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The Influence of Digital Money on Economic Growth in Kenya

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ABSTRACT: The growth of the economy is a concern to many because it has an influence on the progress of a country and its citizens. It is expected that an economy with a highly advanced digital money system should also experience high economic growth. However, statistics indicate that the economic growth rate in Kenya has been fluctuating and has failed to grow consistently despite numerous policy interventions. This study sought to establish the influence of digital money on Economic Growth in Kenya. The study incorporated a descriptive research technique and a time series approach to analyse the relationship between digital money and economic growth using Kenyan quarterly data from 2011 to 2020. Four variables were used as proxies to measure digital money: - the value of mobile money transactions, the value of cards money transactions, the value of internet banking (EFTs) transactions and agency banking. The findings revealed that all relationships that were tested were positive and significant each with p-Value that was less than 0.05. Further analysis showed F-Calculated (1, 38; α=0.05) was 32.909 (card transactions), 247.029 (EFT transactions), 297.118 (mobile transfer), and 571.417 (active agents). Therefore, the study recommended that there is need for an intensified campaign to sensitize the public on the importance of digital money owing to their flexibility and improved security as compared to carrying physical cash especially in the wake of the COVID-19 pandemic. To the policy makers, the findings suggest that there is need to solidify and enforce strong digital/ICT policy that promotes cashless payments.

KEYWORDS: Economic Growth, Digital Money, Mobile money, Card Money, Internet Banking, Agency Banking.

I. INTRODUCTION

Technological innovation is a fundamental driver of economic growth and human progress (Broughel & Thierer, 2019). Economic Growth/development is a term used to describe the constant and gradual increasing volume of production or output of a given country. That is the improvement in the gross domestic product (GDP) used as the main operational and measurable indicator of economic development. Based on the principles of economic theory, economic growth implies an annual increase of material production expressed in value, the rate of growth of GDP or national income (Soyer, Ozgit & Rjoub, 2020). However, an economy develops not only based on the materialistic aspects, therefore, economic development is expressed in a longer period via a series of structural changes. It's achieved through greater participation of the processing capacity of industrial production (secondary sector), and at higher levels is increasingly dominated by service sector (tertiary sector).

Economic growth as a long-term derivative of GDP relies on investments that represent that part of the social product that are in the process of its final allocation and used for replacement of worn-out assets, to build new capacity. That is the employment of the country's money (Capital) and resources (labour) during the period seeking to enhance the overall wealth creation (Mitic & Ivic, 2016). There are two main types of investing: The Real investments involving tangible assets, e.g., land, machinery, etc.) and the financial investments where paper or electronic forms such as stocks, bonds among others come into play (Levišauskait, 2010).

Digital money refers to the means of transaction that occurs solely in electronic medium, that is via digital currency reported and transmitted through computers. The strongest and most famous source of digital money is the Bitcoin cryptocurrency. With the current advancement in technology and high rate of adoption of digital platforms, digital money can now be transacted using smartphones, credit cards (e.g., ATMs), and online transactions with cryptocurrencies (Chaffey, Edmundson-Bird & Hemphill, 2019).

Digitization of operations to date has been facilitated by various technological developments such as the Block chain technologies that is a form of distributed ledger technologies that allow multiple parties to engage in secure, trusted transactions without any intermediary. Others include three-dimensional printing (also known as additive manufacturing, to boost international trade in designs rather than in finished products), Internet of things (the growing array of Internet-connected devices such as sensors, meters, radio frequency identification (RFID) chips among others), 4G and 5G mobile broadband, Cloud computing and Artificial intelligence and data analytics among others (UNCTAD, 2020).

Digital money operations take the following forms: Online Payment Integration (e.g., M-Pesa, PayPal, PesaPal, iPay etc.) cryptocurrency, Bitcoins – a digital or virtual currency developed in 2009 that utilizes peer-to-peer networking to allow payments online among others. Since the very early years of the Internet, digital money has been experiencing significant growth and developments where several DigiCash methods, mobile payments and online transactions have contributed to the concept of automated financial transfers that were easy to access.

Musango (2015) confirms that in short- run, ATMs and credit cards can increase demand for currency in circulation where GDP and Commercial lending interest rate are therefore, determined by the currency in circulation. Nyasimi (2016) states that the potential of digital money to replace currency as the predominant means of paying for retail goods and its ability to flow freely across international borders is attracting much attention among central bankers, the media, and scholars. According to Litvishko, Beketova, Akimova, Azhmukhamedova and Islyam (2020), the rapid growth in the popularity of technological developments promote the aspects of online, mobile and/or Internet banking which confirms a stable and effective demand for this new type of banking services. The cost of customer service via the Internet is minimal, which arouses the interest of customers. However, the development of the digital banking industry requires the efforts of every commercial Bank, as well as support from the State Bank.

II. MAIN OBJECTIVE

The main objective of the study was to establish the influence of digital money on economic growth in Kenya.

A. Specific Objectives

I. To establish the influence of mobile money on economic growth in Kenya.
II. To determine the effect of card money on the on economic growth in Kenya.
III. To examine the impact of internet banking on the on economic growth in Kenya.
IV. To establish the effect of agency banking on economic growth in Kenya.

III. THEORETICAL REVIEW

A. Financial Development Theory

The theory was coined by one of the prolific economic contributors of financial development, Fry (1989) and Levine (1997). Levine argues that the preponderance of theoretical reasoning and empirical evidence suggests a positive first-order relationship between financial development and economic growth. There is even evidence that the level of financial development is a good predictor of future rates of economic growth, capital accumulation, and technological change. The theory suggests that financial instruments, markets, and institutions arise to mitigate the effects of information and transaction costs. A growing literature shows that differences in how well financial systems reduce information and transaction costs influence savings rates, investment decisions, technological innovation, and long run growth rates.

The theory has gained prominence with the development of the financial sector. For instance, Berglöf and Bolton (2002) contribute to the theory by claims that the link between financial development and economic growth does not appear to be very strong during the first decade of transition, at least when one looks at the ratio of domestic credit to GDP. Kenourgios and Samitas (2007) examined the long-run relationship between finance and economic growth for Poland and concluded that credit to the private sector has been one of the main driving forces of long-run growth (Caporale, Rault, Sova & Sova, 2015).

The developments in the financial sector have not only led to the increase in the number of financial institutions, but also the development in level of sophistication with new payment systems and asset alternatives to holding money. This has resulted mainly from technological advancement and increase in competition as the number of institutions increase. Developments in payment systems have started to create close substitutes for hard currency, thus affecting a core part of banking (Nyathira, 2012).

These developments have increased the range of digital financing and investment opportunities available to economic agents besides changing the role of banks with expanded diversification choices in terms of portfolio and sources of financing. Such developments affect the speed, security and strength of the channels of monetary policy transmission mechanism in the economy. As financial markets become more liquid and complete, changes in official interest rates are more readily transmitted to the whole term structure and more generally to financial asset prices. Therefore, the study adopts the theory as an informative theory to the study objectives, that is mobile, card, internet payments towards the reduction in costs of transactions and ultimate increase in economic output.

B. Financial Deepening Theory

The theory of financial liberalization was by Mac Kinnon (1973) and Shaw (1973) who advocate for the independence of the financial sector as an effective way to accelerate growth. Financial deepening reflects an increasing use of financial intermediation by savers and investors as well as the monetization of the economy (McKinnon, 2010; McKinnon, 1973). Financial deepening refers to increased provision of financial services by financial institutions which can have an effect on both individuals' and societies' economic situation (Shaw, 1973). According to Shaw (1973), financial deepening refers to the accumulation of financial assets/capital at a faster pace than the accumulation of non-financial wealth and output.

Just as the financial development theory, the financial deepening theory has seen significant strides with its testable hypotheses developing across the years. This has been evidenced by the financial innovations that have hit the financial sector in full intensity. The theory argues that financial deepening drives economic growth through the presence of efficient markets while economic growth is a response to the expansion of financial markets and progress (Apergis, Filippidis & Economidou, 2007). It broadens its resource base, raises the capital needed to stimulate investment through savings and credit, and boosts the overall productivity.

This is consistent with Gries, Kraft and Meierrieks (2011) whose opinion on financial deepening occurs when the primary, secondary and retail financial markets, financial instruments as well as stakeholders relate with each other to reduce the costs of transactions and/or operations. Therefore, the theory is based on the premise that the higher the real rate of interest, the greater the degree of financial deepening, the more saving there will be, and financial saving will be allocated and invested more efficiently than if saving is invested directly in the sector in which it takes place, without financial intermediation (Alrabadi & Kharabsheh, 2016).

Financial deepening has emerged as a strategy to enhance economic growth more so in developing nations such as Kenya (Bakang, 2015). Ochieng (2015) presents a strong argument that increasing financial deepening has stimulated greater banking productivity. The banking sector innovations in the financial delivery and inclusivity has displayed an increasing trend in recent years leading to increase in money supply in the economy. Besides financial deepening mobilizes savings into investment projects, and also increases the marginal productivity of capital through the intermediation function of well-informed financial institutions (Obafemi, Oburota & Amoke, 2016). In Kenya, based on the theoretical backgrounds, M-Pesa stands tall as one of the revolutionists enabling over 90% of the citizens to benefit from the transaction platform (McGath, 2018; Misati et al., 2021).

C. Financial Innovation Theory

The financial innovation theory is underpinned by a rich literature including the seminal studies by Levich (1985), Rawls III and Smithson (1990), Verghese (1990), Merton (1992) and Levine (1997) among many others. Financial Innovation refers to the finding of new products and new features for existing financial products (Sekhar & Gudimetla, 2013). Financial innovation results in greater economic efficiency over time. In the process of creating a new financial product, besides basic theory of financial management, a financial engineer needs to acquire knowledge of optimization and financial modeling techniques. According to Miller (1992) financial innovations lower cost of capital, reduce financial risks, improve financial intermediation, and hence lead to welfare enhancing. Likewise, Verghese (1990) states that it is necessary to take a close look at the main features of the current wave of financial innovation and evaluate objectively what it has achieved and at what cost.

The theory is justified by the increasing complexity and diversity of financial innovations, which makes it impossible to construct a single general theory for financial innovation. Innovations have, therefore, in the past decade surfaced in the banking sector to include a more inclusive, convenient, safer and cheap mode of payments and transactions. Over the past decade, the theory has gained momentum in proving its applicability in the development of the economy (Frame & White, 2004). Allen (2001) finds empirical evidence suggesting that financial innovation increases the complexity of transactions that provide opportunities to explore questions of interest of consumers of financial services.

In the early 2000s, the developments were not fully optimized as it is in the current era (Armstrong, et al., 2012; Frame & White, 2004). Thus, there was need for stimulation of the sector developments by the governments. Such interventions such as capping interest rates came into force owing to the 2007-08 financial crunch crisis (CBK, 2018; Cuesta & Sepulveda, 2018; (Allen, 2011; World Bank, 2013). However, this in the long run led to the drop in GDP and therefore, the need for innovativeness of the banking sector. Acharya et al. (2010) call for responsible financial innovation, and good governance has also been notably on the rise (Armstrong & Muniesa, 2012; Asante et al. 2014).

Therefore, based on the primary importance place on innovation and its positive impacts in improving financial growth, the current study finds the theory worthwhile. It informs the ability of the financial sector in Kenya to innovate and adopt financial technologies to boost the capacity of the economy. Improvement in financial technologies implies the usage of such aspects as the mobile banking systems, online payment methods, etc., which in turn allows for economic growth in Kenya.

D. Technology Acceptance Model (TAM)

The TAM was introduced by Fred Davis specifically tailored for modelling users' acceptance of information systems or technologies (Davis, 1985) and based on the Theory of Reasoned Action (Fishbein & Ajzen, 1975). The theory has ever since evolved in explaining different aspects of occurrences in the technological environment. The Technology Acceptance Model has become a predominant model for examining the factors of user acceptance to a given technology (Davis, 1989).

The theory is used to explain the general antecedents of computer acceptance that lead to explaining users' behaviour across a broad range of end-user computing technologies and user populations. The basic TAM model included and tested two specific beliefs: Perceived Usefulness and Perceived Ease of Use. This model is widely used to study user acceptance of the technology. According to Davis' theory, perceived usefulness and perceived ease of use influence

one's attitude towards system usage, which influences one's behavioural intention to use a system, which, in turn, determines actual system usage (Venkatesh & Davis, 2000).

The model has been tested over the years proving its prowess in the current era in the financial sector. Lai (2016) noted that the rate at which payment systems develop depends largely on a struggle between rapid technological change and natural barriers to new product or service acceptance. It has significantly supported the adoption of FinTech which has seen a noteworthy jump with financial technologies such electronic check clearing networks, ATMs for cash withdrawals and deposits, online banking and cash flow, and mobile payment infrastructure improving economic growth (Ameme & Wireko, 2016; World Bank, 2019). The emergence of digital payment has enabled customers to embrace E-commerce with the use of internet-based transactions. Which involves online shopping, bookings, e-tickets, use of credit/debit cards, M-wallet, cryptography, QR code payments among others (Madan, 2016). These Mobile money services facilitate distant payments and are often designed specifically to facilitate payment transfer between distant individuals (Akinyemi & Mushunje, 2020). Therefore, the acceptance of the technologies and the advancements by the government to the private sectors can consequently improve the uptake and thus improve useability towards convenience transactions (Gbongli & Amedjonekou, 2019).

IV. EMPIRICAL REVIEW

A. *Mobile Money and Economic Growth*

Nyasimi (2016) by use of a descriptive survey design sought to investigate the effect of mobile money transfer services on economic growth in Kenya for the year 2007 to 2015. The target population accessible was 7 years which was assessed via census methodology and by use of secondary data sources. The study established that there was a positive relationship between the number of customers who use mobile money and GDP growth. However, the number of agents decreased economic growth in both short run and long run. The decrease in the number of mobile money transfer services can be attributed to the minimal operating balance which the money transfer service provider should always maintain. There is need for an intensified campaign to recruit locals to the mobile money transfer services owing to their flexibility and improved security as compared to carrying physical cash.

Nyasimi (2016) assessed the effects of mobile money transfer services on economic growth in Kenya. The study looked into the use of mobile money transfer via the mobile money transfer agents, mobile money transfer customer enrolments, mobile money transfer transaction frequency and mobile money transfer deposit value. The study targeted secondary data for a period of 7 years through a census approach. It was established the number of agents, customers and frequency of transactions have a long run positive shock on economic growth. There is need to intensify the need for adaption of mobile money transfer services among those who have not adapted them.

Mawejje and Lakuma (2019) examined the effects of mobile money on economic growth of Uganda's financial sector. This was tracked by looking into the long-run mobile-money demand function using VEC (vector error correction) techniques. The findings indicated that mobile money had moderate positive effects on monetary aggregates, consumer price index, private-sector credit, and aggregate economic activity. Mobile money balances responded to changes in monetary policy instruments, signaling possible ameliorating effects for the conduct of monetary policy. Furthermore, the results showed that transactional motives related to mobile money had stronger macroeconomic effects than savings motives.

Patnam and Yao (2020) explored the influence of mobile money on economic outcomes in India. The study used granular data on transactions from Paytm, one of the largest mobile money service providers in India with over 400 million users. The findings indicated that mobile money use increases the resilience to shocks by dampening the impact of rainfall shocks on nightlights-based economic activity and household consumption. The findings suggest that firms adopting mobile payments improved their sales after six-months of use, compared to other firms.

B. *Card Money and Economic Growth*

Wong, Lau and Yip (2020) examined the effect of adopting cashless payment in five European Union (EU) countries, namely, Austria, Belgium, France, Germany, and Portugal, for the period of 2000-2012. The findings indicated that there is short run causality running from cheque payment to telegraphic transfer and card payment, as well as causality running telegraphic transfer to card payment. In the long run, there is significant effect of adopting cashless payment on the economy of the five EU countries. Therefore, the adoption of one type of cashless payment will affect another type of cashless payment in the short run. The impact of adopting cashless payment on economic growth can only be significantly observed in the long run. Hence, any policy that promotes cashless payment will not affect the economy immediately.

Sreenu (2020) examined the impact of implementation of a cashless payment policy on economic development and gradual transition to a cashless economy in India. The study was conducted from 2010 to 2018 and the specific variables included credit or debit card payment, check payment, and E-money as well as Indian economic growth. The findings confirmed that there is a high acceptance of cashless system policy and as such there was a positive impact on economic growth by using the credit or debit card payment, check payment, and E-money.

Kumari and Khanna (2017) sought to assess the effect of cashless payment on economic growth by adopting a

conceptual framework. The study by investigating various methods such as the use of card payment methods established that the adoption of the cashless economy policy can enhance the growth of financial stability in the country. One most significant contribution of the cashless via card payment is that it reduces the risk associated with carrying cash and most transactions are settled electronically. Therefore, people do not need to move around with cash thus minimizing chances of theft and armed robbery. This is very effective in solving the problems faced in the financial sector and thus improves the economic growth (Okoye & Ezejiofor, 2013).

Tee and Ong (2016) sought to understand the influence of cashless payment and economic growth in the selected countries: Austria, Belgium, France, Germany, and Portugal, from 2000 to 2012. The study used the within and between effect of adopting cheque payment, telegraphic transfer, card payment and electronic money. The study, therefore, established that there is short run causality running from cheque payment to telegraphic transfer and card payment, as well as causality running telegraphic transfer to card payment. In the long run, there is significant effect of adopting cashless payment on the economy of the five EU countries.

C. *Internet Banking and Economic Growth*

Mugodo (2016) sought to investigate the effect of electronic banking on the financial performance of commercial banks in Kenya. The study was centered on all the 42 commercial banks in Kenya and made use of secondary data (from 2011 and 2015). The study established that electronic banking has contributed positively to the financial performance of Kenya's commercial banks. The study also showed that mobile, internet banking and use of ATM cards positively and significantly influenced the financial performance of Kenya's commercial banks as measured by the return on assets. However, the study resents a conceptual gap since it excluded the impact of electronic banking on internet banking providers.

Kanogo (2013) studied the impact of electronic banking in international business environment and performance by Diamond Trust Bank Limited in Kenya. The study employed a case study approach as its research design method, in which eight departmental and branch heads were interviewed by use of an interview guide, information which formed the primary data of the study. Secondary data comprised of internal memos, reports and newsletters as well as graphical analysis of transactions and revenue so earned. The study established that electronic banking was positively influential to bank performance. Electronic banking generates a sizeable amount of revenue for the bank while on the other hand aiding in cost cutting through reduction of manpower use at branches.

Okiro and Ndungu (2013) sought to determine the impact of mobile and internet-banking on performance of financial institutions in Kenya where the survey was conducted on financial institutions in Nairobi. The study investigated 30 financial institutions and found that the most prevalent internet banking service is balance inquiry while the least is online bill payment. Cash withdrawal was the most used mobile banking service whereas purchasing commodities was the least commonly used. Customers can access account information at any time, day, or night, and this can be done from anywhere. Internet banking has improved banking efficiency in rendering services to customers.

Using panel data of 13 banks over the period of 2003–2013, Siddik, Sun, Kabiraj, Shanmugan and Yanjuan (2016) investigated the effects of e-banking on performance of banks in a developing economy of Bangladesh. The findings indicated that e-banking slowly starts to contribute positively to banks' Return on Equity with a time lag of two years. Nazaritehrani and Mashali (2020) focused on Shahr bank's central headquarter and its branches in Tehran, Iran to investigate the effects of E-banking channels on market share. The study used primary data based on internet banking, automatic teller machines (ATMs), mobile banking, telephone banking (TB), and point of sales (POS) on banks' market share. The findings uncovered that internet banking, POS, and TB, positively affect a bank's market share.

D. *Agency Banking and Economic Growth*

Ndambuki (2016) likewise used the descriptive design approach to investigate the effect of agency banking on profitability of commercial banks in Kenya. By targeting the 43 commercial banks in Kenya the study used secondary data which covered a period of 5 years from the year 2011 to the year 2015. The study found that the number of agents has a positive influence on profitability while the volume of deposits, withdrawals and bill of payments related negatively to profitability of commercial banking.

Muigai (2015) sought to establish the role of Agency banking on the development of the banking sector in Kenya. The survey applied a descriptive research technique where all the commercial banks were surveyed by the use of secondary data from CBK from the year 2010 to 2014. Likewise, the study indicated that there was a strong positive relationship between Agency banking and the development in the banking sector. Therefore, agency banking plays a pivotal role in the development of the banking sector based on the variables: operational efficiency, stability, access and financial depth account and thus improving economic growth.

Mimano (2014) conducted an exploratory analysis to find out the effect of agency banking on the growth of profits of commercial banks in Kenya and used secondary data from 2010 to 2013. The findings revealed that agency banking had a significant impact on the growth of profit of commercial banks. It is can therefore be concluded that that agency banking has resulted in greater uptake of financial services which has resulted in more revenues for the banks. Growth of the profits of commercial banks therefore, results in an improved banking system, the financial sector and ultimately economic development is improved.

By use of a descriptive survey design, Kaburu (2014) sought to analyse the impact of agency banking on growth of SMEs in Tharaka Nithi County by targeting 400 respondents and use of primary data. The study also established that convenient financial services accessibility affects the growth of SMEs business in Tharaka Nithi County. As such, it was concluded that agency banking results in increased capacity for SMEs to save money since agency banks are fast and have no queues like in banks.

V. METHODOLOGY

A. *Research Design*

A research design is a technique that a certain study uses in conducting a statistical data collection, measuring, and analyzing of the data i.e. a plan for a study, providing the overall framework for collecting data (Yanow & Schwartz-Shea, 2015; Meyers, Gamst & Guarino 2016; Saunders et al., 2018).

This study applied a descriptive research technique and a time series approach to track economic growth in Kenya for 10 years, from the year 2011 to 2020. This design helps to describe the trends of digital money indicators and economic growth. Time series approach also helps to link digital money indicators and economic growth. Descriptive design also provides a relatively simple and straightforward approach to the study of values, attitudes, beliefs and motives (Kivunja i& iKuyini, i2017).

B. *Study Population*

The study targeted the time series data from CBK in Kenya for the last 10 years. The quarterly data from CBK (since the year 2011 to 2020) formed the unit of analysis of the study. The data was captured on a quarterly basis for the 10 years under study thus giving rise to 40 lags / time series.

C. *Census Survey*

The quarterly time series data from CBK (since the year 2011 to 2020) formed the unit of analysis of the study. Therefore, no sampling was done, and a census survey was adopted to assess all the data under observation.

D. *Data collection procedure and instruments*

These are tools used to measure the variables of the study (Mugenda & Mugenda, 2011). The data on economic growth and digital money for the study is secondary data. Time series data was extracted from the Central Bank of Kenya website for the period 2011 to 2020. The variables that were obtained are value of mobile money transactions, value of cards money transactions, value of transactions through internet banking (EFTs) and value of GDP for Kenya economy and the number of active mobile agents.

VI. RESULTS AND DISCUSSIONS

A. *Descriptive Statistics*

This section presents the descriptive statistics for the aspects of mobile money, card money, internet banking (EFT transactions), agency banking (number of active agents) and GDP (to measure economic growth).

The results in Table I below revealed that the data for the variables are clustered around the mean, based on the resulting standard deviations. This means for the 10 years under study, the evolutions maintained fairly a constant.

Data for GDP, Card transactions and mobile payments has a skewness between -0.5 to + 0.5 implying the distribution is approximately symmetric. While data for EFT transactions (Skewness -0.027) and Agency banking (-0.840) implies moderate skewness.

The values for asymmetry and kurtosis between -2 and +2 are considered acceptable to prove normal univariate distribution (George & Mallery, 2010). Hair et al. (2010) and Bryne (2010) argued that data is considered to be normal if skewness is between -2 to +2 and kurtosis is between -7 to +7.

Table I: Summary of the Descriptive Statistics

Statistics	GDP (in USD Million)	CARD_TRANSACTIONS (in USD Million)	EFT_TRANSACTIONS (in USD Million)	MOBILE_PAYMENTS (in USD Million)	NUMBER_OF_ACTIVE_AGENTS
Mean	9403.0	1115.1	1278.5	7124.4	12.9
Median	9284.9	1093.7	1268.5	7196.5	13.0
Maximum	12068.1	1869.5	1837.4	15604.7	13.6
Minimum	7149.2	614.0	769.3	2261.4	11.6
Std. Dev.	1481.3	272.0	302.4	3052.7	0.56
Skewness	0.202	0.873	-0.027	0.414	-0.84
Kurtosis	1.836	3.927	1.957	2.913	2.77
Jarque-Bera	2.532	6.515	1.819	1.157	4.79
Probability	0.282	0.038	0.403	0.561	0.09
Sum	376121.1	44602.4	51141.9	284975.5	514.67
Sum Sq. Dev.	85577270.4	2885643.8	3565568.4	363440913	11.79
Observations	40	40	40	40	40

B. *Normality tests*

In this study, normality was diagnosed using a histogram of regression standardized residuals as well as the Jarque-Bera test. According to Gujarati (2007), the assumption of normality of residuals signifies the generalizability of findings. Standardization is important in order to determine if the information given by the dependent variable is normally spread. The null hypothesis (H0) states that the residuals are normally distributed. Where the probability value is greater than 0.05, the data is then considered to be normally distributed

C. *Figure 1: Normality Test for the Residuals*

Likewise, as shown by the Jarque-Bera statistic of 0.835 and the probability value (0.659) which was greater than 0.05. Therefore, the null hypothesis was upheld and therefore, the data is normally distributed. Out of the 40 observations, the test showed that the data was positively skewed (0.347) with a Kurtosis of 3.139

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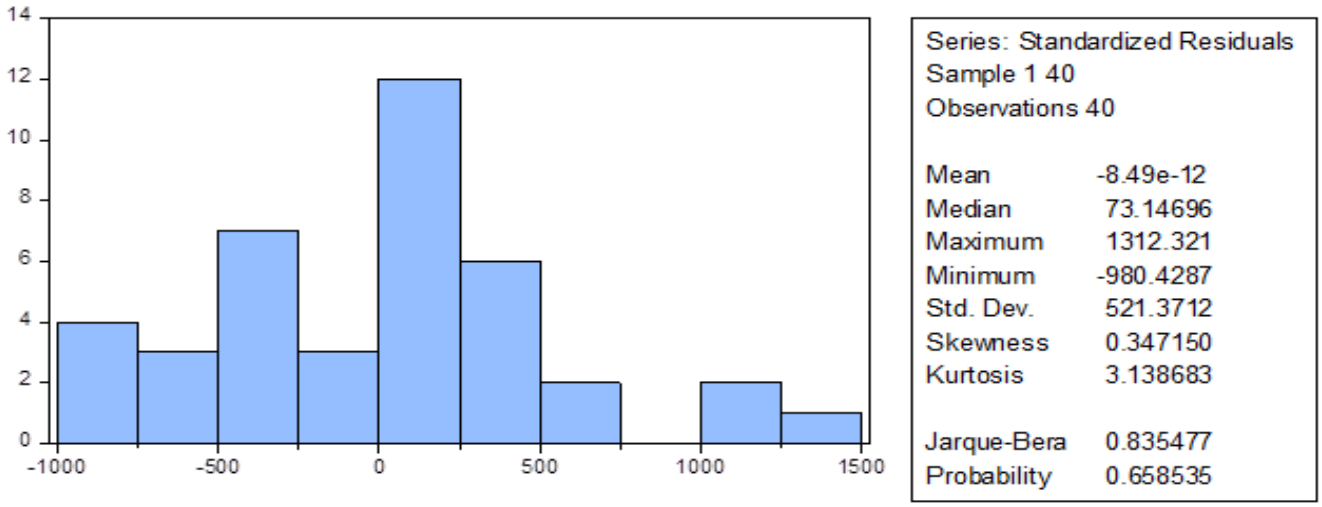

D. *Testing for Heteroscedasticity*

The Ordinary Least Squares (OLS) assumes that the error term is homoscedastic, that is, it has constant variance. If the error variance is not constant, then there is heteroscedasticity in the data. Running a regression model without accounting for heteroscedasticity would lead to biased parameter estimates. To test for heteroscedasticity, the Breusch-Pagan/Godfrey test (1979) and the Modified Wald test (Murteira, Ramalho & Ramalho, 2013) are used.The results in the table below showed that the probability value of the chi square is of the Breauch Pagan test was 0.0524 and greater than the 0.05. Because the null hypothesis of this study states that the error variance is homoscedastic, the study concludes that the error variance is homoscedastic since null hypothesis was not rejected.

Table II: Breauch-Pagan Test for Heteroscedasticity

Panel Cross-section Heteroskedasticity LR Test
Null hypothesis: Residuals are homoscedastic
Specification: LGDP C LOGIVS

	Value	df	Probability
Likelihood ratio	18.15507	10	0.0524

LR test summary:

	Value	df
Restricted LogL	63.13280	35
Unrestricted LogL	72.21034	35

Unrestricted Test Equation:
Dependent Variable: LGDP
Method: Panel EGLS (Cross-section weights)
Date: 08/16/21 Time: 17:40
Sample: 1 40
Periods included: 4
Cross-sections included: 10

Total panel (balanced) observations: 40
Iterate weights to convergence
Convergence achieved after 12 weight iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.240237	0.672615	3.330639	0.0021
LCARD_TRANSACTIONS	0.123247	0.028596	4.309873	0.0001
LEFT_TRANSACTIONS	-0.067055	0.100678	-0.666030	0.5098
LMOBILE_PAYMENTS	0.141416	0.039724	3.559948	0.0011
LNUMBER_OF_ACTIVE_AGENTS	2.064919	0.480216	4.299978	0.0001
	Weighted Statistics			
R-squared	0.955527	Mean dependent var		13.00566
Adjusted R-squared	0.950444	S.D. dependent var		5.946578
S.E. of regression	0.054090	Akaike info criterion		-3.360517
Sum squared resid	0.102402	Schwarz criterion		-3.149407
Log likelihood	72.21034	Hannan-Quinn criter.		-3.284186
F-statistic	187.9979	Durbin-Watson stat		1.180795
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	0.894442	Mean dependent var		9.136680
Sum squared resid	0.102402	Durbin-Watson stat		0.843664

E. *Testing for Multicollinearity*

Multicollinearity was tested in this study by means of tolerance and variance inflation factor (VIF). Hair et al. (2010) points out that a very small tolerance value (0.10 or below) or a large VIF value (10 or above) shows high collinearity (Multicollinearity). According to Hair *et al.* (2010), multicollinearity denotes to a condition where more than two expounding variables are extremely linearly related. Testing for multicollinearity is necessary before data analysis because highly collinear explanatory variables result to estimators that are not best linear unbiased estimators (BLUE). This is because as multicollinearity increases, the standard error of coefficients increases making them less reliable.

Where VIF values are more than 10, it shows that there is multicollinearity (Field 2009). According to the results, the variance inflation factor was found to be less than 10 (1.785972, 4.571241, 5.081772 and 9.692158) hence no multicollinearity.

Table III: Multicollinearity Results Using VIF

Variance Inflation Factors
Date: 08/16/21 Time: 17:45
Sample: 1 40
Included observations: 40

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.887813	12467.39	NA
LCARD_TRANSACTIONS	0.002307	1584.182	1.785972
LEFT_TRANSACTIONS	0.017289	12338.27	4.571241
LMOBILE_PAYMENTS	0.001666	1804.485	5.081772
LNUMBER_OF_ACTIVE_AGENTS	0.372695	34141.17	9.692158

F. *Testing for Autocorrelation*

The study used the Durbin-Watson test to test for autocorrelation. The Durbin-Watson statistic should range between 1.5 to 2.5 to imply absence of correlation between residual terms (Field, 2000). The study adopted the Durbin-Watson test to test for autocorrelation. From the Table IV below, the null hypothesis of no serial correlation between residual terms is accepted given that the Durbin Watson statistic was 1.720180 and was within the acceptable range of 1.5 and 2.5. Therefore, there is no 1st order correlation between residual terms.

Table IV: Durbin Watson test for Autocorrelation in Panel Data

Dependent Variable: LGDP
Method: Panel Least Squares
Date: 08/16/21 Time: 17:08
Sample: 1 40
Periods included: 4
Cross-sections included: 10
Total panel (balanced) observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.525722	0.942238	2.680555	0.0111
LCARD_TRANSACTIONS	0.080332	0.048031	1.672523	0.1033
LEFT_TRANSACTIONS	-0.032621	0.131489	-0.248088	0.8055
LMOBILE_PAYMENTS	0.138896	0.040811	3.403385	0.0017
LNUMBER_OF_ACTIVE_AGENTS	1.982847	0.610488	3.247972	0.0026

R-squared	0.897232	Mean dependent var	9.136680
Adjusted R-squared	0.885487	S.D. dependent var	0.157716
S.E. of regression	0.053371	Akaike info criterion	-2.906640
Sum squared resid	0.099695	Schwarz criterion	-2.695530
Log likelihood	63.13280	Hannan-Quinn criter.	-2.830309
F-statistic	76.39304	Durbin-Watson stat	1.720180
Prob(F-statistic)	0.000000		

G. *Unit Root test*

To establish the stationarity conditions of the data series in this study, unit root test using the Augmented Dickey-Fuller (ADF) methodology was conducted, with the null hypothesis being that the series under consideration is non-stationary or has a unit root. First running the normal regression model helps us to show the relationship between R squared and the Durbin Watson. From the table IV above, the results shows that the R squared (0.897232) is greater than the Durbin Watson statistic was (0. 720180) and thus the series in the model are not stationary. Therefore, stationarity testing was conducted as shown below.

Table V: Stationarity Test for the Variables at Zero Difference

Variable	t-Statistic	Prob.*	Comment
GDP	38.6611	0.0073	Stationary
CARD_TRANSACTIONS	28.6679	0.0945	Non-Stationary
EFT_TRANSACTIONS	18.6909	0.5420	Non-Stationary
MOBILE_PAYMENTS	21.3088	0.3792	Non-Stationary
NUMBER_OF_ACTIVE_AGENTS	21.0697	0.3930	Non-Stationary

From the findings in table V, it was revealed that all the variables under study had an Augmented Dickey-Fuller probability statistic of more than 0.05. Thus, all the variables were found not to be stationary. This necessitated the need for first difference.

Table VI: Stationarity Test for the Variables at 1st Difference

Variable	t-Statistic	Prob.*	Comment
CARD_TRANSACTIONS	85.3149	0.0000	Stationary
EFT_TRANSACTIONS	21.9889	0.3411	Non-Stationary
MOBILE_PAYMENTS	30.8893	0.0567	Non-Stationary
NUMBER_OF_ACTIVE_AGENTS	29.5189	0.0780	Non-Stationary

Table VI shows that card transactions was stationary at first difference were while the rest of the variables were still not stationary (since p-value>0.05). This necessitated the need for the second difference for EFT transactions, mobile payments and the number of active agents.

Table VII: Stationarity Test for the Variables at 2nd Difference

Variable	t-Statistic	Prob.*	Comment
EFT_TRANSACTIONS	21.9889	0.0411	Stationary
MOBILE_PAYMENTS	30.8893	0.0067	Stationary
NUMBER_OF_ACTIVE_AGENTS	29.5189	0.0080	Stationary

Table VII shows that EFT transactions, mobile payments, and the number of active agents became stationary at the second difference, given that the *p-value<0.05*.

H. *Correlation Analysis*

Table VIII: Correlation Analysis

Correlation	LGDP	LEFT_TRANSACTIONS	LCARD_TRANSACTIONS	LMOBILE_PAYMENTS	LNUMBER_OF_ACTIVE_AGENTS
LGDP	**1**				
t-Statistic	-----				
Probability	-----				
LEFT_TRANSACTIONS	0.907241	1			
t-Statistic	13.2964	-----			
Probability	0.000	-----			
LCARD_TRANSACTIONS	0.608568	0.596864	1		
t-Statistic	4.727729	4.585719	-----		
Probability	0.000	0.000	-----		
LMOBILE_PAYMENTS	0.90072	0.690682	0.610629	1	
t-Statistic	12.78177	7.07698	4.753243	-----	
Probability	0.000	0.000	0.000	-----	
LNUMBER_OF_ACTIVE_AGENTS	0.904548	0.641707	0.482224	0.733579	1
t-Statistic	13.07782	6.25468	3.393225	7.302173	-----
Probability	0.000	0.000	0.0016	0.000	-----

The results in the table VIII showed that there is a significant positive link between internet banking (EFT transactions) and economic growth in Kenya (r= 0.907241, p=0.000). It further shows that card money transactions and economic growth in Kenya have a positive and significant relationship (r= 0.608568, p=0.000).

The findings further indicated that there is a positive and significant association between mobile money transactions and economic growth in Kenya (r= 0.90072, p=0.0.000).

Moreover, the table also shows that there is a significant positive relationship between agency banking and economic growth in Kenya (r= 0.904548, p=0.000).

I. *Regression Analysis*

This section was based on estimating the relationship between each independent variable under study and economic growth in Kenya.

1. Relationship between Card Transactions and Economic Growth in Kenya

The results were generated to give the coefficient of determination (R^2), analysis of variance (ANOVA) and regression coefficients for the model on the relationship between card transactions and economic growth in Kenya.

Coefficient of determination (R^2) was used to determine the extent to which card transactions explained any change in the

predicted variable (GDP/economic growth in Kenya). That is the degree to which change in GDP Growth by 1 unit is explained by card transactions.

Results in Table IX show an R-Square of 0.464 with the standard error of estimate being 1098.571. This implies that card transactions do explain 46.4 percent of any change in economic growth in Kenya. The remaining 53.6 percent is explained by other factors. The researcher also tested for serial autocorrelation using Durbin Watson statistics. According to this study, Durbin Watson statistic was 2.041 which falls within the relatively normal range (of between 1.5 and 2.5) and therefore there was no indication of serial autocorrelation in the residuals from a regression analysis.

Table IX: R^2 on Relationship between Card Transactions and Economic Growth in Kenya

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.681[a]	0.464	0.450	1098.571	2.041

a. Predictors: (Constant), Card Transactions

b. Dependent Variable: Economic Growth in Kenya

Analysis of variance (ANOVA) was generated to determine the spread of the mean of variables, that is, spread between card transactions and GDP Growth which gives the regression; and the spread within data (responses) which represents the residuals. As shown in Table X below, F-Calculated (1, 38) = 32.909 > F-critical (1, 38) = 4.098 at 0.05 significance level and confidence level. Results also show p-Value = 0.000 < 0.05. This implies that card transactions have a significant and positive effect on economic growth in Kenya.

Table X: ANOVA on Relationship between Card Transactions and Economic Growth in Kenya

	Sum of Squares	df	Mean Square	F	Sig.
Regression	39,716,702.148	1	39,716,702.148	32.909	.000b
Residual	45,860,585.498	38	1,206,857.513		
Total	85,577,287.646	39			

a. Predictors: (Constant), card transactions

b. Dependent Variable: Economic Growth in Kenya

Table XI: Regression Coefficients on Relationship between Card Transactions and Economic Growth in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	5,266.229	741.742		7.100	0.000
Card transactions	3.710	0.647	0.681	5.737	0.000

a. Dependent Variable: Economic Growth in Kenya

From the findings above, when the predictor (card transactions) is held constant, economic growth in Kenya would remain at 5,266.229 units. In addition, when card transactions increase by 1 unit, the economy would grow by 3.710 units. The model can be summarized as follows:

$$\mathbf{Y = 5{,}266.229 + 3.710}\ X$$

Where Y is the dependent variable (economic growth in Kenya) and X = card transactions). This therefore confirms that card transactions have a significant influence on economic growth in Kenya.

2. ***Relationship between EFT Transactions and Economic Growth in Kenya***

The results were generated to give the coefficient of determination (R^2), analysis of variance (ANOVA) and regression coefficients for the model on the relationship between EFT transactions and economic growth in Kenya.

Coefficient of determination (R^2) was used to determine the extent to which EFT transactions explained any change in the predicted variable (GDP/economic growth in Kenya). That is the degree to which change in GDP Growth by 1 unit is explained by EFT transactions.

Results in Table XII show an R-Square of 0.867 with the standard error of estimate being 547.943. This implies that EFT transactions do explain 86.7 percent of any change in economic growth in Kenya. The remaining 13.3 percent is explained by other factors. The researcher also tested for serial autocorrelation using Durbin Watson statistics. According to this study, Durbin Watson statistic was 1.522 which falls within the relatively-normal range (of between 1.5 and 2.5) and therefore there was no indication of serial autocorrelation in the residuals from a regression analysis.

Table XII: R^2 on Relationship between EFT Transactions and Economic Growth in Kenya

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.931[a]	0.867	0.863	547.943	1.522

a. Predictors: (Constant), EFT Transactions

b. Dependent Variable: Economic Growth in Kenya

Table XIII: ANOVA on Relationship between EFT transactions and Economic Growth in Kenya

	Sum of Squares	df	Mean Square	F	Sig.
Regression	74,168,124.518	1	74,168,124.518	247.029	.000b
Residual	11,409,163.128	38	300,241.135		
Total	85,577,287.646	39			

a. Predictors: (Constant), EFT transactions

b. Dependent Variable: Economic Growth in Kenya

Analysis of variance (ANOVA) was generated to determine the spread of the mean of variables, that is, spread between EFT transactions and GDP Growth which gives the regression; and the spread within data (responses) which represents the residuals. As shown in Table XIII, F-Calculated (1, 38) = 247.029 > F-critical (1, 38) = 4.098 at 0.05 significance level and confidence level. Results also show p-Value = 0.000 < 0.05. This implies that EFT transactions have a significant and positive effect on economic growth in Kenya.

Table XIV: Regression Coefficients on Relationship between EFT transactions and Economic Growth in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	3,571.799	380.992		9.375	0.000
EFT transactions	4.561	0.290	0.931	15.717	0.000

a. Dependent Variable: Economic Growth in Kenya

From the findings, when the predictor (EFT transactions) is held constant, economic growth in Kenya would remain at 3,571.799 units. In addition, when EFT transactions increase by 1 unit, the economy would grow by 4.561 units. The model can be summarized as follows:

Y= 3,571.799 + 4.561 X

Where Y is the dependent variable (economic growth in Kenya) and X = EFT transactions. This therefore confirms that EFT transactions have a significant influence on economic growth in Kenya.

3. Relationship between Mobile Transactions and Economic Growth in Kenya

The results were generated to give the coefficient of determination (R^2), analysis of variance (ANOVA) and regression coefficients for the model on the relationship between mobile payments and economic growth in Kenya.

Coefficient of determination (R^2) was used to determine the extent to which mobile payments explained any change in the predicted variable (GDP/economic growth in Kenya). That is the degree to which change in GDP Growth by 1 unit is explained by mobile payments.

Results in Table XV below show an R-Square of 0.887 with the standard error of estimate being 505.336. This implies that mobile payments do explain 88.7 percent of any change in economic growth in Kenya. The remaining 11.3 percent is explained by other factors. The researcher also tested for serial autocorrelation using Durbin Watson statistics. According to this study, Durbin Watson statistic was 1.781 which falls within the relatively-normal range (of between 1.5 and 2.5) and therefore there was no indication of serial autocorrelation in the residuals from a regression analysis.

Table XV: R^2 on Relationship between Mobile Payments and Economic Growth in Kenya

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.942[a]	0.887	0.884	505.336	1.781

a. Predictors: (Constant), Mobile Payments

b. Dependent Variable: Economic Growth in Kenya

Table XVI: ANOVA on Relationship between Mobile Payments and Economic Growth in Kenya

	Sum of Squares	df	Mean Square	F	Sig.
Regression	75,873,431.707	1	75,873,431.707	297.118	.000b
Residual	9,703,855.939	38	255,364.630		
Total	85,577,287.646	39			

a. Predictors: (Constant), mobile payments

b. Dependent Variable: Economic Growth in Kenya

Analysis of variance (ANOVA) was generated to determine the spread of the mean of variables, that is, spread between mobile payments and GDP Growth which gives the regression; and the spread within data (responses) which represents the residuals. As shown in Table XVI, F-Calculated (1, 38) = 297.118 > F-critical (1, 38) = 4.098 at 0.05 significance level and confidence level. Results also show p-Value = 0.000 < 0.05. This implies that mobile payments have a significant and positive effect on economic growth in Kenya.

Table XVII: Regression Coefficients on Relationship between Mobile Payments and Economic Growth in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	6,147.844	205.055		29.981	0.000
Mobile Payments	0.457	0.027	0.942	17.237	0.000

a. Dependent Variable: Economic Growth in Kenya

From the findings, when the predictor (mobile payments) is held constant, economic growth in Kenya would remain at 6,147.844 units. In addition, when mobile payments increase by 1 unit, the economy would grow by 0.815 units. The model can be summarized as follows:

Y= 6,147.844 + 0.457 X

Where Y is the dependent variable (economic growth in Kenya) and X = mobile payments. This therefore confirms that mobile payments have a significant influence on economic growth in Kenya.

4. Relationship between Mobile Transactions and Economic Growth in Kenya

The results were generated to give the coefficient of determination (R^2), analysis of variance (ANOVA) and regression coefficients for the model on the relationship between active agents and economic growth in Kenya.

Coefficient of determination (R2) was used to determine the extent to which active agents explained any change in the predicted variable (GDP/economic growth in Kenya). That is the degree to which change in GDP Growth by 1 unit is explained by active agents.

Table XVIII: R^2 on Relationship between Active Agents and Economic Growth in Kenya

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.968[a]	0.938	0.936	374.733	1.521

a. Predictors: (Constant), Active agents

b. Dependent Variable: Economic Growth in Kenya

Results in Table XVIII show an R-Square of 0.938 with the standard error of estimate being 374.733. This implies that active agents do explain 93.8 percent of any change in economic growth in Kenya. The remaining 6.2 percent is explained by other factors. The researcher also tested for serial autocorrelation using Durbin Watson statistics. According to this study, Durbin Watson statistic was 1.521 which falls within the relatively-normal range (of between 1.5 and 2.5) and therefore there was no indication of serial autocorrelation in the residuals from a regression analysis.

Analysis of variance (ANOVA) was generated to determine the spread of the mean of variables, that is, spread between active agents and GDP Growth which gives the regression; and the spread within data (responses) which represents the residuals. As shown in Table XIX below, F-Calculated (1, 38) = 571.417 > F-critical (1, 38) = 4.098 at 0.05 significance level and confidence level. Results also show p-Value = 0.000 < 0.05. This implies that active agents have a significant and positive effect on economic growth in Kenya.

Table XIX: ANOVA on Relationship between Active Agents and Economic Growth in Kenya

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	80,241,146.717	1	80,241,146.717	571.417	.000b
Residual	5,336,140.929	38	140,424.761		
Total	85,577,287.646	39			

a. Predictors: (Constant), active agents
b. Dependent Variable: Economic Growth in Kenya

Table XX: Regression Coefficients on Relationship between Active agents and Economic Growth in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	6,182.769	147.169		42.011	0.000
Active agents	0.007	0.000	0.968	23.904	0.000

a. Dependent Variable: Economic Growth in Kenya

From the findings, when the predictor (active agents) is held constant, economic growth in Kenya would remain at 6,182.769 units. In addition, when active agents increase by 1 unit, the economy would grow by 0.007 units. The model can be summarized as follows:

Y= 6,182.769 + 0.007 X

Where Y is the dependent variable (economic growth in Kenya) and X = active agents. This therefore confirms that active agents have a significant influence on economic growth in Kenya.

5. Relationship between Mobile Transactions and Economic Growth in Kenya

The table below presents the findings of the regression at composite level.

Table XX1: Relationship between Digital Money and Economic Growth in Kenya

Dependent Variable: LGDP
Method: Panel Least Squares
Date: 08/16/21 Time: 17:10
Sample: 40
Periods included: 4
Cross-sections included: 10
Total panel (balanced) observations: 40

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.07042	1.126046	10.71930	0.0000
LCARD_TRANSACTIONS	0.007122	0.022858	0.311565	0.7579
LEFT_TRANSACTIONS	0.003648	0.056437	0.064634	0.9490
LMOBILE_PAYMENTS	0.034530	0.023300	1.481940	0.0104
LNUMBER_OF_ACTIVE_AGENTS	1.059879	0.511810	2.070846	0.0404

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.992312	Mean dependent var	9.136680
Adjusted R-squared	0.988468	S.D. dependent var	0.157716
S.E. of regression	0.016936	Akaike info criterion	-5.049480
Sum squared resid	0.007458	Schwarz criterion	-4.458372
Log likelihood	114.9896	Hannan-Quinn criter.	-4.835754
F-statistic	258.1520	Durbin-Watson stat	1.863403
Prob (F-statistic)	0.000000		

Dependent Variable: GDP

The model R- squared was 0.992312. This implies that the goodness of fit of the model explains 99.23% of the variation in the economic growth in Kenya. This shows that digital money has an impact on economic growth in Kenya: that is the aspects of mobile money, card money, internet banking (EFT transactions) and agency banking are good predictors of GDP (as a measure economic growth in the model used). This is further supported by the significance of the F statistic; 258.1520 where the value was greater than the critical value at 0.05 significance level where the Prob (F-statistic) was 0.000. This implies the general linear (OLS) model is statistically significant.

Regression findings in table 4.23 revealed that card money transactions and economic growth in Kenya are positively and insignificantly related (β=0.007122, p=0.7579). These findings are consistent with Sreenu (2020) who noted that there is a high acceptance of cashless system policy and as such there was a positive impact on economic growth by using the credit or debit card payment, check payment, and E-money. Kumari and Khanna (2017) indicated that one most significant contribution of the cashless via card payment is that it reduces the risk associated with carrying cash and most transactions are settled electronically. Tee and Ong (2016) also established that there is short run causality running from cheque payment to telegraphic transfer and card payment, as well as causality running telegraphic transfer to card payment. In the long run, there is significant effect of adopting cashless payment on the economy of the five EU countries.

The table further indicates that internet banking (EFT transactions) and economic growth in Kenya are positively and insignificantly related (β=0.003648, p=0.9490). These findings corroborate those of Mugodo (2016) who showed that mobile, internet banking and use of ATM cards positively and significantly influenced the financial performance of Kenya's commercial banks as measured by the return on assets. Kanogo (2013) also established that electronic banking was positively influential to bank performance. Electronic banking generates a sizeable amount of revenue for the bank while on the other hand aiding in cost cutting through reduction of manpower use at branches.

Moreover, mobile money transactions and economic growth in Kenya are positive and significantly related (β=0.034530, p=0.0104). These results corroborate those of Mawejje and Lakuma (2019) who indicated that mobile money had moderate positive effects on monetary aggregates, consumer price index, private-sector credit, and aggregate economic activity. Mobile money balances responded to changes in monetary policy instruments, signaling possible ameliorating effects for the conduct of monetary policy. Furthermore, the results showed that transactional motives related to mobile money had stronger macroeconomic effects than savings motives. Patnam and Yao (2020) likewise, indicated that mobile money use increases the resilience to shocks by dampening the impact of rainfall shocks on nightlights-based economic activity and household consumption. The findings suggest that firms adopting mobile payments improved their sales after six-months of use, compared to other firms.

The table further indicated that, number of active agents and economic growth in Kenya are positively and significantly related (β=1.059879, p=0.0404). These findings are consistent with Mimano (2014) who concluded that agency banking has resulted in greater uptake of financial services which has resulted in more revenues for the banks. Growth of the profits of commercial banks therefore, results in an improved banking system, the financial sector and ultimately economic development is improved. Kaburu (2014) along the same vein established that convenient financial services accessibility affects the growth of SMEs business in Tharaka Nithi County. As such, it was concluded that agency banking results in increased capacity for SMEs to save money since agency banks are fast and have no queues like in banks.

Thus, the model can be stated as follows:

$$Y_t = 12.07042 + 0.007122X_{1t} + 0.003648X_{2t} + 0.034530X_{3t} + 1.059879X_{4t}$$

Where:

Y = GDP (as a measure economic growth

$X_{1\,t}$ = card money transactions

$X_{2\,t}$ = internet banking (EFT transactions)

$X_{4\,t}$ = mobile money transactions

$X_{4\,t}$ = agency banking

e_t = Error term assumed to be normal in distribution with mean zero and variance σ^2

t = time periods under study

VII. CONCLUSIONS

From the findings, the study concludes that there is positive and significant influence of card money, Mobile payments, internet banking (EFT transactions), and active agents on GDP (to measure economic growth) in Kenya. The study theorized that the developments in mobile money ought to increase the range of digital financing and investment opportunities available to economic agents. The study validates the tenets of financial development theory, financial deepening theory, financial innovation theory and the Technology Acceptance Model (TAM) to have strong and valid hypothesis towards the advancement of mobile money and economic growth.

The theoretical basis has been found to inform the increased provision of financial services by the CBK and the increase in the usage of financial services for economic growth. This is achievable since theoretically and empirically, it has been acknowledged that the use of mobile money as well as digital financing technologies helps in increase in the usage of financial services such as internet banking, mobile payments, agency banking as well as card money payment.

Based on the study findings, the current study recommends the following:

There is need for an intensified campaign to sensitize the public on the importance of digital money transfer services owing to their flexibility and improved security as compared to carrying physical cash. This is evident especially in the current 21st century where technology has exploded to many developing countries. In the wake of the COVID-19 pandemic, the use of mobile money transactions has put to test the financial developments of the country and thus there is need to intensify the need for adaption of mobile money transfer services among those who have not adapted them.

To the policy makers, the findings suggest that there is need to solidify and enforce strong digital/ICT policy that promotes cashless payment. This goes a long way to encourage the firms and entrepreneurs in the country to integrate financial developments in their businesses such as PayPal in websites, social media marketing, e-wallets, mobile banking etc.

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