OXFORD JOURNAL
OF STUDENT
SCHOLARSHIP

Mobile Money Account Growth and Transaction Volume in Kenya, 2007-2023

Rehaan Jain
rehaanjain2101@gmail.com

ABSTRACT

This paper analyses the relationship between transaction value and transaction volume for mobile money services in Kenya from 2007 to 2023, drawing on monthly data published by the Central Bank of Kenya. The two variables are directly related, but the link is less than proportional, so a given rise in registered accounts does not produce an equal rise in transaction volume. Both volume and value follow upward long-term trends, shown in Figures 3 and 4, even as volatility has grown in recent years. This growth has had a measurable social effect: research indicates that M-PESA has helped a substantial share of Kenya's population escape poverty. Account growth, however, does not explain everything. Physical agent networks play an independent role in driving activity, so registering more users does not by itself guarantee higher transaction activity. To improve financial inclusion, policymakers should focus on usage and accessibility rather than account numbers alone.

Keywords

Mobile money; M-PESA; Kenya; financial inclusion; registered accounts; transaction volume; transaction value; mobile banking;

JEL Codes: G21, O16, O33, E42

INTRODUCTION

The Importance of Having Access to Funds

Having access to banking services can help individuals and families make safer and smarter choices with their money. However, many people avoid different forms of banking services if they do not trust the banks, find the services unreliable and/or feel that it disrupts their existing way of managing and handling cash, and growing their wealth. For instance, in rural Kenya people hardly used savings accounts or credit, as they did not trust the banks and the services that were provided by the institutions were poor (Dupas et al., 2013). Furthermore, access to basic banking services in Sub-Saharan Africa is still

relatively limited and is significantly lagging behind other developing regions. Many African rural populations still struggle with minimal physical infrastructure. This lack of access can have grave consequences for people's lives. This includes making it hard to save big amounts, dealing with sudden emergencies, securing loans for business startups, agriculture supplies or basic health items, such as malaria bednets (Dupas et al., 2013).

In rural Kenya, major bank branches are mostly located in urban centers. This leaves remote villages with very limited access to formal banking services. The barriers faced by the rural people highlighted that only 60% of adults were aware of any bank branches in their area. Additionally, no one knew about account opening fees or loan application requirements (Dupas et al., 2013). These barriers contribute to the challenges low-income households face in accessing formal financial services. As a result, they often depend on informal support from relatives living outside the village. Additionally, research shows that even when these households can interact with financial systems, they encounter significant problems in saving and building capital (Dupas et al., 2013).

Understanding How Registered Mobile Money Works

A mobile money account is like a wallet which is managed by a mobile device and is linked by a phone number rather than a bank branch. It is usually offered by mobile money operators or their partners. Once it is registered, a person can easily store funds in that digital wallet and use it for person-to person transfers or make bill payments (GSMA, 2024). Therefore, mobile money emphasises simplicity and accessibility for the people using the service. There is no longer any need to put up with physical paperwork or make regular trips to a branch. The registration is as simple as it can be, asking for nothing more than the user's name, phone number and national ID (Suri, 2017). Take Kenya for instance: to get set up with M-PESA you have to see an authorised agent and present your national ID, but from there the account is put in place and ready to go right away (TechCabal, 2023). After that, you can move money in real time; a person-to-person transfer will be done in a matter of seconds and you will have an SMS to confirm it. It is a far more accessible and quick way of doing things than what you would find with conventional banking (GSMA, 2024). Kenya's population was largely unbanked in the early 2000s, but after M-Pesa was launched in 2007, the share of Kenyan adults with a financial account rose from roughly 42% in 2011 to 90% in 2024. The expansion of mobile money platforms have largely been attributed to this diffusion of mobile banking in Kenya (Onyango, 2025).

Transactional Volume

As more individuals have registered for mobile money, the number and value of transactions have increased exponentially. According to GSMA's State of the Industry Report (2025), mobile money accounts processed approximately 108 billion transactions worth over $1.68 trillion in 2024, with the transaction volumes growing around 20% and values by 16% in a single year. This powerful expansion depicts the growing user confidence in the service, the reach of expanding agent networks into even the most remote areas, and with new regulations that allow cross-border collaboration between service providers. The macroeconomic impact will be significant. In 2023, countries offering mobile money

recorded a GDP increase of $720 billion. It was a 1.7% rise compared to similar countries without mobile money, with Sub-Saharan Africa alone contributing $190 billion annually (GSMA, 2025).

Sub-Saharan Africa leads globally in transactional activity. It is driven by rapid growth in East Africa, one of the fastest growing regions in terms of active accounts, and by West Africa where large agent networks and high mobile usage support regular transactions, such as bill payments and transfers. East Asia ranks second with active accounts growing rapidly in countries, such as Cambodia, the Philippines and Vietnam. This growth has been facilitated by clear Know Your Customer (KYC) rules, the identity verification requirements that financial providers use to register new customers and strong digital infrastructure (GSMA, 2025). By 2024, mobile money services had expanded significantly beyond basic transfers with 44% of providers offering credit facilities. 33% offered saving products like the MPES's M-Shawari loans which allows the users to save funds from their mobile money account. 28% of the services offered insurance, making it easier for individuals to manage all their financial needs in one place (GSMA, 202). For example, a Kenyan farmer using M-PESA could now receive salary payments, access government farming subsidies, purchase crop insurance, take a small loan for seeds, save daily profits with interest and pay merchants via QR code.

Significance of the Study

Policymakers and government institutions in Kenya and Sub-Saharan Africa will benefit directly from this study. Governments designing financial inclusion strategies need to understand whether people who register for mobile money are actively using it to participate in the economy. M-PESA helped approximately 194,000 households which is around 2% of Kenya's population escape poverty. Therefore, highlighting that active usage and not mere registration, drives welfare gains (Suri & Jack, 2016). In a country with only 2,300 ATMs, the agent network supporting M-PESA has been crucial in bringing financial services to communities that would have had no access to formal banking infrastructure. An assessment of how registered account growth relates to transaction volume, and value over time can provide vital evidence about whether expanding the user base boosts economic activity or the accounts inactive after registration findings. This would have significant implications for national financial inclusion policy.

Furthermore, development organisations and NGOs working to improve the livelihoods of vulnerable populations will find this study valuable as a result of increased M-PESA access, the poverty rate among female-headed households decreased by 9.2% from a base of 43.3%, with approximately 185,000 women moving out of subsistence farming and into business and retail occupations (Suri & Jack, 2016). This was achieved through improvements in financial stability, savings behaviour and labour market outcomes driven by consistent use of the mobile money. Furthermore, households without access to M-PESA who experienced a negative economic shock, such as job loss or crop failure saw their consumption fall by 7%. Whereas, households with M-PESA access experienced no reduction in consumption under the same circumstances (Suri & Jack, 2016).

Stakeholders like the banks, telecommunications firms, and regulatory bodies, all play vital roles within Kenya's financial landscape. M-PESA is deeply embedded in the Kenyan economy, with approximately 59% of GDP flowing through its system in 2023 (Trad et al., 2025). Farmers using the service witnessed their market engagement rise by 37% and profit per acre increase by 35%. Thereby, highlighting that growing transaction activity strengthens economic growth well beyond basic payments (GSMA, 2025). However, despite the regional mobile money fee rates typically ranging between 3% and 5%, Safaricom charges fees as high as 10% while controlling 91% of all mobile transactions in Kenya(LSE GROUPS, 2025). These fees are paid by the sender or recipient of a transaction and collected by the service provider. This means that lower-income users who transact more frequently bear a cost burden. This raises important questions about market fairness, consumer protection, and the risks of monopoly over a system that has become so important to the country's financial infrastructure and its people.

While this study is primarily focused on Kenya, its findings carry broader relevance. Mobile money has expanded rapidly across countries including Bangladesh , Paraguay ,and the Philippines (Suri et al., 2023). This signifies that the relationship between account registration, agent networks and transaction activity identified here may offer insights applicable to other emerging markets. Additionally, as the dataset spans from 2007 to 2023, this research supports early adoption and the maturation of the mobile money market, providing a longer and more diverse picture than much of the existing literature.

Aims and Goals of the Paper

The main aim of this paper is to investigate the extent to which the growth in registered mobile money accounts is linked with increases in transaction volume and value in Kenya between 2007 and 2023. Through analysing 198 monthly observations from the Central Bank of Kenya's Mobile Payments Statistics dataset (Central Bank of Kenya, 2023), this paper will examine the relationship between account registrations, agent networks and transactions. Therefore, providing a clear assessment of how M-PESA's has operated and grown in two decades.

The literature review begins by reviewing the existing research, compiling debates on mobile money adoption, financial inclusion and economic growth.the remaining section s are organised as follows.section 2

LITERATURE REVIEW

Information about M-PESA

M-PESA was introduced in Kenya in 2007 by Safaricom as a basic person-to-person transfer service. In saying that, it has substantially evolved into a broader financial platform which has been used for payments, savings and business transactions (World Bank, 2024). Its growth has been influenced by registered accounts and agent networks (refers to a system of human intermediaries like petrol stations,

shopkeepers or local merchants that are authorised by companies, such as Safaricom, to offer services, like depositing or withdrawing cash (Ndung'u, 2021)). This lowered the cost and friction of accessing mobile services across both urban and rural areas.

Studies that have evaluated positive externality of M-PESA have found that its expansion has generated tremendous benefits. For instance, reduced transaction costs, connecting buyers and sellers more efficiently, and it has enabled more people to use their finances wisely and effectively. It has contributed to the country's growth, and is the main driver of financial inclusion in Sub Saharan Africa. Therefore, the agent networks were the main force as they enabled the citizens to have access to the financial tools (LSE GROUPS, 2025; World Bank, 2024).

Factors that Influence the Use of Registered Accounts

Several factors can depict why growth in registered accounts do not always lead to proportional rise in transactions. Across Sub Saharan Africa, mobile phone ownership and internet access are strongly linked to mobile money adoption. However, research has demonstrated that adoption is varied across demographic groups, with women initially being less active users than men. In saying that, their adoption has increased substantially over time, and began supporting households with budgeting and financial independence (FSD Kenya, 2018).

A study which evaluated 317 Kenyan enterprises found that women-owned businesses were actually using mobile money more than the ones owned by men. It was 1.099 compared to 0.801 on the usage intensity scale of mobile money. However, they were still underperforming. The gap in performance compared to men owned businesses was about 55% (Muriithi & Louw, 2025) This is a massive difference. However, the same study found that if these women owned businesses used mobile money more extensively, they could reduce performance disadvantages that they face because of problems of getting finance. Around 66.7% of women in the sample expressed that access to finance as a major barrier, compared to 49.6% of men. Therefore, mobile money appears to act as a partial leveller. Moreover, having a bank account or access to banking capital did not change how much mobile money helped their business performance at all (Muriithi & Louw, 2025) . The benefit was not tied to being part of the normal banking system. This is important because it shows that mobile money does not only support people who already have access to banks, but also provides an alternative financial channel for those who are excluded

By 2022, about 28% of adults in Sub-Saharan Africa had a mobile money account. Also, this region was unique because more people only had mobile money accounts, rather than bank accounts (World Bank, 2024). In Tanzania, mobile money accounts reached 45 % of adults while bank accounts stayed at 23 %. In Cameroon, overall account ownership went up approximately four times because of mobile money. Even in low income countries like Malawi and Togo account ownership increased from around 18 % to over 43 %, so millions of people skipped traditional banks completely.(World Bank, 2024) However the use is still not equal. The World Bank says that mobile money account ownership is still uneven across

gender, income, education, and age, women are also more likely than men to report that not owning a phone is the main reason they do not have an account. In addition, around 30% of mobile money account holders in the region need assistance to use their accounts and in Malawi this figure rises to 46% (World Bank, 2024). This is concerning because, although accounts are being opened rapidly many users do not understand how to use them. So they are more vulnerable to hidden fees, fraud, or difficulties accessing their own money.

A study looking at Sub Saharan Africa between 2012 and 2018 found that total mobile money transactions had a small but positive and significant effect on economic growth, but the number of registered accounts or agents by itself did not have a significant effect (Ritzén & Hussein, 2021). This matters a lot as the critical factor is how many accounts are there but how much is flowing through them, not just how many people signed up. The same research says that around 59 % of Kenya's GDP moves through M-PESA. That is a very high level of integration for a mobile money system and the reason speaks for itself with remittance funds arriving quickly so families can buy seeds or hire workers at the right time, and more cash moving around local markets, which even helps people who do not use the platform (LSE GROUPS, 2025). But there is a downside too. Transaction fees on M-PESA can go up to ten percent, which is a lot higher than in nearby countries where there is more competition, and that reduces disposable income of the same people who are meant to benefit (LSE GROUPS, 2025).

Cross country evidence shows that mobile phone ownership and internet access increases the likelihood of being financially included, along with things like education, age, and wages employment (Joseph et al., 2025). However when you look at how mobile money affects business performance it shows that the direct link between them is weak, and in most models it is not even statistically significant(Muriithi & Louw, 2025) . The benefit only really appears when you focus on women owned businesses that struggle to get finance. This is an important point that often gets missed, mobile money is not a quick fix that works equally for everyone. Its impact depends on who has the phone, who controls the money, and who pays the fees. All the focus on agent networks and account numbers does not account for much if we overlook the quiet problems of missing phones, IDs that are hard to obtain, and fees that make saving almost pointless. Across the region, 30 percent of account holders cannot use their account without help, and in some countries that share is even higher. That gap between having an account and actually being able to manage it is one of the most unaddressed limitations in the broader financial inclusion conversion.

Research gap and contribution to this study

The literature agrees that mobile money matters but not on which part of it matters. Suri and Jack (2016) trace welfare gains to access; Ritzen and Hussein (2021) find that transaction totals, not counts of accounts or agents, are what move growth; Muriithi and Louw (2025) find the effect on firms depends on who holds the account. None of them show how the gap between opening an account and using it changes over time in one country, because the data is usually collected once a year. That yearly data hides the trend. This paper uses 198 monthly observations from Kenya between 2007 and 2023 to track how account growth relates to transaction volume and value, and to separate out the role of the agent network.

The point is not to confirm again that mobile money helps financial inclusion. It is to measure how far registration and use have pulled apart as the market matured, which earlier studies imply but never quantify.

METHODS

3.1 Data sources

The dataset for this research was compiled from the Central Bank of Kenya (2023a). There are 198 monthly observations in the mobile payments dataset, which covers the time from January 2007 to August 2023. It has the year and month, the number of active mobile money agents, the total number of registered mobile money accounts, the total cash in and out transaction volume, and the total cash in and out transaction value. The research has collected nominal and real gdp data. However, it was not used as it did not have monthly variability. Thus, meaning the same annual value repeats for each of the twelve months in a given year. Therefore, giving an inaccurate value to the regression models.

Table 1: Descriptive Statistics

Variable	Obs.	Missing (%)	Mean	SD	Min	Median	Max
Agents (count)	198.00	0.00	141,792.80	104,703.50	307.00	130,748.00	334,726.00
Accounts (millions)	197.00	0.00	33.30	22.90	0.00	26.50	77.60
Volume (millions transactions)	198.00	0.00	94.40	64.80	0.00	90.50	208.60
Value(KSh BIllions)	198.00	0.00	260.60	203.00	0.10	231.00	722.50

Table 2: Correlation Matrix
Log-Transformed Variables

	log(Agents)	log(Accounts)	log(Volume)	log(Value)
log(Agents)	1.0000	0.9702	0.9822	0.9836
log(Accounts)	0.9702	1.0000	0.9920	0.9936

log(Volume)	0.9822	0.9920	1.0000	0.9970
log(Value)	0.9836	0.9936	0.9970	1.0000

Table 1 reports the descriptive statistics. The most striking feature of the data is the very wide range. The agent network starts at 307 active agents early in the period and grows to 334,726 by the end, with a standard deviation of about 104,704, which is close to its mean of roughly 141,793. Registered accounts rise from near zero to 77.6 million, the monthly transaction count climbs from near zero to 208.6 million, and the total monthly value of transactions ranges from KSh 0.1 billion to KSh 722.5 billion. The large gaps between the minimum and maximum, and the standard deviations that sit close to the means, reflect how quickly mobile money expanded in Kenya over the sample.

Table 2 reports the Pearson correlation coefficients for the four log-transformed variables. Every entry is above 0.97, so each pair of series moves together very closely and in the same direction throughout the sample. The highest coefficient, 0.997, links log(volume) and log(value), which shows that monthly transaction counts and monthly transaction values track each other almost exactly. Log(accounts) correlates with log(volume) at 0.992 and with log(value) at 0.994. The lowest entry, 0.9702, lies between log(agents) and log(accounts), and there is still a very strong correlation. Across all 198 months, the four series rise together with little to separate their movements.

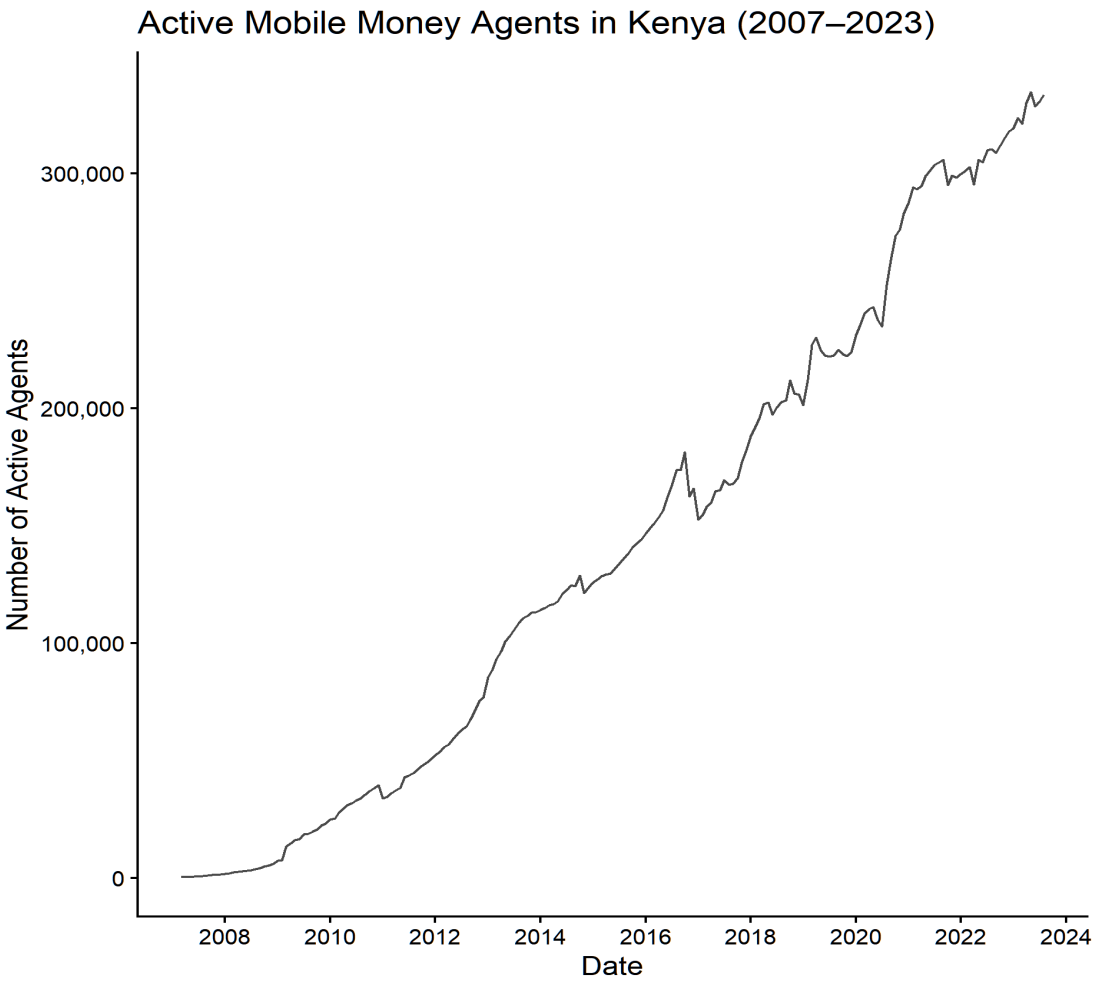

Figure 1 - Active mobile money agents in Kenya, 2007-2023

Figure 1 illustrates the number of active agents. Here, the mobile money network climbs from a few agents in 2008 to over 300,000 in 2023. There was a massive decrease in 2017 from 200,000 active agents to 150,000. The dip in 2017 could be caused by the way the agents were counted rather than a real loss of access, since the agents who fell outside the 30 day activity window would simply not be included, while the transaction values and volume would simple be rising that year (GSMA,2024)

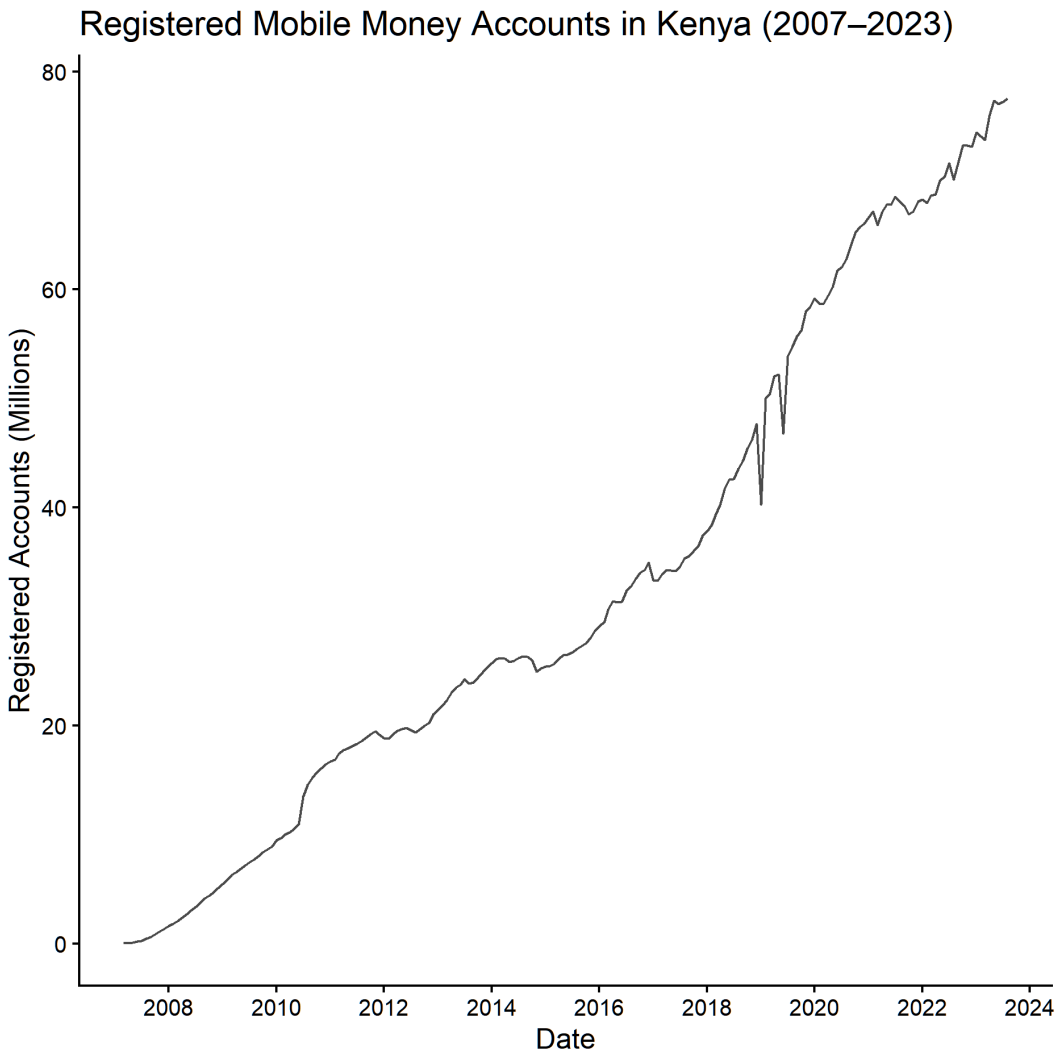

Figure 2 shows the registered accounts in Kenya, 2007-2023 (millions).

figure 2 shows the number of registered mobile money accounts in Kenya from 2007 to 2023, measured in millions. As observed in the graph, growth is mostly continuous, rising to just under 77.6 million by the end of the period.

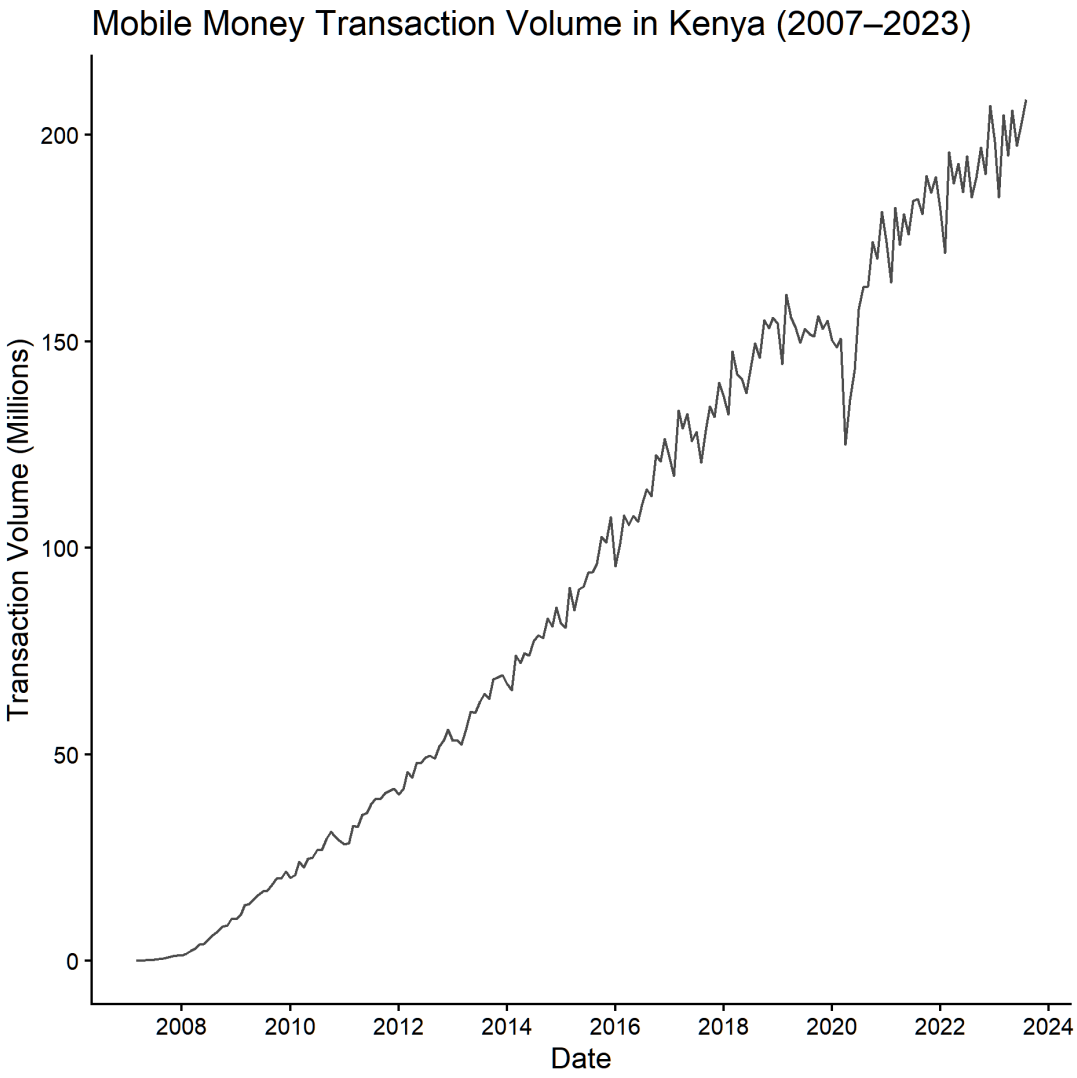

Figure 3 -. Mobile money transaction volume in Kenya, 2007–2023 (millions of transactions).

figure 3 shows mobile money transaction volume in Kenya from 2007 to 2023, measured in millions of transactions. The data series is increasing annually. However, volatility becomes relatively high after 2020.

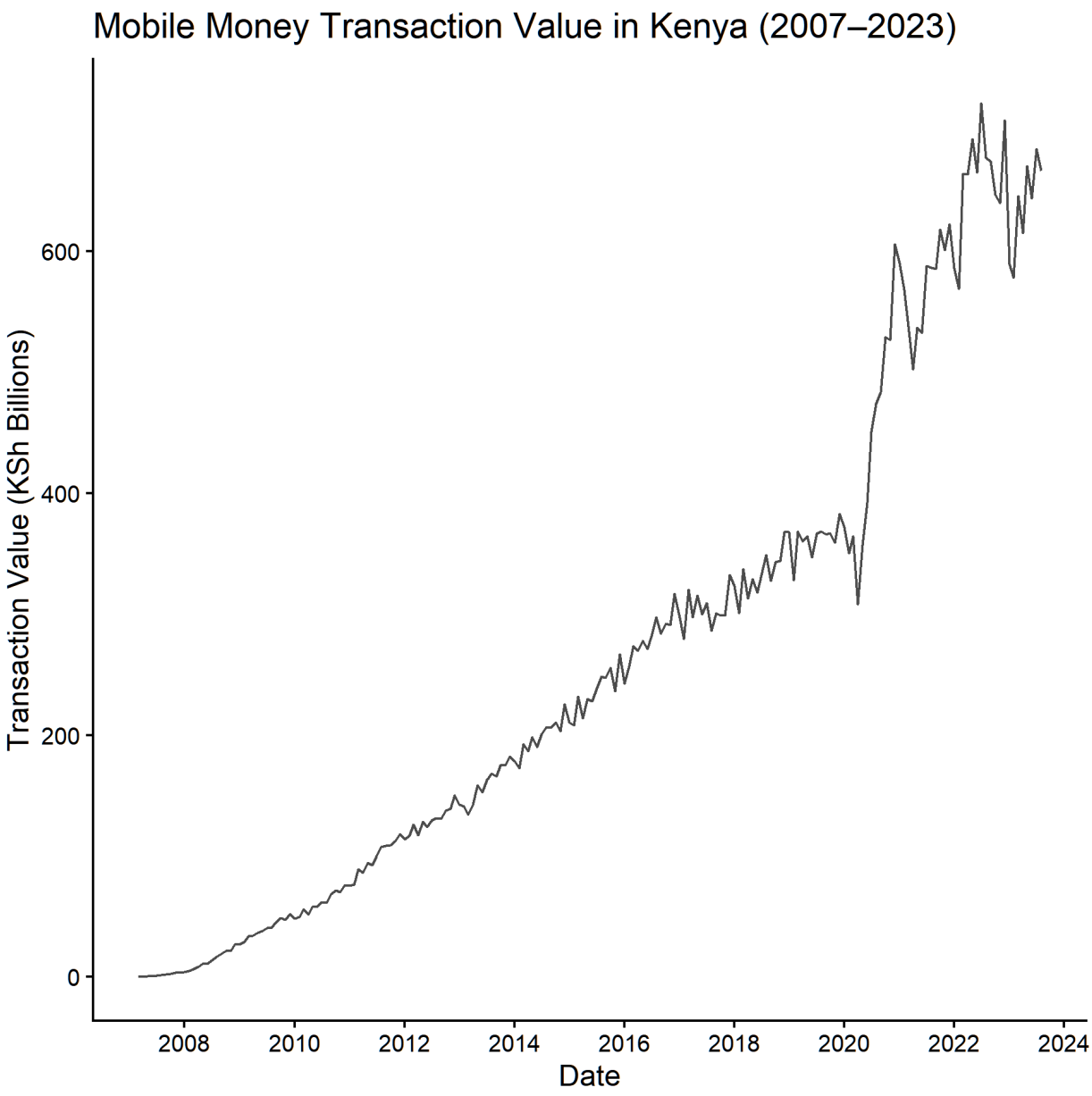

Figure 4 -

Mobile money transaction value in Kenya, 2007–2023 (KSh billions)

Figure 4 shows mobile money transaction value in Kenya from 2007 to 2023, measured in KSh billions. Similar to the transaction amount, the data series shows an increasing trend annually, although at a much steeper pace after 2020 could be due to the pandemic.

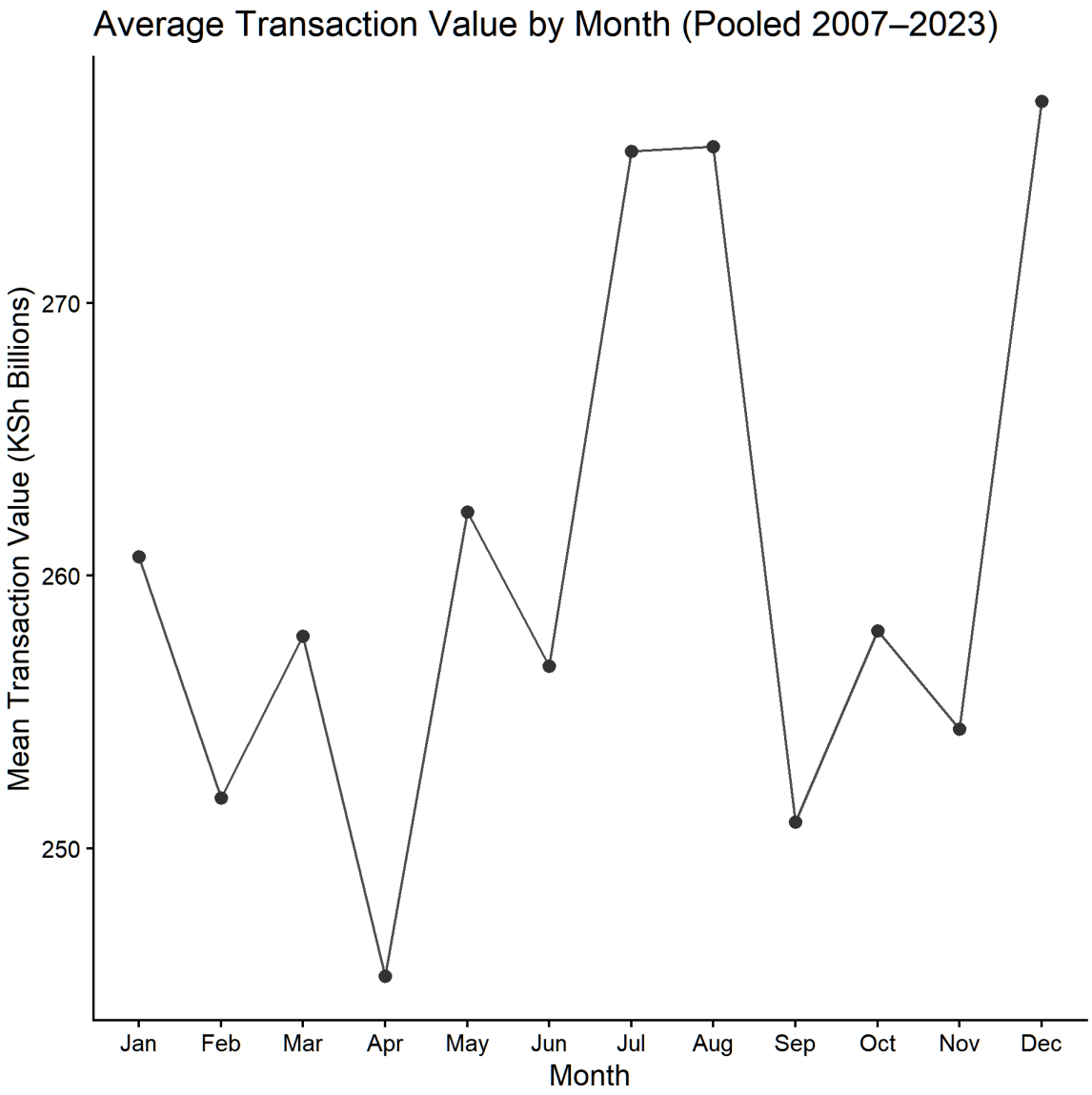

Figure 5 - Average transaction value by calendar month, pooled 2007–2023 (KSh billions)

figure 5 shows the average transaction value by calendar month. As seen on the graph, there is a high point in April, with an average transaction amount of KSh. 244 billion. There is a peak in July and August, at KSh. 277 billion. The period recording the highest transactions amounts is December of KSh. 280 billion. This could be due to the festive season incentivising people to send more money.

3.2 Data Limitations

The variables represent national aggregates, which means that they cannot capture distributional differences across demographic subgroups, such as age, income, education or gender. These are dimensions that future research with disaggregated data could usefully explore, including the gender gap in mobile money adoption and urban-rural disparities in access. Three further limitations shape how the results are shaped. The models leave out factors that move both the account growth and transactions, the factors are network coverage, regulatory changes, and Safaricom's pricing that is likely to fluctuate both the account growth and transaction. There is also a reverse causality problem, since a platform that is already busy and useful this tends to attract new registrations from individuals in Kenya, therefore these registrations are assumed to push transaction activity, which means registered accounts are endogenous, the data can only show that registered accounts and transactions move together, not that one causes the other. The models don't take economic conditions and technology factors into consideration. These factors develop with increasing transactions and accounts, so some degree of influence is reflected through the coefficient values that are shown. Furthermore all the four series have increasing trends throughout the sample period and may well be non-stationary, and this implies the problem of spurious regression and autocorrelation of residuals; no unit root tests are performed, so high R-squared values should be seen as the upper bound of the correlation values.

3.3 : Empirical strategy

This paper investigates the extent to which growth in registered mobile money accounts is associated with increases in transaction volume and transaction value in Kenya between 2007 and 2023. The paper questions if each 1% growth in the number of mobile money accounts lead to proportional 1% growth in transaction value and volume or does this relationship fade over time? In this paper, data from 198 months is analysed by using variables, such as the number of mobile money agents, the number of registered mobile money accounts, transactions volume and their value. Volume and value are kept as separate dependent variables because they measure different things: volume is how often people transact, while values is how much money moves.

Before any analysis is performed on the dataset, several cleaning processes were done to prepare the data for use in regression. Logarithms were calculated for all four variables. This includes agents, accounts, volume and value. A missingness check showed no missing values across all variables, except for the month missing in the accounts series. This was due to the gap in the official publication by the Central Bank. There were no duplicate observations which were found.All data cleaning, estimation and the simulations in Section 6 were carried out in R.

The Ordinary Least Squares (OLS) is what is commonly considered to be the standard approach to conducting regression analysis. Its purpose is to find a regression line that will provide the minimum of residuals' squares for an estimation of the relationship between the dependent variable and covariates (Wooldridge, 2019). If all variables are logarithmic, then the result will be expressed through elasticity. This is because it measures the percentage change in the dependent variable relative to the percentage change in the independent variable; this means that the results are always consistent regardless of their size or units of data. Moreover this allows us to calculate the responsiveness of the mobile money system.The models use four variables: registered accounts, active agents, transaction volume and transaction value. Accounts and agents go together because they cover 2 critical parts of the system. An account gives individuals access to many services, while an agent converts cash into digital funds and vice versa. Registered accounts measure how many people are eligible to transact while active agents measure where people can make that conversation. This matters more than it seems as Kenya has only around 2300 ATMs which is very few to serve a nation of that size making it inaccessible therefore making agents the only possible alternative for the people.

Panel A - Dependent Variable: log(Volume)

Model 1: Baseline
$\log(\text{Volume}) = \beta_0 + \beta_1 \log(\text{Accounts}) + \varepsilon$

Model 2: + Supply Side
$\log(\text{Volume}) = \beta_0 + \beta_1 \log(\text{Accounts}) + \beta_2 \log(\text{Agents}) + \varepsilon$

Model 3: + Time Trend
$\log(\text{Volume}) = \beta_0 + \beta_1 \log(\text{Accounts}) + \beta_2 \log(\text{Agents}) + \beta_3(\text{Year}) + \varepsilon$

Model 4: Full Model
$\log(\text{Volume}) = \beta_0 + \beta_1 \log(\text{Accounts}) + \beta_2 \log(\text{Agents}) + \beta_3(\text{Year}) + \beta_4(\text{Month\_FE}) + \varepsilon$

Panel B - Dependent Variable: log(Value)

Model 1: Baseline
$\log(\text{Value}) = \beta_0 + \beta_1 \log(\text{Accounts}) + \varepsilon$

Model 2: + Supply Side
$\log(\text{Value}) = \beta_0 + \beta_1 \log(\text{Accounts}) + \beta_2 \log(\text{Agents}) + \varepsilon$

Model 3: + Time Trend
$\log(\text{Value}) = \beta_0 + \beta_1 \log(\text{Accounts}) + \beta_2 \log(\text{Agents}) + \beta_3(\text{Year}) + \varepsilon$

Model 4: Full Model

$\log(\text{Value}) = \beta_0 + \beta_1 \log(\text{Accounts}) + \beta_2 \log(\text{Agents}) + \beta_3(\text{Year}) + \beta_4(\text{Month\_FE}) + \varepsilon$

The analysis is separated into two panels, which apply the same framework to calculate the account growth. In panel A the transaction volume is analysed to find out the changes in frequency of the usage in response to growth in the user base. In panel B the transaction value is found which is used to determine the responsiveness of the entire flow of cash within the period .

3.4 : robustness and simulation analysis

To assess the stability and interpretation of the main results, three additional analyses were conducted in R. First, a bootstrap simulation was used to examine the sampling stability of the estimated elasticity on registered accounts. This included drawing 198 monthly observations and re-estimating the regression 1,000 times. The histogram will show whether the coefficient remains stable across repeated samples and stays within a small range of values.

Second, we ran a counterfactual simulation to see how the predicted transaction value would change if account growth had been persistently lower. In this exercise, the estimated regression coefficients were held fixed, while the observed account-growth path was reduced by 10% and then passed back through the fitted model.This test is just to show what the results of the estimated association would look like if we had an input; we were trying to to get a sense of how the fitted model behaves in a hypothetical situation

finally, a Monte Carlo forecast was used to project future transaction value from 2023 to 2033. This simulation generated 1,000 future paths by combining the fitted values from the model with random draws from the estimated residual distribution. The median path is reported together with a 95% simulation range. These forecasts should be interpreted as model-based projections conditional on the historical relationship remaining broadly similar, rather than as precise predictions of future outcomes.

RESULTS

Dependent variable: log(Transaction Volume)

	Dependent variable: log(Transaction Volume)			
	(1)	(2)	(3)	(4)
log(Accounts)	1.175***	0.788***	0.757***	0.755***
	(0.011)	(0.034)	(0.031)	(0.032)

log(Agents)		0.332***	0.432***	0.433***
		(0.028)	(0.029)	(0.030)
Time Trend			−0.002***	−0.002***
			(0.0004)	(0.0004)
Constant	0.389***	−2.151***	−2.936***	−2.972***
	(0.036)	(0.217)	(0.226)	(0.232)
Month Fixed Effects	No	No	No	Yes
Observations	198	198	198	198
R^2	0.984	0.991	0.993	0.993
Adjusted R^2	0.984	0.991	0.992	0.992

Note: *p < 0.1; **p < 0.05; ***p < 0.01

Table 3, Panel A: OLS Regression Results

The results of regression analyses based on four different models by using the log of transaction volume as the dependent variable are shown in Table 3. In Model 1, where registered accounts are used alone, 1% increase in accounts corresponds to 1.175 percent increase in the transaction volume. However, this number overstates the real impact since it neglects other variables that might affect transaction volumes. When the agent network is included in Model 2, the impact of accounts on transaction volume is reduced to 0.788%, with agents contributing 0.332%.

A time trend variable was introduced in Model 3 in order to consider the overall changes in time periods due to factors other than the accounts and agents. Finally, Model 4 provides estimates for both agents and registered accounts in the most extensive equation with coefficients of 0.755% for accounts and 0.433% for agents. Each increase by 1% corresponds to statistical significance at the 1% level. This indicates that we can be 99% confident the relationship that is observed is real and not due to chance. Moreover, a negative and statistically significant time-trend coefficient of 0.002 indicates that the overall transaction volume has been steadily falling over time as new registrations were less active. This can be attributed to the fact that later registrants are less active than those registering first.

Dependent variable: log(Transaction Value)

	Dependent variable: log(Transaction Value)			
	(1)	(2)	(3)	(4)
log(Accounts)	1.175***	0.792***	0.795***	0.791***
	(0.010)	(0.028)	(0.028)	(0.028)
log(Agents)		0.328***	0.317***	0.320***
		(0.023)	(0.026)	(0.027)
Time Trend			0.0003	0.0003
			(0.0003)	(0.0003)
Constant	1.368***	−1.147***	−1.053***	−1.087***
	(0.032)	(0.177)	(0.205)	(0.209)
Month Fixed Effects	No	No	No	Yes
Observations	198	198	198	198
R^2	0.987	0.994	0.994	0.994
Adjusted R^2	0.987	0.994	0.994	0.994

Note: *p < 0.1; **p < 0.05; ***p < 0.01

Table 4, Panel B: OLS Regression Results

Results for these four regression analyses where the dependent variable is the log transaction value are presented in Table 4 below. In general, similar results as observed in Panel A above. For instance, in Model 4, where all possible control variables were included, a 1% increase in registered accounts implies a 0.791% increase in the transaction value, and a 1% increase in agents implies a 0.320% increase in transaction value, both being significant at the 1% level. This means that, contrary to the case of transaction volumes, transaction value does not show any decline in this period because even as the users' frequency of transactions reduces with time, the magnitude of their transactions correlates with economic growth.

DISCUSSION AND FURTHER ANALYSIS

Figure 6 -. Bootstrap distribution of the log(accounts) elasticity on transaction volume

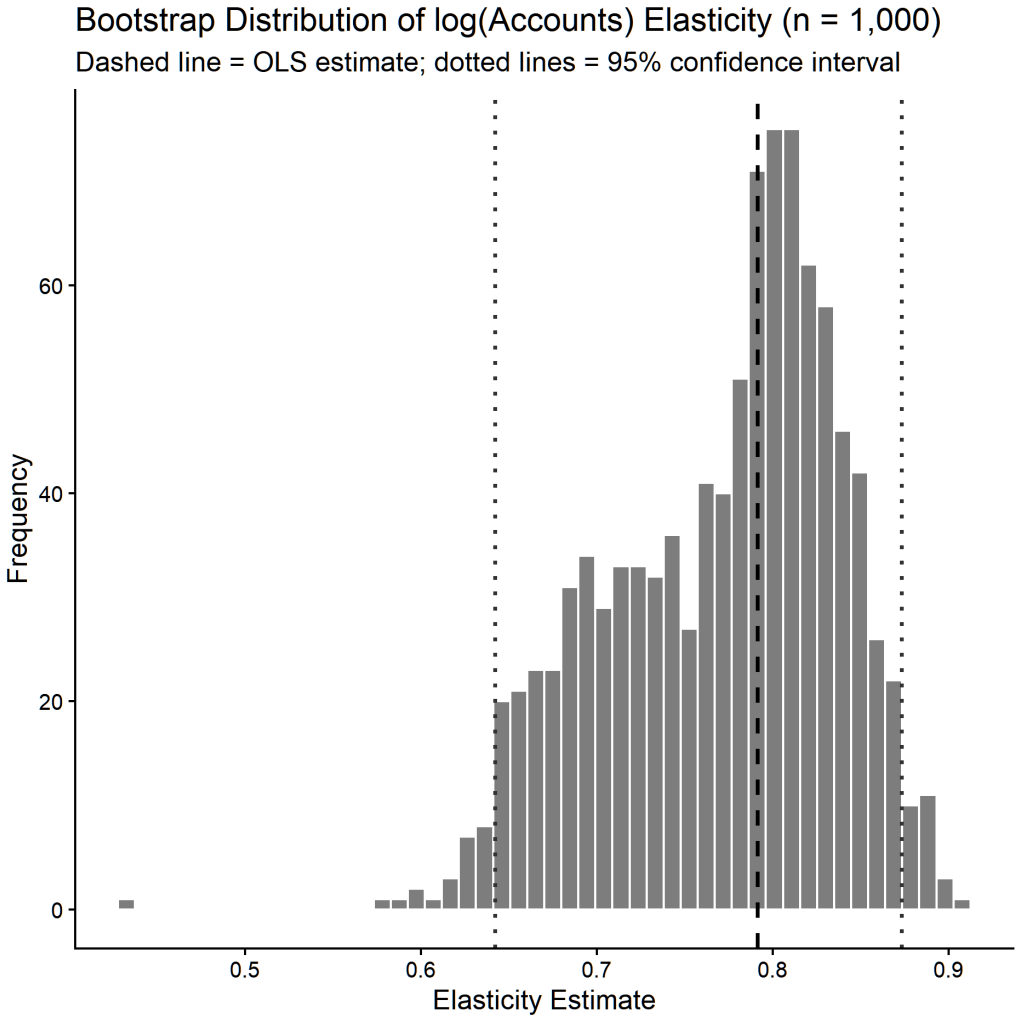

Figure 6 has illustrated the results of running the regression model 1,000 times on different random samples of the data. This process is known as bootstrapping. Each time the model was run, it produced a slightly different elasticity estimate. The histogram displays how often each value appeared. The bars cluster tightly around 0.80, aligning with the original OLS estimate. This consistency indicates that the result is not just a one time occurrence. The two dotted lines signify the 95% confidence interval: ranging from about 0.64 to 0.89. Since the entire distribution is above 0 and below 1.0, we can be confident that the relationship between registered accounts and transaction value is positive and less than proporotional. Each new sample is created by drawing 198 observations from the original 198 months with replacement

meaning some months get picked more than once while others are left out entirely, and the regression is then re-estimated on that reshuffled sample.

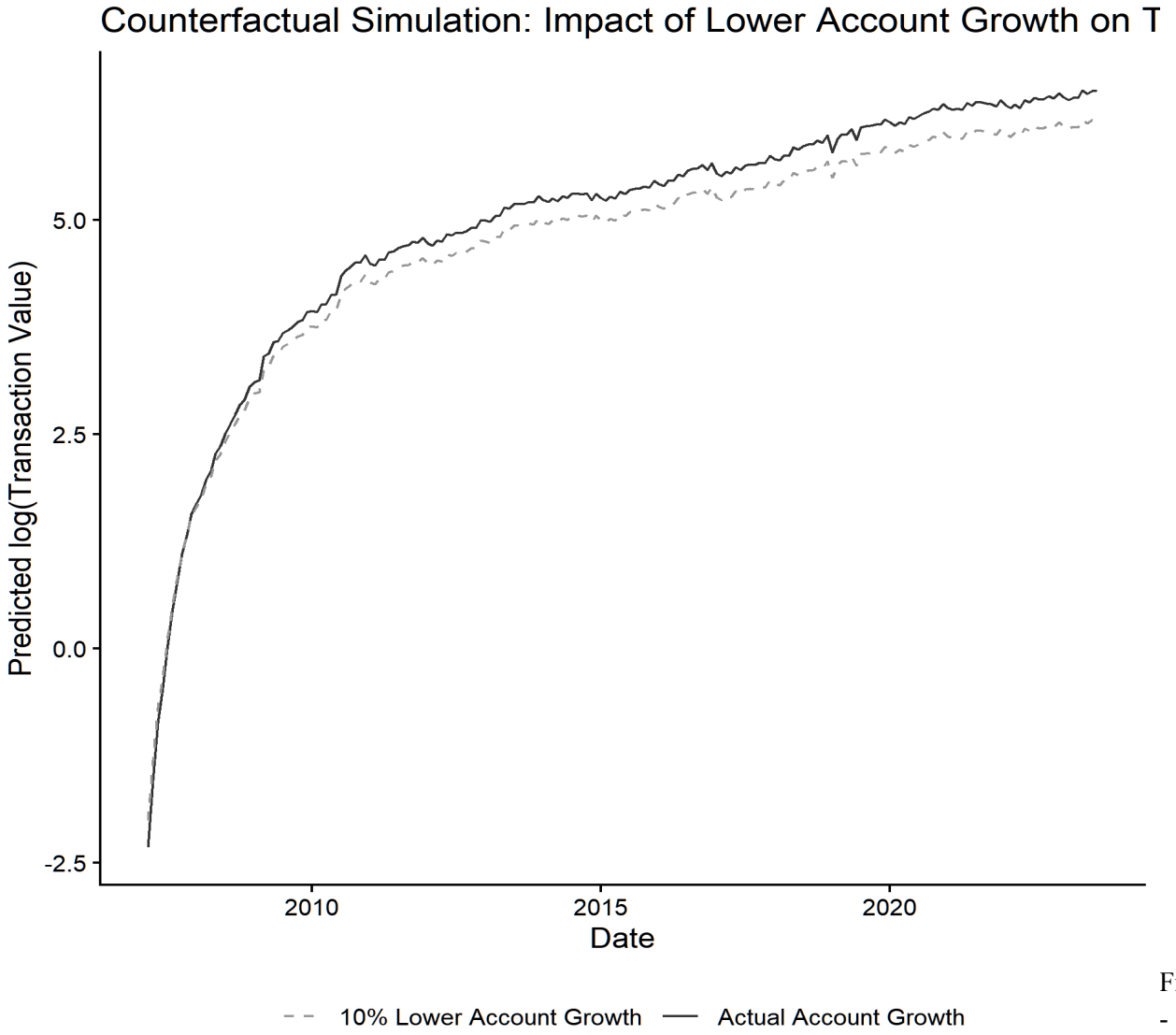

Figure 7 -

Counterfactual simulation: predicted log(transaction value) under actual account growth (solid) versus a sustained 10% reduction in account growth (dashed)

Figure 7 explains the situation if the growth rate of accounts was 10 percent lower for all the years in the sample period. The solid line presents the estimated transaction value based on the real growth rate of accounts observed, while the dashed line indicates the transaction value estimated when account growth was 10 percent lower than the real level. During the first few years, from 2007 to 2010, there is little

difference between the two lines because the values were so small that a 10% change in account growth had a very small absolute effect. After about 2011, as the account base grew larger, the 10% decrease had a greater significance. As a result, a noticeable divergence appeared between the two lines.This simulation holds the fitted model coefficients fixed and feeds a lower account-growth path back through the model, so the gap between the two lines is the arithmetic of the estimated relationship under a different input rather than independent evidence of what would have happened.

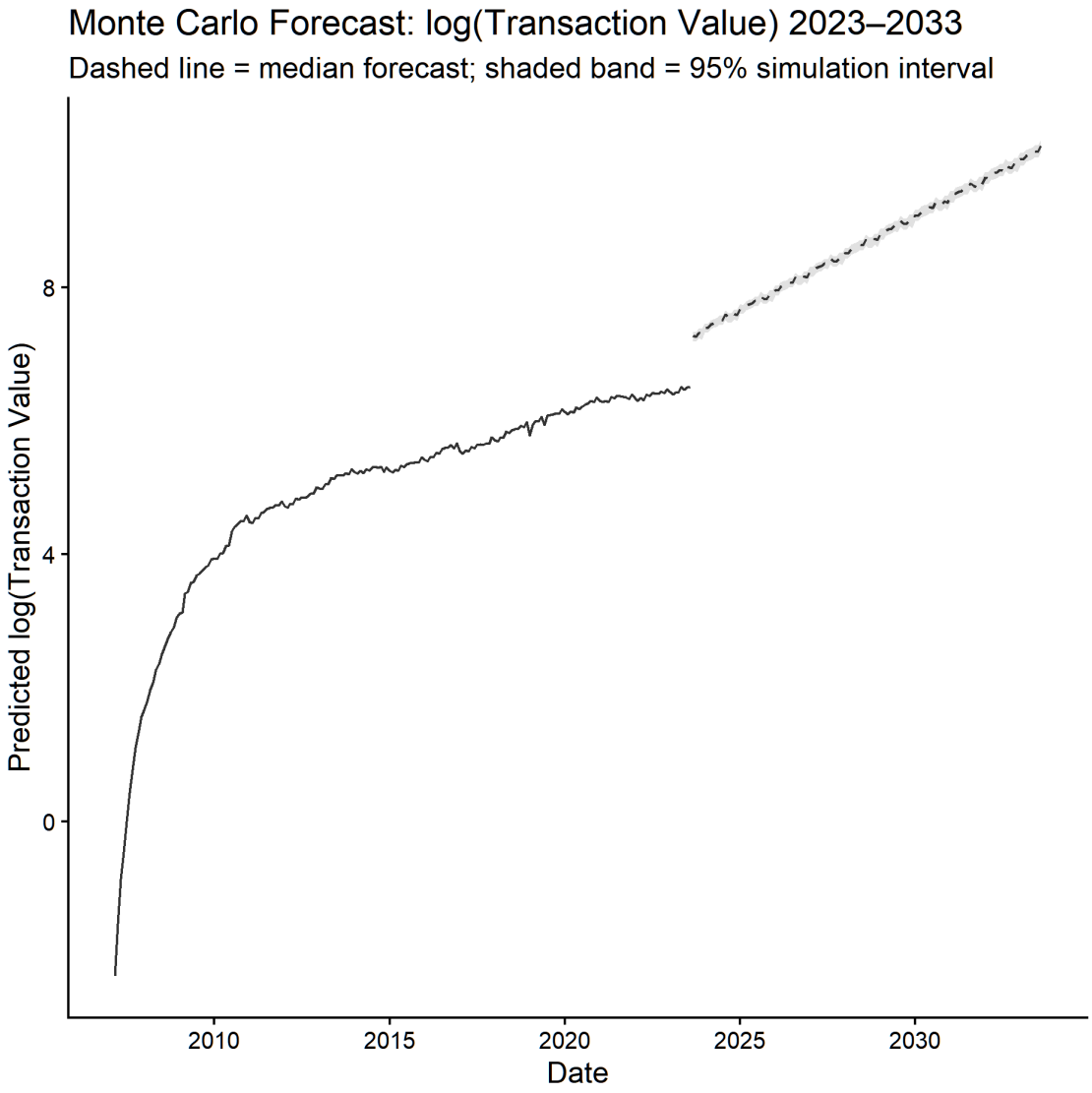

Figure 8 - Monte Carlo Forecast of Log(Transaction Value), 2023–2033

The solid black line is drawn over the actual period, from 2007 to 2023, where the graph presents the fitted values of the model for this period. The dotted line illustrates the prediction between 2023 and 2033 with the use of the median value generated from 1,000 future predicted paths simulated, whilst the shaded grey region depicts the 95% simulation range. The shaded uncertainty bands are quite narrow and are barely visible without zooming. Thus, indicating that the model is producing fair and precise forecasts. As it can be viewed, the forecast of the median continues to move upward at a constant pace. This means that as long as the patterns of the last sixteen years hold, the transaction value will continue to increase until 2033.Each of the 1,000 paths is generated by drawing random errors from the model's estimated residual distribution and adding them to its predictions, and the narrowness of the band reflects only that residual variation, not the larger risk that the historical relationship itself changes over a ten-year period.

CONCLUSION

This study examines how growth in registered mobile money accounts relates to transaction value and transaction volume in Kenya between January 2007 and August 2023, using 198 monthly observations from the Central Bank of Kenya. Four ordinary least squares (OLS) models give consistent results: a 1% rise in registered accounts is associated with a 0.755% rise in transaction volume and a 0.791% rise in transaction value, holding other factors constant. The relationship is positive in both cases, and the elasticity is below one. The agent network also has a separate and significant effect on transaction activity, since a 1% increase in the number of agents raises transaction volume by 0.433% and transaction value by 0.320%. Figure 3 shows a rising trend in transaction volume, though recent months are more volatile. Volume keeps growing overall, which suggests that newer users transact less often than earlier adopters. Figure 4 shows a rising trend in transaction value, so the total amount of money moving through the system continues to grow even as transaction frequency falls. The bootstrap method confirms these patterns, and Monte Carlo forecasting projects that transaction value will keep rising through 2033.Several factors may explain why transaction activity grows less than proportionally with registered accounts. Registered accounts are cumulative and may include accounts that are dormant or only lightly used. Later adopters may also differ from earlier users, for example by being more rural, having lower incomes, or facing weaker digital access, which may reduce the intensity of mobile money use. As the market matures, new registrations may therefore add names to the system faster than they add transaction activity. This paper contributes to the literature by measuring this registration-use gap month by month within a single country. Earlier studies have shown that mobile money supports financial inclusion and economic activity, but many use annual, cross-country, or survey-based data and therefore do not directly show how registration and actual usage change relative to one another over time

These findings carry several implications for mobile banking in developing economies. First, account growth and actual transaction activity have come apart, so the number of registered accounts on its own does not drive financial activity. Second, for governments and other stakeholders working to widen financial inclusion, the practical steps are to expand the agent network in rural areas, lower transaction fees, and run financial literacy programmes for users. Measures like these would let mobile banking reach its full potential.However, these findings should be interpreted as statistical associations rather than causal effects. Reverse causality and omitted factors, including broader economic conditions, regulatory changes, technological adoption, network coverage, and Safaricom's changing business model, may influence both account growth and transaction activity. The trending nature of the time-series data also creates possible risks of non-stationarity, autocorrelation, and spurious regression.

ACKNOWLEDGEMENTS

I would like to thank my mentor, Maiwand Nangyal, for his constant help, support, and guidance during my research.

REFERENCES

Andrianaivo, M., & Kpodar, K. (2011). *Mobile money and economic growth in Sub-Saharan Africa*. https://www.diva-portal.org/smash/get/diva2:1564403/FULLTEXT01.pdf

Central Bank of Kenya. (2023a). *Mobile payments statistics* [Dataset]. National Payment System. https://www.centralbank.go.ke/national-payments-system/mobile-payments/

Central Bank of Kenya. (2023b). *Annual GDP statistics* [Dataset]. https://www.centralbank.go.ke/annual-gdp

Dupas, P., & Robinson, J. (2013). Savings constraints and microenterprise development: Evidence from a field experiment in Kenya. *American Economic Journal: Applied Economics*, 5(1), 163–192. https://doi.org/10.1257/app.5.1.163

FSD Kenya. (2018). *Women, men and youth and the adoption of mobile money in Kenya*. https://www.fsdkenya.org/blogs-publications/blog/women-men-and-youth-and-the-adoption-of-mobile-money-in-kenya/

GSMA. (2026). *The State of the Industry Report on Mobile Money 2026*. https://www.gsma.com/sotir/wp-content/plugins/plugin_gsma_sotir/reports/The-State-of-the-Industry-Report-2026_English.pdf

GSMA. (n.d.). *Mobile money*. Mobile for Development. Retrieved April 18, 2026, from https://www.gsma.com/mobilefordevelopment/mobile-money/

Kemgou Voptia, P. (2024). *Financial inclusion in Sub-Saharan Africa: Does the mobile money adoption matter?* SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5167812

LSE GROUPS. (2025). *Evaluating the positive externalities of M-PESA in Kenya*. London School of Economics. https://info.lse.ac.uk/staff/divisions/Eden-Centre/Assets-EC/Documents/GROUPS-papers/GROUP-05-2025.pdf

Muriithi, J., & Louw, J. (2025). Mobile money usage and performance of women-owned enterprises in Kenya. *Investment Analysts Journal*. https://doi.org/10.1080/10293523.2025.2503099

NCBA Group. (n.d.). *M-Shwari*. Retrieved April 18, 2026, from https://ke.ncbagroup.com/m-shwari/

Ndung'u, N. S. (2021). *A digital financial services revolution in Kenya: The M-Pesa case study*. African Economic Research Consortium. https://aercafrica.org/old-website/wp-content/uploads/2021/03/AERC-MPesa-Case-Study.pdf

Onyango, A. (2025, July 27). World Bank: Mobile money fuels 114 per cent surge in financial inclusion in Kenya. *Eastleigh Voice*. https://eastleighvoice.co.ke/kenyan%20adults/186423/world-bank-mobile-money-fuels-114-per-cent-surge-in-financial-inclusion-in-kenya

Safaricom. (2023). *Annual report 2023*. https://www.safaricom.co.ke/about/resources/annual-reports

Suri, T. (Senior Ed.), Aker, J., Batista, C., Callen, M., Ghani, T., Jack, W., Klapper, L., Riley, E., Schaner, S., & Sukhtankar, S. (Eds.). (2023, February 9). *Mobile money* (VoxDevLit, Vol. 2, Issue 2). VoxDev. https://voxdev.org/sites/default/files/2023-09/Mobile_Money_2.pdf

Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science*, 354(6317), 1288–1292. https://doi.org/10.1126/science.aah5309

TechCabal. (2023). *How to open an M-Pesa account*. https://techcabal.com/2023/10/09/open-mpesa-account-2025/

Wooldridge, J. M. (2019). *Introductory econometrics: A modern approach* (7th ed.). Cengage Learning. https://www.kufunda.net/publicdocs/Wooldridge-Introductory-Econometrics_-A-Modern-Approach-6th-Edition-c2016.pdf

World Bank. (2024). *The impact of mobile money in Sub-Saharan Africa*. World Bank Group. https://thedocs.worldbank.org/en/doc/63acca3e345e3896403d42c63b886a48-0050062024/original/SSA-Mobile-Money-Note.pdf