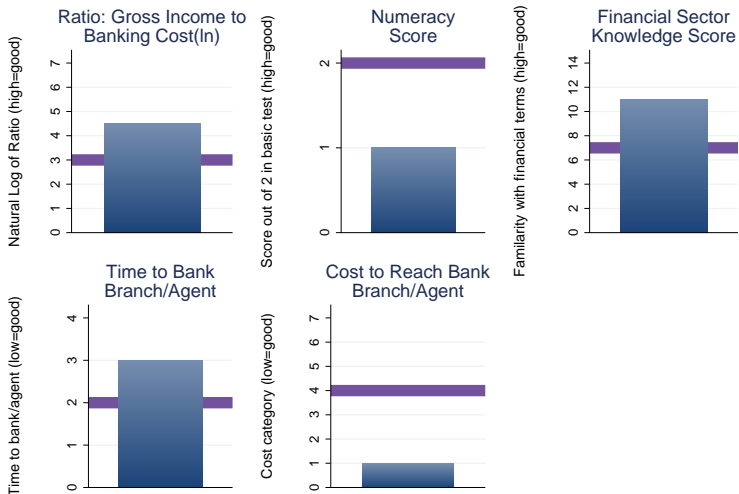


Respondent 34

A 47 year-old female from Riruta, Nairobi, Respondent 34 is active weekly in formal banking and mobile money, and monthly in informal financial services. This respondent has access to transactions, saving and lending products, but does not have any insurance products. Given the inclusion performance of Respondent 34, it is unsurprising that no significant constraint stands out, although there are question marks over the numeracy of this respondent.

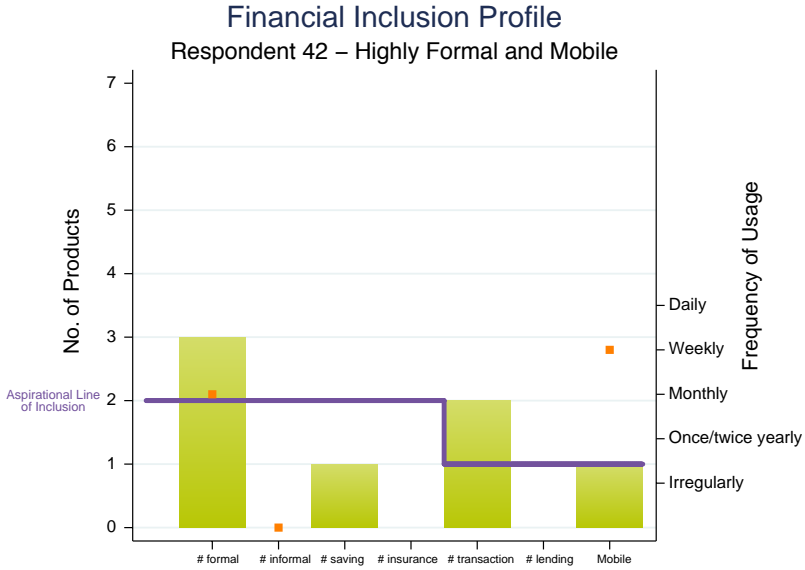


Financial Constraints Profile: Respondent 34

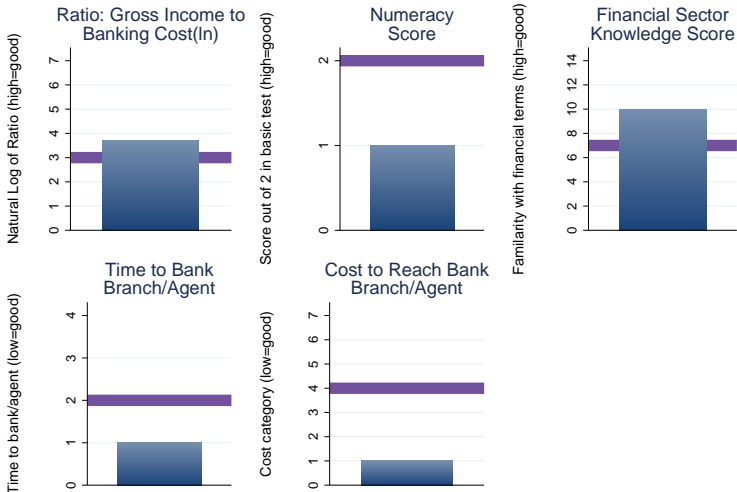


Respondent 42

A 31 year-old male from the Laini Saba area of Nairobi, Respondent 42 has three formal bank accounts with transactions and savings functionality and uses both formal banking (monthly) and mobile money (weekly) regularly. Respondent 42 does not have any lending or insurance products, and does not engage in informal financial services. No single constraint stands out for this respondent, although the numeracy score is low.

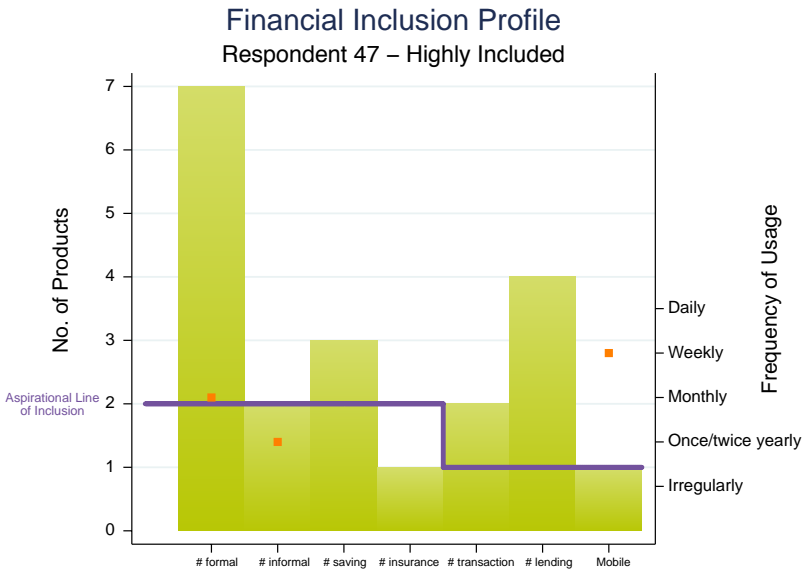


Financial Constraints Profile: Respondent 42



Respondent 47

A 23 year-old male from Ngara, Nairobi, Respondent 47 is highly included, ‘enjoying’ four formal accounts, five informal accounts and mobile money. His most frequently used informal account is only used one or twice a year, but he uses formal banking monthly and mobile money weekly. In terms of functionality, Respondent 47 has the use of transactions, savings, lending and insurance products. He is financially numerate and does not have any significant constraints.



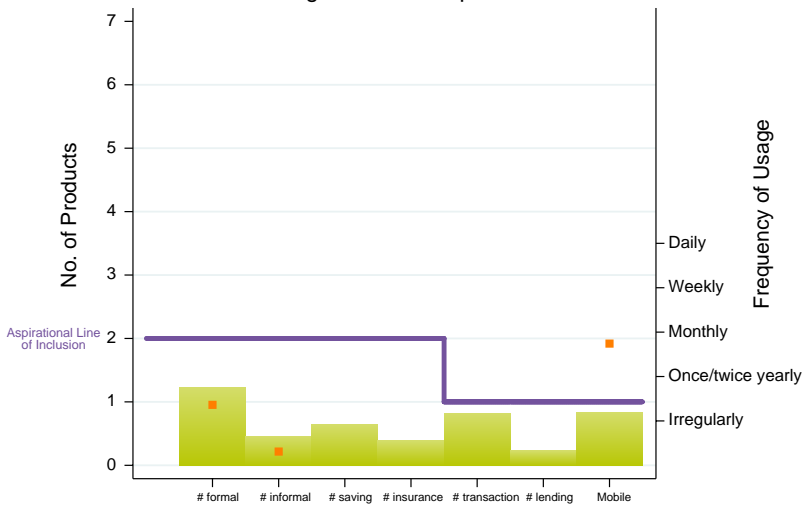
Financial Constraints Profile: Respondent 47



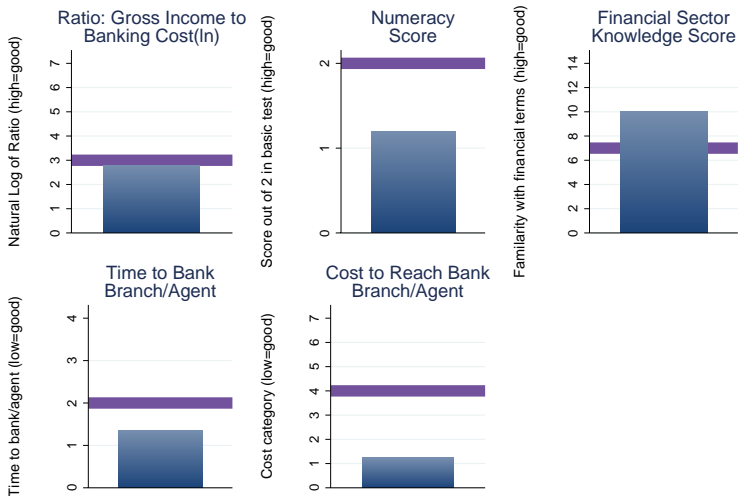
Province average: Nairobi

The average Nairobi resident falls short of both the aspirational line of inclusion and the minimum line of inclusion, with 1.22 formal accounts on average which is most likely to be a transaction account. The use of mobile money is widespread, and the average level of usage is monthly. In terms of constraints, the average Nairobi resident has low financial numeracy and, while affordability does not seem to be a concern, the median resident is likely to have lower ratio of gross income to banking costs.

Financial Inclusion Profile
Average Nairobi Respondent



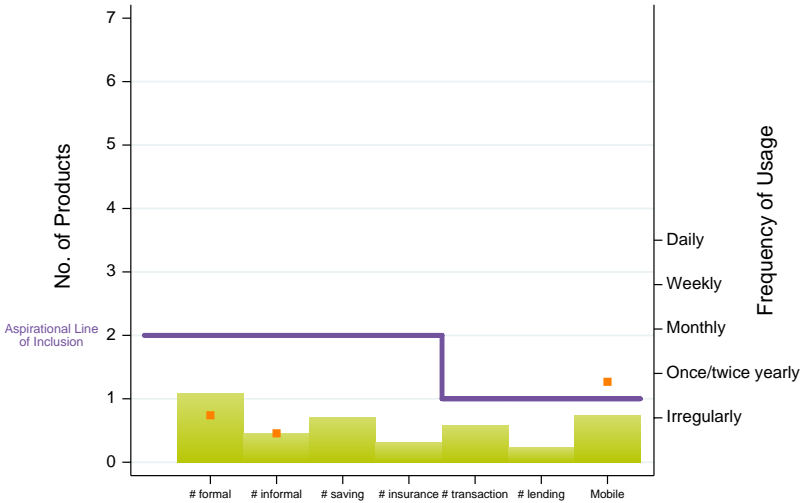
Financial Constraints Profile: Nairobi



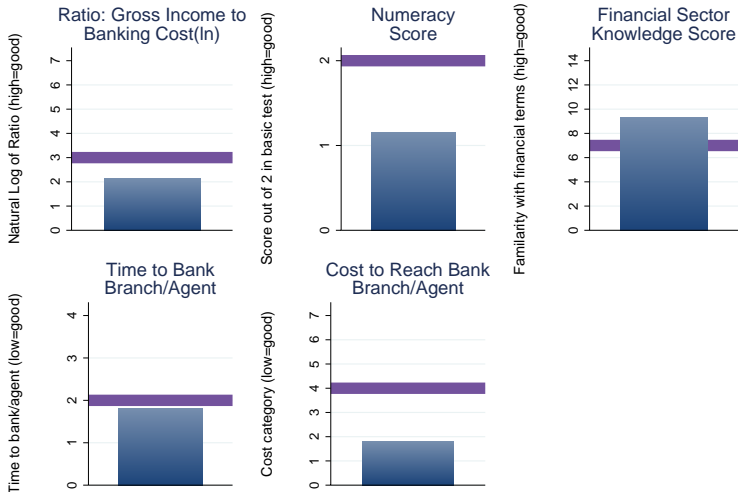
Province average: Central

The average Central Province respondent scores less well than the average Nairobi respondent, with lower usage for most product types, with the exception of informal accounts. Frequency of usage is also lower in Central Province than in Nairobi for formal and mobile accounts, but is higher for informal accounts. With regards to the constraints profile, it is noticeable that affordability is not as serious an issue as it is in lower-income provinces.

Financial Inclusion Profile
Average Central Respondent



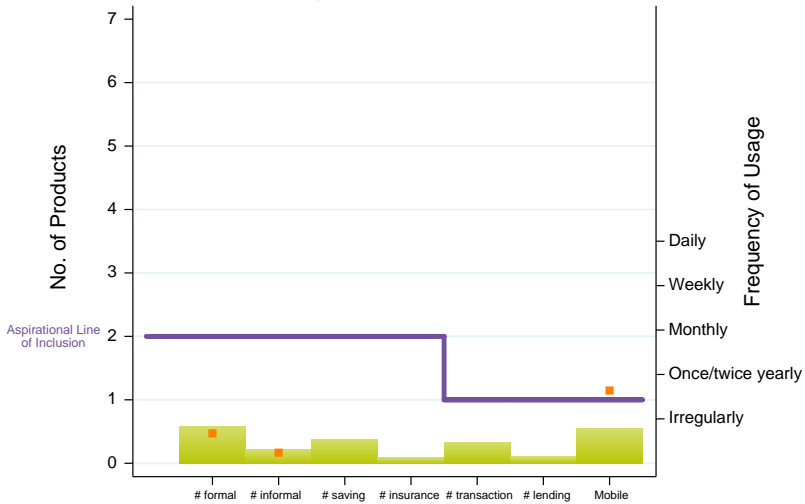
Financial Constraints Profile: Central



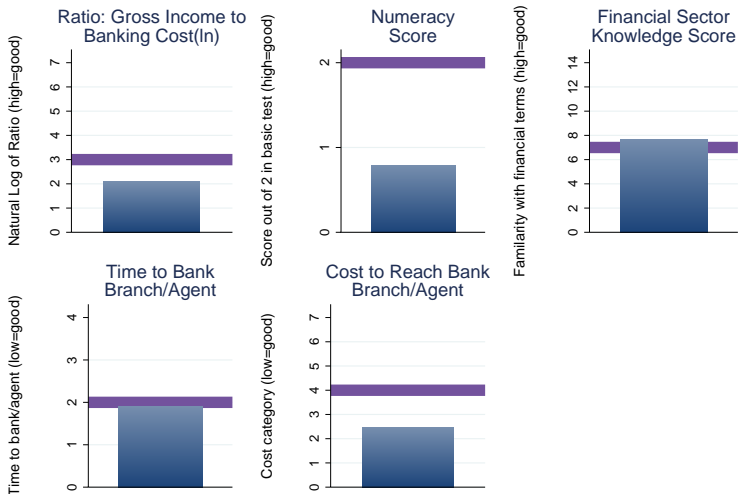
Province average: Coast

The Coast Province has lower levels of financial inclusion than many other provinces. While it is ranked fifth (out of seven provinces) for formal accounts, it is ranked last for informal financial services, savings products, lending products and insurance products.⁵ Affordability and numerical capability remain issues, while there may be reasons to suspect that religion reduces demand for certain financial services.

Financial Inclusion Profile
Average Coast Respondent



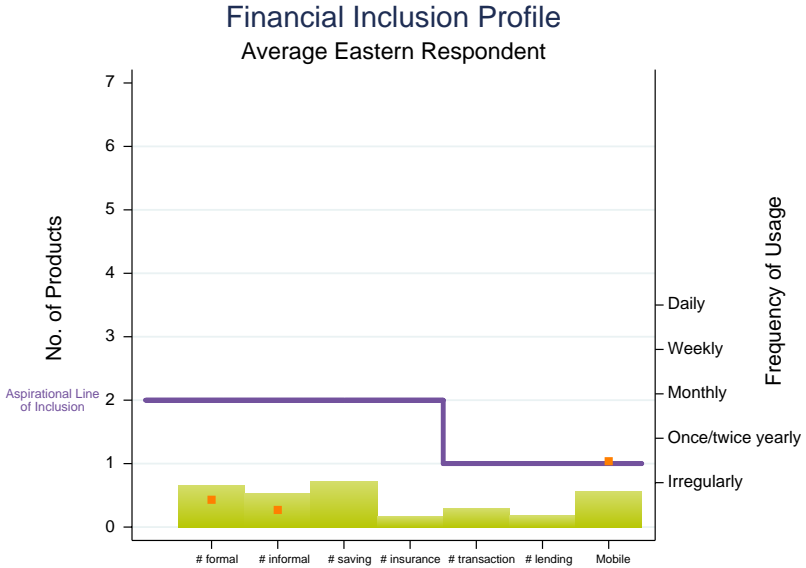
Financial Constraints Profile: Coast



5 North Eastern Province is not included in the data.

Province average: Eastern

The residents of Eastern Province have an average of 0.66 formal accounts, 0.53 informal accounts, and 0.54 mobile accounts. Driven by the most extensive use of informal products, savings products are most prevalent in Eastern Province. However, the average respondent in Eastern Province falls short of the minimum line of financial inclusion.



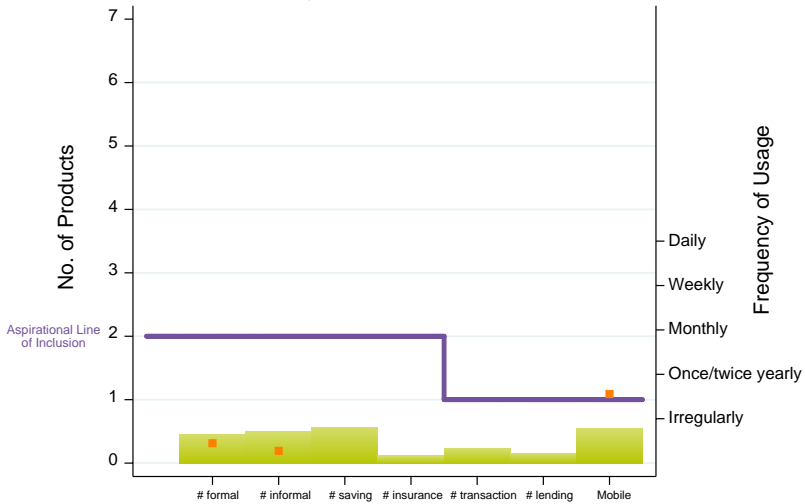
Financial Constraints Profile: Eastern



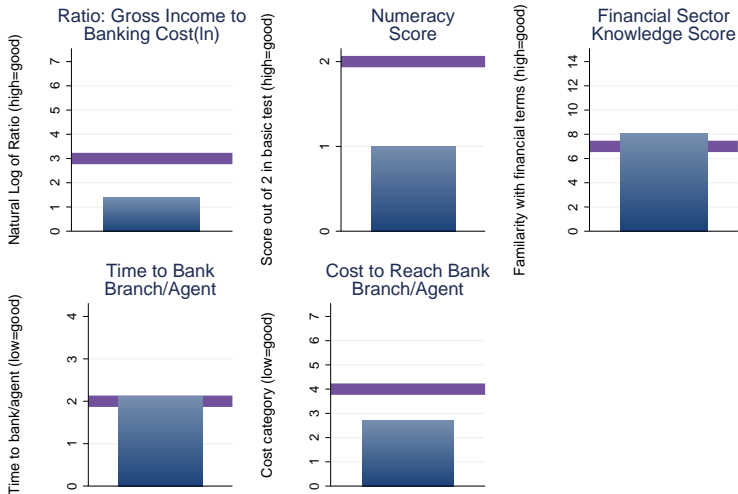
Province average: Nyanza

Nyanza is the second least financially developed province in the data set. Mobile (average of 0.54 per resident) and informal (average of 0.49) are the most prevalent financial services. The average resident has 0.46 formal accounts. Nyanza and Western are the only two provinces where informal accounts dominate formal accounts. Affordability is a significant issue in Nyanza.

Financial Inclusion Profile
Average Nyanza Respondent

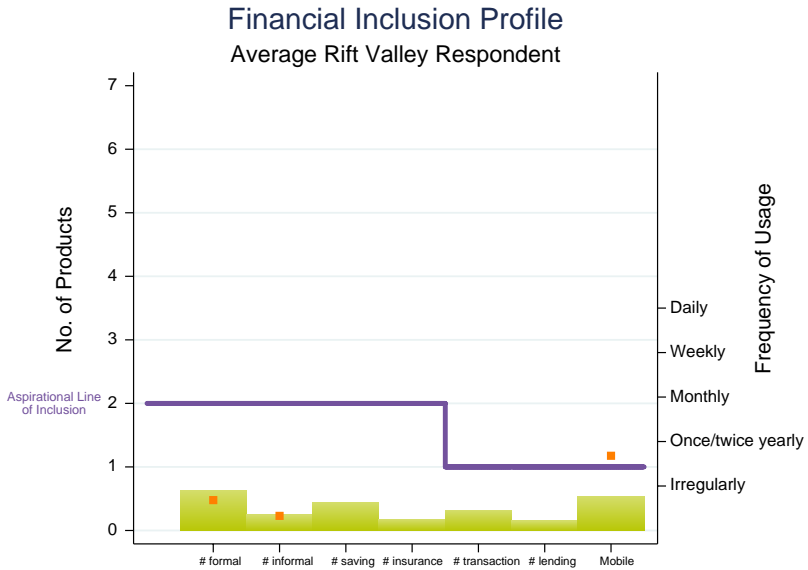


Financial Constraints Profile: Nyanza

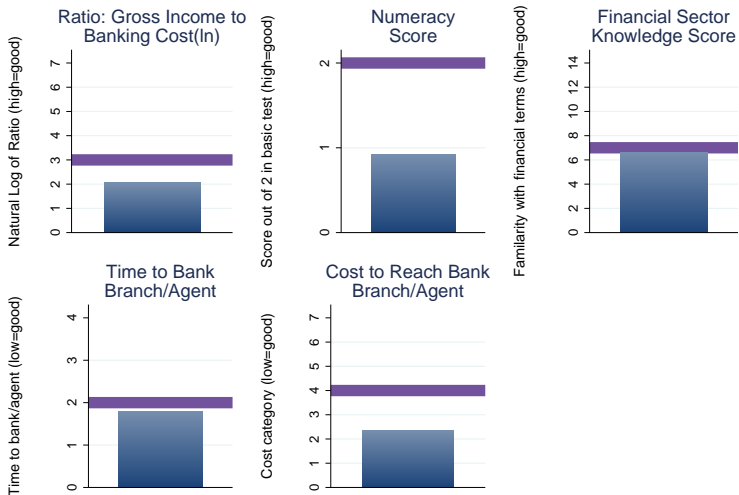


Province average: Rift Valley

The average Rift Valley resident has 0.62 formal accounts, 0.25 informal accounts and 0.53 mobile accounts. The Rift Valley has the second lowest usage of informal products, but the fourth highest usage of formal accounts.



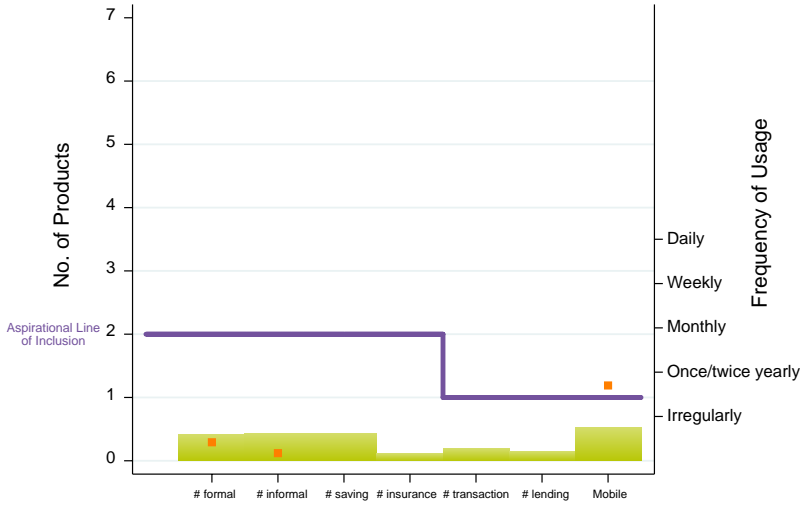
Financial Constraints Profile: Rift Valley



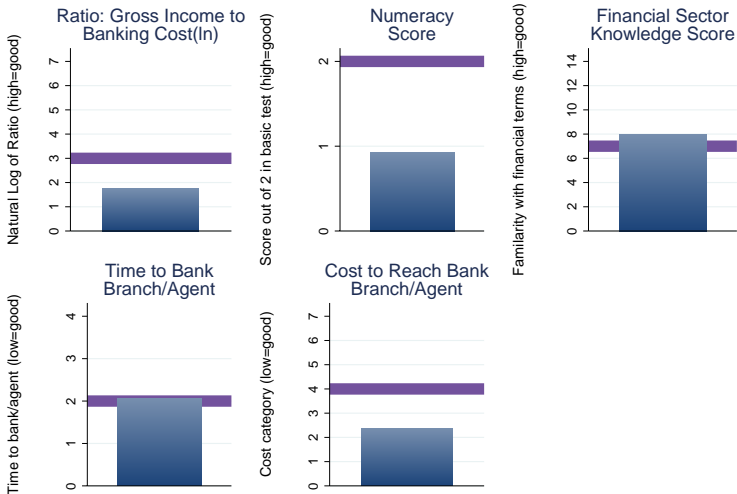
Province average: Western Kenya

The average Western Province resident falls well short of the minimum line of inclusion. The average resident has around 0.43 informal accounts and while mobile money usage is more prevalent, it remains lower than in the capital. Affordability and numeracy seem to be the most important constraints, as opposed to distance or time to bank.

Financial Inclusion Profile
Average Western Respondent

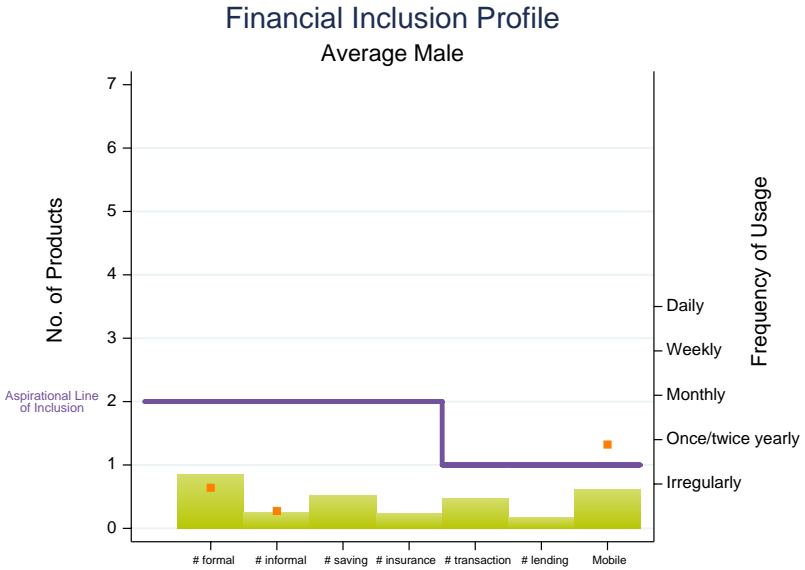


Financial Constraints Profile: Western

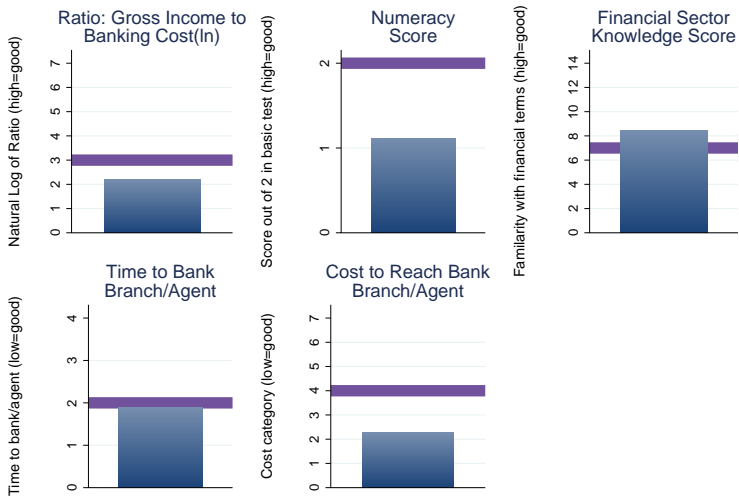


Average respondent: Male

The average male has 0.86 formal accounts, 0.26 informal accounts and 0.61 mobile accounts. Compared with females, males are more formally banked, less informally banked and are more likely to have a mobile account. Men have higher financial sector knowledge compared with men.

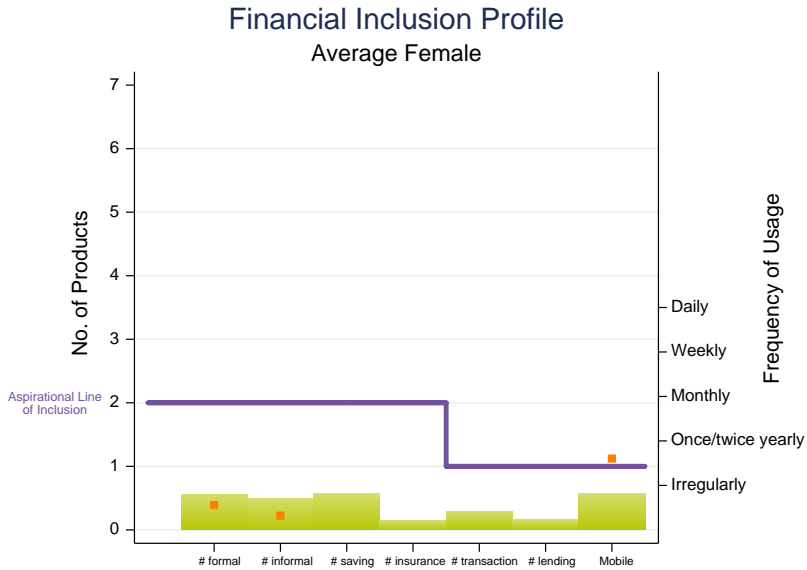


Financial Constraints Profile: Male

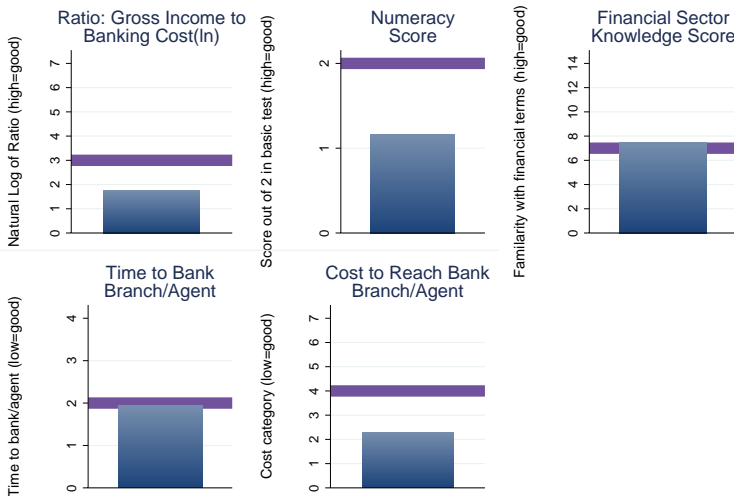


Average respondent: Female

The average female has 0.56 formal accounts, 0.49 informal accounts and 0.57 mobile accounts. Females have on average more informal accounts, lending and insurance products than males, while males have significantly more transaction accounts reflecting gender roles within the household. Afordability is a greater challenge for women.



Financial Constraints Profile: Female



7 Options for future surveys

Efforts to develop more sophisticated measures of financial inclusion represent an opportunity to understand the difference between ‘usage’, ‘access’ and ‘frequency of usage’, and to drive policy efforts towards meaningful financial inclusion. The objective of this chapter has been to explore alternative ways of measuring financial inclusion, culminating in the development of the scorecard. Looking forward to future surveys, a number of options present themselves.

Financial inclusion index

In Section 4, the issues associated with a composite indicator of financial inclusion are presented and the case made for the portfolio approach to presenting data. Nevertheless, a summary financial inclusion measure, similar to the sixth (and final) FSM indicator, could be developed. Inevitably, tough assumptions are made about standardisation and weighting, or in other words, what is important and what is not.

Arguably, the most meaningful combination of the indicators previously presented would be to combine the ‘currently have’ and frequency of usage data into a unified measure. The suggestion would be to reduce the ‘currently have’ variable to a categorical variable, where a score of zero is given for no products, 1 for one product and 2 for two or more products. For each individual, this value is multiplied by zero for frequency of usage of less than once a year, by 1 for usage of a few times a year, and by 2 for monthly or more frequently. This would make having two or more accounts and using them (or at least the most frequently used one) a few times a year equal to having one account and using it monthly or less. This score of between 0 and 4 could be calculated for each of formal, informal and mobile products (although the frequency of usage might be adjusted for mobile money); see Table 5 for more details.

Table 6 provides these scores for the average Kenyan and for four categories: Nairobi residents, Western Kenyan residents, Kenyan males and Kenyan females. The need for policymakers and communications strategies to reduce complex data into digestible numbers provides the rationale for this approach. The scores in Table 6 are out of 4, with a score of 4 meaning that an individual has two (in)formal accounts and uses their most important account monthly or more frequently, or has one mobile money account and uses it more frequently than monthly. The scores suggest there is much room for improvement. Importantly, and as previously argued, summary measures

hide significant amounts of information. For example, it is not clear from the summary scores whether frequency of usage or actual access is weaker. When such disaggregated data is required, the portfolio approach is recommended.

Table 5: Proposed approach to a financial inclusion index

Formal products			
Currently have		Usage	
Number	Score	Category	Score
2 (+)	2	Monthly or more frequently	2
1	1	A few times a year	1
Zero	0	Less than once a year	0
Total score = 'Currently have' Score x usage score			
Informal products			
Currently Have		Usage	
Number	Score	Category	Score
2 (+)	2	Monthly or more frequently	2
1	1	A few times a year	1
Zero	0	Less than once a year	0
Total score = 'Currently have' score x usage score			
Mobile products			
Currently Have		Usage	
Number	Score	Category	Score
1(+)	2	Monthly or more frequently	2
Zero	0	A few times a year	1
		Less than once a year	0
Total score = 'Currently have' score x usage score			

Table 6: Sample financial inclusion index scores (maximum Score is 4)

Category	Formal score	Informal score	Mobile score	Average score
Average Kenyan	0.68	0.12	2.38	1.06
Nairobi Resident	1.35	0.13	1.65	1.04
Western Kenya Resident	0.37	0.08	1.29	0.58
Male	0.91	0.09	1.62	0.87
Female	0.52	0.13	1.32	0.66

It would be possible in theory to do a similar exercise for access to products based on functionality rather than formality of provider. Unfortunately, FinAccess data from 2013 do not allow for this.

New emphasis on product functionality

In similar fashion to Figure 2, the presentation of financial access indicators could focus on the functionality of products rather than the formality of the provider. This could be done as a complement to the traditional access strand. If this approach were to be pursued, it is suggested that the questionnaire be designed to fully measure formal and informal insurance and investment products, in addition to the suite of transactions, savings and lending products.

Financial management opportunities

As described in Section 4, one could construct a set of questions dedicated to ascertaining how well individuals can manage income, health and other shocks through financial products, and also how well individuals can manage unexpected windfalls and a desire for regular savings through financial products. The exact design of these questions should be country-specific, take income levels into consideration, and ideally be derived from sophisticated financial diaries exercises.

Build an online scorecard application

Compared to the access strand approach and the three options presented above, the scorecard approach does not lend itself well to the quick communication of summary statistics. However, the option exists to develop an online application to communicate the results of future surveys. An online portal could be developed that would allow the browser to choose, for example, an average for young males in Western Kenya.

8 Conclusions

The ubiquitous dependence on binary and basic categorical measures in the financial inclusion literature has weakened understanding of what it truly means to be financially included, and has encouraged policymakers to promote the roll-out of basic accounts to low-income households in developing countries. In many cases, such accounts fall dormant, lack the functionality required to achieve the often-cited welfare gains from financial inclusion, and

are poorly adapted to the complex financial management needs of low-income households.

This chapter presents a portfolio approach to better understand financial inclusion, along with a number of options for future surveying exercises. It is hoped that this effort will stimulate debate on what it means to be financially included, and that the index will become a tool that policymakers and analysts can use to measure financial inclusion at the individual and administrative levels and across different socioeconomic characteristics.

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Appendix

Provincial and gender summary statistics

	Nairobi	Central	Coast	Eastern	Nyanza	Rift Valley	Western	Male	Female
No. of formal accounts	1.10	0.78	0.54	0.49	0.38	0.51	0.35	0.68	0.46
Frequency of formal usage	1.36	1.06	0.67	0.61	0.45	0.68	0.42	0.91	0.56
No. of informal accounts	0.59	0.75	0.26	0.70	0.57	0.36	0.49	0.43	0.59
Frequency of informal usage	0.31	0.65	0.24	0.39	0.28	0.33	0.17	0.39	0.32
No. of savings accounts	0.64	0.71	0.38	0.71	0.57	0.44	0.44	0.52	0.57
No. of transaction accounts	0.82	0.57	0.33	0.30	0.23	0.32	0.20	0.47	0.29
No. of lending accounts	0.23	0.23	0.10	0.18	0.16	0.16	0.15	0.18	0.16
No of formal products	0.39	0.31	0.09	0.17	0.12	0.18	0.12	0.24	0.15
No. mobile money accounts	0.83	0.73	0.54	0.56	0.54	0.53	0.52	0.61	0.57
Frequency of mobile account usage	2.74	1.81	1.64	1.48	1.56	1.68	1.70	1.89	1.60

CHAPTER 7

Financial Capability and Financial Inclusion: Measuring the Missing Ingredient

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AND SUNČICA VUJIĆ



1 Introduction

The last ten years has seen a huge rise in research into and analysis of the role of financial skills, knowledge and attitudes in financial decision-making and behaviours. This has been precipitated by different policy contexts – in the developed countries by the financial crisis, and in developing countries by the rise of the financial inclusion agenda (OECD, 2005) – and it has been furthered by the rise of behavioural economics (Thaler and Sunstein, 2009; Altman, 2012). The debate has evolved from a focus on the need for financial education to equip people with a knowledge and understanding of financial concepts and the operations of the financial sector (‘financial literacy’) and to enable people to interact with the sector, to recognising that the links between knowledge, attitudes and behaviours are as complex in this arena as they are in so many others (Kempson et al., 2005; Sherraden, 2010).¹

The concept of ‘financial capability’ is now being used in developing country contexts with a view to understanding its role as a missing link to financial inclusion (Atkinson and Kempson, 2008; Accion, 2013; Kempson et al., 2013). While the measurement of financial literacy has focused on an understanding of financial concepts and interactions with the formal sector, studies in developing countries recognise that such knowledge may not be necessary for effective money management and more inductive approaches have identified a range of personal characteristics which respondents themselves identify as being related to *capability*. The most recent multi-country study, led by Elaine Kempson in collaboration with the World Bank (Kempson et al., 2013), identified ten domains that contribute to financial capability, but concluded that these could not be turned into a single measure because they were poorly correlated within countries and operated differently across country contexts. Moreover, measures of this type do not capture individuals’ ability to manage their finances independently of endowments such as income, education or other attributes. An approach to measuring this ability is at present missing from the literature.

This chapter contributes to this discussion by conceptualising financial capability, from the perspective of Sen’s capability approach (Sen, 1999), as the set of financial functionings that people have reason to value. It is then possible to consider the conversion efficiency with which individuals transform their knowledge, skills, attitudes and endowments into these desirable financial behaviours. Data envelopment analysis (DEA) can be used to measure the relative efficiency with which individuals transform their initial endowments

1 The experience of HIV/AIDS programmes, for example.

into financial functionings. This has the particular advantage of producing a measure which, by looking at efficiency, makes allowance for differences in education, income and proximity to services and does not require us to indicate which aspects of financial behaviours are more important than others. The efficiency measure is then developed and tested using data from FSD Kenya's FinAccess 2013 survey. Given the lack of respondents' own assessments of their financial functionings, we are constrained to making the assessment based on previously defined measures. A DEA measure of efficiency in achieving financially capable behaviour is produced, individuals are given relative scores, and the results are used to test the relationship between the DEA measure and access to key financial services using probit regression analysis.

Individuals' efficiency is found to be significantly related to the nature of their employment, and this is likely due to the way different patterns of income enable financial management. Additionally, participating in joint decision-making in the household, as opposed to being the sole decision-maker (including as a result of being single or divorced), is significantly related to the measure of efficiency, suggesting a role of relations with others in constructing efficient financial behaviour. Being Christian lowers efficiency relative to being of other religions. The measure is significantly positively related to the use of banks and Rotating Savings and Credit Associations (ROSCAs), but is not significantly related to the use of mobile money accounts. Causality is then tested using propensity score matching, with the results suggesting that it runs from banks and ROSCAs to greater efficiency rather than the other way.

We conclude that this presents a methodological innovation in the measurement and analysis of financially capable behaviours. However, the indicators available in the FinAccess 2013 survey are far from optimal. Ideally, the approach would focus on the ways respondents assess the extent to which they are meeting their financial goals, and in order to develop this approach further it is also necessary to compute comparable measures of inputs and outputs using the DEA across time. There is therefore a need for further consideration of measurement of the underlying variables.

The chapter proceeds as follows. First we present an overview of the evolution of the concept of financial capability and its measurement. DEA is then introduced and its application as a means of measuring the efficiency of achieving financially capable behaviour is explained. The data on which the measure is based is then described. The results are then presented and discussed in two stages: first, the efficiency score itself; and second, the analysis of its relationship to financial service access. We conclude with a discussion of the implications of our methodology and results for further research on financial capability.

2 Financial capability: An evolving concept in need of measurement

The measurement of financial literacy started out with questions to test understanding of compound interest rates, inflation and risk diversification in developed country contexts (Lusardi, 2008), and it has been found to be strongly associated with engagement with financial products and services such as retirement planning and investment choices. Even within these contexts, the definition of financial literacy lacks consensus (Huston, 2010; Remund, 2010), but it has mainly been associated with financial knowledge in order to address policy-related concerns regarding consumers' interaction with the financial sector that have risen over the last decade. As research has developed and, in particular, as evidence of the impact of financial education programmes has demonstrated relatively little impact of financial education on financial literacy itself (Mandell and Klein, 2009), the complexity of the relationship between knowledge and behaviour has also become more evident, which has brought about a shift to a wider conception of financial capability to capture this broader perspective.

Measures of financial literacy based on the understanding of financial concepts have been adapted and expanded to address developing country contexts (Cole et al., 2009; Carpena et al., 2011) in order to examine the relationship between knowledge and attitudes and behaviour towards financial services. While financial literacy is correlated to having a bank account in developing countries (Xu and Zia, 2012), its relationship with financial service use is more tenuous in a context where such use is low, and financial capability appears of greater relevance when embracing a wider conception of effective money and resource management.

Research in both developed and developing countries has shown that people talk about financial capability as comprising behaviours, attitudes, psychological traits and motivations (Kempson et al., 2005; Kempson et al., 2013), and this further demonstrates that the role of knowledge is not central in people's decision-making process. Financial capability has been found to be a composite of different skills covering areas such as day-to-day money management, planning for the future, choosing products and being informed (Atkinson et al., 2007). In their exploratory study, Kempson et al. (2005) found that knowledge and understanding, as well as skills and the personal characteristics of confidence and attitudes, affect individuals' levels of financial capability. The concept of financial capability thus appears to be multidimensional, both in terms of what behaviour it relates to and its determinants (Collins et al., 2009b;

FINRA, 2009). Indeed, the importance of individual personality, circumstances and previous experiences has also been recognised (Kempson et al., 2005), and this opens up a new level of discussion in which individual financial capability is seen in relation to the wider context in which an individual takes financial decisions, therefore suggesting that it is likely to be contextual and culturally sensitive (Atkinson and Kempson, 2008). This also makes clearer the potential for differences between being 'financially capable' in a developing country context and in a developed country context. Moreover, it also opens up the potential for financial capability to be fluid over people's life cycles (Kempson et al., 2005; Accion, 2013) and presents individual financial capability as a relative concept based on specific personal and contextual circumstances (Kempson et al., 2005). In line with this, some have argued against the view that financial capability constitutes a single capability that can be measured and that once gained, will directly impact people's financial decisions (Bay et al., 2014). The same authors talk about a 'situated model of financial literacy', which is dependent on the specific social and cultural setting, suggesting that capability is created through its practices and therefore it is through its practices that it should be approached and described (*ibid.*).

In contexts where formal financial access is very low, such as Kenya, financial capability has been found to be more strongly associated with individual efforts to increase household income and with individual virtuous behaviours (Zollmann and Collins, 2010). In these contexts – where income is low, irregular and unpredictable (Collins et al., 2009b) – financial capability is associated less with allocating funds into different investments and more with discipline and commitment. Efforts to increase financial capability may thus not actually result in improved financial inclusion, if financial illiteracy is not the biggest obstacle to financial access (Cole et al., 2009). Research in Kenya has shown that previous experience, both positive and negative, is a better predictor of take-up of financial services than financial education (Zollmann and Collins, 2010). Experience includes both personal use of certain financial instruments and observation of friends and family members. It seems that, in the Kenyan context, financial literacy is more important in avoiding being cheated by financial service providers than in being able to manage personal finances. Overall, in this context, the low uptake of financial services seems to be due more to the mismatch between the offer of and demand for financial services than to a lack of knowledge (Zollmann and Collins, 2010).

Atkinson and Kempson (2008) point out that in developing countries, surveys of financial capability should be both culturally and income neutral to capture people's real ability to manage their finances independently of their level of income or the role that they play in managing their money. In some households,

education levels or gender relations embedded in cultural structures and practices may define who the main money manager is. However, that individual may not be the most financially capable person in the household. According to Atkinson and Kempson (2008), it is therefore important to measure financial capability at the individual level, also taking into account those individuals who are not responsible for money management.

With this developing understanding, attempts to measure financial capability are still in their infancy. Two studies have used inductive approaches in an attempt to identify components of financial capability that are relevant across country contexts. Microfinance Opportunities (MFO) conducted research in India, Pakistan, Malawi and Costa Rica from which they developed an index for financial capability covering three areas: basic behaviours around money management (savings, spending, planning, borrowing, etc.), personal characteristics (prudence in spending money, ability to plan ahead, etc.), and relationships around money (e.g. being part of a reciprocal support network versus self-sufficiency) (MFO, 2015). This study confirmed the finding of Zollman and Collins (2010) that personal characteristics, such as being confident about individual management skills, being organised and being a good administrator, are key. In their identification of social relationships around money as inputs to financial capability, MFO included indicators about people's ability to build social capital in their communities (described as someone who helps others in the community), but also individuals' capacity to take care of their basic needs without external help. In addition, the index contains indicators on fairness and greed to evaluate the type of principles that drive individual financial management (MFO, 2015).

The most recent and extensive cross-country study undertaken is by Elaine Kempson and co-authors, in collaboration with the World Bank and with funds from the Russian Trust Fund (Kempson et al., 2013). The study started by using focus groups in eight countries (Colombia, Malawi, Mexico, Namibia, Papua New Guinea, Tanzania, Uruguay and Zambia) to establish what was understood by financial capability. Again, it was found to cover day-to-day management and planning for the future. Under day-to-day management, participants mostly mentioned the ability to plan against income and to stick to this, the ability to prioritise on essentials, being self-disciplined and living within one's means. Under planning for the future, participants described a financially capable individual as one who is able to think and plan for the future, to save and plan for unexpected as well as expected events, and someone who focuses on self-improvement and saves whenever possible. Personal characteristics such as altruism, control, time orientation, impulsivity, achievement orientation,

social status, and action orientation were used to distinguish between capable and incapable individuals (Kempson et al., 2013).

The dimensions of financial capability found in an earlier UK-based study (Kempson et al., 2005) related to choosing products and 'being informed' about them, but these were generally considered less important in developing countries, thus confirming the role of context. Also, participants did not relate financial capability to level of income or education, instead giving examples of financially capable individuals who were extremely poor and financially incapable people who were better off than the rest of the community. Financial capability was seen in terms of behaviour and as being highly connected to individual motivations (Kempson et al., 2013).

Kempson et al. (2013) also argue that other factors that need to be taken into account are the low level of education in developing countries and the geographical distribution of the population. A large portion of people in developing countries live in rural areas that are far from formal financial services and where a communal style of living is more widespread. The authors argue that it is more common for people to rely on each other for financial support and that financial decisions are often influenced by a communal interest, which is put before the individual's own. However, different practices of money management should not be taken *a priori* as a sign of not being financially capable, and should be evaluated in their particular context. Moreover, the authors argue that because of the low level of education, financial capability needs to be understood and evaluated using simple concepts to which people can easily relate, and that the core approaches to measuring literacy via compound interest rates and similar complex indicators are therefore not the best way to understand people's money management practices (Kempson et al., 2013).

From this work, they designed a survey which was then analysed using factor analysis to identify ten domains of financial capability: budgeting, living within means, monitoring expenses, using information, not overspending, covering unexpected expenses, savings, attitude toward the future, not being impulsive, and achievement orientation. These domains broadly correspond to the areas of financial capability identified in the first phase of the study, so the main goal of developing a measure of financial capability that is comparable across countries was achieved (Kempson et al., 2013). The study further tried to reduce the ten domains down to a single score. However, since the domains loaded on different factors in different countries, it was concluded that they would be more relevant to making comparisons across countries than a single score. This reiterates the fact that financial capability is a 'composite of skills' that may lose its meaning when reduced to one single score. Moreover, the

study points out that it is not possible to rank the ten domains of financial capability in order of importance and that comparisons between people can only be done at a domain level; it is not possible to say whether one individual is overall more financially capable than another (Kempson et al., 2013).

Above we have reviewed the evolution of the debate from a focus on financial literacy to financial capability in developing country contexts. Inductive research has now gone some way to identifying key domains through which financial capability is demonstrated and the influences on it. Moreover, in low-income contexts the use of actual financial services is no longer seen as constituting a key feature of financial capability. Kempson et al. (2013) argued that a single score could not be established because the relationship between factors differs too much across contexts, and concluded that an analysis of indices in different domains was therefore the best approach for the study. In the next section, we propose an alternative approach.

3 Methodology: Financial capability, the capability approach and conversion efficiency

The concept of financial capability seeks to capture the ability of an individual to achieve a set of desired outcomes in managing their money, taking into account the diverse contexts and circumstances they face. While the two have not been widely linked in the literature to date, this resonates with Sen's capability approach (Johnson and Storchi, forthcoming). The capability approach is an evaluative framework for examining well-being which distinguishes means from ends, as distinct from earlier welfare assessments that evaluated well-being through the space of income or utility. In Sen's view, money and resources are not the end but simply the means to achieving valued ends, which may differ between people. In this approach, people have a set of capabilities, or freedoms, which represent the opportunity to do or to be that which they have reason to value. The capability set is not observable because it is a set of possibilities. What is actually achieved is what Sen calls 'functionings', and these are observable as the final outcomes that people choose to achieve from their set of available capabilities.

Under this approach, the ability to effectively manage financial resources would also seemingly be better regarded as a means rather than an end, that is, as a set of skills that expand the capability set and hence change the achievements (functionings) that might be chosen. However, the boundary between capabilities and functionings is frequently blurred (Clark, 2005; Wolff

and De-Shalit, 2013) and some functionings, such as good health or basic education, are also inputs into further functionings, such as being able to work. These functionings have intrinsic value – for example, due to the status in society they can confer, hence contributing not only to material outcomes but also to social and subjective dimensions (White, 2010) – and they also deliver value in achieving further desirable functionings.

To date, the policy discussion around promoting financial capability suggests that the skills of being able to effectively manage money and resources are an important functioning for people to achieve, therefore appearing to treat financial capability as a functioning that people might have reason to value, perhaps as a means to further functionings. However, there is little evidence to date from open-ended research on well-being within this framework that such skills are valued, although resources frequently are (Johnson and Storchi, forthcoming). To fully operationalise this approach, it would be necessary to inductively establish relevant functionings and to adopt a methodology through which the extent to which they are achieved could be examined, for example through self assessment. In the absence of such data, we adopt the existing set of capacities identified in the previous studies discussed above as the set of desirable financial functionings. The capable outcomes are captured by financial behaviours such as budgeting, not overspending, living within one's means, saving, monitoring expenses and covering unexpected expenses.

The process of turning people's initial endowments of skills and resources into a set of functionings is called 'conversion'. In this process, endowments of income, education, and so on – along with personal characteristics, including psychology – feed into the establishment of the capability set and the choices made (Robeyns, 2005). The efficiency with which this conversion takes place is open to analysis. Binder and Broekel (2011) calculate the efficiency with which income is turned into subjectively assessed well-being outcomes using a version of data envelopment analysis. They then analyse the DEA scores to understand what might influence them in terms of age, gender, disability, and so on. Where some social groups seem to experience constraints in this conversion relative to others, this suggests avenues for the evaluation of public policy in achieving welfare outcomes.

Using this approach, we employ data envelopment analysis to measure conversion efficiency. DEA is a non-parametric method that uses linear programming techniques for the estimation of the relative technical efficiency of individuals as a set of decision-making units (DMUs) (e.g. firms, organisations or individuals) that produce a homogeneous set of outputs from a common set of inputs (Charnes et al., 1978). It is a powerful tool for dealing with multiple output and multiple input models, and it is especially useful when there is no

theoretical functional form of the production function being investigated. The approach has mainly been used to assess the efficiency of firms or organisations, including microfinance organisations (Gutiérrez-Nieto et al., 2007, 2009), but it has also been used in agricultural economics at the individual farmer level to assess decision-making (André et al., 2010) and farm sustainability (Reig-Martínez et al., 2011), to evaluate teacher effectiveness (Rogge, 2011) and to evaluate subjective well-being and life satisfaction (Bernini et al., 2013; Guardiola and Picazo-Tadeo, 2014).

DEA defines Θ as the ratio of the weighted sum of outputs to the weighted sum of inputs. The optimisation problem consists of finding the weights for the outputs and inputs that maximise the efficiency of the DMU i being analysed, under the restriction that using the weights, no-one's efficiency can exceed 1.

For each decision-making unit i , let $x_i^m (m = 1, 2, \dots, M)$ be the M inputs used by DMU i and $y_i^n (n = 1, 2, \dots, N)$ be the N outputs produced by DMU i . Let Θ_i denote the technical efficiency of DMU i , Θ_i is then given by :

$$\begin{aligned} \max \quad & \Theta_i = \frac{\sum_{n=1}^N U^n y_i^n}{\sum_{m=1}^M U^m x_i^m} \\ \text{s.t.} \quad & \frac{\sum_{n=1}^N U^n y_j^n}{\sum_{m=1}^M U^m x_j^m} \leq 1 \\ & U^n > 0, V^m > 0 \\ & \forall j, m, n \end{aligned} \tag{1}$$

In this study, the DMUs are the individuals who participated in the FinAccess 2013 survey in Kenya, the outputs are the financial behaviours which are indicators of financial functionings, and the inputs are the characteristics of the individuals which are hypothesised to have influence on the outcomes. DEA does have limitations. First, DEA results are very sensitive to the selection of the input and output variables. Thrall (1989) shows that the efficiency score produced by DEA cannot decrease when introducing new variables into the analysis. Therefore to avoid over-estimation of the DEA result, Banker et al. (1989) suggest that the number of DMUs should be at least three times the number of variables in the analysis. Since there are 5,198 DMUs in our study, which is much larger than in any other field of study using DEA, this problem has been addressed. Second, DEA using small samples of DMUs can also be confounded by the likelihood that DMUs that are more efficient than those in the sample have been omitted. Again, given the large number of DMUs in our case, this is unlikely to be an issue.

This approach offers a number of advantages that address the issues raised in the above literature review. First, it does not require us to indicate which aspects of financial behaviour are more important than others. Second, it produces a relative assessment across individuals with the potential to change over time. Third, individuals' endowments in terms of income, education, proximity to financial services and psychological pre-dispositions are included as inputs. The measure is therefore able to account for these endowments and is neutral to their influence, as it is the efficiency with which their endowments are turned into desirable outcomes that we now evaluate. An individual with a lower level of income or education or greater distance from financial services who achieves the same scores on output domains as someone with higher income or education or greater proximity to services, and lesser inclination towards the future, will be treated as a more financially efficient individual. Fourth, DEA is not sensitive to the unit and form of the variables, giving us flexibility in constructing the variables we need.

Finally, the approach can be applied across country contexts by pooling data and does not require a set of weights to be pre-defined through which a single index of efficiency of financial capability is produced. Hence, the result retains a richer relationship to the underlying data and can allow for relative cross-country comparisons of efficiency.

4 Data description

In order to develop input and output indicators with which to compute this measure of efficiency in achieving financial capability, we are constrained by the data available in the FinAccess 2013 dataset. This does not allow us to present indicators in all of the domains established by Kempson et al. (2013), so we have also used cluster analysis to develop indicators of inputs and outputs.

We extract seven indicators to be our output variables:

1. Having a budget (O1)
2. Sticking to a budget (O2)
3. Managing spending (O3)
4. Managing borrowing (O4)
5. Saving frequency (O5)
6. Variety of saving reasons (O6)

Cluster analysis² was used to form five of these indicators, namely ‘Having a budget’, ‘Sticking to budget’, ‘Managing spending’, ‘Managing borrowing’ and ‘Variety of saving reasons’. The result of clustering shows that ‘Having a budget’ and ‘Sticking to a budget’ do not cluster together and thus need to be treated as distinct financial behaviours.

‘Having a budget’ comes from the statement ‘You have a plan for how to allocate money for things like food, clothing, bills and other needs from month to month’. This is similar to one of the components of the budgeting domain constructed by Kempson et al. (2013), which asks ‘whether people plan how to spend their money when they receive it, and how frequently they do it’. ‘Sticking to a budget’ comes from the statement ‘No matter how hard you try, you just can’t manage to stick to a budget’. We transform this variable so that those who disagreed with the statement get a higher value. Although this is also similar to one of the budgeting domains in Kempson et al. (2013) – ‘How frequently they [people] keep to the plan they make’ – we treat it differently because the cluster analysis shows that sticking to a budget is quite different to having a budget. Intuitively, there is no reason to expect that someone who has a budget will stick to it firmly.

‘Managing spending’ contains three statements: ‘You often don’t feel in control of your finances’, ‘You frequently borrow to buy things you want, but don’t need to survive’ and ‘You often make spending mistakes that force your family to cut back on essentials, like food and cooking fuel’. These three statements cluster together and since they all represent the similar domain of overspending, we only treat those who disagreed with all three statements as not overspending.

‘Managing borrowing’ contains three statements: ‘You need to take out additional loans to pay your existing credit/loans’, ‘You often have trouble making your money last between pay days’ and ‘You have often been surprised by the final amount you had to pay for a loan’. Since these statements covered different aspects of borrowing, we construct a variable that takes a value from 0 to 3 based on how many statements the individuals disagreed with.

On the saving side, we further consider people’s frequency of saving in relation to a 365-day year, such that 1 represents daily saving, while saving twice a year scores $2/365$, or 0.005. Kempson et al. (2013) construct their saving domain considering saving for the future and saving for emergency together with the regularity of saving. In contrast, we do not discriminate between different reasons for saving, or say which one is better. Instead, we use cluster analysis to

2 Results available on request.

group the saving reasons and treat those who can save for multiple reasons as being financially capable. From 23 reasons for saving, we identified four groups that characterise the four main categories of reasons that people are saving for: 'emergency and smooth consumption', 'long term', 'land and housing' and 'farming and other'. The variety of reasons for saving is constructed by counting how many categories the individual is currently saving for.

In selecting the output variables, we focus on how people really behave rather than how they think, and therefore exclude people's attitudes and awareness from the output side. There is always inconsistency between the thought process and behaviour, and behaviour is the output we are more interested in. On the other hand, we do not deny that there is a strong correlation between the two. If they do map each other perfectly, there will be no loss of generality when considering only one of them, and if not, then as stated above, we think behaviour is a more appropriate measure. Thus, we leave the psychological aspect to the input side.

There are numerous factors that can influence people's financial behaviour. Next to the psychological factors, the above discussion identifies formal education, financial literacy, income, and so on. We select the following variables as our inputs:

1. Attitude towards future (I1)
2. Attitude towards current status (I2)
3. Years of education (I3)
4. Income group (I4)
5. Financial numeracy (I5)
6. Financial literacy, including knowledge of financial terms – basic (I6), loan (I7) and investment (I8) – and financial institutions (I9)
7. Distance to the nearest financial service (I10)
8. Cost to the nearest financial service (I11)

The FinAccess 2013 dataset contains few psychometric variables. We use the statements 'You are worried that you won't have enough money to live on in old age' and 'You go without basic things so that you can save' to account for individuals' confidence about the future and saving, respectively. 'Years of education' and 'income' are chosen as input variables since they are highly correlated with saving behaviour. 'Financial numeracy' is a variable that takes a value of 0, 1 or 2 depending on how many numerical questions on fractions and interest the individual answered correctly.

We also treat ‘financial literacy’ as an input. In this case, it is based on familiarity with a range of financial terms that are grouped into three areas as a result of cluster analysis: basic, loan and investment. Adding knowledge of financial institutions, we construct four variables counting how many terms/institutions they have heard of.

To measure ‘distance to financial service’, we use the time it takes people to travel to the nearest financial service. We transform this so that the less time it takes people to get to the nearest financial service, the higher the value of the constructed variable. The same rule applies to the variable ‘cost to financial service’, but we use the log of this variable, as its reciprocal was otherwise too small.

Although DEA is a non-parametric method that does not require the specification of a particular functional form, some basic assumptions still need to be made. First, constant returns to scale are assumed since the application is to individual data in which a size effect should not arise, in accordance with the CCR model (Charnes et al., 1978). Second, this application uses output-oriented DEA in which the inputs are fixed and the extent to which outputs can be increased is assessed. This is most appropriate for policy-oriented problems where the aims are to increase the outputs rather than reducing the inputs. Moreover, for this approach outputs should not be under the control of DMUs, which might seek to adjust them in order to gain higher scores (Banker and Morey, 1986). Since the individuals face no incentives to control their outputs, we do not face this problem here.

The FinAccess 2013 dataset includes 6,449 individuals. Those under 18 years of age are dropped since formal services such as banks and mobile money, which are the subject of our subsequent regressions, require individuals to be aged 18 or over to access them. Some observations are also dropped because of missing input or output data, giving a final sample size of 5,198.

Table A1 in the Appendix shows the summary statistics for the constructed outputs and inputs. The difference between ‘having a budget’ and ‘sticking to a budget’ is evidenced here, with 74.4% having a budget but only 36.9% reporting that they stick to it. The mean of 0.07 for saving indicates an average saving frequency of once every 25 days. The financial literacy indicators show that people are familiar with the terms included in the variable for basic knowledge – such as ‘savings account’, ‘insurance’, ‘cheque’, ‘budget’ and ‘ATM card’ – and, on average, people have heard of nearly six of the seven terms. On the other hand, clustered terms related more to loans (‘collateral’, ‘mortgage’ and ‘inflation’) have a low recognition rate of less than one.

It is worth noting that the relationship between outputs and inputs is similar to that which common sense would suggest. Table A2 in the Appendix reports the correlation between the outputs and inputs. It shows that the ability to stick to a budget and to manage spending and borrowing are highly correlated with the two attitudinal variables, while having a budget and saving behaviour are more closely related with initial endowments of education, income and financial literacy. There is a causality concern in using the DEA approach – it may be unclear whether it is the inputs (education, income) that make people more financially capable, or the other way around. Table A2 shows that the demographic variables of concern are only highly correlated with saving variables, while other financial behaviour are controlled by psychological variables only.

5 Estimation results: DEA as a measure of conversion efficiency

Figure 1 presents the distribution of the DEA scores and Table A3 gives the descriptive data. The mean score is 0.401 and the distribution shows that the scores are skewed towards the lower end, although 9.5% have a score of 1, representing perfectly efficient conversion.

Figure 1: Frequency histogram of DEA

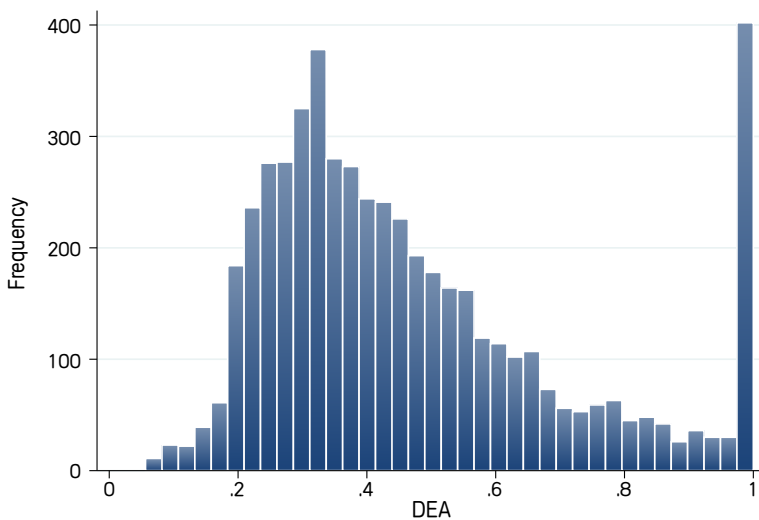


Table A4 presents the OLS regression result of the DEA efficiency score in its inputs and outputs. This analysis allows us to see, on average, how each input and output variable contributes to the DEA score. It shows basically that the coefficients of the inputs variables are negative and the outputs are positive, which is in accordance with how the DEA scores are computed. There is a counter-intuitive result for 'loan knowledge' that has arisen because of the high correlation within the knowledge variables. However, it is not appropriate to arbitrarily drop any one area of financial knowledge that has been established through the cluster analysis, and this simply demonstrates the behaviour of our score and does not actually affect the use of the variable in subsequent analysis.

Table A5 shows the OLS regression result of DEA on other social variables. Education, income and remoteness are elements of the input in DEA, so it is not surprising that they have a significant negative relationship with DEA. This result arises from the method of constructing the DEA score so does not offer new insight, but it is still necessary to include the variables as the regression results for other variables may otherwise be biased. In other words, the estimation of coefficients on variables that are correlated with education, income or remoteness might be influenced by the negative effect of inputs on DEA if education, income and rural were not included in the regression.

Apart from variables that are directly related to the input variables (rural – related to cost and distance to financial services, education and log of income), a number of other variables are also notable or significant. First, age has a very weak significant effect, suggesting some reduction in efficiency as people get older. Second, there are regional variations – those in the Eastern and Nyanza regions are significantly more efficient than those in Nairobi (the base case). Regional DEA averages show that Nairobi has the lowest average score, and this is in part due to the higher input variables in this region in terms of incomes, education and proximity to financial services. The relative advantage of Nairobians means that they would need to score higher in their output variables than those in other regions to attain similar efficiency scores, but it might be suggested that with such higher levels of income, in particular, they in fact do not need to be as efficient. In other words, there is an income threshold at which it becomes in some ways not necessary to be as efficient, since managing money is not as pressing. Further analysis of the DEA by income quartile³ shows that the income effect does drop out in the top two quartiles of the income distribution, and that the regional effects virtually disappear.

3 Results available on request.

Third, being employed in the agriculture sector or doing business has a positive influence on efficiency capability (relative to being employed in own agriculture), and so does working for the government to a lesser degree. For those employed in agriculture, this may be the result of being paid a daily wage, which means that managing spending and sticking to a budget is a necessary and perhaps easier function. The direction of causality for those in business would seem likely to run both ways – those with greater efficiency in achieving capable behaviours are more likely to be in business because they are better at managing money; on the other hand, having a business also tends to yield daily income, which imposes a daily constraint on financial management. Being employed in government offers some significant associations, and this may also be because monthly salary receipts offer a framework within which financial management takes place. Interestingly, the effect of being employed in domestic chores is mildly negative, which is likely linked to the fact that this group is unlikely to have much in the way of financial management responsibilities through which their efficiency can be developed.

Fourth, being Christian is weakly related to lower efficiency scores, and this may be related to particular practices of money management in minority non-Christian populations (mainly Muslim). Fifth, the marginal significance of sole decision-making responsibility and the more significant result for shared decision-making in both specifications (2) and (3) supports the finding of Kempson et al. (2013) that those with responsibility for decision-making in the household are likely to be more financially capable, but also suggests that sharing decisions may produce a dynamic of discussion that positively moderates behaviour. This is consistent with the negative and significant result of being single or divorced.

Overall, these results offer insights into the distribution of the efficiency with which financial behaviours that are viewed as capable are achieved across Kenya, and the possible dynamics of achieving more efficient and capable financial behaviour. In particular, two areas stand out. The first is the relationship with employment type and what this means in terms of how different types of employment enable different types of financial management. The second is the role of shared household decision-making and the contrast with being a sole decision-maker (including as a result of being single or divorced).

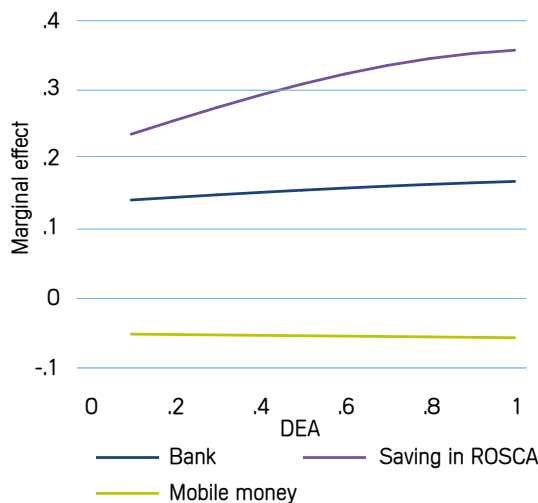
6 Estimation results: The role of financial capability in financial inclusion

In this section, we examine the relationship between the DEA measure of efficiency in achieving financially capable behaviour and access to the three most used financial services in Kenya: mobile money (66.4%), banks (31.8%) and ROSCAs (25.6%) (see Table A3 in the Appendix for summary statistics).

Table A6 presents the marginal effects for bank access across a range of specifications, and demonstrates that the DEA is positive and significant across all specifications. The results for ROSCAs (Table A7) are similarly positive and significant. The results for mobile money (Table A8), in contrast, show that the DEA efficiency score is not significant once other variables are controlled for.

These results are summarised in Figure 2, which shows the marginal effects of higher efficiency scores on access to each of these services (holding all other variables at their mean values). This presents a rather interesting relationship in which the strongest and most positive relationship is with ROSCA access, while that for bank access is much weaker and that for mobile money is slightly negative and declining. This result is not causal, as the effect of efficient behaviour on ROSCA use can run in both directions. Those who are more efficient are more likely to select themselves into ROSCAs, but, on the other hand, as the likelihood of membership of a ROSCA rises for other reasons, greater efficiency is achieved through the discipline that it offers.

Figure 2: Marginal effect of financial capability on access



The weaker positive relationship between rising efficiency in achieving capable behaviours and bank access resonates with the fact that banks provide less in the way of mechanisms that enable improved financial behaviour, especially in terms of discipline. This is underpinned by the fact that their use is strongly related to employment in the private sector and in government, where salaries are usually received through banks and using them is therefore not necessarily a choice in the pursuit of improved financial behaviour. In the reverse direction of causality, the relationship suggests that those with higher capability scores are more likely to use banks.

A negative relationship between mobile money use and efficiency could be interpreted as suggesting that the ease that mobile money offers in terms of accessing reciprocal transfers is either a cause or an effect – or both – of lower efficiency in achieving financially capable behaviours. In other words, those who are least efficient are more likely to seek access to transfers from others because they have not learnt how to manage shocks and hazards through their own financial management, while at the same time access to mobile money and the reliance on transfers it precipitates might in fact reduce the need to develop those behaviours. However, the negative coefficient is only marginally significant in one specification and therefore does not suggest that such dynamics are at play. Mobile money is a tool that has become widely used and other research has indicated that this bears little relationship to intentions to save or access to formal financial services, but that it facilitates the wide range of inter-personal transfers that are embedded in networks of reciprocity and a ‘fiduciary culture’ in which relationships of equality and ‘negotiability’ dominate (Johnson et al., 2012).

For the purposes of robustness testing, Table A9 shows probit estimation results using the separate input and output variables that constitute the DEA score. This shows that only the saving variables have independent relationships to service access.⁴ The ability to save and diversity of reasons for saving are positively related to having a bank account but, interestingly, are negatively related to saving frequency. This supports the idea that people save in banks irregularly when they have money to do so, and contrasts with the built-in discipline in ROSCAs, which would appear to have slight positive effects. Use of all three services is only weakly positively related to the diversity of reasons for savings.

These results demonstrate that there is a significant relationship between efficiency scores and the use of banks and ROSCAs, which deserves further

4 The variable ‘able to save’ is omitted from the ROSCA regression because not saving is a perfect predictor of not being in a ROSCA.

examination to establish the direction of causality. In the next section, we therefore employ the methodology of propensity score matching to examine this.

7 Estimating the causal effect of financial service usage using the matching approach

An evaluation of the effects of programme participation – in this case, financial service use – has to deal with the problem of quantifying the effect of participation compared to what would have been the case without participating. This problem naturally arises because it is impossible to observe individuals in two different states (participation and non-participation) at the same time and place. Therefore, it is the principle task of any evaluation study to find a credible estimate for the counter-factual state.

There are essentially two methods to estimate the counterfactual situation: randomised experiments and non-experimental (also called *quasi-experimental*) methods. In principle, randomised experiments provide the easiest solution to recovering the desired counterfactual. In randomised experiments, individuals eligible for participation are randomly assigned to a treatment and control groups. Since these groups do not differ from each other, on average, in either observable or unobservable characteristics, and the control group can be considered ‘identical’ to the treatment group, the average difference in outcomes between the two groups provides a simple answer to the counterfactual question.⁵

Currently, the most common technique to solve the evaluation problem when the participants and non-participants are not randomly assigned to a programme is the *propensity score matching* (PSM) approach. This approach mimics a randomised experiment *ex post* by constructing a control group that resembles the treatment group as much as possible. After matching the members of the control group and considering their observable characteristics, they have a probability of being selected for participation in the programme that is comparable to that of the members of the treatment group. The key difference between this and the randomised approach, of course, is that unobservable characteristics cannot be controlled for.

5 Randomised experiments are often not politically or socially feasible. Moreover, they are in practice not entirely free of complications; see Heckman and Smith (1995) for a discussion of the advantages and disadvantages of the randomisation approach.

While the use of financial products (banks, ROSCA, or mobile money) has not been designed as a randomised experiment, the data for the evaluation analysis was constructed to mimic an experimental situation. For each member of the treatment group (i.e. financial service user), a matched partner with the same observable characteristics was drawn from the control group (i.e. financial service non-user). The intention was to create a control group that would resemble the treatment group as much as possible. The individual characteristics available for this matching procedure were education, income, religious origin, remoteness, gender, marital status, age, region, income resources, attitude to future and saving, and possession of a mobile phone. Table A10 shows the matching quality. After the matched pairs have been formed, a suitable way to assess the matching quality is a comparison of the standardized bias before matching, SB^b , to the standardised bias after matching, SB^a . The standardised biases are defined as

$$SB^b = \frac{(\bar{X}_1 - \bar{X}_0)}{\sqrt{0.5(V_1(X) - V_0(X))}}; \quad SB^a = \frac{(\bar{X}_{1M} - \bar{X}_{0M})}{\sqrt{0.5(V_{1M}(X) - V_{0M}(X))}};$$

where $\bar{X}_1 (V_1)$ is the mean (variance) in the treated group before matching and $\bar{X}_0 (V_0)$ is the analogue for the comparison group. $\bar{X}_{1M} (V_{1M})$ and $\bar{X}_{0M} (V_{0M})$ are the corresponding values after matching (Rosenbaum and Rubin, 1985). Following the example of Sianesi (2004), we also re-estimate the propensity score on the matched sample to compute the pseudo- R^2 s before and after matching. These measures (see Table 10) suggest that the quality of our matching procedures is quite satisfactory. The standardised bias of the matched sample is markedly smaller than that of the unmatched sample. Likewise, the pseudo- R^2 after matching are fairly low and decrease substantially compared to before matching. This is what we should expect considering that after matching, there should not be any systematic difference in the distribution of covariates between product users and matched product non-users.

If the matching approach is successful in mimicking a randomised experiment, any differences in observable characteristics between the treatment and control groups should disappear, which will then allow us to evaluate financial product usage by comparing mean outcomes between the treatment and control groups. Our point estimates in Table 11 suggest that bank usage is associated with a higher DEA, and this effect is statistically significantly different from zero – bank usage increases the DEA efficiency score by about 4.8 percentage points compared to non-bank usage. Similarly, ROSCA usage increases the DEA by about 7.0 percentage points compared to non-ROSCA usage. The difference in the effect of mobile money on the DEA between users and non-users is

not statistically different from zero, however. This leads to the conclusion that both using banks and using ROSCAs, but not mobile money, have a positive impact on efficiency in achieving financially capable behaviours.

This result is in some ways surprising, and the mechanism at work needs more exploration. ROSCAs clearly have a strong discipline component as part of their set up, and hence it might be expected that this would enhance saving and related financial management behaviours, but banks do not facilitate discipline as clearly. However, qualitative evidence from other research shows that putting funds in a bank account is seen as a way of moving funds from more immediate accessibility to somewhere that is further away and less easy to access, and hence aids discipline in the use of these funds. However, it is also possible that other unobservable factors in the form of underlying attitudes beyond those we have been able to match (attitude to saving, attitude to the future, etc.) are particularly important and that the PSM should also take these into account.

8 Conclusion

This chapter has presented an innovative approach to deriving a single measure to evaluate the efficiency with which people turn their endowments into financially capable behaviour, using data envelopment analysis (DEA). This approach takes forward recent research identifying domains of capability, while addressing the limitations of combining domains into a single index with fixed weights that may not adequately capture contextual variation. DEA acts to optimise the use of the data to derive the relative efficiency score, and hence allows for contextual variation in the absolute levels of inputs or the achievement of particular combinations of actual financial behaviours. Data can therefore be pooled across countries and comparisons made between them (as was done here for regions of Kenya), allowing a comparison of the relative efficiency of individuals in achieving different combinations of outputs dependent on their inputs.

The results indicate that type of employment is related to efficiency, which suggests that income flows of a certain nature – in particular, daily earnings – are likely to enable higher efficiency, and there is a weak but positive relationship with being employed by the government. Participating in shared decision-making has a positive effect and this, alongside the finding that being single or divorced has a negative effect (in contrast to being married), suggests that the dynamic of discussion within a household improves financial behaviour

outcomes. The financial practices of non-Christians are also correlated with enhanced efficiency.

Efficiency is positively and significantly related to the use of banks and ROSCAs, but negatively (though not significantly) related to the use of mobile money. Causality has been explored using the technique of propensity score matching, and the results suggest that this association is positively causal for banks and ROSCAs. Interestingly, mobile money has no similar effect, which confirms its role as a very different type of financial service.

Overall, these results suggest that ours is a meaningful measure of efficiency in achieving financial capability. However, the indicators available in FinAccess 2013 to undertake the analysis were rather limited in some areas (especially psychometric variables) and need to be further developed to enable further analysis of this type. More broadly, the conceptual framework of the capability approach deployed here offers the potential to take the analysis further. Instead of assessing the efficiency with which pre-defined indicators of financial capability are achieved, we may instead wish to assess the efficiency with which people are able to achieve the financial goals they value in pursuit of their well-being. Such an assessment requires difference indicators, and future FinAccess surveys should consider how this can be undertaken as it would offer a basis through which to assess both financial capability and the extent to which financial inclusion is actually meeting people's own objectives for well-being.

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Appendix

Table A1: Summary statistics of outputs and inputs

Variable	Mean	Std. Dev.	Min.	Max.
Have budget (O1)	0.744	0.437	0	1
Sticking to budget (O2)	0.369	0.482	0	1
Managing spending (O3)	0.311	0.463	0	1
Managing borrowing (O4)	1.769	1.081	0	3
Saving frequency (O5)	0.070	0.182	0	1
Variety of saving reasons (O6)	1.052	0.904	0	4
Attitude to future (I1)	0.300	0.458	0	1
Attitude to present (I2)	0.518	0.500	0	1
Year of education (I3)	7.759	4.136	0	16
Income group (I4)	3.012	1.612	0	8
Efficient numeracy (I5)	1.054	0.838	0	2
Knowledge: basic (I6)	5.873	1.927	0	7
Knowledge: loan (I7)	0.836	1.077	0	3
Knowledge: investment and risk (I8)	1.841	1.151	0	3
Knowledge: institution (I9)	3.452	2.025	0	7
Distance to financial service (I10)	3.713	3.797	0.143	12
Cost to financial service (I11)	-1.224	1.867	-6.215	0
Number of observations	5,198			

Table A2: Cross-correlations

	O1	O2	O3	O4	O5	O6	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	O11
O1	1.00																
O2	-0.15	1.00															
O3	-0.12	0.30	1.00														
O4	-0.14	0.28	0.31	1.00													
O5	0.05	-0.02	-0.01	-0.02	1.00												
O6	0.16	-0.08	-0.03	-0.07	0.22	1.00											
I1	-0.08	0.23	0.20	0.21	0.01	-0.06	1.00										
I2	-0.15	0.14	0.17	0.10	-0.02	-0.03	0.12	1.00									
I3	0.12	-0.01	0.05	-0.01	0.07	0.22	0.07	0.05	1.00								
I4	0.08	0.03	0.06	0.01	0.09	0.25	0.10	0.02	0.36	1.00							
I5	0.06	0.01	0.06	0.01	0.03	0.17	0.05	0.02	0.48	0.27	1.00						
I6	0.18	-0.05	0.01	-0.05	0.08	0.25	-0.01	-0.02	0.48	0.24	0.39	1.00					
I7	0.08	-0.02	0.03	-0.03	0.06	0.17	0.08	0.02	0.49	0.35	0.36	0.37	1.00				
I8	0.14	-0.03	0.02	-0.05	0.06	0.23	0.03	-0.02	0.52	0.32	0.43	0.65	0.58	1.00			
I9	0.15	-0.03	0.00	-0.04	0.10	0.22	0.04	-0.03	0.48	0.33	0.36	0.59	0.55	0.62	1.00		
I10	0.05	-0.00	-0.00	-0.03	0.06	0.06	0.07	0.01	0.22	0.19	0.15	0.13	0.22	0.18	0.18	1.00	
I11	0.09	-0.01	-0.01	-0.03	0.08	0.07	0.04	0.01	0.24	0.13	0.14	0.20	0.17	0.19	0.19	0.25	1.00

Note: Variable definitions can be found in Table A1

Table A3: Summary statistics of probit regression variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Product usage dummies					
Bank	0.318	0.466	0	1	5198
Saving in ROSCA	0.256	0.436	0	1	5198
Mobile money	0.664	0.472	0	1	5198
Financial capability efficiency score					
DEA	0.401	0.225	0.028	1	5198
Individual demographics					
Rural	0.618	0.486	0	1	5198
Female	0.588	0.492	0	1	5198
Single	0.207	0.405	0	1	5198
Divorced	0.026	0.158	0	1	5198
Widowed	0.095	0.293	0	1	5198
Age	36.907	14.631	18	97	4928
Age square	1576.138	1346.957	324	9409	4928
Primary education	0.507	0.5	0	1	5198
Secondary education	0.297	0.457	0	1	5198
Tertiary education	0.093	0.291	0	1	5198
Christian	0.939	0.240	0	1	5198
Log income	8.241	1.398	3.689	13.017	5198
Regional dummies					
Central	0.158	0.364	0	1	5198
Coast	0.092	0.29	0	1	5198
Eastern	0.168	0.374	0	1	5198
Nyanza	0.157	0.364	0	1	5198
Rift valley	0.237	0.425	0	1	5198
Western	0.109	0.312	0	1	5198
Income sources					
Income – transfer	0.471	0.499	0	1	5198
Income – employed in agriculture	0.228	0.419	0	1	5198
Income – domestic employment	0.07	0.255	0	1	5198
Income – government employment	0.039	0.193	0	1	5198
Income – employed in private sector	0.141	0.348	0	1	5198
Income – business	0.243	0.429	0	1	5198
Income – investment and other sources	0.047	0.211	0	1	5198
Asset					
Mobile	0.735	0.441	0	1	5198

Table A4: OLS regression results for inputs/outputs on DEA

Variable	DEA
Education year	-0.006*** (-10.80)
Distance (transformed)	-0.009*** (-20.14)
Cost to financial service (transformed)	-0.037*** (-39.10)
Knowledge: Basic	-0.029*** (-23.55)
Knowledge: Loan	0.009*** (4.52)
Knowledge: Investment	-0.003 (-1.46)
Knowledge: Institution	-0.006*** (-5.05)
Efficient numeracy	-0.009*** (-3.67)
Income group	-0.054*** (-46.32)
Worrying about old age	-0.086*** (-22.63)
Worrying without basic to save	-0.083*** (-24.22)
Having budget	0.093*** (23.74)
Stick to budget	0.013*** (7.83)
Managing spending	0.056*** (14.10)
Managing borrowing	0.068*** (18.15)
Saving frequency	0.335*** (35.80)
Saving variety	0.093*** (46.83)
Constant	0.929*** (117.14)
N	5,198
Adjust R ²	0.740

Notes: t-statistics in brackets. *, ** and *** represents significance level at 5%, 1% and 0.1% respectively.

Table A5: OLS estimation of DEA on social variables

	(1)	(2)	(3)
Rural	0.083*** (12.66)	0.086*** (13.10)	0.083*** (12.69)
Age	-0.002* (-2.19)	-0.002* (-2.10)	-0.002* (-2.26)
Agesqr	0.000 (1.87)	0.000 (1.85)	0.000 (1.91)
Education – primary	-0.150*** (-14.49)	-0.154*** (-15.09)	-0.151*** (-14.61)
Education – secondary	-0.190*** (-16.48)	-0.195*** (-17.28)	-0.190*** (-16.53)
Education – tertiary	-0.171*** (-11.57)	-0.177*** (-12.17)	-0.172*** (-11.60)
Central	-0.017 (-1.32)	-0.018 (-1.42)	-0.017 (-1.34)
Coast	0.017 (1.21)	0.014 (1.02)	0.016 (1.14)
Eastern	0.033** (2.60)	0.032* (2.50)	0.033* (2.55)
Nyanza	0.035** (2.67)	0.036** (2.81)	0.034** (2.65)
Rift valley	0.022 (1.80)	0.019 (1.56)	0.020 (1.68)
Western	-0.011 (-0.79)	-0.011 (-0.81)	-0.011 (-0.80)
Income – transfers	0.009 (1.59)	0.011 (1.84)	0.010 (1.72)
Income – employment in agriculture	0.024*** (3.48)	0.023** (3.21)	0.024*** (3.37)
Income – domestic employment	-0.024* (-2.18)	-0.024* (-2.18)	-0.022* (-1.96)
Income – government employment	0.041** (2.60)	0.042** (2.68)	0.041** (2.59)
Income – private-sector employment	-0.005 (-0.55)	-0.007 (-0.85)	-0.006 (-0.72)
Income – own business	0.041*** (6.03)	0.041*** (6.03)	0.041*** (6.04)
Income – investment and other	0.017 (1.29)	0.020 (1.50)	0.018 (1.32)
Mobile	-0.012 (-1.76)	-0.012 (-1.79)	-0.012 (-1.80)

Table A5 (continued)

	(1)	(2)	(3)
Log income	-0.059*** (-24.62)	-0.059*** (-24.99)	-0.059*** (-24.85)
Christian	-0.058*** (-4.57)	-0.055*** (-4.36)	-0.056*** (-4.48)
Gender			
Female	0.010 (1.58)	- -	- -
Marital status			
Single	-0.021** (-2.85)	- -	-0.016* (-2.01)
Divorced	-0.047** (-2.64)	- -	-0.043* (-2.42)
Widowed	0.005 (0.51)	- -	0.010 (-1.00)
Decision-making role			
Sole decision-maker	- -	0.025* (2.23)	0.018 (1.56)
Shared decision-maker	- -	0.035** (3.12)	0.027* (2.22)
Constant	1.128*** (34.98)	1.105*** (35.47)	1.119*** (34.23)
N	4,928	4,928	4,928
Adj. R ²	0.329	0.329	0.330

Note: t-statistics in brackets. *, ** and *** represents significance level at 5%, 1% and 0.1% respectively.

Table A6: Marginal effects of probit estimation results on bank usage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Education year	0.043*** (33.24)	0.030*** (21.43)	0.032*** (22.26)	0.031*** (20.13)	0.026*** (16.31)	0.022*** (13.57)	0.023*** (13.95)
Log income		0.105*** (24.65)	0.114*** (25.10)	0.106*** (21.71)	0.085*** (16.48)	0.079*** (15.41)	0.077*** (15.07)
DEA			0.149*** (5.12)	0.203*** (6.77)	0.185*** (6.31)	0.193*** (6.58)	0.190*** (6.52)
Christian				0.005 (0.17)	0.011 (0.43)	0.007 (0.26)	-0.000 (-0.01)
Rural				-0.068*** (-5.11)	-0.042** (-3.15)	-0.035** (-2.69)	-0.032* (-2.43)
Female				-0.045*** (-3.74)	-0.035** (-2.93)	-0.031* (-2.58)	
Single				-0.007 (-0.48)	0.001 (0.09)	0.006 (0.40)	0.012 (0.80)
Divorced				-0.067 (-1.80)	-0.050 (-1.39)	-0.054 (-1.50)	-0.068 (-1.91)
Widowed				0.033 (1.46)	0.033 (1.50)	0.034 (1.54)	0.007 (0.31)
Age				0.009*** (4.40)	0.008*** (3.89)	0.006** (3.16)	0.005* (2.46)
Age square				-0.000** (-3.24)	-0.000** (-2.85)	-0.000* (-2.05)	-0.000 (-1.46)
Central				0.044 (1.80)	0.069** (2.84)	0.065** (2.75)	0.060* (2.53)
Coast				-0.049 (-1.78)	-0.035 (-1.30)	-0.030 (-1.13)	-0.033 (-1.25)
Eastern				-0.022 (-0.90)	0.001 (0.03)	-0.000 (-0.01)	-0.006 (-0.25)
Nyanza				-0.068** (-2.62)	-0.053* (-2.07)	-0.047 (-1.85)	-0.055* (-2.18)
Rift valley				-0.057* (-2.44)	-0.039 (-1.68)	-0.038 (-1.68)	-0.043 (-1.92)
Western				-0.076** (-2.77)	-0.063* (-2.36)	-0.058* (-2.20)	-0.063* (-2.39)
Income – transfers					-0.016 (-1.36)	-0.016 (-1.40)	-0.010 (-0.87)
Income – employment in agriculture					-0.086*** (-5.75)	-0.076*** (-5.12)	-0.079*** (-5.30)

Table A6 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income – domestic employment					-0.043	-0.045	-0.043
					(-1.79)	(-1.90)	(-1.80)
Income – government employment					0.216***	0.208***	0.200***
					(6.19)	(6.11)	(5.89)
Income – private-sector employment					0.018***	0.101***	0.097***
					(6.71)	(6.41)	(6.19)
Income – own business					0.063***	0.051***	0.047***
					(4.80)	(3.97)	(3.61)
Income – investment and other					0.085**	0.082**	0.078**
					(3.12)	(3.05)	(2.94)
Mobile						0.166***	0.162***
						(10.60)	(10.36)
Sole decision-maker							0.100***
							(4.16)
Shared decision-maker							0.047
							(1.87)
N	5,198	5,198	5,198	4,928	4,928	4,928	4,928
pseudo R ²	0.126	0.207	0.211	0.236	0.262	0.28	0.284

Note: t-statistics in brackets. *, ** and *** represents significance level at 5%, 1% and 0.1% respectively.

Table A7: Marginal effects of probit estimation results on ROSCA usage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Education year	0.005*** (3.54)	0.004* (2.36)	0.008*** (5.23)	0.011*** (6.09)	0.012*** (6.56)	0.009*** (5.07)	0.008*** (4.57)
Log income		0.013** (2.71)	0.031*** (6.27)	0.048*** (9.36)	0.046*** (8.60)	0.043*** (8.03)	0.037*** (6.84)
DEA			0.301*** (10.37)	0.293*** (9.90)	0.273*** (9.23)	0.281*** (9.51)	0.283*** (9.52)
Christian				0.082** (2.79)	0.080** (2.73)	0.079** (2.69)	0.102*** (3.44)
Rural				-0.029* (-2.09)	-0.026 (-1.80)	-0.023 (-1.63)	-0.028 (-1.94)
Female				0.165*** (13.14)	0.152*** (11.83)	0.155*** (12.14)	
Single				-0.123*** (-7.36)	-0.115*** (-6.90)	-0.113*** (-6.76)	-0.081*** (-4.58)
Divorced				-0.006 (-0.15)	-0.011 (-0.29)	-0.014 (-0.36)	0.027 (0.71)
Widowed				0.009 (0.43)	0.018 (0.82)	0.018 (0.86)	0.090*** (4.10)
Age				0.009*** (4.24)	0.009*** (4.05)	0.007*** (3.38)	0.007** (3.25)
Age square				-0.000*** (-4.48)	-0.000*** (-4.13)	-0.000*** (-3.44)	-0.000*** (-3.63)
Central				0.047 (1.73)	0.044 (1.64)	0.039 (1.48)	0.045 (1.68)
Coast				-0.020 (-0.64)	-0.016 (-0.52)	-0.014 (-0.45)	-0.017 (-0.55)
Eastern				0.112*** (4.21)	0.109*** (4.09)	0.108*** (4.08)	0.111*** (4.14)
Nyanza				0.137*** (5.09)	0.119*** (4.39)	0.123*** (4.57)	0.127*** (4.68)
Rift valley				-0.029 (-1.12)	-0.018 (-0.68)	-0.017 (-0.68)	-0.020 (-0.77)
Western				0.034 (1.15)	0.035 (1.20)	0.039 (1.35)	0.043 (1.48)
Income – transfers					0.027* (2.22)	0.025* (2.05)	0.041*** (3.31)
Income – employment in agriculture					0.060*** (4.15)	0.066*** (4.57)	0.061*** (4.19)

Table A7 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income – domestic employment					-0.006	-0.007	0.013
					(-0.23)	(-0.29)	(0.53)
Income – government employment					-0.098**	-0.098**	-0.094**
					(-3.01)	(-3.01)	(-2.90)
Income – private-sector employment					-0.016	-0.020	-0.040*
					(-0.83)	(-1.05)	(-2.09)
Income – own business					0.083***	0.075***	0.082***
					(6.06)	(5.50)	(6.01)
Income – investment and other					0.053*	0.055*	0.059*
					(2.00)	(2.10)	(2.21)
Mobile						0.100***	0.100***
						(6.65)	(6.54)
Sole decision-maker							0.099***
							(3.35)
Shared decision-maker							0.188***
							(6.27)
N	5,198	5,198	5,198	4,928	4,928	4,928	4,928
psuedo R ²	0.002	0.003	0.021	0.1	0.114	0.122	0.108

Note: *t*-statistics in brackets in brackets. *, ** and *** represents significance level at 5%, 1% and 0.1% respectively.

Table A8: Marginal effects of probit estimation results on mobile money usage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Education year	0.040***	0.032***	0.031***	0.030***	0.028***	0.013***	0.013***
	(32.50)	(23.98)	(21.72)	(18.68)	(16.75)	(8.67)	(8.72)
Log income		0.068***	0.063***	0.057***	0.045***	0.023***	0.020***
		(15.63)	(13.48)	(11.18)	(8.44)	(5.12)	(4.55)
DEA			-0.067*	-0.034	-0.051	-0.042	-0.042
			(-2.36)	(-1.14)	(-1.71)	(-1.71)	(-1.71)
Christian				0.077**	0.079**	0.071**	0.072**
				(2.85)	(2.94)	(3.23)	(3.28)
Rural				-0.024	-0.002	0.020	0.021
				(-1.65)	(-0.16)	(1.67)	(1.74)
Female				0.000	0.001	0.020	
				(0.03)	(0.07)	(1.89)	
Single				-0.080***	-0.075***	-0.049***	-0.038**
				(-4.90)	(-4.61)	(-3.69)	(-2.67)
Divorced				0.028	0.025	0.023	0.020
				(0.70)	(0.65)	(0.70)	(0.62)
Widowed				0.007	0.012	0.015	0.014
				(0.34)	(0.53)	(0.81)	(0.75)
Age				0.014***	0.014***	0.007***	0.006***
				(6.91)	(6.63)	(4.02)	(3.48)
Age square				-0.000***	-0.000***	-0.000***	-0.000***
				(-7.14)	(-6.77)	(-4.02)	(-3.69)
Central				-0.026	-0.006	-0.014	-0.016
				(-0.83)	(-0.20)	(-0.55)	(-0.63)
Coast				-0.091**	-0.082*	-0.045	-0.050
				(-2.72)	(-2.44)	(-1.69)	(-1.88)
Eastern				-0.110***	-0.089**	-0.078**	-0.082***
				(-3.56)	(-2.86)	(-3.18)	(-3.31)
Nyanza				-0.088**	-0.082**	-0.038	-0.044
				(-2.83)	(-2.62)	(-1.53)	(-1.77)
Rift valley				-0.108***	-0.087**	-0.062**	-0.067**
				(-3.63)	(-2.90)	(-2.64)	(-2.84)
Western				-0.130***	-0.118***	-0.068**	-0.072**
				(-4.02)	(-3.63)	(-2.65)	(-2.78)
Income – transfers					0.010	0.004	0.013
					(0.83)	(0.43)	(1.30)
Income – employment in agriculture					-0.028	0.004	0.000
					(-1.95)	(0.31)	(0.04)

Table A8 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Income – domestic employment					0.002	-0.006	0.001
					(0.10)	(-0.33)	(0.03)
Income – government employment					0.118*	0.063	0.058
					(2.46)	(1.72)	(1.59)
Income – private-sector employment					0.117***	0.069***	0.063***
					(5.54)	(4.13)	(3.73)
Income – own business					0.100***	0.047***	0.046***
					(6.59)	(3.81)	(3.75)
Income – investment and other					-0.024	-0.025	-0.026
					(-0.75)	(-0.97)	(-1.01)
Mobile						0.394***	0.390***
						(53.79)	(52.99)
Sole decision-maker							0.074***
							(3.70)
Shared decision-maker							0.056**
							(2.70)
N	5,198	5,198	5,198	4,928	4,928	4,928	4,928
psuedo R ²	0.109	0.143	0.144	0.162	0.175	0.39	0.391

Note: t-statistics in brackets. *, ** and *** represents significance level at 5%, 1% and 0.1% respectively.

Table A9: Marginal effects of probit estimation using indicators of financially capable behaviour

	Bank	ROSCA	Mobile money
Rural	-0.029* (-2.37)	-0.008 (-0.60)	0.014 (1.15)
Female	-0.025* (-2.17)	0.156*** (12.75)	0.020 (1.88)
Single	0.007 (0.46)	-0.108*** (-6.73)	-0.047*** (-3.55)
Divorced	-0.070* (-2.03)	-0.038 (-1.04)	0.020 (0.63)
Widowed	0.028 (1.34)	0.020 (0.99)	0.015 (0.80)
Age	0.006** (2.88)	0.006** (2.91)	0.007*** (4.00)
Agesqr	-0.000 (-1.71)	-0.000** (-2.93)	-0.000*** (-3.99)
Education year	0.017*** (10.73)	0.002 (1.33)	0.012*** (8.61)
Central	0.032 (1.42)	0.008 (0.30)	-0.019 (-0.75)
Coast	-0.018 (-0.68)	0.009 (0.31)	-0.042 (-1.59)
Eastern	0.001 (0.05)	0.115*** (4.56)	-0.086*** (-3.48)
Nyanza	-0.061* (-2.55)	0.099*** (3.87)	-0.046 (-1.84)
Riftvally	-0.036 (-1.66)	-0.009 (-0.37)	-0.062** (-2.63)
Western	-0.052* (-2.05)	0.049 (1.79)	-0.065* (-2.53)
Income – transfers	-0.031** (-2.84)	0.008 (0.73)	-0.002 (-0.15)
Income – employment in agriculture	-0.078*** (-5.46)	0.056*** (4.01)	0.001 (0.06)
Income – domestic employment	-0.046* (-2.05)	-0.021 (-0.90)	-0.006 (-0.31)
Income – government employment	0.169*** (5.21)	-0.115*** (-3.79)	0.049 (1.34)

Table A9 (continued)

	Bank	ROSCA	Mobile money
Income – private-sector employment	0.078***	-0.042*	0.062***
	(5.13)	(-2.33)	(3.67)
Income – own business	0.030*	0.039**	0.039**
	(2.37)	(2.94)	(3.13)
Income – investment and other	0.061*	0.039	-0.033
	(2.44)	(1.56)	(-1.30)
Mobile	0.134***	0.068***	0.386***
	(8.86)	(4.69)	(52.28)
Log income	0.055***	0.015**	0.022***
	(11.56)	(2.97)	(5.33)
Christian	-0.019	0.043	0.069**
	(-0.77)	(1.54)	(3.14)
Having budget	0.025	0.029*	0.034**
	(1.91)	(2.12)	(2.97)
Sticking to budget	-0.002	-0.004	0.006
	(-0.20)	(-0.30)	(0.55)
Managing spending	0.027*	0.013	-0.007
	(2.22)	(1.01)	(-0.62)
Managing borrowing	-0.002	-0.006	0.005
	(-0.29)	(-1.11)	(0.98)
Saving frequency	-0.049	0.130***	-0.046
	(-1.75)	(4.72)	(-1.66)
Variety of saving reasons	0.118***	0.128***	0.030***
	(20.52)	(21.07)	(5.07)
Attitude to future	0.013	-0.027*	0.002
	(1.07)	(-2.04)	(0.21)
Attitude to saving	-0.005	0.003	0.003
	(-0.48)	(0.27)	(0.28)
N	4,928	4,928	4,928
psuedo R ²	0.335	0.189	0.395

Notes: t-statistics in brackets. *, ** and *** represents significance level at 5%, 1% and 0.1% respectively.

Table A10: Matching quality

Treated	Sample	Pseudo R^2	LR χ^2	$p > \chi^2$	MeanBias	MedBias
Bank	Raw	0.274	1686.70	0.000	26.3	19.3
	Matched	0.013	55.62	0.001	4.4	3.4
ROSCA	Raw	0.109	613.20	0.000	14.3	13.2
	Matched	0.004	15.39	0.950	2.2	1.6
Mobile money	Raw	0.389	2440.81	0.000	25.0	15.2
	Matched	0.016	143.92	0.000	4.7	4.3

Table 11: PSM result

Outcome variable	Treatment variable	Treated	Controls	Difference	S.E.	t-stat
DEA	Bank	0.4121	0.3778	0.0344	0.01253	2.74
	ROSCA	0.5101	0.4563	0.0537	0.0109	4.91
	Mobile money	0.4341	0.4331	0.0010	0.0160	0.06

The transformation of financial services in Kenya since 2000 has been remarkable. Kenya outperforms both the global average and many middle-income countries such as Chile, Brazil, India, Mexico and Russia, with 75% of adults holding a formal account that allows them to save, send or receive money. This book explores the transformation with analysis of a range of new datasets by leading academic experts. The exceptional growth in mobile money, the emergence of bank agents, the expansion of bank branches and the growth of domestically owned banks are just some of the dimensions investigated in the book. While the Kenyan experience is unique, the story has great relevance for all emerging economies seeking to develop their financial systems.



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