

Do Digital Payment Platforms' Activities affect Corruption? Evidence from Panel of West African Countries

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Abstract

The study examines whether the digital payment platforms (ATM, POS, Mobile and Online platforms) affects the level of corruption in selected West African countries. A standard panel data models such as pooled Least Square, random effect and system GMM were adopted to generate the estimators. The findings suggest that the operation of ATM has been deterrent to corruption level in selected West African Countries. This is evidence with the negative effects observed in both the individual and interaction models. The point of sale (POS), Mobile and Online medium of electronic payments have increasing effects on corruption. This is proofed, given the positive signals seen in both the individual and interaction models. The paper further test for robustness through model re-specification and changes in estimation technique and thus, reveals that the coefficients are consistent to model re-specification and advanced estimation procedure. Hence, digital payment platforms significantly influence corruption in West African countries. The implication therefore is that, the regulatory authorities and deposit money banks should advocate for larger usage of the POS and Online digital payment platforms. Also, the use of the mobile platform should be regulated to contend with insecurity it heralds.

Keywords: Digital Payment Platforms, Corruption, Random Effect, Pooled OLS, System GMM

JEL Classification: D72, E51

1. Introduction

Several studies had examined the issue of corruption in different dimensions. For instance, studies that have investigated the determinants of corruption found that institutional factors were predominant determinants of corruption (see Abramo, 2008; Graf Lambsdorff, 2005; and Ogbeide and Mustapha, 2013). Some studies concentrated on the cross-country determinants of corruption and submitted that the determinants of corruption could be categorised into economic, socio-cultural and political factors (Bardha, 1997; Svensson, 2005; Treisman, 2007; and Elbahnasawy and Revier, 2012). In these studies, the economic factors that influenced corruption include: real GDP per capita, investment, inflation, government

size, openness, population growth, educational attainment, among others. Socio-cultural and political factors considered consist of freedom of press, judicial efficiency, religion, ethnicity and government type. These recognized determinants were appraised to have long-run impacts on corruption and corruption is a social disease that cannot be overlooked for so long. Therefore, there is need for short-term measure to address corruption.

Existing studies on corruption had concentrated on the role of government but largely ignored the role of central bank and payment system and corruption erupts from financial transactions. In recent time, electronic payment innovations have brought about several electronic payment channels and subsequent establishments of financial technology companies. The widely used e-payment technologies in West African countries are Automatic Teller Machine (ATM), Point of Sales (POS) Technology, Mobile Money Transfer (MMT) Technology and Online Money Payment (WEB) Technology (NIBSS, 2017). Shares of these electronic payment technologies increased continuously since inception, specifically in Nigeria (see Table 1). The rising shares and high rate of adoption for settlement of payments have expose customers to more risks such as internet fraudsters, incomplete transactions among others. However, less-emphases is placed on its influence on corruption.

With this development, investigation on the impact of technology development on corruption and other malpractices is important to compliment the role of government in improving the performance of institutions and promoting institutional changes. While rigorous academic studies on this aspect are extremely limited, there are many media reports that argued that financial transactions are intended to avoid taxes, generate black economy and facilitate petty corruption.¹ Studies that have related corruption to measures of payment systems in a country include (Elbahnasawy and Revier, 2012; and Goel and Mehrotra, 2012). In these studies, increased use of paper-based financial transactions and cheques fuel corruption. On the other hand, card-based transactions reduces prevalence of corruption in advanced countries. However, these studies concentrated on advanced and developed countries where technology application is more advanced, hence need to examine the impact of digital payment channels on corruption in developing countries/ region.

In this paper, the relationship between the use of digital payment to carry out financial transaction and corruption is investigated. It is apparent that illegal financial transactions thrive on anonymity. This suggests that vast majority of such financial transactions will avoid the banking hall and will be executed through digital channels that will require no physical appearances. The role of the digital payment channels relative to other assets that is used for economic and financial transactions could therefore be one of its important determinants. The impact of large denominations in illegal transactions had repeatedly been emphasized in the literature on money laundering (see Rogoff, Giavazzi & Schneider, 1998; and Rogoff, 2002). It is obvious that the ability to transfer large amount of money through the digital platforms reduces the transaction cost of corruption and thus, unfolds the important roles of digital

¹ Media reports in Nigeria, Ghana, Cote D'Ivoire, Senegal have shown that political corruption were prevalent specifically, during election when political parties do disburse cash to voters prior and during elections and for which a huge amount of financial transactions were conducted through cash and various digital payment channels.

payment platforms and Central Banks in these selected West African countries in combating against corruption.

It therefore suffices that the fundamental issues of reducing the rampaging of corruption and its attendance effects is to understand the contributions of the recent digital payment platforms on corruption available in the selected West African countries. In line with these reasoning, the paper has raised the following research questions to guide the study. First, are there relationships between the digital payment platforms and corruption? The main reason for this question is to ascertain the contribution of each of the digital payment platforms on the prevalence of corruption in developing countries, which has been less researched in the literature. Second, is there possibility inconsistencies in the coefficient as result of alternative specification and change in estimation procedure? Third, is corruption uproar reduced after the adoption of the digital payment technologies? Therefore, it is essential to research on the effects of digital payment technology innovation on the corruption level in developing West African countries.

The paper is arranged in five sections. Introduction is contained in section one while section two consist of the literature review. The third section describes the method, data and data description, and section four presents and discusses the findings. Section five concludes the research.

Table 1: Shares of Digital-Payment Channels in Nigeria (in %)

Year	Cheque	ATM	POS	NIP	NEFT	Mobile	Online
2012	15.54	18.48	16.67	17.70	14.89	19.94	10.27
2013	14.42	24.28	30.97	26.16	14.83	29.01	14.32
2014	19.40	7.54	6.85	9.28	18.06	3.67	15.95
2015	16.61	13.76	9.88	11.90	16.24	10.92	16.58
2016	16.93	15.99	16.08	16.30	17.25	15.90	20.78
2017	17.10	19.95	19.55	18.67	18.73	20.57	22.10

Source: Compiled by the Author. Underlying data are from NIBSS (2017)

2. Literature Review

2.1. Concept of Digital Payment System

Digital payment is often times called an electronic payment. It is the transfer of value from one payment account to another using a digital device such as a mobile phone, POS (Point of Sales), ATM (automated teller machine) or computer. It is also payments that are conducted over the internet and mobile channels. Onay (2008) pointed out that the Internet has changed the dimensions of competition in the retail banking sector. This means that for digital payments to take place, the sender of the payment must have a bank account, an online banking method, a device from which he or she can make the payment, and a medium of transmission meaning

that either he or she should have signed up to a provider or an intermediary such as a bank or a service provider. Digital payments can be partially digital, primarily digital, or fully digital. For example, a partially digital payment is one in which both payer and payee use cash via third party agents, with providers making digital bank transfers in the backend. A primarily digital payment might be one in which the payer initiates the payment digitally to an agent who receives it digitally but the payee receives the payment in cash from that agent. Regardless of the type, some things we know for sure is that digital payments offer significant benefits to individuals, companies, governments, or international development organizations.

Furst, Lang and Nolle (2000a, 2000b,) in the study of who offers Internet Banking and internet banking: developments and prospects, economic and policy analysis, showed that banks contribution to electronic banking were usually more profitable and depended less heavily on traditional banking activities than banks that did not. Looking at the work of Mia, Rahman, Debnath (2007) in their study, observed that the latest development in financial services by banks is the electronic banking. Electronic banking has really changed both the manual and traditional forms of transacting business and at the same time is being replaced by modern technology that is based on automation, network and interconnection of computers and other electronic devices which has therefore enhanced the banks performance and operation in terms of service delivery. Karjaluoto (2002) made it known that “banking is no longer bound to time and geography”. Customers now, all over the world have relatively easy access to their accounts.

2.2. Empirical Review

Furst, Lang and Nolle (2000) in their found that banks in all size categories offering Internet banking were generally more profitable and tended to rely less on traditional banking activities in comparison to non-Internet banks. The authors also concluded that Internet banking was too small a factor to have affected banks’ profitability. At the same time, Onay (2008) in her research on this matter in Turkish concluded that electronic banking has a positive impact on the profits of banks. The author pointed out that internet has changed the dimensions of competition in the retail banking sector. It has also provided opportunities for emerging countries to build up their financial intermediation infrastructure in a country. Also, Siam (2006) studied the impact of electronic banking on Jordanian banks and came to a conclusion that majority of the banks are providing services on internet through their websites and his findings show that the attention is more to achieving electronic banking as satisfying and fulfilling customers’ needs. He also concluded that there should be a well-articulated strategy to achieve success and profits in the long run.

Yusuf (2016) also posited that the introduction of the central bank of Nigeria cashless policy is deemed to reduce the cost of credit which would lead to the overall improvement of the monetary policy. Adeyemo, Isiavwe, Adetula, Olamide, and Folashade, (2020) examined the Central Bank of Nigeria’s mandatory adoption of cashless and electronic payment policy’s implication on banks customers and concluded that regulators should cooperate with key stakeholders to fight against the cybercrime. They further reports that this would foster the electronic space to be more reliable. De Young,(2007) in his study examined the effect of electronic banking on the performance of banks by studying US community banks markets and compared the performance of virtual click and mortar banks with brick-and-mortar banks. The result from that study concluded that electronic banking improved the profitability of banks, hence increasing their revenues. Generally, it is worthy to note that electronic banking

is largely driven by the factors minimizing the operating costs and maximizing operating profit.

3 Methodology

The section consists of the Data and data description, method description, model specification, and preliminary results.

3.1. Data

The panel consists of ten (10) West African countries² covering the period of 2010 to 2017. The choice of West African countries is constrained by availability of data. However, the sample is a fair representation of the fifteen West African countries on the continent. The variables considered for the analyses by the study include corruption, values of transactions of digital payment platforms such as Automated Teller Machine (ATM), Point of Sales (POS), Mobile Money Transfer (MOB), and Online (ONL). Control variables such as output performance, government regime are considered as unique characteristics of the countries selected.

3.2. Data Description

Corruption: this is a variable that cannot be measured directly. Conversely, there are several indices that have been used to measure perceived, rather than actual, level of corruption in a country. This paper made use of the control of corruption index (CCI) that is published by the World Bank Worldwide Governance indicators as a measure of corruption. This is more appropriate when compared with the corruption perception index reported by Transparency International because it relates with cross-country and high time conscious (Kaufmann, Kray, & Mastruzzi, 2010). The control of corruption index ranges between +2.5 and -2.5, while the positive side represents no corruption, the negative side stands for rising corruption.

Out of all the visible digital payment channels available in recent time, the study focused on four major channels, which consists of the Automated Teller Machine (ATM), Point of Sale (POS) service, Mobile Money service (MOB), and the Online services (ONL). The choice of selecting these four channels is based on data availability for the values of transactions made for all digital payment channels. The paper further included some variables as controls basically because of their unique characteristics across selected West African countries. These variables are output performance, government regime, inflation, openness and freedom of press. Indeed, there are no broadly accepted theory of determinants of corruption that may guide the selection of these variables but the consideration were based on the peculiarities of the selected West Africa countries.

The Gross Domestic Product (GDP) per capita (PCI) was used to measure the output performance. The data was adjusted for purchasing power parity and was extracted from the World Bank World Development Indicators (WDI) database. Government regimes were measured through dummy variables and the freedom of the press index ranks countries on a scale ranging from 0-100. The lower value indicates free press and vice-versa.

² The West African Countries considered by the paper are: Benin, Burkia Faso, Cote D'Ivoire, Ghana, Guinea, Liberia, Nigeria, Senegal, Sierra Leone, Togo.

3.3. Random effects model

Seldadyo and de Haan (2006) stated that the absence of a strong theoretical framework for corruption, and lack of consensus on proper regression model for the estimation of corruption model parameters, has made several studies focused on the use of the pooled OLS regression. The study made use of the Pooled OLS regression model and further employed the random effect model for the estimation of the parameter estimates of the determinants of corruption in panel framework. Baltagi (2008), stated that there are too many parameters in the fixed effect model which might assumed to be fixed and could aggravate the issue of multicollinearity among explanatory variables, which consequently, will results in loss f degree of freedom. Based on this submission, the random effect model specification is presumed to be more superior and efficient that the fixed effects estimation techniques. Therefore, the paper considered the results of the random effect model as the benchmark to examine the impact of digital payment platforms on corruption. The model is specified as follows:

$$CCI_{i,t} = \phi_0 + \phi W'_{i,t} + \beta Z'_{i,t} + \theta_i + \varepsilon_{i,t} \quad (1)$$

Where: i is the number of countries and t is the time period. The CCI is the control of corruption index, W is a vector of digital payment platforms such as ATM, POS, MOB and ONL, respectively. Z is a vector of control variables as defined earlier. θ_i represents the unobservable time-invariant country –specific effect that is not included in the model and $\varepsilon_{i,t}$ is the error term. Both θ_i and $\varepsilon_{i,t}$ are assumed to be random in nature, independent of each other, and independent and identically distributed, $\theta_i \approx IID(0, \sigma_\theta^2)$ and $\varepsilon_i \approx IID(0, \sigma_\varepsilon^2)$. for the control variables, studies have identified a robust and consistent relationship between GDP per capita and corruption (Bardhan, 1997; and Serra, 2006).

3.4. Dynamic Panel Data Model

The paper identified additional concern that the corruption in a country may be highly persistent. Most of the previous studies that are related to cross country determinants of corruption have used lagged value of corruption to address the issue of serial correlation in corruption level (Dreher and Siemers, 2009; Lio, Liu and Ou, 2011; and Elbahnasawy, 2014). In addition, one major weakness of panel random model is that it assumes exogeneity of all explanatory variables with the random country effects. Nonetheless, the disturbances contain unobservable, time-invariant, country effects that may be correlated with explanatory variables. Dynamic panel data method allows for such endogeneity by employing the instrumental variables technique (Baltagi, 2008). The dynamic panel data model can be specified as follows:

$$CCI_{i,t} = \phi_0 + \alpha W'_{i,t} + \beta X'_{i,t} + \alpha CCI_{i,t-1} + \theta_i + \varepsilon_{i,t} \quad (2)$$

Where θ_i and $\varepsilon_{i,t}$ are assumed to be random in nature, independent of each other, and independent and identically distributed, $\theta_i \approx IID(0, \sigma_\theta^2)$ and $\varepsilon_i \approx IID(0, \sigma_\varepsilon^2)$. The Arellano and Bond (1991) generalized method of moment procedure in which the orthogonality conditions, that exist between the lagged dependent variable and the disturbances produces additional instruments was used to estimate parameters in equation (2). The GMM estimator

uses the lagged values of the endogenous explanatory variables as instruments to address the endogeneity issue (Arellano and Bond, 1991). Adopting the GMM framework of Blundell and Bond (1998), the paper applied a two-step system GMM with robust standard error proposed by Windmeijer (2005).

4. Results

4.1. Descriptive Statistics

Table 2 shows the descriptive statistics and normality tests of the explanatory variables namely: control of corruption index (CCI), corruption perception index (CPI) and risk of corruption (RoC). From the table, apart from the fact that the control of corruption index measure trend is negatively skewed, it portends a higher risk. The three measures were normally distributed as indicated by the normality test. The time dimensional estimations are reported in Table 3.

Table 2: Descriptive Statistics			
Details	Corruption Measure (CCI)	Corruption Perception Index (CPI)	Risk of Corruption (RoC, In %)
Average	-1.35	2.57	0.05
Median	-1.57	2.09	0.07
Risk	-1.09	1.54	0.085
Skewness	-1.03	1.44	0.074
Kurtosis	-2.01	4.63	0.062
Normality Test			
Jarque Bera	-2.19	2.95	0.08
Prob. Value	0.023	0.043	0.054
No. of Obs.	90	90	90

Table 3: Measures for Corruption and Time Dimensions			
Parameters	CCI_{i,t}	CPI_{i,t}	RoC_{i,t}
Sensitivity Estimate (Beta)	1.09	0.94	0.12
T-Stats	2.06	2.02	1.59
P-Value	0.039	0.063	0.12
One Period Lag			
Sensitivity Estimate (Beta)	2.14	0.87	0.14
T-Stats	2.35	1.69	1.05
P-Value	0.045	0.189	0.355

Source: Compiled by the Author. Underlying data are sourced from various Sources, such as World Bank WDI, Transparency International and Corruption Index reports. The sample period is from 2010 to 2017.

Although the risk associated to the digital payment system is much prevalent compared to the before cashless system, however the relative impact of time is much higher in the control of

corruption index (CCI) measure than other measures of corruption considered in the paper. This indicates that control of corruption index as a measure of corruption in the West African region is strongly affected by time. Meanwhile, the corruption perception index and the risk of corruption were less affected. After considering one period backward, the trend of the control of corruption index is the only measure that proves significant. This shows that the trend of the control of corruption index possesses reasonable time trend. Hence, the justification for choosing the control of corruption index as the dependent variable in further estimations considered by the paper.

4.2. Impact Assessment of Digital payment on Corruption

The characteristics of the data set were presented in Table 4. From the general review, it is obvious that, the average value of the online digital payment platform is extremely lower than averages of other variables; this is due to the unit of measurement. In order not to have an upwardly bias³ sensitivity estimates the model specification follows the double log approach. The normality test shows that all variables considered are normally distributed and therefore, necessitates the adoption of the panel least square estimation technique a proposed in the methodology.

Table 4: Descriptive Statistics

Details	CCI	FPRESS	ATM	POS	REGIME	MOBILE	ONLINE	PCI
Average	2.57	6.15	4.24	0.73	12.9	0.6	0.15	34.91
Risk	1.54	0.69	1.63	0.42	1.06	0.36	0.02	13.98
Skewness	1.44	0.58	-0.043	0.704	0.626	0.111	0.05	0.506
Kurtosis	4.63	1.94	1.72	1.93	1.78	1.61	1.45	1.75
Normality Test								
Jarque Bera	2.95	9.92	6.49	12.48	12.16	7.95	16.03	10.32
Prob.	0	0.006	0.038	0.001	0.002	0.018	0.0003	0.005
Observations	336	336	336	336	336	336	336	336

Source: Author's compilation; Estimation was performed using EViews 10 software and underlying data were extracted from Central Banks' annual reports of selected West African countries.

Table 5 shows the results of the effects of digital payment platforms on corruption. There are five models in this table. Models IA – ID are curious to examine the individual effects of the four platforms selected (ATM, POS, Mobile and Web) on control of corruption index. Model IE presents the result of the effect of a system of digital payment on corruption. The model was quite insightful as it shows the interrelations and interactions among the payment platforms and corruption. Focus of interpretation is on model IE nevertheless, comparison is made between the individual and interaction effects for consistencies.

The result indicates that operation of ATM has been deterrent to corruption level in selected West African Countries. This is evidence with the negative effects observed in both the individual and interaction models. In both models, the negativity was highly significant,

³ If a linear–linear model specification approach is adopted then, the sensitivity beta estimates will be upwardly bias, as it trends towards the average of the corruption statistics. Hence, the double-log approach was used to specify the fifteen models estimated in this section.

which implies that the restriction placed on the maximum daily withdrawal that can be made on the ATM machines has curtailed the spread of corruption in these countries. This result is in line with the findings of Goel and Mehrotra (2012) and Uchechukwu, Chubuzor, Donatus and Gloria (2017). In the work of Goel et al. (2012), financial payment instruments such as ATMs constitutes significant proportion in reducing the corruption level. While, Uchechukwu et al. (2017) reported a negative relationship between cost of building ATM locations and lists of restrictions in the use of ATMs on level of corruption. The reason they alluded to the negative relationship is that banks use ATM to gain large coverage but with the restrictions placed on the usage of this digital platform, the volume of cash transaction that can be exchanged using this medium is controlled and hence, reduces corruption.

The point of sale (POS) has an increasing effect on corruption and the exchange level of funds. An increase in the use of POS machines raises the visibility and coverage of banks. This can be seen in the individual and interaction effects, as both effects gave positive signals (see Table 5). The coefficients of the regressor in the two models (models IB & IE) were significant at 95 percent confidence levels. Intuitively, the positive effects indicate that much investment in the POS has an increasing effect on corruption through visibility of the exchange. This finding supports claims of Ene and Itah (2014), Yomere and Osazevbaru (2015) and Asekome and Akara (2018). Yomere et al (2015) that relates the use of POS to corruption through income. It founds that rising use of POS generates high income and breeds corruption. This reason was also shared by the study.

Mobile money transfer (Mobile) is another digital payment platform that was given high priority by the study. On one hand, the interaction effect shows that the advent of the mobile banking has brought positive effect on level of corruption in these countries. The implication is that mobile banking increases banking transactions performed by users and has generated increased level of corruption because it has no restriction is put on the volume of transactions that can be performed and above all, the possibility of less security needed before transaction can be completed. The coefficient was statistically reliable for policy formulation as shown by the confidence level of 95 percent. On the other hand, the individual effect was negative. The coefficient of the individual effect in this case was not significant and such estimate is not reliable. Hence, the thrust of the effect is the interaction effect. Varying impacts were observed in the literature and this buttressed our findings in both models. For instance, Ene and Itah (2014) found a negative relationship between mobile banking and level of corruption through volume and value of transactions. The result to them is as a result of the increasing number of unsuccessful transactions, which discourage individual from using the medium.

The Online (Web) medium of electronic payments has increasing effects on corruption. This is proofed, given the positive signals seen in both the individual and interaction models. The coefficients were reliable for policy formulations. Meanwhile, the online method will produce more returns to banks and fuelled corruption when use alongside all other digital payment platforms, as the coefficient of the interaction model is greater than that of the individual model. Studies with positive impact between the online platform and corruption level include (Lio, Liu, and Olu, 2011.; Ajayi, 2014 and Uchechukwu et al., 2017). Whilst studies with negative findings (Ene and Itah, 2014; Armeiy, Lipow and Webb, 2014). The reason offered by studies with negative effect is high rates of bank charges in which discourage customers to using this method. Conversely to recent studies, this study inclusive, found positive effect and suggests that this is due to reduction in the cost of operating an online banking and it also

offers a larger coverage, which brings about the possibility of making uncovered financial transactions.

Table 5: Panel Estimates of Corruption Model I (Dependent Variable: Corruption Measure, CCI)

Variable	Model IA	Model IB	Model IC	Model ID	Model IE
Constant	4.424**	-2.147	-1.927	-0.831	1.029
<i>t-stats</i>	2.049	-0.511	2.858	-2.416	2.944
<i>Prob.</i>	0.048	0.61	0.037	0.056	0.034
ATM	-6.648				-1.046
<i>t-stats</i>	-2.075				2.649
<i>Prob.</i>	0.049				0.028
PoS		2.541**			6.091
<i>t-stats</i>		3.075			2.132
<i>Prob.</i>		0.039			0.046
Mobile			-3.858		4.796
<i>t-stats</i>			-0.075		2.091
<i>Prob.</i>			0.939		0.042
Online				1.201**	4.24
<i>t-stats</i>				2.132	2.649
<i>Prob.</i>				0.042	0.039
Control Variables:					
PCI					3.356
<i>t-stats</i>					2.349
<i>Prob.</i>					0.037
FPRESS					-5.25
<i>t-stats</i>					-0.995
<i>Prob.</i>					0.291
REGIME					2.666
<i>t-stats</i>					2.305
<i>Prob.</i>					0.047
Diagnostic Tests					
R-Squared	0.181	0.116	0.138	0.187	0.228
Adjusted R	0.139	0.104	0.114	0.162	0.216
F-Statistics	20.564	17.561	10.52	18.43	35.29
Probability	0.062	0.04	0.047	0.059	0.021

Source: Author Compilation. The computation was performed through E-views 10. Underlying data set was garnered from Central Banks (CB) Annual Reports of several years. The sampled period is from 2010 to 2017.

The study also makes provisions for control variables in the interaction model (model IE). The control variables include PCI, REG and FPRESS. The results show that the use of national income and government regime have positive effects on corruption. Other diagnostic tests considered show that our models are strong, reliable and correctly specified. For

instance, R-squared and adjusted R-squared ranges between 11 percent and 22.8 percent. This shows that there are other factors that determine corruption. With 22.8 percent, it implies that the payment aspect of banking activities is quite substantial in managing corruption level in West African countries.

4.3. Robustness Checks

The study performed robustness tests on the consistency of the parameters estimated in two ways. Firstly, estimate an alternative specification by using Corruption Index reported by Transparency International as a measure of corruption and including slope dummies among the explanatory variables. Secondly, use system Generalized Method of Moments (System-GMM) as a means of further estimation as proffered in the methods. The result of the first approach is presented in Table 6, while that of the second approach is in Table 7, respectfully.

In table 6, the coefficients of ATM that serve as a measure of the effect of ATM operations on corruption have a complete sign change in the individual model but retain the negative effects in the interaction model. POS retain its positive effects in both models. Furthermore, mobile portends similar sign change with POS, as the sign retain negative and positive values in both individual and interaction models. The online method was also having positive effects in both models and the signs were retained when compared to the original models.

The results in the lower panel of table 6 represents the interaction dummies included in the model for alternative specification. The results show that even with interactions with dummy, the coefficients of the original estimates remain strong to model specification. Except for ATM that has a complete reversal in signs. The positive effect in the ATM coefficient indicates that in specific future periods increasing ATM operations will raises corruption in these countries through increase in the income of West African citizens. The dummy included in the interaction model gave a positive sign and was significant at 0.041. This confirms that the digital payment have stimulates corruption in West Africa. That is, if the banks decide to expand the coverage through digital payment option with legal and strict regulations then, these countries are expected to encounter more menace of corruption.

Table 6: Robustness through change in specification Model II (Dependent Variable: CPI)

Variable	Model IIA	Model IIB	Model IIC	Model IID	Model IIE
Constant	-6.941	-4.723	4.717	3.746	4.39
<i>t-stats</i>	2.264	-0.246	1.936	2.116	3.477
<i>Prob.</i>	0.049	0.806	0.052	0.057	0.028
ATM	2.137				-1.977
<i>t-stats</i>	5.009				-2.017
<i>Prob.</i>	0.016				0.048
PoS		1.645			2.42
<i>t-stats</i>		2.705			2.17
<i>Prob.</i>		0.402			0.04
Mobile			-7.559		1.346
<i>t-stats</i>			-0.122		-1.895
<i>Prob.</i>			0.904		0.137

Online				1.041	1.371
<i>t-stats</i>				2.072	2.082
<i>Prob.</i>				0.044	0.049
Interacting Dummies:					
DUM@ATM	1.65				
<i>t-stats</i>	2.272				
<i>Prob.</i>	0.047				
<u>DUM@POS</u>		1.283			
<i>t-stats</i>		2.545			
<i>Prob.</i>		0.045		DUM@WEB	DUM@ALL
<u>DUM@MOBILE</u>			2.035	2.027	1.344
<i>t-stats</i>			0.936	2.209	2.398
<i>Prob.</i>			0.351	0.043	0.041
Diagnostic Tests					
R-Squared	0.111	0.145	0.983	0.092	0.204
Adjusted R	0.101	0.116	0.816	0.087	0.185
F-Statistics	9.524	6.844	4.403	10.435	17.53
Probability	0.059	0.061	0.069	0.048	0.037

Source: Author Compilation. The computation was performed through E-views 10. Underlying data set was garnered from Central Bank (CB) Annual Reports for several years. The sampled period is from 2010 to 2017.

Here, the study adopted another estimation technique (i.e. system-GMM), this practice is not peculiar to this study (see Ene and Itah, 2014; Ajayi, 2014; Armey et al., 2014; and Asekome and Akara, 2018). From the result, the digital payment platforms considered in the study are consistent to change in estimation techniques, as most coefficients for the regressors retained their respective signs, except for ATM that shows a slight reversal in sign in the interaction model. This specifically pointed out that original model is reliable for policy formulation as it is consistent to changes in model specification and explanatory variables. It can be deduced intuitively that, the digital payment option that serves as one of the instrument of cashless system breeds more corruption in these countries.

Table 7: Robustness through system-GMM Model III (Dependent Variable: CCI)					
Variable	Model IIIA	Model IIIB	Model IIIC	Model IIID	Model IIIE
CCI (-1)	2.176	-7.454	4.695	-1.116	3.036
<i>t-stats</i>	2.404	-2.355	2.169	-0.621	2.188
<i>Prob.</i>	0.036	0.043	0.046	0.536	0.046
ATM	-1.345				1.159
<i>t-stats</i>	-2.752				2.289
<i>Prob.</i>	0.037				0.041
PoS		1.596			3.119
<i>t-stats</i>		2.404			2.032
<i>Prob.</i>		0.028			0.046
Mobile			1.039		1.542

<i>t-stats</i>			2.407		1.071
<i>Prob.</i>			0.042		0.287
Online				-6.406	3.043
<i>t-stats</i>				-2.404	2.189
<i>Prob.</i>				0.047	0.043
Control Variables:					
PCI					1.601
<i>t-stats</i>					2.205
<i>Prob.</i>					0.046
FPRESS					-7.175
<i>t-stats</i>					-0.439
<i>Prob.</i>					0.667
REGIME					1.981
<i>t-stats</i>					1.169
<i>Prob.</i>					0.245
Diagnostic Tests					
R-Squared	0.106	0.096	0.18	0.158	0.183
Adjusted R	0.101	0.092	0.168	0.143	0.157
F-Statistics	10.403	8.564	8.564	16.51	15.4
Probability	0.01	0.058	0.062	0.048	0.039

Source: Author Compilation. The computation was performed through Eviews 10. Underlying data set was garnered from Central Bank (CB) Annual Reports of several years. The sampled period is from 2010 to 2017.

5. Discussion and Conclusion

The inferential methodology was conducted using the panel least square approach and follows autoregressive and distributional lag modelling. The findings show that corruption level increased after the introduction of digital payment system into the financial sector. More so, the inferential results show that corruption contradict the autoregressive and distributional lag modelling frameworks. The implication of this is that, corruption in the current period does not depend on previous corruption instances; and that, governments should not to worry about the current corruption circumstances of their countries, however, what is pertinent, is to set up an appropriate regulation to curtail corruption and its attendance effects. This is central to the development of the West African States.

The study investigates the effects of digital payment platforms on corruption. To broaden the curiosity, the study identified four major digital payment platforms, which include ATM, POS, mobile money transfer and online banking. These four e-payment channels have increasing effects on corruption, as reported by several estimations. Intuitively, the results suggest that countries can reduce the effects of corruption on the economy by regulating the use of digital payment channels especially, POS, mobile money and online banking activities. The reason for this intuition is that, these channels are effective in terms of making funds transfer and have wider coverage compared to other digital payment channels in West Africa. More so, the ability of these channels to bank the unbanked populace is highly significant and more cost effective.

The study concludes on two grounds. First, governments of West African countries do not need to be concerned about the impact of previous corruption practices however, what is more protuberant is the current amount of resources available to governments to address corruption and build their current commitments. Therefore, it is important for the management of West African economies, to consider in investing appropriate regulation to guide digital payment channels identified by the paper.

Second, the average effects of all digital payment channels used by the paper continuously increase corruption levels and even, after controlling for specification and other estimation technique. The results is an indication that, one of the strategies that West African governments, especially the selected countries can adopt to reduce the menace of corruption is to regulate on the use of digital payment channels. The increasing effects of these e-payment channels subscribe to the conclusion that digital payment system has brought about more corruption I West African countries from inception.

Operational and Policy Implication

Based on the findings, the following recommendations are made for policy implications. The recommendations start from the governments and prospective investors in digital payment channels; this is followed by specific recommendations.

- i. Governments and prospective investors should concentrate on the resources (operational, financial and managerial) that is available to address the menace of corruption in the current period. Less emphasis should be placed on previous effects of corruption in these countries.
- ii. Government should examine the charges made by banks on online and mobile money payment transactions. These charges must be moderated to enable increase inclusion in the financial sector. As findings show that it is relatively high and discourages customers from using such electronic payment channels.
- iii. Governments should urgently initiate strong regulations to guide the usage of digital payment platforms to transfer large volume of financial transactions. These regulations should consider countries peculiarities.
- iv. Since mobile money transfer and online payment channels are more cost effective, the study recommends that banks should increase provision of these mediums; and monetary authorities such as the Central Banks should monitor transactions on these platforms in relation to government regulations, so as to reduce the risks associated to corrupt activities.

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