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Improving Access to Banking: Evidence from Kenya

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ABSTRACT

The paper analyses the case of Equity Bank to explore the relationship between bank branch expansion, financial inclusion and bank profitability. The findings show that, unlike traditional banks in Kenya, Equity Bank pursues branching strategies that target under-served territories and less privileged households. Its presence has a positive and significant impact on households' access to bank accounts and credit, especially for Kenyans who are less educated, do not own their own home, and live in less-developed areas. Equity Bank's business model proves to be profitable both at the bank and branch level as it allows the bank to pursue an aggressive pricing schedule, reduce delinquency rates, and secure inexpensive funding in the form of retail deposits.

JEL CODES: G2; O1; R2.
KEY WORDS: Equity Bank, bank penetration, bank account, microfinance.

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1. Introduction

Despite extensive economic and financial sector reforms over the last few decades, many Sub-Saharan African countries still face severe financial development challenges and gaps in terms of access to financial services relative to not only the advanced economies but also other peer developing ones (Allen, Carletti, Cull, Qian, Senbet and Valenzuela, 2014, 2016; ACCQSV).[1] A key obstacle is access of the disadvantaged to finance, which would promote economic growth at the broadest level. In fact, in Sub-Saharan Africa over eighty percent of the adult population lacked an account in the early 2000s, well above the world average of fifty percent (Chaia, Dalal, Goland, Gonzalez, Morduch and Schiff, 2013; Honohan, 2008).

In light of the ample empirical evidence of a positive linkage between access to finance and economic development (e.g., Burgess and Pande, 2005; Levine, 2005), a fundamental question is how to spur access to finance, in particular among the disadvantaged. While the success of microfinance institutions (MFIs) such as Grameen Bank has captured the attention of many economists and policy makers, the provision of microfinance to low-income market segments in a financially self-sustaining way continues to be a major challenge. In addition, some MFIs are now beset by non-repayment problems (for example, in Andhra Pradesh) and high costs of financing, and financial alternatives for the poor are few. Given the high transaction costs of lending small amounts, most commercial banks are incapable of extending credit profitably and, therefore, view the sectors targeted by MFIs as 'unbankable,' while moneylenders generally charge usurious rates of interest. In view of these problems, Bubna and Chowdhry (2010) propose a model of financial inclusion based on the use of information available within the local population, a model that to some extent is being exploited by domestic banks such as the one we study, Equity Bank in Kenya.

[1] Gaps in access to financial services for some market segments are an indication of financial exclusion. Financial inclusion refers to the use of formal financial services at affordable costs by all the segments of the population.

The understanding of which specific policies and institutions best promote financial inclusion in environments plagued by asymmetric information, weak institutions and the absence of basic infrastructures necessary for banking is still limited. In a recent paper, Allen, Demirguc-Kunt, Klapper, and Martinez Peria (2016) explore the barriers to financial inclusion and the policies that are effective in promoting inclusion among the most vulnerable individuals. They find that financial inclusion is associated with greater proximity to bank branches, lower banking costs, stronger legal rights, and more politically stable environments. The results also suggest that policies appear to be relatively less effective in encouraging the use of basic financial services by youth and women.

One important question is the role played by financial institutions in spurring access to finance, in particular through their branch expansion policies. One complication in this study is the lack of suitable data in most contexts. As emphasized by Allen at al. (2016), data collected from financial institutions are often aggregated at the country level, which makes it impossible to assess the determinants and causal effects of bank expansion on financial inclusion across geographical areas within a country as well as on banks' profitability.[2] In this paper, we take one step further in studying the relationship between bank branch penetration policies, financial inclusion and bank profitability by examining the case of Equity Bank, a pioneering institution that devised a banking service strategy targeting low income clients and underserved geographic areas in Kenya. Equity Bank's record in improving financial inclusion has been impressive. In 2006 when it was first publicly listed, it had 1.0 million customers, representing 4.8 percent of the population aged 15 and over. By 2015 the number of customers had risen to 10.0 million representing 36.1 percent of the adult population.[3]

[2] Country-level measures of financial outreach assume a uniform distribution of bank outlets within a country's various areas and across its population, ignoring that bank branches are concentrated in urban areas and that bank expansions tend to target specific segments of the population (Beck, Demirguc-Kunt and Martinez Peria, 2007).
[3] Data from Equity Bank annual reports and World Bank Development Indicators for Kenya.

The study is important for several reasons. First, Kenya has made strides in financial inclusion, but without commensurate progress in the quality of the formal institutions that support provision of financial services (Kaufmann, Kraay and Mastruzzi, 2010). Despite these limitations, the country has witnessed a notable expansion in its network of financial services touch points, such as bank branches, bank agents and mobile money agents compared to its African peers.[4] However, Kenya is still characterized by latent demand for banking services, especially outside urban areas (Dupas, Keats, Green and Robinson, 2016).

Second, and perhaps most importantly, the focus on Equity bank and its branch expansion policy allows us to study the relationship between bank branch penetration, financial inclusion and bank profitability in depth. To overcome the typical lack of suitable data, we obtain micro-level data on bank branch networks for all commercial banks in Kenya and merge it with nationally representative household surveys of financial usage. We also collect branch-level data on the profitability, credit quality and financial structure of all branches of Equity Bank, and conduct analyses to benchmark its profitability relative to that of other banks in Kenya. These various data sources are key in evaluating the effects of Equity Bank's expansion into underserved markets on financial inclusion and its own profitability, both at the bank and at the branch level.

We study three related questions. Did Equity Bank pursue a different branching strategy than other banks in Kenya, one that placed greater emphasis on serving the economically disadvantaged? If so, what effect did this expansion strategy have on households' usage of banking services? Finally, was Equity's branch expansion and emphasis on under-served clienteles profitable? In our *first* set of results, we find that Equity Bank pursued a different branching strategy from other banks. While banks of all ownership types (including Equity Bank) opened a greater number of branches in urban,

[4] The proportion of the population living within a 3 kilometer distance of a financial access touch point is 58.7 percent for Kenya, 44.1 percent for Uganda, 42.7 percent for Nigeria and 28.3 percent for Tanzania. In terms of financial access touch points per 100,000 people, Kenya has 161.7, Uganda 63.1, Tanzania 48.9 and Nigeria 11.4 (http://www.fspmaps.com).

highly populated and English speaking districts, Equity Bank expanded significantly more to underserved districts between 2006 and 2009 than other banks. In our *second* set of results, we find that the presence of Equity Bank branches is strongly positively linked to the likelihood of residents having both bank accounts and loans, especially for Kenyans who are less educated, do not own their own home, and live in rural and arid (semi-arid) areas. In our *third* set of results, we find that the business model of Equity Bank was profitable at both the bank and branch levels. In particular, our branch level analysis shows that the expansion of Equity Bank into arid and semi-arid areas was more profitable than its expansion into urban and rural areas as it allowed the bank to pursue an aggressive pricing schedule, reduce its delinquency rates, and secure stable, inexpensive funding from retail deposits in those areas. Overall, these findings suggest that the business model followed by Equity Bank played a key role in the provision of financial services to population segments typically ignored by traditional banks while generating higher profits than those of other banks operating in Kenya.

Several papers have attempted to identify policies, services, and innovations that have a causal impact on financial inclusion through experiments based on randomized controlled trials (RCTs) conducted in developing countries.[5] Although RCTs represent an important breakthrough in the study of financial inclusion, they typically have some limitations: sample sizes are small, contexts differ, and small variations in experimental design can affect results (Ravallion, 2009). Thus, assessing the external validity of results generated in a specific experimental setting is a thorny issue in developing policy advice. Moreover, important developments in financial inclusion are taking place without the aid of experiments and are not amenable to study via randomization. We view our nationally-representative evidence on financial access and branch penetration and performance as complementary to the experimental evidence from RCTs, which usually focuses on a small set of communities.[6] While not

[5] See, for example, Banerjee, Duflo, Glennerster and Kinnan (2015), Brune, Giné, Goldberg and Yang (2016), Dupas and Robinson (2013), Dupas et al. (2016), and Karlan and Zinman (2011).

[6] Our paper also expands international evidence on the determinants of access to financial services in less developed

relying on a RCT, this paper develops a different identification strategy that can—unlike the RCTs—gauge an aggregate impact.

Our study is closest in spirit to Brown, Guin and Kirschenmann (2016) and Bruhn and Love (2014). Brown et al. (2016) find similar gains as ours in bank account usage associated with the expansion of a major microfinance provider (ProCredit) in Albania, Bulgaria, Macedonia, and Serbia. Similarly to our study, that paper finds that ProCredit was more likely to enter areas with relatively poor households and that the increase in account usage was more pronounced among low- and middle-income households and the self-employed. Bruhn and Love (2014) show that the entry of Mexico's Banco Azteca, which opened a large number of branches in retail stores of the *Grupo Elektra* in 2002, played an important role in raising the incomes of the poor. Like Equity Bank, Banco Azteca is a bank for low-income individuals, which has reduced transaction costs, acquired effective information, and enforced loan repayment. Although the Kenyan episode that we investigate lacks the quasi-experimental characteristics of the Azteca study, the expansion of Equity Bank's business model to other countries in the region, its profitability and financial performance, and the sheer magnitude of the increase in its customers from 4.8 percent of the adult population in 2006 to 36.1 percent in 2015 with a corresponding effect on financial participation make this an episode worthy of study. This case is also interesting as the business model of Equity Bank has implied an outstanding performance of its share price both in absolute and relative terms. Figure 1 shows the path of stock prices of Equity Bank, Kenyan Commercial Bank, Barclays Bank of Kenya, and the FTSE/JSE Africa Banks Index from August 15, 2006 until December 31, 2015. Equity's share price increased by 900 percent compared to 160 percent for Kenya Commercial Bank, 27 percent for Barclays Bank of Kenya, and 122 percent for the FTSE/JSE Africa Banks Index.

economies (Beck and Brown, 2011) and in Kenya (Beck, Cull, Fuchs, Getenga, Gatere, Randa and Trandafir 2010; Beck, Maimbo, Faye and Triki, 2011).

In sum, our work provides a deeper investigation of bank branching strategies targeting poorer households and areas largely ignored by traditional commercial banks as well as the drivers of profitability across geographic areas. Despite a large body of research that explores branching strategies and the determinants of bank profitability, most of this empirical work has followed individual banks, in part because no meaningful statistics at the branch level are usually reported publicly. In contrast to the previously mentioned papers, in this paper we are able to combine data on branch expansion and financial inclusion with Equity's internal data at the branch level to understand the elements of the bank business strategy and the associated drivers of its profitability.

2. Equity Bank: Institutional Background

Kenya is undoubtedly a global leader in the innovation and implementation of mobile money through its signature product called M-Pesa. Kenya has emerged to be at the frontier of financial inclusion in other ways as well. Among them is the advent of an innovative and entrepreneurial bank which has devised a business strategy to tap into the traditionally under served populations among the most geographically neglected areas of the country. This entrepreneurial institution, Equity Bank, has played a key role in fostering financial inclusion in Kenya and in the neighboring countries in East Africa while remaining profitable in the process. In the period 2006-13 its client base grew from 1.0 to 8.4 million people making Equity Bank the largest bank in Africa in terms of customers. At the same time, according to the *Financial Times'* 2014 ranking of the world's Top 1,000 banks, Equity Bank generated the highest rate of return in Africa with a return on assets of 6.8 percent and a return on capital of 54.9 percent.

Initially, Equity Bank relied on funds from its founders and their friends, but in 2006 it was listed on the Nairobi Securities Exchange where it has become the largest bank by market capitalization with roughly 28,000 shareholders. Equity Bank's business model and outstanding

financial performance has lead to the outstanding share price appreciation of 900 percent or 27.8 percent per year on average from 2006 to 2015 shown in Figure 1. Given Equity Bank's financial success, the bank has been expanding its business model to other African countries, such as Uganda, Tanzania, Rwanda and South Sudan, and the stock of its parent company was cross-listed on the Uganda Securities Exchange.

Equity Bank's original business model was the result of a turnaround process that started in 1993. Originally known as Equity Building Society (EBS), and founded as a family-run business in 1984, the institution specialized in providing mortgage loans and targeted the low-income Kenyan population. Narrow specialization and lack of proper governance brought little success. A period of poor performance led to an accumulation of non-performing loans which, by 1993, accounted for more than 50 percent of the EBS portfolio (Beim and Low, 2010). At that point, the EBS was declared technically insolvent by the Central Bank of Kenya. Given its potential and its focus on serving the poor, however, the organization was allowed to continue its operations conditional on a capital injection.

In 2004 Equity obtained the status of a fully regulated commercial bank and James Mwangi became the Chief Executive Officer. Under his leadership, the bank went through a major transformation process, including the restructuring of the governance system, the expansion of the distribution network, a greater focus on employee development and internal culture, and a diversification beyond mortgages to microcredit offerings tailored to its target market segment. To this end, training was provided at all employee levels to ensure that local employees,who were better qualified to communicate with the local population, were able to sell the expanded range of products and drive the bank's expansion. Equity Bank also maintained salaries and benefit packages at a level comparable to the rest of the banking industry to limit employee turnover.

Starting from just 13 regular branches in 2002, that number increased more than ten-fold by

2009 when Equity Bank was operating 155 branches in Kenya (Equity Bank, 2009). Its branch expansion enabled Equity Bank to secure stable, inexpensive funding by attracting retail deposits. Importantly, the bank was willing to reach out to the distant and relatively unsafe areas largely ignored by its competitors. Hence, in addition to permanent locations, it also exploited mobile branches – trucks with armed guards and chaser cars driving to the sites that did not have enough customers to support a permanent branch. By 2006, the ordinary branches became overcrowded: Equity Bank had an average of 24,238 customers per branch compared to an industry average of 6,383 clients (Saloner, Coates, Azuelo, Flannery and Moreno, 2007). To manage its growing client base, the bank invested in alternative distribution channels including an ATM network and point of sale services (Equity Bank, 2009). At the same time, the bank started to operate through mobile and internet banking channels. Finally, Equity Bank put much effort into retaining its clients as they became wealthier (and thus could contemplate switching to a multinational bank). For this purpose, the bank introduced the 'prestige' branches, which were relatively quiet and spacious and were operated by the best employees of the bank.

Equity Bank targeted low-income customers who were previously considered 'unbankable' or abandoned by major competitors.[7] The target groups included micro entrepreneurs, salaried workers, small-scale farmers, small and medium enterprises and private individuals. A major part of this segment had neither trust in banks nor much understanding of financial products. To induce them to become bankable, potential clients were offered a range of products tailored to their personal needs, including loans as small as 500 Ksh (about US$ 5.81) at a time when the average size of a loan was 16,000 Ksh.[8] By tailoring their offerings in this way, rejected loan applications were kept to a minimum, and rejected customers received detailed guidance on the requirements for a successful application.

[7] In the mid-1990s following a recession in Kenya a number of international banks (ABN Amro, Standard Chartered and Barclays) abruptly stopped their activities in rural areas, giving their customers little notice.
[8] See "Kenya's Biggest Bank: The Cult of Equity," *The Economist* December 8th, 2012.

To make the products even more attractive and accessible, Equity Bank expanded its range of eligible collateral, required only a National ID card to complete a loan application, waived the minimum balance requirements and maintenance fees for deposit accounts that were pervasive in the industry, and charged withdrawal fees that were ten times lower than the industry average (Saloner et al., 2007).[9]

Expansion to previously unbankable areas, soft eligibility requirements and major efforts to retain its clients allowed the bank to maintain an aggressive pricing schedule reflected in higher lending-deposit interest rate spreads (Saloner et al., 2007). In 2006 Equity Bank kept its deposit rate at 1.25 percent while competitors' rates reached 6 percent. However, for many of their customers, a bank account with Equity Bank was the only viable option for keeping money safe. The average lending rates charged by Equity Bank were also somewhat higher than the industry average (17.5 percent versus 13.7 percent). Such rates were sustainable given limited competition from other players for the low-income market segment focused on microcredit.

3. Bank Expansion Strategies in Kenya

Different types of banks are likely to follow different expansion strategies. While foreign banks may target a set of elite customers and prefer urban areas, domestic banks may exploit their superior knowledge of culture and local communities and their comparative advantage in underdeveloped areas. For example, as part of its expansion strategy, Equity Bank emphasized that local languages be spoken in its branches, which is important considering that 30-40 percent of the people in central Kenya only speak a minority language. In addition, government-owned banks may pursue non-profit goals in their branching and expansions.

To characterize bank branch expansions, we construct a new dataset based on bank branch

[9] Equity did, however, demand some client loyalty. Customers were prohibited from having an account at any other financial institution.

locations, which we aggregate to construct a district-level panel on the number of branches by bank.[10] The panel data set covers 45 commercial banks that operated in 65 Kenyan districts in the period between 2006 and 2009.[11]

As shown in Table 1, the Kenyan banking system expanded greatly in terms of number of branches. Between 2006 and 2009, the total number of bank branches in Kenya increased from 576 to 970 (a 68 percent increase). The expansion involved all ownership categories of banks, especially domestic private banks, among which Equity Bank played an important role. The number of Equity Bank's branches increased from 44 to over 112 in the period 2006-2009 (a 155 percent increase). No other bank expanded by this many branches in the same period, making it difficult to attribute the magnitude of the expansion of Equity Bank exclusively to an improvement in growth opportunities. The strong branch expansion in Kenya occurred not only in urban districts but also in rural, arid and semi-arid districts as shown in Table A.1 in the Appendix.

To explore whether Equity Bank pursued distinct branching strategies from other commercial banks in Kenya, we relate the number of branches of Equity Bank and other banks (or groups of banks) by district to a number of district-level characteristics. Our baseline reduced-form specification takes the form:

$$Branches_{dt} = \alpha + A_t + \beta X_d + \varepsilon_{dt}, \quad (1)$$

where the dependent variable *Branches* is the number of bank branches in district *d* at time *t* for Equity Bank and other individual banks, while for groups of banks it is the number of branches over the total number of banks in each group (based on ownership types) in district *d* at time *t,* to put them on a

[10] Data sources on bank branches include phone calls, official websites, government and Central Bank of Kenya publications and banks' annual reports.

[11] Although Kenya is currently divided into 46 districts, we take advantage of a more disaggregated country division as of the 1999 census. In that census, Kenya comprised eight provinces that were subdivided into 69 districts; the survey data we use in this study cover 65 of those districts.

comparable basis with Equity Bank branches at the district level.[12] Among the explanatory variables, A_t is a fixed effect for 2009, and X_d is a set of district level control variables for 2006. The control variables indicate whether the district is a rural or arid (semi-arid) district, the population density of the district, and the proportion of the population speaking a minority language or Swahili.[13] Table A.1 in the Appendix reports descriptive statistics for all the variables used in the analysis by district.

We separately estimate this model by ordinary least square (OLS) for Equity Bank, three types of banks (foreign private banks, government-owned and government-influenced banks and domestic private banks *excluding* Equity Bank) and three other individual banks (Co-operative, Barclays and Kenya Commercial Bank). As shown in Table 1, Co-operative Bank is the second largest domestic private bank in terms of its branch network after Equity Bank, Barclays is the largest foreign bank and Kenya Commercial Bank is the largest government influenced bank. We cluster standard errors by district. Furthermore, to explore if the branch expansion of Equity Bank between 2006 and 2009 targeted more underserved districts, we augment our baseline specification with an interaction term between the district level proportion of people speaking a minority language and the 2009 indicator.

Table 2 reports our estimates of the correlates of the number of bank branches per district in year t (Equation 1), comparing Equity Bank with the previously mentioned three groups of banks in the banking system. The results suggest some similarities, as well as some disparities, between Equity Bank and the others in terms of their branching strategies. On the one hand, all types of banks, including Equity Bank, have greater branch penetration in urban and English speaking districts (Models 1 to 4). On the other hand, Equity Bank differs on several dimensions. *First,* the coefficients associated with rural and arid and semi-arid districts are either statistically insignificant or marginally

[12] For each ownership type, therefore, this is a measure of average branches per bank.
[13] The Financial Sector Deepening (FSD) Kenya FinAccess questionnaire, the household survey we rely on in this study, enabled respondents to indicate that their primary language was one of 10 different options: English, Swahili, Kikuyu, Luo, Meru, Kisii, Luhya, Kalenjin, Kamba and Somali.

significant at standard confidence levels for Equity Bank, while they are negative and highly significant for the other banks. *Second,* the expansion of Equity Bank, as indicated by the positive coefficient on the 2009 dummy variable, is highly significant. That coefficient is also significant for the rest of the banking system, but its size is only one-tenth to one-fifth that of the coefficient for Equity Bank.[14] *Third*, the sensitivity of branch penetration to population density is lower for Equity Bank than for the others. In fact, the coefficient for population density is negative and highly significant for Equity Bank in Model 4, indicating a preference for less densely populated districts (other factors held constant). This coefficient is also negative for other banks, but is not significant or only marginally significant.[15] *Fourth*, the intercept of the regression models is much larger for Equity Bank's branching than for other bank types. This shows Equity Bank's greater general tendency to open branches regardless of district characteristics.[16] Overall, the results in Models 1 to 4 suggest that Equity Bank exhibited significantly greater branch expansion relative to other banks between 2006 and 2009, particularly in underdeveloped districts.

One important component of Equity Bank's expansion strategy has been to target the segment of the population speaking local languages. There are two ways of doing this. The first one is penetrating districts characterized by a high proportion of people speaking minority languages. The second is to communicate with clients using minority languages in the branches. We start by exploring whether Equity Bank has expanded more than other banks to districts in which English or Swahili is *not* the predominant language.

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[14] We conduct tests to compare the coefficients associated with the 2009 dummy variable across different banks. The tests reject the null hypothesis that the coefficient for Equity Bank is equal to the coefficients for foreign banks (Chi2=15.79; Prob>Chi2=0.0001), government banks (Chi2=13.54, Prob>Chi2=0.0002), and other domestic banks (Chi2=16.01, Prob>Chi2= 0.0001). This confirms that in recent years Equity Bank has exhibited significantly greater branch expansion than other banks in Kenya.

[15] The sensitivity of branch penetration to population density is particularly interesting in view of the African financial development gap observed at a macro level (ACCQSV, 2013, 2016). One robust finding is that population density is more strongly associated with banking sector development in Africa than in other developing regions.

[16] However, in a robustness check in Table A.2, we show that the constant in the regression models for the branching strategies of three other large Kenyan Banks are similar in size, or larger than, that for Equity Bank.

To do this, we augment our baseline specification, by interacting the district-level proportion of people speaking minority languages with the 2009 dummy variable, to explore whether the bank expansions reported in Models 1 to 4 are heterogeneous across different types of districts. In Models 5 to 8, the positive and negative coefficients associated with the 2009 dummy variable and its interaction with the proportion of people speaking minority languages, respectively, suggest that the branch expansions of Equity Bank and other banks were greater in districts where minority languages were not predominant. However, the magnitudes of the coefficients suggest that Equity Bank, in contrast to the other banks, reached districts where neither English nor Swahili were the most common language.

To analyze the magnitude and significance of the expansion of each type of bank across different types of districts, we calculate the partial effect of the bank branch expansions (i.e., the effect of the 2009 dummy variable) at different district-level proportions of people speaking minority languages. Figure 2 shows the marginal effect of the 2009 dummy variable conditional on values of minority languages. Consistent with the interpretation of the coefficients from the regressions, the magnitudes and confidence intervals reported in the figure indicate that all banks expanded less into the districts where minority languages were predominant than those where minority languages were less spoken. But the figure also indicates that Equity Bank was the only bank that significantly expanded into all districts, including those where minority languages were predominantly spoken. Therefore, Figure 2 confirms that Equity Bank moved *more* toward minority-language speakers than other banks between 2006 and 2009.

To rule out the possibility that our results are driven by the fact that we are comparing a precisely measured individual-bank effect with an inaccurately measured average effect across banks, we next compare Equity Bank's branch expansion with that of three other large banks (Co-operative, Barclays and Kenya Commercial Bank) using the same analyses conducted in Table 2 and Figure 2.

The results reported in Table A.2 and Figure A.1 in the Appendix confirm our previous findings in that Equity Bank was the only one of the four that expanded significantly into all districts in Kenya between 2006 and 2009, even those where the vast majority of the population spoke a minority language.[17]

4. Bank Penetration and Financial Access: A Closer Look at Equity Bank

Our previous results suggest that Equity Bank has pursued distinct branching strategies from other banks. Our next step is to explore whether the presence of Equity Bank improved access of households to banking services. To do this, we augment our data on bank branches across districts with the Financial Sector Deepening (FSD) Kenya's FinAccess household surveys. The 2006 surveys consist of 4,420 completed interviews, while the 2009 surveys consist of 6,598 completed interviews.[18] We use the FSD FinAccess surveys in our analysis for a number of reasons. *First*, it captures important dimensions of financial inclusion as it was specifically designed to measure access to financial services in Kenya. *Second,* it provides information on individual and household characteristics that are helpful to explore potential heterogeneities. *Third,* it is a nationally representative household survey that covers the universe of districts in Kenya. *Fourth,* its implementation over different years allows us to explore the within-district time variation in financial inclusion.

[17] Both the point estimates and the confidence intervals in Figure A.1 confirm this conclusion. For example, the point estimates show that Barclays had an expansion similar to Equity's in districts where few people spoke a minority language. However, in districts where the majority of the population spoke a minority language, Equity expanded by roughly one branch whereas Barclays expanded by only 0.5 branches. Also, the confidence interval for Barclays' point estimate encompasses negative values in districts where over 85 percent of the population spoke a minority language, while the confidence interval for Equity remains in positive territory through almost the entire range of the share of the population speaking a minority language. Similar comparisons using Figure A.1 show that Co-operative Bank and Kenya Commercial Bank expanded substantially less into predominantly minority speaking districts than Equity (or Barclays).

[18] The sample was constructed using a stratified three-stage design. In the first stage, the number of households to be allocated to each district is assigned. In the second stage, clusters are randomly selected from the district with each cluster comprising an equal sample of 10 households. Finally, in the third stage, individuals within the household are randomly selected based on a listing of all household members aged 16 years and above, using the Kish Grid-diagram. The Kish Grid-diagram is a method that uses a pre-assigned table of random numbers for selecting individuals within a household to be interviewed.

Based on the surveys, we construct two measures of access to banking services. The first measure is a dummy variable indicating whether an individual has a bank account. The second is another dummy indicating whether an individual has a loan from a bank. Table A.3 in the Appendix reports descriptive statistics for all the individual and household-level variables. The proportion of individuals having a bank account in Kenya increased considerably in the sample period, going from 14 percent to 23 percent in the 2006-2009 period. The proportion of individuals having a loan from a bank showed a more modest increase from 2.9 percent to 4.4 percent. While 95 percent of the individuals that had a loan from a bank also had a bank account, the remaining 5 percent did not.

We estimate a Linear Probability Model (LPM) of having a bank account to explore the impact of Equity Bank presence on financial inclusion:[19]

$$Bank_{idt} = A_d + B_t + \beta Equity_{dt} + \gamma Branches_{dt} + \delta z_{idt} + \varepsilon_{idt}, \quad (2)$$

where the dependent variable, $Bank_{idt}$, is a dummy indicating whether household *i* has a bank account in district *d* at the time *t*. Our main independent variables are, $Equity_{dt}$, a dummy variable indicating whether Equity Bank operates in district *d* at time *t*, and, $Branches_{dt}$, the total number of bank branches of *other* banks operating in district *d* at time *t*. The total number of bank branches can be viewed as a parsimonious control for time-varying district characteristics, such as economic development and bank competition.[20] We also control for a comprehensive set of variables at the individual and household level (z_{idt}). They indicate household size, education, gender, wealth (measured by an asset score), house ownership, type of job, age and language.[21] A_d is a set of district fixed effects to control

[19] All our results on access to banking services are robust to estimation via probit models. We prefer to report linear probability models because estimating probit models with many fixed effects may introduce an incidental parameter problem.

[20] Note that our results are very similar whether or not we include Equity Bank's branches in the calculation of the total number of branches.

[21] The asset score is higher if the individual owns a greater number of physical assets such as a mobile phone, television, or microwave. There are 20 asset categories and the ownership of each of them increases the asset score by one.

for time-invariant district heterogeneity and B_t is a fixed effect for 2009 to control for time-variant macro-level factors directly affecting financial inclusion in Kenya.

Table 3 reports the results from estimating Equation (2) by OLS, with error terms clustered at the district-year level to account for possible correlations in errors across households within districts for each specific year. We first restrict our sample to districts that did not have any Equity Bank branch in 2006 to estimate the standard two time periods difference-in-differences estimator. Model 1 reports a regression with individual/household characteristics, district level bank branch expansions, and district and time fixed effects. Next, Model 2 differentiates the presence of different types of banks by their ownership structure (i.e. foreign banks, government banks and domestic private banks). Finally, for robustness purposes, instead of using an indicator denoting the presence of a certain type of bank, Model 3 uses the number of branches for each bank ownership type. As mentioned before, these variables can be viewed as a parsimonious control for time-varying bank competition. Note that the domestic banks category includes the branches of Equity Bank in those models, which provides a stricter test of whether Equity's presence increases the likelihood of having a bank account beyond the effect that a typical branch of a private domestic bank would have.

The results show that the presence of Equity Bank in a specific district is strongly positively related to the residents' probability of having a bank account, which goes beyond the effect of bank expansion and presence of other commercial banks. This effect is highly statistically significant regardless of the model specification. The coefficient associated with Equity Bank in Model 1 suggests that the penetration of Equity Bank in a new district increases the probability of having a bank account by roughly 5.5 percentage points after controlling for the total number of other banks' branches, a comprehensive set of variables at the individual and household level, and both district and time fixed effects. Models 2 and 3 also suggest that the impact of the presence of Equity Bank in a specific district goes beyond the impact of the presence of a standard domestic bank. The magnitudes are in line with

our baseline specification. As noted, according to the FinAccess survey, the proportion of household members aged 16 years and above having a bank account in Kenya was 14 percent in 2006 and 23 percent in 2009. Therefore, the magnitude associated with Equity Bank presence on financial access is also economically meaningful. This finding is consistent with the notion that the business model of Equity Bank, which targeted low- and middle-income segments of the population using such strategies as the local language requirement in its branches, has contributed to greater financial inclusion.[22]

It is noteworthy that most of the control variables come in significantly in the expected directions. For example, individuals with large families and with no knowledge of English are less likely to have a bank account, while education, wealth (measured by an asset score), house ownership, age and income stability (i.e. salaried workers) are positively related to having a bank account.[23]

4.1. Addressing Potential Endogeneity Problems

Given that bank branch expansions are not random events, the estimation of Equation (2) may still produce biased estimates of the impact of bank penetration on financial access due to potential endogeneity concerns. In order to alleviate the above endogeneity problems, we re-estimate our LPM of having a bank account using an Instrumental Variables (IV) approach. Specifically, we conduct IV regressions in which we employ the district-level proportion of people speaking a minority language and the district-level proportion of people having cell phones as instruments for the presence of Equity Bank. These instruments also enter our model interacted with year dummies to exploit the

[22] Although it is possible that other banks in Kenya could have replicated the strategies of Equity Bank, the implementation of those strategies involves substantial costs. Our results suggest that these costs should be smaller for domestic banks that can exploit their superior knowledge of local culture, social norms, and local communities as well as their comparative advantage in underdeveloped areas. Equity Bank seems to have seized upon these opportunities more quickly than other banks, and, regardless of Equity Bank's motivation, the end result has been greater financial inclusion. Going forward, other banks may pursue strategies similar to that of Equity, but during the period that we study Equity was clearly at the forefront of this movement, as reflected in the extraordinarily rapid growth in its number of clients relative to other banks.

[23] These results are also consistent with international evidence on the determinants of the use of bank services (see, e.g., Beck and Brown, 2011).

fact that, as previously documented, between 2006 and 2009 Equity Bank shifted its branching policy moving more toward less developed districts as compared to other banks.

The district-level proportions of people speaking a minority language and having a cell phone constitute valid instruments for Equity Bank branch expansion if these variables only affect the probability of having a bank account through bank expansion. It is reasonable to argue that the fraction of people from a district speaking a particular language should not be *directly* linked to whether a particular individual has access to a bank account, which is our outcome variable. However, it is important to note that this assumption does *not* imply that the language that an *individual* speaks is not an important determinant of having a bank account. In fact, we control in all our specifications for individual languages. Regarding our second instrument, it is reasonable to argue that the proportion of people having a cell phone is a valid instrument as it is not obvious that the primary objective of the major cell phone providers across Kenya was the expansion of bank accounts or credit. According to Oteri, Kibet and Edward (2015), cell phone penetration in Kenya registered an exponential growth from 0.053 percent to 79 percent between 1999 and 2013. The magnitude of this cell phone penetration has not been synchronized with the penetration of traditional banking services, which suggests that the primary objective of the major cell phone providers across the country was not access to traditional banking.

Table 4 reports the results from our IV regressions. Our estimations confirm the positive and significant impact of Equity Bank presence on households' access to financial services. The main difference with our baseline LPM is that the magnitude of the coefficients associated with Equity Bank presence increases regardless of the instrument used. The coefficients associated with Equity Bank, in our IV regressions, suggests that the penetration of Equity Bank into a new district increases the probability of having a bank account by more than 8 percentage points. This is an economically meaningful magnitude if we consider that, according to the FinAccess survey, the proportion of

household members aged 16 years and above having a bank account in Kenya was 14 percent in 2006 and 23 percent in 2009. Therefore, the results from our IV regressions suggest an attenuation bias in our baseline LPM estimates, which is consistent with the premise that, if more underdeveloped districts are less effective at providing access to finance, a model that does not correct for potential endogeneity would underestimate the true impact of Equity Bank branch expansion. Deriving qualitatively similar results using alternative instruments enhances the plausibility that endogeneity biased the effect of Equity's branch expansion downward in our baseline LPM models.[24]

4.2. Equity Bank's Expansion and Financial Inclusion

To explore whether the transformation undergone by Equity Bank between 2006 and 2009 contributed to greater financial inclusion, we now consider all districts (those with and without Equity Bank branches in 2006) and augment our main baseline regressions with a dummy variable, Equity Bank presence (2009), that takes the value 1 for Equity Bank presence the year 2009 and 0 otherwise.[25] We also created the corresponding variables for the presence and number of branches of other banks in 2009.

Table 5 reports the results of our analysis. The negative and generally insignificant coefficients on Equity Bank presence and the positive and highly significant coefficients on Equity Bank presence (2009) suggest that the increased probability of having a bank account is mainly driven by the expansion of Equity Bank between 2006 and 2009. Specifically, Model 1 suggests that the presence of Equity Bank in a district in the year 2009 increases the probability of having a bank account by 4.85 (-

[24] F-tests of excluded instruments and *p*-values of Hansen's *J* tests of over-identifying restrictions are also reported in the table. The F-tests of excluded instruments reject the null hypothesis of weak instruments and, therefore, indicate that the instruments and endogenous variables are correlated, even after netting out the effects of all other exogenous variables. The p-values of Hansen's *J* test cannot reject the null hypothesis that the proportion of people speaking a minority language is a valid instrument.

[25] The Equity Bank presence (2009) dummy variable is equivalent to the product between Equity Bank presence and a 2009 dummy variable.

2.41+7.26) percentage points, while the results indicate that the presence of Equity Bank in a district in 2006 did not have a significant effect on the probability of having a bank account.[26] The results from Models 2 and 3 are qualitatively very similar to Model 1 (and each other). Overall, these results confirm that the branch expansion by Equity Bank between 2006 and 2009 contributed to greater financial inclusion.

4.3. The Beneficiaries of Equity Bank's Banking Services

To this point we have presented evidence consistent with the propositions that Equity Bank's branch strategy targeted under-served geographic areas *and* had a substantial impact on access to banking services in Kenya. Specifically, the results in our previous sections suggest that Kenyans residing in districts in which Equity Bank started operations had a higher probability of having a bank account. Since Equity Bank's business model is based, at least in part, on providing financial services to the rural poor, we would expect the impact of its expansion to be stronger for the underprivileged segments of the population (in terms of physical and human capital).

With this idea in mind, we augment our baseline specification with interaction terms between the Equity Bank presence (2009) dummy variable and home ownership, education, urban area, and previous presence of Equity Bank to examine potential heterogeneities in the impact of Equity Bank presence in the year 2009 on access to financial services. These heterogeneities allow us to assess whether the expansion of Equity Bank effectively increased usage of financial services among traditionally unbanked people and hence fostered financial inclusion for the disadvantaged.

Specifically, Table 6 explores potential heterogeneities in the impact of Equity Bank presence in the year 2009 on the probability of having a bank account. Models 1 to 4 augment our previous baseline regression with the four interaction terms described above, respectively: the interaction of the

[26] The insignificant coefficient for 'Equity Bank Presence' (-2.41) summarizes the 2006 effect.

2009 Equity Bank presence dummy variable with (a) a dummy indicating if the individual is a homeowner, (b) a dummy indicating whether the individual has a secondary and/or tertiary education level, (c) a dummy indicating whether the individual lives in an urban area, and (d) a dummy indicating whether Equity Bank was present in the district in the year 2006. All of the coefficients associated with the interaction terms have a negative sign and are highly significant, suggesting that the impact of the Equity Bank expansion between 2006 and 2009 on access to banking services was, indeed, heterogeneous across individuals with different characteristics. The effect was stronger for Kenyans who did not own a permanent house, who lacked secondary/tertiary education, and who lived in rural areas and in districts without any Equity Bank branch in the year 2006. Therefore, these results are consistent with Equity Bank's expressed mission of extending financial services to the population segments generally ignored by traditional commercial banks. Finally, it is worth noting that all the main results and the signs of the coefficients associated with the new interaction terms remain unchanged when all the interactions terms are included in the same specification (Model 5).

4.4. Access to Credit

Next, we estimate an Ordered Probit model to consider the impact of Equity Bank presence on the probability of having a bank account and/or a loan from a bank. Table 7 reports the coefficients and marginal effects from an Ordered Probit model of usage of banking services. Column 1 of the table presents coefficients from the Ordered Probit model while the next three columns present the associated average marginal effects of the bank branching variables for each level of financial access. Our dependent variable takes the value "0" if the individual has neither a bank account nor a loan from a bank, the value "1" if the individual has a bank account, and the value "2" if the individual has a loan from a bank. As in our LPMs, we control for the total number of bank branches, a comprehensive set of variables at the individual and household level, and both district and time fixed

effects. The results indicate that the presence of Equity Bank increases the probability of both having a bank account (column 3) and a bank loan (column 4). The results suggest that Equity Bank presence increases the probability of having a bank account by almost 3 percentage points, a slightly smaller magnitude than in our baseline OLS and IV regressions, and the probability of having a bank loan by 1 percentage point.

In unreported regressions, we replicate our previous model *excluding* urban districts (i.e., Nairobi and Mombasa) and find practically identical results. These results suggest that Equity Bank is expanding access to bank accounts and credit everywhere and that Equity Bank is not just obtaining funding in the form of retail deposits from less developed areas to expand credit in more developed ones. Given that credit is scarce in non-urban areas and an important source funding investment and growth, this higher level of financial access through the provision of credit can perhaps significantly relax the financial constraints of firms and households in areas typically ignored by traditional banks.

5. The Profitability of Equity Bank's Business Model

In this final section, we use bank and branch level data to explore whether the business model of Equity Bank has been profitable and to understand the mechanisms that explain the profits of the bank at a more granular level. Specifically, we first compare the profitability of Equity Bank with other banks in Kenya using a bank-level panel dataset that covers all the commercial banks in Kenya. Then we compare the profitability, credit quality and financial structure of Equity Bank branches.

5.1. Bank Profitability

We compare the profitability of Equity Bank with other Kenyan banks using bank level data drawn from the Bankscope database, provided by Bureau van Dijk. To measure the profitability of a bank, we use return on average assets (ROAA). Data from 41 Kenyan banks are available from 2004

to 2013. Table A.4 in the Appendix reports descriptive statistics for the ROAA and the dummy variables used in this analysis.

We estimate two different models. The first model explores whether Equity Bank has been, on average, more profitable than other banks in Kenya. We start by estimating:

$$ROAA_{it} = \alpha + A_t + \beta Domestic_i + \gamma Government_i + \delta Equity_i + \varepsilon_{it}, \quad (3)$$

where $ROAA_{it}$ denotes the return on average assets (in percentage points) of bank i at time t, A_t is a vector of yearly fixed effects, $Domestic_i$ is a dummy variable that takes the value of one for domestic private banks (including Equity Bank), $Government_i$ is a dummy variable that takes the value of one for government and government-influenced banks, and $Equity_i$ is a dummy variable that takes the value of one for Equity Bank. The omitted category in the regressions is foreign-owned banks. ε_{it} is the error term.

Model 1 of Table 8 reports the results from estimating the equations (3) by OLS, with standard errors clustered at the bank level to allow the error term to be correlated across observations from the same bank. The results show that Equity Bank has been significantly more profitable than other domestic private banks in Kenya, an advantage that is also economically meaningful. The coefficient for the Equity Bank dummy variable indicates that its ROAA was, on average, 264 basis points higher than for foreign banks in Kenya. The difference in profitability between foreign banks and the rest of the banks in Kenya (except Equity Bank) is not statistically significant.

The second model that we estimate examines how the profitability of Equity has evolved over time as compared to the average profitability of the banking sector in Kenya. The specification takes the form:

$$ROAA_{it} = A_t + B_i + \gamma_t Equity_i + \varepsilon_{it}, \quad (4)$$

where A_t and B_i denote year and bank fixed effects, respectively. $Equity_i$, our dummy variable for Equity Bank, enters the regression interacted with year dummies, with γ_t denoting the year-specific effects.

Model 2 reports the results from estimating Equation (4) by OLS, with standard errors clustered at the bank level. The model shows that the profitability of Equity Bank has improved over time and that the increase in profitability coincided with its period of expansion into previously unbanked areas (from 2006 onwards), which is the period of time explored in this study. The results on financial inclusion and profitability presented so far suggest that the branching strategies followed by Equity Bank played a key role in the provision of financial services to the population segments typically ignored by traditional banks while generating sustainable profits at a level higher than for other Kenyan banks in the process.

5.2. Evidence for Branch Profitability

We have shown that the expansion of Equity Bank has been profitable at the bank level. The next step is to provide evidence on how those profits were generated. We use branch-level panel data from Equity Bank on the financial performance and expansion of the bank to identify whether its expansion into the less-served arid and semi-arid areas has been more profitable than its expansion into urban and rural areas. Additionally, we use the branch-level data to better understand the sources of the profits Equity Bank obtained from its expansion into remote areas largely ignored by its competitors.

Our branch-level dataset contains financial information on the profitability, credit quality and financial structure of 112 Equity Bank branches for the period 2004 to 2015. We analyze four measures related to profitability. We use return on assets, the ratio of income from interest on loans to assets,

the ratio of deposits interest expense to assets, and the lending-deposit interest rate spread.[27] We measure the quality of the loan portfolio using the delinquency rate (i.e., the proportion of delinquent to total loans). Finally, as measures of financial structure, we rely on the ratio of income from interest on loans to total income and the ratio of customer deposits to total liabilities.

To minimize the influence of outliers on our results and to eliminate potential coding errors, we clean the data in two ways. First, we exclude all observations in which the value of our variable exceeds the sample mean by more than five standard deviations. Second, we exclude observations from the year the branches opened to guarantee that all observations for our financial performance indicators are based on a full year of data. Table A.5 in the Appendix provides descriptive statistics for all the branch-level financial indicators used in this analysis.

We consider all the branches that Equity Bank opened between 1986 and 2009, splitting them into two categories: new and old. New branches are those that opened from 2006 to 2009, which is the period that coincides with the expansion of the bank explored in our previous analyses. Old branches are, therefore, those that opened in the period between 1986 and 2005. We estimate branch-level regressions that explore whether Equity Bank's branch expansion from 2006 to 2009 was more profitable in arid and semi-arid areas than in urban and rural areas. Our specification takes the following form:

$$y_{ict} = A_{ct} + \alpha New_i + \beta New_i x ASA_c + \varepsilon_{it}, \quad (5)$$

where y_{ict} denotes measures of profitability, credit quality or financial structure of branch i in county c at time t, New_i is a dummy variable that takes the value of one for branches that opened between 2006

[27] The lending-deposit interest rate spread is the difference between the average yield the branch receives from loans and the average rate it pays on deposits. We calculate the yield the bank receives from loans by dividing the income from interest on loans by total loans. We calculate the average rate the bank pays on deposits by dividing deposits interest expense by total deposits.

and 2009, ASA_c is a dummy variable that takes the value of one for arid and semi-arid counties, A_{ct} denotes county-year effects that control for time-varying, county-level factors such as business cycle effects in county c at time t.

Table 9 reports the results from estimating Equations (5) by OLS, with standard errors clustered at the county level to allow the error term to be correlated within a geographic area. Model 1 indicates that the expansion of Equity Bank into arid and semi-arid areas was more profitable than its expansion into urban and rural areas. There are several factors that explain the higher profitability associated with the expansion of Equity Bank into arid and semi-arid areas. Models 2 and 3 suggest that comparatively higher income from interest on loans and lower deposit interest expenses (as a fraction of the assets of the branch) both contributed to the higher ROA in branches located in arid and semi-arid counties. These findings are consistent with a more aggressive pricing schedule by Equity Bank in areas largely ignored by its competitors, as is also reflected in higher lending-deposit interest rate spreads in arid and semi-arid counties (Model 4). Since holding a bank account and/or a loan with Equity Bank was the only option for many customers in less developed areas to keep their money safe and/or finance their business projects, the bank was able to combine low interest paid on deposits with relatively high interest charged on loans in less banked regions.

In terms of credit quality, Equity Bank has also benefited from a lower delinquency rate in arid and semi-arid counties. Model 5 shows that, as expected, delinquency rates are lower for new branches than old branches, and much lower for new branches in arid and semi-arid areas, despite the higher loan rates in those areas. This suggests that Equity bank was probably able to effectively screen borrowers in the areas where it faced less competition and could charge higher rates. Finally, Models 6 and 7 show that income from interest on loans represented a higher proportion of revenues, and customer deposits represented a higher proportion of the total liabilities, in branches located in arid and semi-arid counties as compared to branches in rural and urban counties.

The main contribution of this analysis is to show that Equity Bank's branch expansion into areas largely ignored by traditional commercial banks was profitable, and to describe the business model that drove that profitability. Despite a large body of research that explores the determinants of bank profitability, most of this empirical work is based on bank level data, in large part because no meaningful statistics on branch performance are usually reported publicly. Our analysis, therefore, provides a deeper investigation of the strategies that Equity Bank employed and the drivers of profitability across geographic areas.

6. Interpretations and Limitations

A potential concern regarding the interpretation of some of our results is that Equity Bank might not have actively pursued financial inclusion by entering underdeveloped areas. Rather, our main result on financial inclusion could be accounted for by either demand side factors (e.g., more developed areas have more demand for financial services), or by Equity Bank's anticipation of growth opportunities in certain areas that they hoped to capture by opening new branches ahead of other banks. However, no other bank underwent such an expansion in the same period, making it difficult to attribute the magnitude of the expansion of Equity Bank exclusively to an improvement in growth opportunities. Additionally, we note that even if such alternative interpretations hold, Equity Bank seems to have seized upon these opportunities more quickly than other banks, and, regardless of Equity Bank's motivation, the end result has been greater financial inclusion and more credit in non-urban areas as well as in cities. Given that credit is scarce in less developed areas and an important source funding investment and growth, this higher level of financial access through the provision of credit can perhaps significantly relax the financial constraints of firms and households in these areas.

We have limited ourselves to analyzing the case of Equity Bank to explore the relationship between bank branch expansion, financial inclusion, and bank profitability. We acknowledge,

however, that provision of financial services on the scale of Equity Bank raises a host of additional issues that we do not address. For example, having a very large proportion of all bank accounts in a country in the hands of a single institution could raise concerns about the stability of the Kenyan banking system. While the bank accounts are individually small, they are vital to account owners with limited means. Such a concentration of bank accounts is likely to pose challenges for the deposit insurance system. Even if the system has the funds to cover a potential Equity Bank failure, any delay in accessing deposits by account owners while the failure is resolved poses its own set of stability issues.

Equity Bank's expansion into the neighboring countries, such as Uganda, Tanzania, and Rwanda, also raises the possibility that poor financial performance in other markets could jeopardize the safety of Kenyans' deposits. Encouraging competition for this market segment could help alleviate concerns about the concentration of deposits and accounts, but it raises additional issues. For example, it seems competition among micro-lenders in Andhra Pradesh and the over-indebtedness of many poor borrowers has contributed to the recent instability in Indian microfinance (Mader, 2013). All of these issues are worthy of investigation, but we leave this to future research.

Further, this raises the question of what is the role of financial inclusion in promoting economic growth. Simply expanding credit to poor areas and populations does *not* guarantee that the funds will be used properly (e.g., in spawning entrepreneurial activities). This has been shown by the uneven successes of many microfinance institutions in developing countries. Although Equity Bank has been financially successful thus far, it remains to be seen whether the bank's model is sustainable over the long term and whether it can be applied successfully in other countries.

7. Conclusions

Most Sub-Saharan African countries face a financial development gap relative to other peer developing economies. A key obstacle to financial development is the access of underprivileged segments of the population to finance, which would promote economic growth at the broadest scale. In view of the important role of financial inclusion in low income economies, in this paper we study the relationship between bank branch expansion, financial inclusion, and bank profitability in Kenya.

The paper finds that the bank branch expansion led by Equity Bank, a pioneering institution that devised a banking service strategy targeting low income clients and traditionally under-served districts in Kenya, had a positive impact on households' access to bank accounts and credit. This effect was particularly strong for Kenyans with less education, who did not own their own homes, and those living in less-developed areas and in districts without previous presence of Equity Bank. Moreover, the paper shows that the business model followed by Equity Bank was profitable as it allowed the bank to maintain an aggressive pricing schedule, reduce delinquency rates, and secure inexpensive funding in the form of retail deposits. Our work provides a deeper investigation of bank branching strategies targeting less privileged households and areas largely ignored by traditional commercial banks, as well as the drivers of profitability across geographic areas.

The results highlight that microfinance at scale can be profitable and can lead to increased financial access, but there is much more to it. The success of institutions, such as Equity Bank, depends crucially on the business model and innovation. Therefore, it is important to emphasize that the success of innovative delivery mechanisms depends also on the regulatory environment, as suggested by Equity Bank's mixed success in neighboring countries. For example, much of Equity Bank's growth in Kenya since 2009 has been fueled by an expanded network of agents (rather than by new branch expansion). However, in Uganda, Equity Bank's attempt to recruit an agent network has thus far been blocked by regulatory authorities.

References

Allen, Franklin, Elena Carletti, Robert Cull, Jun Qian, Lemma Senbet and Patricio Valenzuela, 2016, Resolving the African financial development gap: Cross-country comparisons and a within-country study of Kenya, in *African Successes: Modernization and Development*, edited by S. Edwards, S. Johnson, and D. Weil, NBER and University of Chicago Press, Chapter 1 in Volume III, 13-62.

Allen, Franklin, Elena Carletti, Robert Cull, Jun Qian, Lemma Senbet and Patricio Valenzuela, 2014, The African financial development and financial inclusion gaps, *Journal of African Economies* 23, 614-642.

Allen, Franklin, Asli Demirguc-Kunt, Leora Klapper and Maria Soledad Martinez Peria, 2016, The foundations of financial inclusion: Understanding ownership and use of formal accounts, *Journal of Financial Intermediation* 27, 1-30.

Banerjee, Abhijit, Esther Duflo, Rachel Glennerster and Cynthia Kinnan, 2015, The miracle of microfinance? Evidence from a randomized evaluation, *American Economic Journal: Applied Economics* 7, 22-53.

Beck, Thorsten and Martin Brown, 2011, Which households use banks? Evidence from the transition economies, Working paper 1295, European Central Bank.

Beck, Thorsten, Robert Cull, Michael Fuchs, Jared Getenga, Peter Gatere, John Randa and Mircea Trandafir, 2010, Banking sector stability, efficiency, and outreach in Kenya, in C. Adam, P. Collier and N.Ndung'u, eds.: *Kenya: Policies for prosperity* (Oxford University Press).

Beck, Thorsten, Asli Demirgüç-Kunt and Maria Soledad Martinez Peria, 2007, Reaching out: Access to and use of banking services across countries, *Journal of Financial Economics* 85, 234-266.

Beck, Thorsten, Samuel Munzele Maimbo, Issa Faye and Thouraya Triki, 2011, Financing Africa: Through the crisis and beyond, Washington, DC: World Bank.

Beim, David and Murraw Low, 2010, Equity Bank: The Real Thing? *The Sanford C. Bernstein & Co. Center for Leadership and Ethics Case Series.*

Brown, Martin, Benjamin Guin and Karolin Kirschenmann, 2016, Microfinance banks and financial inclusion, Review of Finance 20, 907-946.

Bruhn, Miriam and Inessa Love, 2014, The real impact of improved access to finance: Evidence from Mexico, *Journal of Finance* 69, 1347-1376.

Brune, Lasse, Xavier Giné, Jessica Goldberg and Dean Yang, 2016, Facilitating savings for agriculture: Field experimental evidence from Malawi, *Economic Development and Cultural Change* 64, 187-220.

Bubna, Amit and Bhagwan Chowdhry, 2010, Franchising microfinance, *Review of Finance* 14, 451-476.

Burgess, Robin and Rohini Pande, 2005, Do rural banks matter? Evidence from the Indian social banking experiment, *American Economic Review* 95, 780-795.

Chaia, Alberto, Aparna Dalal, Tony Goland, Maria Jose Gonzalez, Jonathan Morduch and Robert Schiff, 2013, Half the world is unbanked, in R. Cull, A. Demirgüç-Kunt, and J. Morduch, eds.: *Banking the World* (MIT Press).

Dupas, Pascaline and Jonathan Robinson, 2013, Savings constraints and microenterprise development: Evidence from a field experiment in Kenya, *American Economic Journal: Applied Economics* 5, 163-92.

Dupas, Pascaline, Anthony Keats, Sarah Green and Jonathan Robinson, 2016, Challenges in banking the rural poor: Evidence from Kenya's western province, in *African Successes: Modernization and Development*, edited by S. Edwards, S. Johnson, and D. Weil, NBER and University of Chicago Press, Chapter 3 in Volume III, 63-101.

Equity Bank Annual Report, 2009, available at http://equitybankgroup.com/investor-relations/financial-results.

Honohan, Patrick, 2008, Cross-country variation in household access to financial services, *Journal of Banking and Finance* 32, 2493-2500.

Karlan, Dean and Jonathan Zinman, 2011, Microcredit in theory and practice: Using randomized credit scoring for impact evaluation, *Science* 332, 1278-1284.

Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi, 2010, The worldwide governance indicators: Methodology and analytical issues, Policy Research Working Paper 5430, World Bank.

Levine, Ross, 2005, Finance and growth: Theory and evidence, in P. Aghion and S. Durlauf, eds.: *Handbook of Economic Growth* (Elsevier Science, Amsterdam).

Mader, Philip, 2013, Rise and fall of microfinance in India: The Andhra Pradesh crisis in perspective, *Strategic Change* 22, 47-66.

Oteri, Omae M., Langant P. Kibet and Ndung'u Edward, 2015, Mobile subcription, penetration and coverage trends in Kenya's telecommunication sector, *International Journal of Advanced Research in Artificial Intelligence* 4, 1-7.

Ravallion, Martin, 2009, Should the randomistas rule? *The Economists' Voice*, 6, 1-5.

Saloner, Garth, Bethany Coates, Ana Garcia Azuelo, Jessica Flannery and Haydee Moreno, 2007, EQUITY BANK (A), *Stanford Graduate School of business, Case No.E260.*

Table 1
Bank Branches over Time by Bank Name and Ownership Types

This table reports the number of Kenyan bank branches by bank name and ownership types for 2006 and 2009, based on various data sources, including phone calls, official websites, banks' annual reports and government publications.

Domestic private banks	**2006**	**2009**	**Change**	**% Change**
African Banking Corporation Ltd.	8	10	2	25
CharterHouse Bank Ltd.	10	10	0	0
Chase Bank Kenya Ltd.	2	12	10	500
City Finance Bank Ltd.	1	1	0	0
Commercial Bank of Africa Ltd.	19	20	1	5
Co-operative Bank of Kenya Ltd.	52	83	31	60
Credit Bank Ltd.	4	5	1	25
Diamond Trust Bank of Kenya Ltd.	8	32	24	300
Dubai Bank Ltd.	4	4	0	0
Equatorial Commercial Bank Ltd.	3	5	2	67
Equity Bank	**44**	**112**	**68**	**155**
Fidelity Commercial Bank Ltd.	5	7	2	40
FINA Bank Ltd.	6	14	8	133
First Community Bank	0	18	18	-
Giro Commercial Bank Ltd.	6	8	2	33
Guardian Bank Ltd.	6	7	1	17
Imperial Bank Ltd.	6	13	7	117
Investments and Mortgages	9	17	8	89
Middle East Bank Kenya Ltd.	2	3	1	50
National Industrial Credit Bank Ltd.	16	16	0	0
Oriental Commericial Bank Ltd.	4	8	4	100
Paramount Universal Bank Ltd.	4	7	3	75
Prime Bank Ltd.	9	14	5	56
Southern Credit Banking Corporation Ltd.	9	10	1	11
Trans-National Bank Ltd.	9	13	4	44
Victoria Commercial Bank Ltd.	1	1	0	0
Sub-Total	**247**	**450**	**203**	**82**

Foreign banks	**2006**	**2009**	**Change**	**% Change**
Bank of Africa Kenya Ltd.	4	10	6	150
Bank of Baroda Kenya Ltd.	7	9	2	29
Bank of India Ltd.	4	5	1	25
Barclays Bank of Kenya Ltd.	62	119	57	92
Citibank N.A.	3	4	1	33
ECO BANK	9	19	10	111
Gulf African Bank Ltd	0	14	14	-
Habib Bank A.G. Zurich	4	5	1	25
Habib Bank Ltd.	4	4	0	0
K-Rep Bank Ltd.	22	30	8	36
Standard Chartered Bank Kenya Ltd.	31	35	4	13
UBA	0	4	4	-
Sub-Total	**150**	**258**	**108**	**72**

Government and government-influenced banks	**2006**	**2009**	**Change**	**% Change**
CFC Stanbic Bank Ltd.	16	35	19	119
Consolidated Bank of Kenya Ltd.	12	13	1	8
Development Bank of Kenya Ltd.	1	2	1	100
Kenya Commercial Bank Ltd.	117	169	52	44
National Bank of Kenya Ltd.	33	43	10	30
Sub-Total	**179**	**262**	**83**	46

Total	**576**	**970**	**394**	**68**

Table 2
Comparing Banks' Expansion Strategies

This table reports OLS estimates on the determinants of bank branching by districts. For Equity Bank, the dependent variable is the number of bank branches in a given district; for other bank groups, the dependent variable is the number of branches at district level over the number of banks in each group. Robust standard errors are in parentheses. Standard errors are clustered by district. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable: Number of branches over number of banks	Foreign	Govern.	Domestic	Equity	Foreign	Govern.	Domestic	Equity
Rural	-4.032**	-4.368***	-2.958**	-6.440	-4.032**	-4.367***	-2.958**	-6.438
	(1.677)	(1.470)	(1.360)	(3.898)	(1.684)	(1.476)	(1.365)	(3.913)
Arid and Semi-Arid	-4.146**	-4.598***	-3.051**	-7.276*	-4.146**	-4.598***	-3.051**	-7.275*
	(1.681)	(1.478)	(1.362)	(3.929)	(1.688)	(1.485)	(1.368)	(3.946)
Minority language	-5.801**	-6.808***	-4.588**	-17.880***	-5.700**	-6.635***	-4.496**	-17.538***
	(2.691)	(2.474)	(2.192)	(6.334)	(2.640)	(2.392)	(2.149)	(6.083)
Swahili	-5.902**	-6.953***	-4.680**	-18.666***	-5.899**	-6.947***	-4.677**	-18.655***
	(2.741)	(2.512)	(2.232)	(6.452)	(2.751)	(2.521)	(2.240)	(6.471)
log(Density population)	-0.080	-0.102*	-0.063	-0.311**	-0.080	-0.102*	-0.063	-0.311**
	(0.052)	(0.057)	(0.043)	(0.134)	(0.052)	(0.058)	(0.043)	(0.135)
Dummy(2009)	0.118**	0.213***	0.102**	1.045***	0.206	0.363**	0.182	1.341*
	(0.052)	(0.072)	(0.045)	(0.282)	(0.134)	(0.174)	(0.114)	(0.681)
Minority language x Dummy(2009)					-0.198	-0.339	-0.181	-0.669
					(0.189)	(0.246)	(0.162)	(0.983)
Constant	10.054***	11.720***	7.711***	25.869***	10.008***	11.640***	7.668***	25.711***
	(2.858)	(2.595)	(2.329)	(6.585)	(2.830)	(2.560)	(2.305)	(6.418)
Observations	129	129	129	129	129	129	129	129
Adjusted R-squared	0.750	0.747	0.717	0.524	0.749	0.748	0.717	0.522

Table 3
Access to Banking Services and Bank Presence

This table reports estimates from a Linear Probability Model (LPM) of the probability of a household having a bank account. The data consists of 4,360 individuals interviewed in 2006 and 6,562 individuals in 2009. We include district and year fixed effects in all the models. Robust standard errors are in parentheses. Standard errors are clustered by district-year groups. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

Dep. variable: Bank account	(1)	(2)	(3)
Household size	-0.0045***	-0.0044***	-0.0045***
	(0.002)	(0.002)	(0.002)
Education: Primary	-0.0059	-0.0057	-0.0058
	(0.012)	(0.011)	(0.012)
Education: Secondary	0.1234***	0.1235***	0.1238***
	(0.019)	(0.019)	(0.019)
Education: Tertiary	0.2174***	0.2183***	0.2175***
	(0.061)	(0.061)	(0.061)
Female	-0.0278***	-0.0277***	-0.0278***
	(0.008)	(0.008)	(0.008)
Asset score	0.0532***	0.0533***	0.0532***
	(0.005)	(0.005)	(0.005)
Own permanent house	0.0653***	0.0650***	0.0660***
	(0.014)	(0.014)	(0.014)
Income type: Agriculture	0.0072	0.0070	0.0065
	(0.012)	(0.012)	(0.011)
Income type: Waged	0.1611***	0.1604***	0.1609***
	(0.018)	(0.018)	(0.018)
Income type: Business	0.0632***	0.0629***	0.0623***
	(0.014)	(0.014)	(0.014)
Age group: 18-24	-0.0001	-0.0003	-0.0000
	(0.011)	(0.011)	(0.011)
Age group: 25-34	0.0523***	0.0521***	0.0523***
	(0.015)	(0.015)	(0.015)
Age group: 35-44	0.0947***	0.0947***	0.0947***
	(0.015)	(0.015)	(0.015)
Age group: 45-54	0.0949***	0.0953***	0.0952***
	(0.016)	(0.016)	(0.016)
Age group: 55+	0.0991***	0.0994***	0.0993***
	(0.016)	(0.016)	(0.016)
Swahili	-0.1828***	-0.1824***	-0.1831***
	(0.028)	(0.028)	(0.028)
Minority language	-0.2110***	-0.2109***	-0.2115***
	(0.028)	(0.028)	(0.028)
Bank branches	-0.0004		
	(0.003)		
Equity Bank presence	0.0549***	0.0475***	0.0514***
	(0.013)	(0.011)	(0.013)
Foreign bank presence		-0.0089	
		(0.009)	
Gov. and gov.-influenced bank presence		0.0149	
		(0.012)	
Domestic private bank presence		0.0084	
		(0.016)	
Foreign bank branches			-0.0059
			(0.005)
Gov. and gov.-influenced bank branches			0.0055
			(0.004)
Domestic private bank branches			-0.0008
			(0.010)
Observations	5,314	5,314	5,314
Pseudo R-squared	0.2669	0.2668	0.2669
District Fixed Effects	YES	YES	YES
Time Fixed Effects	YES	YES	YES

Table 4
Access to Banking and Bank Presence: Instrumental Variables

This table reports estimates from IV GMM Linear Probability models of the probability of a household having a bank account. We include district and year fixed effects in all the models. Equity Bank presence is instrumented with the district–level proportion of people speaking a *minority* language and its interaction with a 2009 dummy. Robust standard errors are in parentheses. Standard errors are clustered by district-year groups. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

Dependent variable: Bank account	(1)	(2)
	Instruments: Minority language and Minority language x Dummy(2009)	Instruments: Mobile phone penetration and Mobile phone penetration x Dummy(2009)
Household size	-0.0047***	-0.0044***
	(0.002)	(0.002)
Education: Primary	-0.0080	-0.0063
	(0.010)	(0.010)
Education: Secondary	0.1194***	0.1220***
	(0.018)	(0.018)
Education: Tertiary	0.2117***	0.2188***
	(0.072)	(0.072)
Female	-0.0270***	-0.0279***
	(0.008)	(0.008)
Asset score	0.0535***	0.0535***
	(0.004)	(0.004)
Own permanent house	0.0701***	0.0680***
	(0.014)	(0.014)
Income type: Agriculture	0.0067	0.0059
	(0.010)	(0.010)
Income type: Waged	0.1605***	0.1590***
	(0.018)	(0.018)
Income type: Business	0.0625***	0.0619***
	(0.013)	(0.013)
Age group: 18-24	-0.0000	-0.0008
	(0.013)	(0.013)
Age group: 25-34	0.0532***	0.0534***
	(0.014)	(0.013)
Age group: 35-44	0.0948***	0.0940***
	(0.014)	(0.014)
Age group: 45-54	0.0951***	0.0957***
	(0.016)	(0.016)
Age group: 55+	0.0998***	0.1003***
	(0.015)	(0.015)
Swahili	-0.1839***	-0.1841***
	(0.028)	(0.028)
Minority language	-0.2096***	-0.2098***
	(0.029)	(0.029)
Equity Bank presence	0.1436**	0.0841*
	(0.073)	(0.044)
Foreign bank presence	-0.0135	-0.0098
	(0.009)	(0.008)
Gov. and gov.-influenced bank presence	-0.0069	0.0029
	(0.012)	(0.008)
Domestic private bank presence	-0.0077	-0.0004
	(0.011)	(0.009)
Observations	5,314	5,314
Centered R-squared	0.273	0.2753
Uncentered R-squared	0.358	0.3601
F test of excluded instruments	129.9	558.8
p-value of Hansen J statistic	0.417	0.0223
District Fixed Effects	YES	YES
Time Fixed Effects	YES	YES

Table 5
Access to Banking and Bank Presence: Comparing 2006 and 2009

This table reports estimates from a Linear Probability Model (LPM) of the probability of a household having a bank account. The data consists of 4,360 individuals interviewed in 2006 and 6,562 individuals interviewed in 2009. We include district and year fixed effects in all the models; we also include but do not report coefficients on individual/household controls. Robust standard errors are in parentheses. Standard errors are clustered by district-year groups. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

Dep. variable: Bank account	(1)	(2)	(3)
Bank branches	0.0055**		
	(0.003)		
Equity Bank presence	-0.0241	-0.0423*	-0.0189
	(0.015)	(0.023)	(0.016)
Foreign bank presence		0.0145	
		(0.015)	
Gov. and gov.-influenced bank presence		-0.0005	
		(0.013)	
Domestic private bank presence		-0.0143	
		(0.020)	
Foreign bank branches			0.0112
			(0.009)
Gov. and gov.-influenced bank branches			-0.0025
			(0.005)
Domestic private bank branches			-0.0011
			(0.006)
Bank branches (2009)	-0.0019*		
	(0.001)		
Equity Bank presence (2009)	0.0726***	0.0582**	0.0769***
	(0.014)	(0.027)	(0.015)
Foreign bank presence (2009)		-0.0270	
		(0.017)	
Gov. and gov.-influenced bank presence (2009)		-0.0031	
		(0.017)	
Domestic private bank presence (2009)		0.0640**	
		(0.026)	
Foreign bank branches (2009)			-0.0022
			(0.007)
Gov. and gov.-influenced bank branches (2009)			-0.0015
			(0.004)
Domestic private bank branches (2009)			-0.0005
			(0.005)
Observations	10,922	10,922	10,922
Pseudo R-squared	0.3138	0.3122	0.3139
Individual / Household Controls	YES	YES	YES
District Fixed Effects	YES	YES	YES
Time Fixed Effects	YES	YES	YES

Table 6
Access to Banking and Bank Presence: Interaction Effects

This table reports estimates from a Probit model of the probability of a household having a bank account. The data consists of 4,360 individuals interviewed in 2006 and 6,562 individuals interviewed in 2009. We include district fixed effects in all the models; we also include but do not report coefficients on individual/household controls. Robust standard errors are in parentheses. Standard errors are clustered by district-year groups. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

Dep. variable: Bank account	(1)	(2)	(3)	(4)	(5)
Equity Bank presence	-0.0174	-0.0217	-0.0190	-0.1812***	-0.3160***
	(0.018)	(0.018)	(0.018)	(0.025)	(0.029)
Equity Bank presence (2009)	0.0795***	0.0770***	0.0678***	0.2308***	0.3805***
	(0.018)	(0.019)	(0.018)	(0.030)	(0.034)
Permanent own house x Equity Bank presence (2009)	-0.0519**				-0.0429*
	(0.025)				(0.024)
Secondary-tertiary education x Equity Bank presence (2009)		-0.0870***			-0.0820***
		(0.024)			(0.023)
Urban x Equity Bank presence (2009)			-0.0578**		-0.0539**
			(0.022)		(0.021)
Equity Bank presence (2006) x Equity Bank presence (2009)				-0.1630***	-0.2944***
				(0.040)	(0.030)
Observations	10,922	10,922	10,922	10,922	10,922
Pseudo R-squared	0.3143	0.3152	0.3138	0.3138	0.3156
Control Variables	YES	YES	YES	YES	YES
District Fixed Effects	YES	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES	YES

Table 7
Access to Credit and Bank Expansion

This table reports estimates from an Ordered Probit model of the probability of a household's access to bank services. Bank services take the value 0 if the individual has neither a bank account nor a bank loan; it takes the value 1 if the individual has a bank account; and it takes the value 2 if the individual has a bank loan. The data consists of 4,360 individuals interviewed in 2006 and 6,562 individuals interviewed in 2009. We include district and time fixed effects in all the models; we also include but do not report coefficients on individual/household controls. Robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. Column 1 presents coefficients from the Ordered Probit model while the next three columns present the associated average marginal effects of the bank branching variables for each level of financial access.

	(1)	(2)	(3)	(4)
	Ordered Probit	Average Marginal Effects		
		Financial Access=0	Financial Access=1	Financial Access=2
Bank branches	0.0018***	-0.0003***	0.0002***	0.0001***
	(0.0003)	(0.0001)	(0.0000)	(0.0000)
Equity Bank presence	0.0066	-0.0012	0.0009	0.0003
	(0.0708)	(0.0132)	(0.0096)	(0.0036)
Equity Bank presence (2009)	0.2294**	-0.0429**	0.0311**	0.0117**
	(0.0922)	(0.0173)	(0.0126)	(0.0047)
Observations	10,922	10,922	10,922	10,922
Pseudo R-squared	0.2940			
Individual / Household Controls	YES	YES	YES	YES
District Fixed Effects	YES	YES	YES	YES
Time Fixed Effects	YES	YES	YES	YES

Table 8
Bank Profitability

This table reports estimates from a model of the profitability of Equity Bank compared to other banks in Kenya. The data consists of 41 commercial banks from 2004 to 2013. Model 1 includes year fixed effects. Model 2 considers both bank and year fixed effects. Robust standard errors are in parentheses. Standard errors are clustered by bank groups. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

Return on Average Assets (%)	(1)	(2)
Domestic private bank	0.688	
	(0.862)	
Government bank	0.187	
	(0.871)	
Equity Bank	2.643***	
	(0.404)	
Equity Bank x I(2005)		3.245
		(2.047)
Equity Bank x I(2006)		4.043*
		(2.115)
Equity Bank x I(2007)		3.852*
		(2.026)
Equity Bank x I(2008)		4.942**
		(2.085)
Equity Bank x I(2009)		4.563**
		(2.136)
Equity Bank x I(2010)		4.733**
		(2.141)
Equity Bank x I(2011)		4.716**
		(2.109)
Equity Bank x I(2012)		4.411**
		(2.153)
Equity Bank x I(2013)		4.176*
		(2.158)
Observations	311	311
Adjusted R-squared	0.002	0.131
Bank Fixed Effects	NO	YES
Time Fxed Effects	YES	YES

Table 9
Branch Profitability

This table reports estimates from a model of branch profitability. The data consists of 112 branches of Equity Bank during the 2004-2013 period. We include county x year fixed effects in all the models. Robust standard errors are in parentheses. Standard errors are clustered by county groups. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Profitability				Credit quality	Financial structure	
	ROA	Income from interest on loans to Assets	Deposits interest expense to Assets	Lending-deposit spread	Delinquent rate	Income from interest on loans to Income	Customer deposits to Liabilities
New branch	-0.053***	-0.012***	-0.001	-0.018***	-0.026**	-0.043	-0.010***
	(0.013)	(0.002)	(0.001)	(0.005)	(0.010)	(0.028)	(0.003)
New branch x Arid and semi arid county	0.185***	0.088***	-0.004***	0.076***	-0.057***	0.284***	0.019***
	(0.000)	(0.002)	(0.000)	(0.005)	(0.010)	(0.028)	(0.003)
Observations	919	920	916	975	897	914	716
Adjusted R-squared	0.410	0.714	0.293	0.542	0.386	0.502	0.639
County-Time Fixed Effects	YES	YES	YES	YES	YES	YES	YES

Figure 1: Equity Bank's stock price index

This figure shows the evolution of the stock price of Barclays Bank of Kenya, Equity Bank and Kenya Commercial Bank, and the FTSE/JSE Africa Banks Index (August 15, 2006=100). Data Source: Bloomberg.

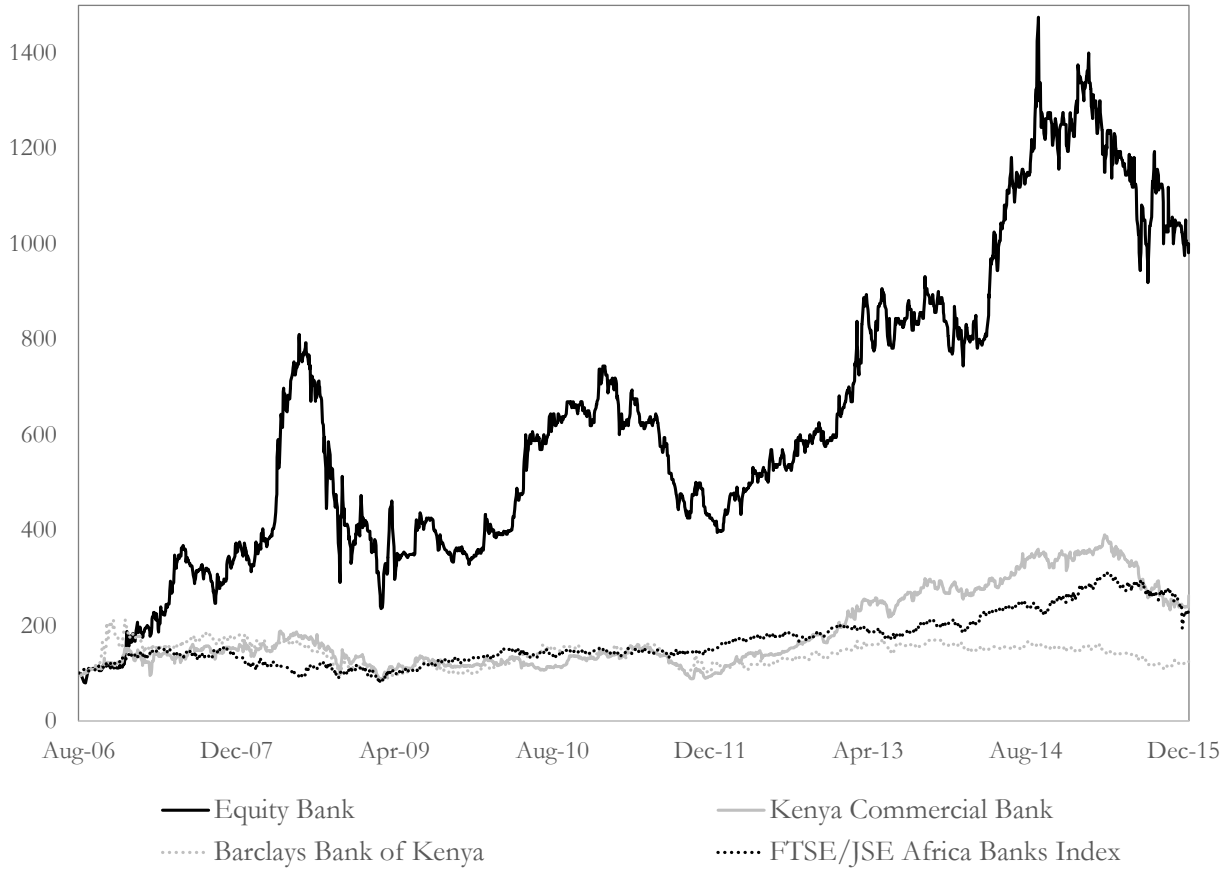
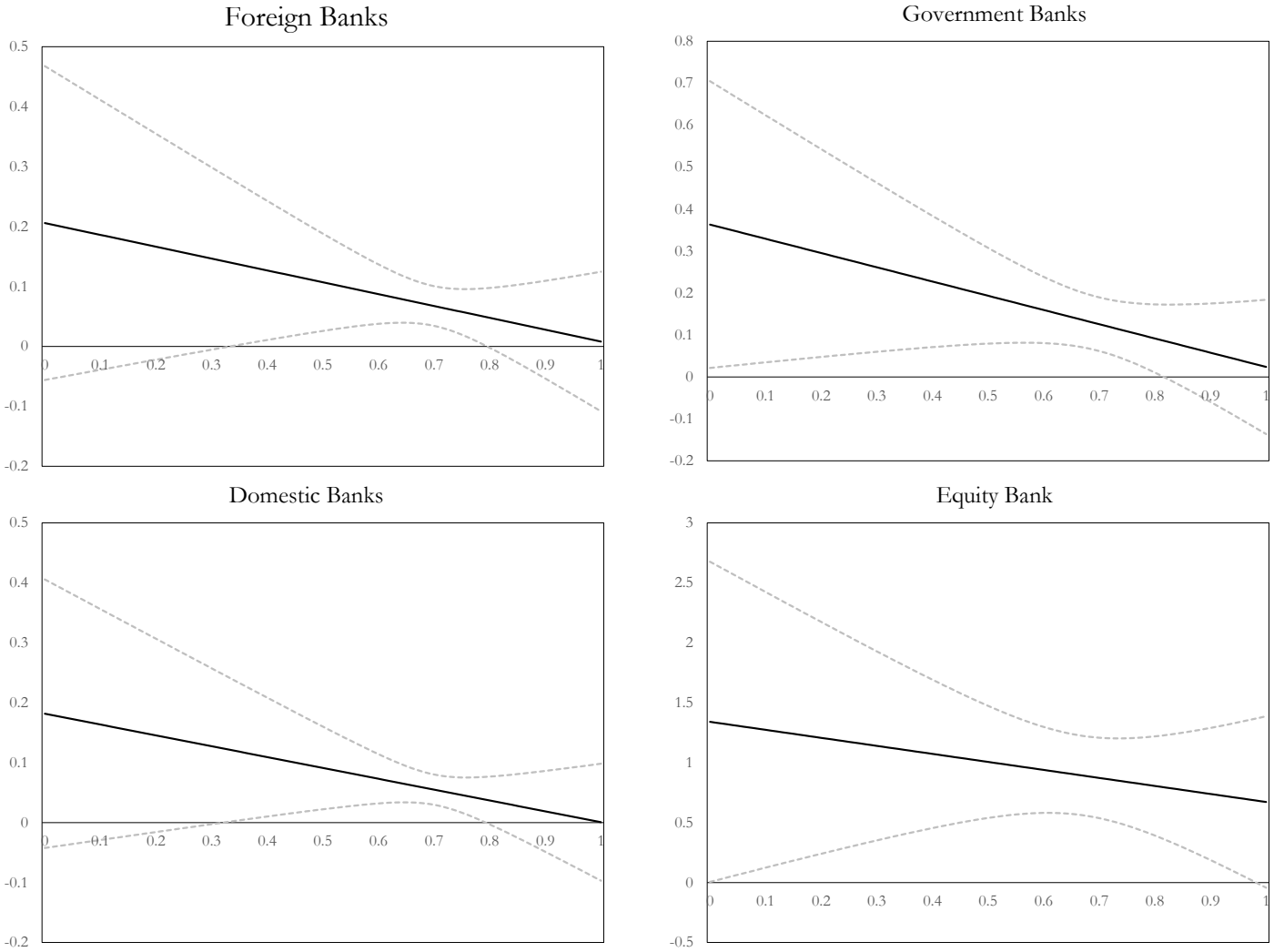


Figure 2: Branch Bank Expansion and Minority Languages

Branch expansion across districts conditional on values of district-level proportion of people speaking minority languages. Dotted lines are 95% confidence bands.



Appendix
Table A.1
Descriptive Statistics, District Level

This table reports descriptive statistics at the district level, based on 2006 and 2009 FinAccess household surveys, 1999 Kenyan census; data sources on bank branches include phone calls, official websites, banks' annual reports and government publications.

District	Bank branches (2006)	Bank branches (2009)	Swahili (2006)	Minority Language (2006)	Urban	Rural	Arid and Semi-Arid	Area (km2)	Population (1999)
Baringo	3	4	0.65	0.27	0	0	1	8,646	264,978
Bomet	2	4	0.44	0.50	0	1	0	1,882	382,794
Bondo	0	2	0.10	0.88	0	1	0	987	238,780
Bungoma	8	12	0.64	0.29	0	1	0	2,069	876,491
Buret	1	3	0.52	0.42	0	1	0	955	316,882
Busia	3	6	0.68	0.32	0	1	0	1,124	370,608
Butere Mumias	1	4	0.70	0.27	0	1	0	939	476,928
Embu	6	8	0.34	0.58	0	0	1	729	278,196
Garissa	1	8	0.02	0.98	0	0	1	44,952	329,939
Gucha	0	0	0.33	0.59	0	1	0	661	460,939
Homa Bay	5	6	0.08	0.90	0	1	0	1,160	288,540
Isiolo	2	5	0.73	0.23	0	0	1	25,698	100,861
Kajiado	6	21	0.83	0.03	0	0	1	21,903	406,054
Kakamega	10	12	0.64	0.30	0	1	0	1,395	603,422
Keiyo	1	0	0.78	0.13	0	0	1	1,439	143,865
Kericho	7	9	0.59	0.39	0	1	0	2,111	468,493
Kiambu	10	19	0.17	0.66	0	1	0	1,324	744,010
Kilifi	5	11	1.00	0.00	0	1	0	4,779	544,303
Kirinyaga	5	9	0.01	0.96	0	1	0	1,478	457,105
Kisii	7	13	0.35	0.58	0	1	0	649	491,786
Kisumu	20	31	0.21	0.66	0	1	0	919	504,359
Kitui	3	7	0.22	0.78	0	0	1	20,402	515,422
Koibatek	0	1	0.40	0.57	0	0	1	2,306	138,163
Kuria	1	1	0.93	0.05	0	1	0	581	151,887
Kwale	4	8	1.00	0.00	0	1	0	8,295	496,133
Laikipia	7	13	0.54	0.26	0	1	0	9,229	322,187
Lamu	2	3	1.00	0.00	0	1	0	6,167	72,686
Lugari	0	0	0.50	0.35	0	1	0	670	215,920
Machakos	9	16	0.35	0.53	0	1	0	6,281	906,644
Makueni	4	7	0.29	0.71	0	0	1	7,966	771,545
Malindi	4	11	1.00	0.00	0	1	0	7,751	281,552
Mandera	0	2	0.00	1.00	0	0	1	26,744	250,372
Maragua	0	0	0.03	0.83	0	1	0	868	387,969
Marakwet	1	1	0.63	0.28	0	0	1	1,588	140,629
Marsabit	1	2	0.85	0.13	0	0	1	61,296	121,478
Mbeere	0	2	0.13	0.85	0	0	1	2,093	170,953
Meru	19	31	0.13	0.83	0	1	0	8,017	1,300,000
Migori	2	5	0.59	0.39	0	1	0	2,005	514,897
Mombasa	60	83	0.90	0.00	1	0	0	230	665,018
Moyale	1	3	0.73	0.27	0	0	1	9,390	53,479
Mt.Elgon	1	0	0.93	0.03	0	1	0	944	135,033
Murang'a	12	16	0.07	0.86	0	1	0	930	348,304
Mwingi	1	3	0.26	0.74	0	0	1	10,030	303,828
Nairobi	230	388	0.58	0.01	1	0	0	696	2,100,000
Nakuru	26	40	0.58	0.23	0	1	0	7,242	1,200,000
Nandi	4	7	0.83	0.16	0	1	0	2,899	578,751
Narok	4	6	0.90	0.04	0	0	1	15,098	365,750
Nyandarua	4	6	0.00	0.93	0	1	0	3,304	479,902
Nyando	0	0	0.10	0.88	0	1	0	1,168	299,930
Nyeri	17	20	0.06	0.89	0	1	0	3,356	661,156
Rachuonyo	0	0	0.06	0.90	0	1	0	945	307,126
Siaya	2	4	0.11	0.77	0	1	0	1,520	480,184
Suba	0	0	0.33	0.65	0	1	0	1,055	155,666
Taita Taveta	3	11	0.95	0.00	0	1	0	17,128	246,671
Tana River	2	1	0.98	0.00	0	0	1	38,446	180,901
Teso	0	1	1.00	0.00	0	1	0	559	181,491
Tharaka	0	0	0.03	0.97	0	0	1	1,570	100,992
Thika	12	22	0.18	0.69	0	1	0	1,960	645,713
Trans-Nzoia	9	15	0.96	0.01	0	1	0	2,487	575,662
Transmara	1	0	0.73	0.25	0	0	1	2,846	170,591
Turkana	2	3	0.94	0.06	0	0	1	68,388	450,860
Uasin Gishu	16	23	0.78	0.12	0	1	0	3,328	622,705
Vihiga	0	4	0.57	0.30	0	1	0	563	498,883
Wajir	2	4	0.02	0.98	0	0	1	55,501	319,261
West Pokot	1	1	0.66	0.34	0	0	1	9,064	308,086

Table A.2
Comparing Banks' Expansion Strategies, Largest Kenyan Banks

This table reports OLS estimates on the determinants of bank branching by districts. The dependent variable is the number of bank branches in a given district each bank. Robust standard errors are in parentheses. Standard errors are clustered by district. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

Dependent Variable: Number of branches	(1) Co-operative Bank	(2) Barclays Bank	(3) Kenya Commercial Bank	(4) Equity Bank	(5) Co-operative Bank	(6) Barclays Bank	(7) Kenya Commercial Bank	(8) Equity Bank
Rural	-9.006*	-16.634**	-9.940***	-6.440	-9.003*	-16.631**	-9.936***	-6.438
	(5.353)	(7.826)	(2.861)	(3.898)	(5.376)	(7.859)	(2.875)	(3.913)
Arid and Semi-Arid	-9.649*	-17.320**	-10.937***	-7.276*	-9.648*	-17.320**	-10.937***	-7.275*
	(5.373)	(7.844)	(2.919)	(3.929)	(5.397)	(7.878)	(2.934)	(3.946)
Minority language	-0.267	-0.373	-0.343**	-0.311**	-0.267	-0.373	-0.343*	-0.311**
	(0.186)	(0.250)	(0.171)	(0.134)	(0.186)	(0.251)	(0.172)	(0.135)
Swahili	-18.317**	-26.257**	-18.273***	-17.880***	-17.737**	-25.711**	-17.636***	-17.538***
	(8.800)	(12.630)	(5.539)	(6.334)	(8.620)	(12.339)	(5.333)	(6.083)
log(Density population)	-19.019**	-26.891**	-18.578***	-18.666***	-19.000**	-26.873**	-18.557***	-18.655***
	(8.946)	(12.860)	(5.586)	(6.452)	(8.979)	(12.904)	(5.604)	(6.471)
Dummy(2009)	0.451*	0.885***	0.798***	1.045***	0.953	1.358*	1.351**	1.341*
	(0.251)	(0.296)	(0.252)	(0.282)	(0.629)	(0.735)	(0.566)	(0.681)
Minority language x Dummy(2009)					-1.135	-1.070	-1.248	-0.669
					(0.900)	(1.051)	(0.800)	(0.983)
Constant	28.574***	44.074***	30.688***	25.869***	28.307***	43.822***	30.394***	25.711***
	(9.276)	(13.405)	(5.586)	(6.585)	(9.148)	(13.246)	(5.500)	(6.418)
Observations	129	129	129	129	129	129	129	129
Adjusted R-squared	0.574	0.692	0.652	0.524	0.571	0.688	0.648	0.512

Table A.3
Descriptive Statistics, Household Level

This table reports descriptive statistics at the household level, based on the 2006 and 2009 FinAccess household surveys.

	2006					2009				
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Bank account	4,360	0.1420	0.3491	0	1	6,562	0.227	0.419	0	1
Bank Loan	4,360	0.0290	0.1680	0	1	6,562	0.044	0.204	0	1
Household size	4,360	4.4722	2.3382	1	16	6,562	4.959	2.600	1	20
Education: Primary	4,360	0.3172	0.4654	0	1	6,562	0.186	0.389	0	1
Education: Secondary	4,360	0.2289	0.4202	0	1	6,562	0.124	0.329	0	1
Education: Tertiary	4,360	0.0234	0.1512	0	1	6,562	0.007	0.082	0	1
Female	4,360	0.5585	0.4966	0	1	6,562	0.419	0.493	0	1
Asset score	4,360	2.2011	2.1053	0	15	6,562	2.723	2.761	0	18
Own permanent house	4,360	0.1298	0.3361	0	1	6,562	0.186	0.389	0	1
Income type: Agriculture	4,360	0.4165	0.4930	0	1	6,562	0.417	0.493	0	1
Income type: Waged	4,360	0.1729	0.3782	0	1	6,562	0.152	0.359	0	1
Income type: Business	4,360	0.2865	0.4522	0	1	6,562	0.286	0.452	0	1
Age group: 18-24	4,360	0.2032	0.4024	0	1	6,562	0.178	0.383	0	1
Age group: 25-34	4,360	0.2837	0.4509	0	1	6,562	0.258	0.438	0	1
Age group: 35-44	4,360	0.1982	0.3987	0	1	6,562	0.208	0.406	0	1
Age group: 45-54	4,360	0.1232	0.3287	0	1	6,562	0.134	0.340	0	1
Age group: 55+	4,360	0.1459	0.3530	0	1	6,562	0.183	0.387	0	1
Language: Swahili	4,360	0.4764	0.4995	0	1	6,562	0.647	0.478	0	1
Language: Minority language	4,360	0.4266	0.4946	0	1	6,562	0.231	0.422	0	1
Urban	4,360	0.1135	0.3173	0	1	6,562	0.158	0.365	0	1
Rural	4,360	0.6564	0.4750	0	1	6,562	0.649	0.477	0	1
Arid and Semi-Arid	4,360	0.2300	0.4209	0	1	6,562	0.193	0.395	0	1
Total bank branches	4,360	29.3475	67.4684	0	230	6,562	61.189	124.190	0	388
Bank branches (excluding Equity Bank)	4,360	27.7094	64.6335	0	220	6,562	56.249	116.231	0	362
Equity ban branches	4,360	1.6381	2.9712	0	10	6,562	4.939	8.093	0	26
Equity bank presence	4,360	0.477	0.50	0	1	6,562	0.873	0.333	0	1

Table A.4
Descriptive Statistics, Bank-Level Data

This table reports descriptive statistics of return on average assets (ROAA) at the bank level, based on the data obtained from the Bankscope database, and of the bank categories in Kenya.

Variable	Obs	Mean	Std. Dev.	Min	Max
Return on average assets (%)	311	2.287	3.607	-11.061	53.947
Domestic private bank (including Equity Bank)	311	0.611	0.488	0	1
Government bank	311	0.161	0.368	0	1
Foreign bank	311	0.228	0.420	0	1
Equity Bank	311	0.032	0.177	0	1

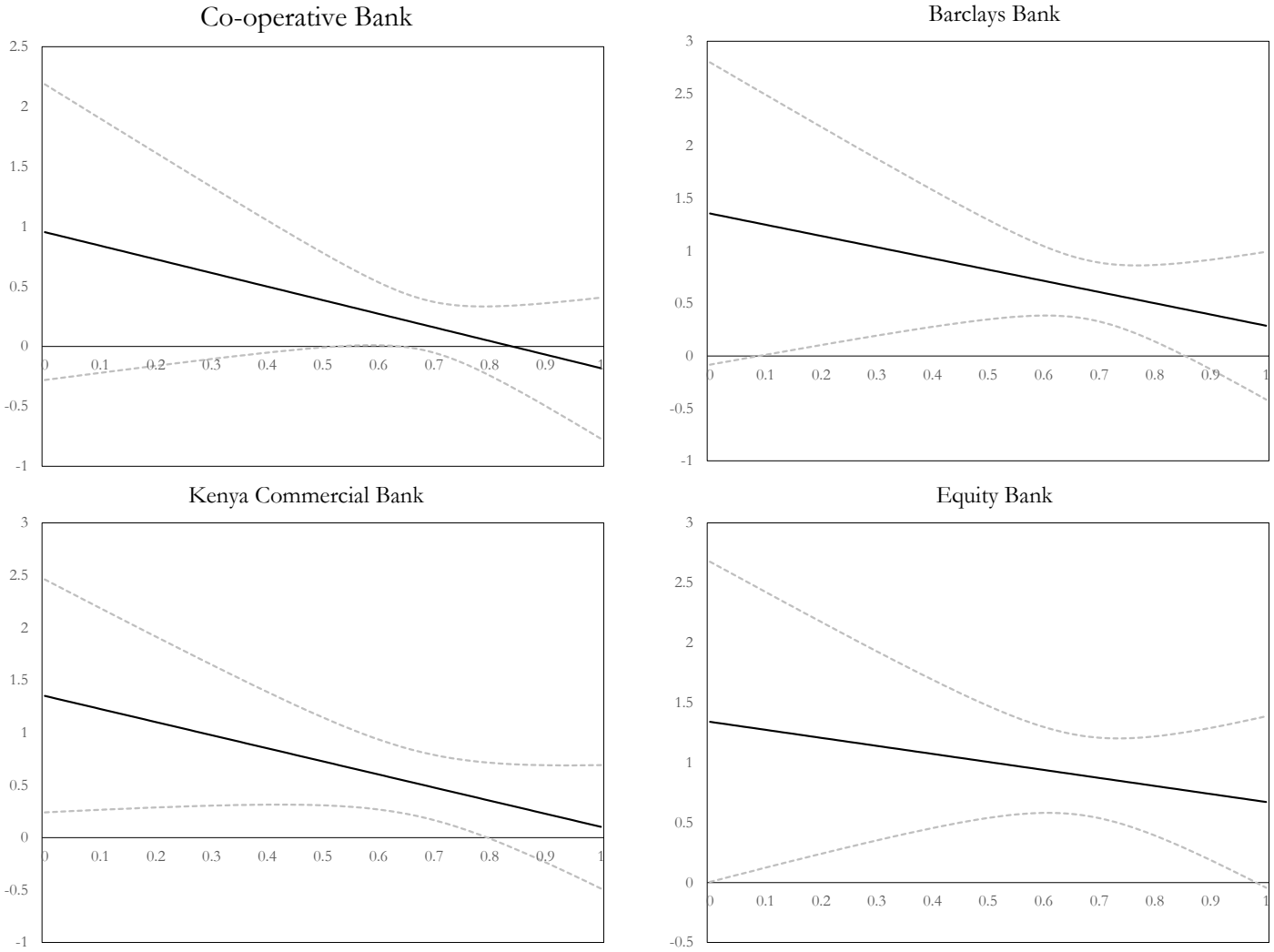
Table A.5
Descriptive Statistics, Branch-Level Data

This table reports descriptive statistics at the branch level, based on data obtained from Equity Bank.

Variable	Obs	Mean	Std. Dev.	Min	Max
Return on assets	919	0.107	0.072	-0.246	0.288
Income from interest on loans to assets	920	0.157	0.047	0.032	0.374
Deposits interest expense to assets	916	0.014	0.010	0.001	0.070
Lending-deposit spread	975	0.149	0.052	-0.042	0.361
Delinquent rate	897	0.038	0.031	0.000	0.189
Income from interest on loans to income	914	0.578	0.132	0.230	0.996
Customer deposits to liabilities	716	0.958	0.029	0.790	0.999
New branch	975	0.683	0.466	0	1
Arid and semi arid county	975	0.176	0.381	0	1

Figure A.1: Branch Bank Expansion and Minority Languages

Branch expansion across districts conditional on values of district-level proportion of people speaking minority languages. Dotted lines are 95% confidence bands.



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