SAJE South African Journal of Economics
ESSA The Economic Society Of South Africa (Est. 1925)
South African Journal of Economics Vol. 85:4 December 2017

REMITTANCE, INSTITUTIONS AND INVESTMENT VOLATILITY INTERACTIONS: AN INTERCONTINENTAL ANALYSIS

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Abstract
Generating massive investment for growth and development has been one of the main policy goals of most economies around the globe. Countries, most especially developing ones, are highly susceptible to investment volatility owing largely to the fragile nature of their economies as well as weaknesses in terms of dysfunctional institutions. Therefore, sound economic management suggests the need to better understand possible sources for mitigating the adverse effects of investment volatility. Remittances have been identified as important capital flows which do a good job of dousing macroeconomic volatilities. It is on this basis that the study sought to uncover the causal relationship between remittances and investment volatility via the intermediating role of institutions. Using a panel of 70 countries and the system Generalized Method of Moments (GMM) estimator, three insightful outcomes come to the fore. First, remittances played countercyclical roles across the estimated regressions. Second, institutional quality had no significant role in mitigating investment volatility and lastly, the interactive terms of both remittances and institutions significantly mitigated the negative impacts of investment volatility with the exception of the political component of the institutional architecture. Policy suggestions are drawn based on our results.
JEL Classification: E2, F2, F21, F4
Keywords: Remittance, institutions, investment volatility, Generalized Method of Moments

1. INTRODUCTION

Of all foreign capital flows, remittances continue to receive a special attention owing to its beneficial impacts particularly in developing economies. In principle, these benefits are usually traced to migration motives chief among which are the notions of altruism and co-insurance. On the empirical front also, several studies have established that remittances help in smoothing consumption in the face of economic downturns[1]; act as shock absorbers in times of socio-economic crises as well as provide an insurance cover against diverse forms of uncertainties and risks[2]. In addition,

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[1] See, for example, Chami *et al.* (2005), World Bank (2006), IMF (2005), among others.
[2] Financial transfers from migrant workers are a form of insurance for developing countries against exogenous shocks (Lucas and Stark, 1985; Kapur, 2004; Lopez-Cordova and Olmedo, 2005; Rapoport and Docquier, 2005; Yang and Choi, 2007).

doi: 10.1111/saje.12162

remittances[3] have not only been widely acknowledged as the second largest source of external financing after foreign direct investment, but also the most favoured in respect of resiliency to business cycles and other socio-economic shocks (See Ratha 2003; Ratha and Mohapatra, 2007; Chami *et al.,* 2009; Bugamelli and Paternò, 2011; Raheem, 2015; for more details).

Notwithstanding, there are also dark sides to the foregoing positive narrative on the development effects of remittances. These include, but are not limited to, causing inflationary pressures[4], lowering labour force participation rate and engendering real exchange rate appreciation[5]. In this study, one key interest is examining the connection between remittances and investment volatility as hypothesised by Backus *et al.* (1992), Razin and Rose (1994) and Hirata *et al.* (2004). These authors predicted that increased cross-border capital flows enhance substitution possibilities between domestic and foreign investments, and hence, increase investment volatility. They also argued that when restrictions on cross-border capital flows are reduced, the possibilities of substituting foreign for domestic investments increase, which in turn amounts to an increase in investment volatility. There is yet another question of concern beyond the remittances-investment volatility relationship. This is related to empirically investigating the hypothesis that the nature of the core relationship between remittances and investment volatility is contingent on the institutional framework in place. For instance, sound institutions are important in providing the enabling environment for potential investors and entrepreneurs. Several studies have provided evidence in support of the desirable macroeconomic impacts of good institutions in ensuring development outcomes. For instance, Rodrik (2004) notes that institutional quality holds the key to prevailing patterns of prosperity across countries. He also argues that wealthier countries attract investors because of the presence of effective property rights and the rule of law, as well as the existence of monetary and fiscal policies that are grounded in solid macroeconomic institutions. The converse, in his view, holds in poorer countries where these arrangements are tenuous. In essence, in Rodrik's view, "institutions rule." Another study by De Soto (2000) also submits that the institutional framework is vital in guaranteeing the interests of third parties, thereby ensuring that investors' funds are not expropriated. Without the enabling environment and the security of third party interests, the incentives to invest are stymied (Brafu-Insaidoo and Biekpe, 2011). Furthermore, Roe and Siegel (2011) also argue that institutions that do not rein in corruption, secure property rights, stream-line government interventions and legal procedures work to stifle investment. Similar conclusion can be further drawn from several other studies that submit that countries characterised by poor institutions tend to be stagnated (See Acemoglu *et al.,* 2005 for a more detailed narrative).

[3] Since 1998, remittances – at least through official channels – have been second only to FDI flows, but several times larger than other private capital inflows and official aid (IMF, 2005; World Bank, 2006; Chami *et al.,* 2008).

[4] Some authors have argued that remittances hinders economic growth by simultaneously increasing the price of domestic goods and reducing the competitiveness of exports – a phenomenon known as the Dutch disease – (Bourdet and Falck 2006; Acosta *et al.,* 2009).

[5] Remittances may equally be harmful to the long-run growth of recipient economies through an appreciation of the real exchange rate, which tends to be detrimental to the traditional tradable sector which is purported to lose competitiveness via a combination of spending and resource movement effects (Amuedo-Dorantes and Pozo, 2006; Acosta *et al.,* 2009).

A large body of empirical studies exist on the association between remittances and several other economic variables like economic growth (Chami *et al.*, 2003; IMF, 2005; Barajas *et al.,* 2009), poverty and income inequality and welfare issues (Adams and Page, 2005; Brown and Jimenez, 2008), investment (Glytsos, 2002; Léon-Ledesma and Piracha, 2004; Lucas, 2005), output growth volatility (Spatafora, 2005; Chami *et al.,* 2009; Bugamelli and Paternò, 2011; Ebeke and Combes, 2013; Ajide *et al.,* 2015), real exchange rate (Amuedo-Dorantes and Pozo, 2006), financial development (Aggarwal *et al.*, 2011; Demirgüç-Kunt *et al.*, 2011; Raheem, 2015; Ajide *et al.*, 2016), institutional quality (Catrinescu *et al.,* 2009; Abdih *et al.,* 2012), human capital (Hildebrandt and McKenzie, 2005; Lopez-Cordova, 2006; Acosta *et al.*, 2008). All these notwithstanding, the particular strand that examines this relationship with respect to investment volatility is at best emerging. Investment is one of the key ingredients of economic progress thus it is required for the path of growth to be easily tracked. However, the prevailing uncertainties and risks in the socio-economic and political landscape in the developing world which often engenders wide gyrations in investment behaviour raises the pertinent issue of the role of remittances flows in moderating any adverse impacts. Thus, a deeper understanding is imperative both on the mechanisms through which remittances can mitigate investment volatility on one hand and how the interaction of remittances with institutional quality influences the outcomes on the other hand. Put together, these amply offer compelling rationale for undertaking this study.

Another interesting aspect of this study, unlike extant counterparts[6], is the use of a large dataset from a panel of seventy (70) countries drawn across various continents. The import of using a large dataset is that it will allow for more generalizable and valid conclusions. Further, the study represents a pioneer attempt at examining the relationship between remittances and investment volatility via institutional framework.[7] This perspective is quite important as the thick line of distinction between the developed and developing countries are famously drawn in terms of the nature of institutional arrangements. While the former is viewed as well adorned with good institutional environments, the latter on the other hand are typified as bereft of quality institutions.

To this end, the study has the broad objective of examining the role of institutions in the remittance-investment volatility relationship using a panel of 70 developing countries. For the objective to be properly tracked, the following specific objectives are pursued: *(i)* quantifying the impact of remittances on investment volatility *(ii)* estimating the institutional impacts on investment volatility and, *(iii)* situating quantitatively the role of institutions on the remittance-investment volatility nexus.

The structure of the remainder of this paper is straightforward. Section two provides a concise review of the literature while Section three covers data and model specification

[6] We, however, acknowledge the rather similar contributions of Craigwell *et al.* (2009, 2010). Specifically, Craigwell *et al.* (2009) found that remittance flows have a stabilising influence on output and investment volatility. In a latter paper, using a panel data on 95 developing countries, Craigwell *et al.* (2010) also reported that remittances play a key role in mitigating the effect of adverse output shocks but exert no significant influence on consumption and investment volatility. Nonetheless, our study goes some more distance by crafting a role for institutions in the remittances-investment volatility nexus. This is the prime contribution of this study.

[7] It is noteworthy to state that footnote 6 offers insights into the distinctiveness of the present study which, as far as we know, supports its pioneering status.

issues. The empirical results are presented and discussed in Section four. The fifth and final section provides brief concluding remarks.

2. BRIEF LITERATURE REVIEW

This abridged section undertakes two important tasks. First, a discussion of the theoretical linkage between remittance and investment volatility is offered. Second, the empirical counterpart of the foregoing narrative is equally documented. To begin with, theoretically, the capacity of migrants' remittances to act counter-cyclically or pro-cyclically has been argued to depend on the motive for which the remittance is sent. For instance, if the motive is predominantly altruistic then remittances may act counter-cyclically as automatic stabilisers through their cushioning effects on aggregate fluctuations (Bugamelli and Paterno, 2009; Chami *et al.,* 2009). In similar fashion, this conventional wisdom also posits that remittances should move counter-cyclically with output fluctuations so as to compensate for the lost income of family members owing to economic downturn back home (Balli and Rana, 2015). This insurance role allows households to smooth negative income and consumption shocks (see, Combes and Ebeke, 2011; Bugamelli and Paterno, 2009; and Craigwell *et al.,* 2010; among others for detailed expositions). However, this macroeconomic volatility stabilising role of remittances has been argued to depend on the nature of the co-movements between business cycles in the home countries of migrants and the flow of remittances (Jidoud, 2015).

The flip side argument is that the perception regarding the counter-cyclicality of remittances fails to hold in situations where the sending of remittances is viewed as a portfolio decision. In the event of this, the prediction of the theory is that remittances display pro-cyclicality. Hence, the flow of remittances is observed to be higher when macroeconomic performance and prospects are favourable in migrants' home countries. This notwithstanding, there is also the accompanying argument that if remittances are used to finance investments, they could fuel macroeconomic instability through this channel. This argument is premised on the notion that pro-cyclical patterns of remittances may further exacerbate macroeconomic fluctuations through transmission of shocks from remittance-sending to remittance-recipient economies.

The related empirical counterpart commences with the work of Combes and Ebeke (2011) that analyses the impact of remittances on household consumption instability on a panel of developing countries using a dynamic panel model and the System-GMM estimator. In their results, four main outcomes are discernable: first, remittances are found to significantly reduce household consumption instability; second, remittances are found to play an insurance role by dampening the effects of various sources of consumption instability like natural disasters, agricultural shocks, discretionary fiscal policy, systemic financial and banking crises as well as exchange rate instability; third, this stabilising role seemed stronger in less financially developed countries, and lastly, some indication of threshold effects was uncovered since the overall stabilising effect of remittances is mitigated when remittances exceed 6% of GDP. Using a sample of 70 countries including 16 advanced economies and 54 developing countries, Chami *et al.* (2009), also estimate the impact of remittances on output growth volatility. Their results using Generalized Method of Moments (GMM) provide robust evidence that remittances have a negative effect on the output growth volatility of recipient countries, thus supporting the notion that remittance flows are a stabilising influence on output.

More recently, Jidoud (2015) employs two main approaches (both theoretical model and empirical analysis) at investigating the channels through which remittances affect macroeconomic volatility on a sample of 27 African countries using a dynamic stochastic general equilibrium (DSGE) model augmented with financial frictions. His empirical results show that remittances exert a significant smoothing impact on output volatility but with a smaller impact of consumption volatility. The theoretical side of his results also revealed that the stabilising impact of remittances hinges on two main channels: first, the size of the negative wealth effect on labour supply induced by remittances and, second, the strength of financial frictions and the ability of remittances to alleviate these frictions.

Similar in spirit to the present enquiry is the study by Brafu-Insaidoo and Biekpe (2011). They examine the impact of foreign capital flows on investment volatility in both emerging and frontier market economies in Sub-Saharan Africa over the period 1975–2009. Employing a dynamic panel regression analysis, their results fail to accept the hypothesis that foreign capital worsens investment volatility. Rather, foreign direct investment and foreign debt inflows reduce investment volatility in these emerging and frontier market economies. The importance of variables like stability in the domestic financial markets, inflation volatility and the political climate were equally identified. Also, related empirical enquiries include studies like Razin and Rose (1994), Hirata *et al.* (2004), Grenade (2004) and Denizer *et al.* (2000) all of which fail to offer conclusive evidence on the relationship between international capital flows and investment volatility.

3. DATA AND MODEL SPECIFICATION

This section is bifurcated. The first part relates to data issues, where scope of the study and data sources is addressed. The second portion details on model specification and methodology-related issues.

3.1 Data

The dataset for this study covers 70 countries.[8] The choice of these countries is premised on the fact that they are considered to be remittances-recipient countries with available data. Also, worthy of note is the fact that the selected countries have been able to attract some level of investments into their economies. The data spans the period from 1996 to 2013. The choice of this period is also based on data availability. Our two main data sources are World Governance Indicators (WGI), for institutional data; and World Development Indicators (WDI) for data on the macroeconomic variables. Complimentary data was also sourced from two additional sources. We sourced for data on natural disasters from Center for Research on the Epidemiology of Disasters (CenRED), while Untited Nations on Trade and Development (UNCTAD) provided information on our real effective exchange rate index. To reiterate, the three key variables in our model are: remittances, institutions and investment volatility. We therefore turn next to succinct descriptions of these variables.

Investment volatility is here measured as the deviation of the growth rate of Gross Fixed Capital Formation trend from its natural trend. The standard volatility literature

[8] The list of countries under investigation as well as the date description are presented in the Appendix section.

has identified three potential approaches to measuring volatility namely standard deviation, Hodrick-Prescott filter trend and Generalized Autoregressive Conditional Heteroskedasticity (GARCH). The first two approaches are adopted for this study. The reason for dropping the last approach, GARCH, is due to the panel nature of our dataset. GARCH family is adjudged more suited for data with time series dimension. Also to note is that personal remittances are defined independently of the source of income of the sending household, the relationship between the households, and the purpose for which the transfer is made.

As regards institutions, we adopt the definition of the World Bank as it describes the data in its World Governance Indicators (WGI). This data source has been widely deployed in the literature on a variety of empirical subjects. The WGI project constructs aggregate indicators of six broad dimensions of governance: *Voice and Accountability* (VA) which captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. *Political Stability and Absence of Violence* (PS) that measures the perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional or violent means, including domestic violence and terrorism. *Government Effectiveness* (GE) captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. *Regulatory Quality* (RQ) captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. *Rule of Law* (RL) captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. *Control of Corruption* (CC) captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. These indices range between -2.5 and 2.5 implying worst and best institutional quality, respectively.

3.2 Model Specification

This study captures three separate strands of the literature. The first examines external financial flows (See Prasad *et al.,* 2003; Raheem and Ogebe, 2014; Raheem and Adeniyi, 2015). The second strand relates to determinants of investment (Backus *et al.,* 1992; Razin and Rose, 1994; Hirata *et al.,* 2004), while the last strand centres on volatility related issues (See Ramey and Ramey, 1995; Chami *et al.,* 2005; Ajide *et al.*, 2015 for more details).

Given the studies above, the baseline regression of the study is in the form stated below:

$$SINV_{it} = CONS + \propto_0 SINV_{it-1} + \propto_1 REM_{it} + \propto_2 INST_{it} + \propto_3 (REM * INST)_{it} + \propto_4 X'_{it} + \delta_i + \rho_t + \varepsilon_{it} \quad (1)$$

Where *SINV* represents the measure of investment volatility as previously explained. *REM* is the ratio of remittances to *GDP*; *INST* stands for measures of institutions as

elaborated earlier and X' is a vector of control variables that have been identified in the literature to be determinants of investment. These conditioning variables are dichotomised. The variables in the first group includes traditional correlates such as GDP (growth rate of GDP per capita), INF (Inflation- log of Consumer Price Index), OPEN (Trade Openness – measured as a ratio of GDP) and CRED (Private Sector Credit measured as a ratio of GDP). The second group comprises two proxies for shocks: REER-real exchange rate instability (standard deviation of the real effective exchange rate index growth rate); and NAT-natural disaster[9] (cost of total damage as a ratio of GDP)[10]. The reason for the inclusion of the second group is the idea that the stabilising effects of remittances may depend on exogenous shocks. CONS is the intercept term in the model, while δ *and* ρ measure the country and time specific fixed effects, respectively. The former is used to measure time invariant heterogeneity while the latter is used to solve the problem of common shocks in the model.

The model above is expected to suffer from endogeneity related issues such as reverse causality between investment volatility and some of the explanatory variables; measurement errors (for instance, measuring the volatility of investment flow is not without its problems) and omitted variable bias based on the intuition that it is practically impossible to estimate all the potential determinants in a single model. To this end and to take account of these problems, the System Generalized Method of Moments (SGMM) of Arellano and Bond (1991) and Arellano and Bover (1995) were employed. Also, in an attempt to account for heteroscedasticity in the residuals generated, we used two-step GMM. Despite the advantages of SGMM, it faces a common problem of instrument(s) identification. The literature has identified two possible types of instruments namely internal and external. In the case of the former, the use of lagged differences and lagged levels of the explanatory variables is often recommended and was also adopted in this study, while in the latter case it is difficult to identify, due to the stringent conditions requisite for the validity of such instruments. Nonetheless, we follow a similar approach to extant studies that have used the ratio of remittances to GDP for all other recipient countries and/or the log-weighted GDP per capita for each of the migrant host countries as external instruments (See for example Chami *et al.,* 2009; Combes and Ebeke, 2011).

[9] Data on natural disaster were obtained from CenRED. Aside from providing data on natural disaster related occurrences, CenRED also publishes data related to complex and technological disaster. Natural disaster is classified into five types and each classification is further sub-classified. This classification includes climatological disasters (disasters caused due to long run or seasonal climatic variability such as extreme temperatures, drought and wild fire); geophysical disasters (earthquakes, tsunamis and volcanic eruptions) and meteorological disasters (tornado, lighting, floods, hail, wave surges, storms/blizzards droughts, mudslides and avalanches). These data are publicly available at www.cred.be

[10] Other plausible proxies that could have been used are number of deaths recorded as a fraction of the total population in the year preceding the disaster (Combes and Ebeke, 2010), number of injured citizens, number of homeless people and number of disaster occurrences. The choice of our proxy is due to the ease of data availability. It is noteworthy to state that the choice of this proxy should have little or no effect on the reported results.

3.3 A Priori *Expectations*

In terms of *a priori* expectations, REM is expected to exert negative impact on investment volatility hence it is said to be countercyclical in nature. Institutions are also expected to mitigate the adverse effects of investment volatility. Hence, a negative relationship is hypothesised. A negative relationship is hypothesised between GDP per capita and investment volatility. For instance, Dasgupta and Ratha (2000) and Hernandez *et al*. (2001) contend that a fast-growing economy is likely to create a congenial environment for higher future earnings and hence higher rates of returns, in addition reduce risk of investments. Inflation, which measures the extent of macroeconomic instability, serves to exacerbate investment volatility. Thus, a positive sign is expected in such relationship. Agosin and Mayer (2000) and Grenade (2004), indicate that high and volatile inflation increases the uncertainty of investments and heightens risk of long-term investments. Also, a greater degree of openness is expected to dampen investment volatility suggesting a negative relationship. Lastly, credit to the private sector is hypothesised to reduce investment volatility. Denizer *et al*. (2002) and Easterly *et al*. (2001) identified deeper financial markets as a veritable tool for lowering macroeconomic volatility.

4. EMPIRICAL RESULTS

The starting point of this empirical segment is the presentation of the cross-sectional analysis of the key variables in the model. The result of this analysis is presented in Table 1 below. Three major interesting scenarios sprung up. *(i)* Countries with low investment

Table 1. Investment volatility, institution and remittances, 1996-2012

Country	Investment volatility (std. deviation of growth rate of gross fixed capital formation)	Workers' remittances to GDP averages 1996-2012	Institution average 1996-2012
Algeria	5.02	1.11	−1.14
Argentina	2.89	0.11	−0.57
Australia	1.70	0.31	1.14
Austria	1.37	0.74	1.15
Bangladesh	1.78	7.29	−1.19
Belgium	0.82	1.91	0.90
Bolivia	2.89	3.27	−0.81
Brazil	1.24	0.27	−0.34
Cameroun	2.25	0.52	−1.17
Colombia	3.37	1.75	−0.78
Congo Rep.	3.35	0.23	−1.39
Costa Rica	1.69	1.47	0.19
Cote D'Ivoire	2.08	1.20	−1.35
Denmark	1.48	0.40	1.37
Ecuador	3.74	4.56	−1.02
Egypt	2.14	4.76	−0.86
El Salvador	1.12	14.92	−0.54
Finland	0.86	0.32	1.39
France	1.19	0.65	0.58
Gabon	6.52	0.11	−0.80
Gambia	7.70	11.12	−0.77
Germany	1.66	0.28	1.03
Ghana	3.51	0.55	−0.37
Greece	3.83	1.05	0.20
Guatemala	2.09	7.90	−0.92
Guyana	3.24	10.99	−0.58
Honduras	3.44	12.90	−0.91

Table 1. Continued

Country	Investment volatility (std. deviation of growth rate of gross fixed capital formation)	Workers' remittances to GDP averages 1996-2012	Institution average 1996-2012
Hong Kong	3.82	1.98	0.92
Hungary	1.96	1.15	0.47
Iceland	6.14	0.57	1.17
India	3.80	3.00	−0.59
Indonesia	4.94	0.93	−0.89
Iran	1.18	0.47	−0.98
Ireland	5.24	0.28	1.05
Israel	2.08	0.36	0.20
Italy	1.18	0.211	0.25
Jamaica	3.43	13.50	−0.36
Jordan	3.36	18.62	−0.37
Kenya	1.86	2.90	−1.00
Latvia	5.00	1.66	0.20
Luxemburg	1.75	3.18	1.06
Malawi	5.57	0.37	−0.69
Mali	3.21	4.47	−0.69
Mexico	1.70	1.91	−0.47
Morocco	3.91	6.97	−0.61
Netherland	1.94	0.28	1.01
New Zealand	1.61	0.92	1.07
Niger	10.69	1.52	−0.84
Norway	2.03	0.17	1.23
Pakistan	1.67	3.89	−1.28
Panama	3.60	0.83	−0.27
Papua New Guinea	3.01	0.17	−0.97
Paraguay	1.57	2.74	−1.03
Peru	3.40	1.59	−0.64
Philippines	1.57	10.37	−0.65
Portugal	3.81	2.16	0.68
Senegal	1.98	7.87	−0.56
Sierra Leone	9.89	1.60	−1.62
South Africa	2.39	0.25	−0.04
South Korea	1.63	0.74	0.31
Spain	3.87	0.69	0.56
Sri Lanka	2.68	7.70	−0.66
Sudan	5.06	3.64	−1.78
Sweden	1.12	0.17	1.30
Switzerland	1.02	0.48	1.27
Thailand	5.22	1.06	−0.44
Togo	1.65	7.43	−1.20
Trinidad and Tobago	7.01	0.57	−0.16
Tunisia	1.30	4.20	−0.44
Turkey	2.80	0.77	−0.44
Average	**3.08**	**3.28**	**–0.22**
Median	**2.54**	**1.23**	**–0.47**

Source: Authors' computation.

volatility (e.g. Belgium, Finland, Italy, Switzerland, and Sweden) tend to have high institutional quality and vice versa (e.g. Gambia, Malawi, Niger and Sierra Leone). *(ii)* High remittance-recipients' countries also displayed highly unstable investment flows (e.g. Gambia, Guyana, Honduras, Jamaica and Jordan). *(iii)* Finally, it appears that with remittances accompanied by improved institutional quality, volatility of investment is dampened (e.g. El-Salvador, Senegal, Philippines). In sum, the broader cross-sectional picture is that remittances, institutional quality, as well as their combinations somewhat reduce the volatility of investment.

As a necessary next step, the descriptive statistics of the model is presented in Table 2. The mean value of growth of SINV is 2.104. Also, the average values of other key variables of interest, viz: workers' remittances and institutions are 3.28

Table 2. Descriptive statistics

Variable	Mean	Standard Deviation	Min	Max
SINV	2.104	1.873	0.462	9.394
GDP	3.398	3.480	−17.954	26.268
VA	−0.107	1.031	−1.883	1.826
PS	−0.397	0.982	−2.812	1.826
GS	−0.082	1.112	−1.604	2.357
RQ	−0.096	1.202	−1.730	1.996
RL	−0.186	1.084	−1.633	1.999
CC	−0.152	1.162	−1.507	2.553
AGG	−0.237	1.284	−1.683	2.093
REM	3.281	4.459	0.108	18.617
OPEN	83.828	54.763	14.932	458.33
PCRE	59.081	51.401	1.616	319.46
INF	6.099	9.017	−4.479	132.823
REER	136.723	95.364	45.787	824.637
NAT	1.354	10.462	0	17.384

Source: Authors' Computation.

and −0.22,[11] respectively. In addition, it is instructive to mention that on an individual basis, the performance of institutional indices is quite below the average. The most volatile series in the model are trade openness and credit to the private sector. Remittances and GDP growth are fairly stable and have increasing trend, judging by their low standard deviation values and positive mean values, respectively.

The estimates of the System-GMM regressions are presented in Table 3. The dampening influence of remittances on investment volatility is established across all regressions with the exception of the model that controls for political component of governance. One plausible explanation for this finding is not unconnected with the altruistic nature of remittances, which usually lead to increased inflows during periods of adverse shocks such as droughts, civil war, famine and so forth. These effects are equally found to be statistically significant at the conventional 5% level[12]. This result is similar to the results of Craigwell *et al.* (2010) and Brafu-Insaidoo and Biekpe (2011). This outcome further lends credence to the oft-touted counter-cyclical role of remittances. On the flip side, however, this finding runs against the submission of the influential papers by Backus *et al.* (1992), Razin and Rose (1994) and Hirata *et al.* (2004). These authors hypothesised that increased cross-border capital flows enhance substitution possibilities between domestic and foreign investments, and hence, increase investment volatility. The discrepancies between these two sets of results might have stemmed from the type and nature of foreign capital flows considered. While our study examined remittances on the one hand, their papers focused on foreign direct investment on the other hand.

For the second hypothesis, it is startling to note that institutions have no significant effect on investment volatility as the results on Table 3 indicate. In fact, each dimension of governance exerts no significant influence on investment volatility. The positive signs on the coefficients of each governance dimension are nonetheless suggestive of the magnifying roles that institutions exert on investment volatility. This outcome seems

[11] Using principal component analysis (PCA), we find the average (AGG) of the six indices of institutions. The PCA helps to solve the problem of irrelevant information by minimising the influence of high correlation between the indices of governance on the empirical results.

[12] Although, the model that includes the political component of institutions is not statistically significant.

Table 3. Empirical estimates of remittance-investment volatility

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
$SINV_{t-1}$	0.102	0.223	0.392	0.201***	0.174	0.358	0.103	0.293
	(0.284)	(0.156)	(0.282)	(0.083)	(0.153)	(0.241)	(0.087)	(0.183)
GDP	0.107**	−0.013	−0.193	0.045	0.103	0.122**	0.173	0.273***
	(0.032)	(0.073)	(0.160)	(0.093)	(0.059)	(0.059)	(0.197)	(0.125)
CRED	−0.213*	−0.198*	−0.126*	−0.283*	−0.058***	−0.124**	−0.156**	−0.148**
	(0.013)	(0.029)	(0.025)	(0.001)	(0.020)	(0.001)	(0.061)	(0.056)
INF	0.035	0.182	0.193	0.082**	0.172**	0.082***	0.183	0.201
	(0.022)	(0.141)	(0.147)	(0.035)	(0.061)	(0.032)	(0.141)	(0.120)
OPEN	0.314*	0.148*	0.281**	0.290*	0.114*	0.176**	0.163*	0.318*
	(0.072)	(0.063)	(0.121)	(0.071)	(0.048)	(0.063)	(0.036)	(0.076)
REM	−0.174*	−0.203*	−0.313**	−0.228*	−0.219*	−0.2938*	−0.143*	−0.203**
	(0.006)	(0.012)	(0.099)	(0.059)	(0.049)	(0.127)	(0.020)	(0.078)
REER	0.322**	0.044*	0.048**	0.018**	0.078**	0.047*	0.058***	0.038*
	(0.084)	(0.011)	(0.019)	(0.005)	(0.032)	(0.006)	(0.022)	(0.004)
NAT	−0.385	0.054	0.399**	0.059	0.100	−0.234	0.112	−0.284
	(0.201)	(0.055)	(0.129)	(0.106)	(0.091)	(0.334)	(0.100)	(0.216)
RQ		0.362						
		(0.234)						
REM*RQ		−0.314**						
		(0.125)						
RL			0.517					
			(0.472)					
REM*RL			−0.362**					
			(0.103)					
CC				0.583				
				(0.392)				
REM*CC				−0.356**				
				(0.103)				
VA					0.928			
					(0.633)			
REM*VA					−0.198*			
					(0.022)			
GE						0.377		
						(0.301)		
REM*GE						−0.452***		
						(0.193)		
PS							0.422	
							(0.309)	
REM*PS							−0.283	
							(0.193)	
AGG								0.483
								(0.394)
REM*AGG								−0.420**
								(0.183)
R^2	0.492	0.364	0.482	0.627	0.591	0.398	0.453	0.573
Hansen test (p-value)	0.683	0.789	0.728	0.394	0.597	0.472	0.692	0.682
AR(2) test p-value	0.838	0.939	0.820	0.273	0.290	0.384	0.463	0.482
Wald	12.932**	13.256**	11.537**	14.688**	12.833**	11.980**	7.292	13.948**
No of instruments	15	17	16	16	16	17	16	17
No of countries	70	68	68	68	70	70	70	65

Source: Authors' computation.
Note: *, **, *** indicate the level of statistical significant at 1%, 5% and 10%, in that order.

consistent with the widely acknowledged dysfunctional institutional environments especially commonplace in developing nations. Notwithstanding, this coefficient is insignificant in a statistical sense in Table 3.

In an attempt to test the third hypothesis, remittances are interacted with institutional variables. This was done in order to examine if there is a joint effect of these variables on investment volatility. The coefficients of these interaction terms across the estimated models yielded negative signs and are mostly significant at the 5% level with the exception of political stability, which carries a positive sign. The implication is precisely that while other governance dimensions appear to dampen investment volatility on one hand,

Table 4. Robustness check (three-years non-overlapping average)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
$SINV_{t-1}$	0.341	0.182**	0.067*	0.293	0.283	0.187	0.098**	0.437
	(0.293)	(0.045)	(0.002)	(0.177)	(0.204)	(0.100)	(0.038)	(0.384)
GDP	−0.148	−0.100	−0.098	−0.177	−0.392	−0.726	−0.146	−0.193***
	(0.098)	(0.301)	(0.092)	(0.154)	(0.683)	(0.329)	(0.392)	(0.079)
CRED	−0.453***	−0.087*	−0.168**	−0.385**	−0.198*	−0.085**	−0.075**	−0.384**
	(0.219)	(0.000)	(0.075)	(0.140)	(0.017)	(0.034)	(0.007)	(0.102)
INF	0.056**	0.156**	0.184**	0.203**	0.100***	0.045	0.130*	0.384
	(0.022)	(0.035)	(0.063)	(0.068)	(0.050)	(0.040)	(0.021)	(0.193)
OPEN	0.130*	0.152*	0.180*	0.170**	0.103**	0.155**	0.156*	0.153**
	(0.042)	(0.034)	(0.043)	(0.045)	(0.044)	(0.059)	(0.035)	(0.067)
REM	−0.173*	−0.384**	−0.537**	−0.673*	−0.374*	−0.423*	−0.327	−0.485**
	(0.032)	(0.133)	(0.156)	(0.224)	(0.157)	(0.098)	(0.467)	(0.079)
REER	0.362**	0.021*	0.037**	0.023*	0.056**	0.033*	0.048**	0.047*
	(0.102)	(0.001)	(0.010)	(0.005)	(0.019)	(0.007)	(0.016)	(0.002)
NAT	−0.238	0.039	0.347***	−0.138	0.029*	0.294	−0.174	−0.203
	(0.193)	(0.045)	(0.139)	(0.076)	(0.001)	(0.201)	(0.093)	(0.153)
RQ		0.654						
		(0.859)						
REM*RQ		−0.312**						
		(0.099)						
RL			0.799					
			(0.598)					
REM*RL			−0.492*					
			(0.093)					
CC				0.985				
				(0.733)				
REM*CC				−0.385**				
				(0.175)				
VA					1.033			
					(0.924)			
REM*VA					−0.463*			
					(0.045)			
GE						1.099		
						(0.794)		
REM*GE						−0.294**		
						(0.136)		
PS							1.104	
							(0.899)	
REM*PS							−0.344	
							(0.258)	
AGG								1.002***
								(0.485)
REM*AGG								−0.249*
								(0.074)
R^2	0.745	0.453	0.364	0.533	0.456	0.577	0.433	0.463
Hansen test (P-value)	0.699	0.743	0.395	0.439	0.848	0.694	0.468	0.464
AR(2) test p-value	0.578	0.465	0.693	0.390	0.530	0.559	0.459	0.736
Wald	12.103**	13.112**	15.328**	14.378**	13.059**	10.833**	6.435	13.384**
No of Instruments	15	17	16	16	16	17	16	17
No of Countries	70	68	68	68	70	70	70	65

Source: Authors' computation.
Note: *, **, *** indicate the level of statistical significant at 1%, 5% and 10%, in that order.

political stability seems to magnify investment volatility on the other hand. This outcome could be attributed in part to the prevalence of political strife that has characterised some nations, militant insurgency such as the Iraq and Syria Islamic State in the middle east; the Arab Spring in the northern Africa, to mention a few. This impact remains albeit insignificant statistically.

As regards the other conditioning variables, it was found that CRED, OPEN and INF produced results in line with our *a priori* expectations. The importance of financial development in mitigating the adverse effect of investment volatility has again been established in this paper. Also, macroeconomic instability, proxied by inflation, makes

investors uncertain about macroeconomic prospects within economies. In macroeconomic literature, among the most volatile variables is trade openness. Intuitively, a volatile series such as OPEN will tend to magnify the volatility of another already volatile series, like investment.

Further to these findings, we included proxies for common shocks. The first proxy captures the competitiveness among countries. The higher the volatility of the real exchange rate index, the higher would be the level of skepticism of investors. The results showed that there is a positive relationship between volatility of investment and growth of exchange rate index. However, in the case of natural disaster we are unable to infer a definite relationship with investment.

For our post estimation exercise we conducted an assortment of formal tests. These include Arellano and Bond test for autocorrelation, Sargan test for over-identifying restrictions and Wald Statistics for joint significance. Results of the autocorrelation test show the absence of autocorrelation in the models. The Sagan test results show that the instruments are not over-identified and are not correlated with the error term. This reinforces our conviction about their validity. For the Wald test, it can be concluded that the variables in the model are jointly significant.

Two robustness tests were conducted. First, the HP filtered trend was used to extract an alternative measure of investment volatility. The second robustness check relates to using three-year non-overlapping intervals. The results of these two exercises are quite similar to the results presented earlier on Table 3. The results of the three-year non-overlapping interval estimations are presented in Table 4. However, due to want of space, we refrain from presenting the results of the HP filter trend. We surmise that there is hardly a doubt that this comes at virtually no cost in terms of information loss.

5. CONCLUSION

The study examined the stabilising roles of remittances and institutions on investment volatility in a panel consisting of seventy (70) remittance-recipients' countries while employing a System-GMM estimation technique. In all, three hypotheses were tested and at least three insightful outcomes emanated as follows: First, remittances were found to have had a stabilising effect on investment volatility; second, the converse to the previous result held for the institutions-investment volatility nexus. With other words, institutions played a less pronounced influence on investment volatility. Lastly, the interaction between remittances and institutions equally had dampening effects on investment volatility across regressions.

An implication emanating from these results is for policymakers to formulate policies that foster the continued inflow of remittances. Further to this, the possibility of attracting other types of foreign capital flows should also be explored. It could be the case that if financial gaps are bridged, investment levels might be more stable. Even though, institutions do not have the expected direct effect on investment volatility, the indirect transmission mechanism through remittances cannot be ignored. To this end, policies should be geared towards improving the institutional framework of remittance-recipients' countries. It is important to also note that policies designed to increase remittances flows should go hand-in-hand with polices that aim to improve institutional quality. Quite importantly too, policymakers need to give the overall macroeconomic environment the requisite attention.

Forging ahead, in terms of future research, an area that appears promising is to enquire the impact of other types of external flows such as developmental aid and FDI on investment volatility. Put alternatively, the effect of financial integration on investment volatility should be examined. Also, future studies could examine the effect(s) of capital market-based measures of financial development on the remittances-investment volatility relationship. Since some regions are more prone to shocks, such as natural and agricultural related, more than the others, it would be promising to see region specific studies along this line of enquiry. Lastly, a more recent strand of the remittances literature has argued that the influence of remittances on macroeconomic indicators could be non-linear. It would be interesting for future studies to pursue the possibility of the existence of such threshold effect of remittances.

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APPENDIX A1: DATA DESCRIPTION

Name	Source	Description
Remittances	WDI	Personal remittances comprise personal transfers and compensation of employees. Data are the sum of two items defined in the sixth edition of the IMF's Balance of Payments Manual: personal transfers and compensation of employees.
Institutions	WGI	Institutions based on the definition of World Bank is decomposed into Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption.
Investment	WDI	Gross fixed capital formation includes expenditure on land improvements; plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.
GDP per capita growth	WDI	Annual percentage growth rate of GDP per capita based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP per capita is gross domestic product divided by midyear population
Inflation	WDI	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.
Trade openness	WDI	Trade Openness is the sum of exports and imports of goods and services measured as a share of gross domestic product.
Financial development	WDI	Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment. Examples of other financial corporations are finance and leasing companies, moneylenders, insurance corporations, pension funds, and foreign exchange companies.
Real exchange rate shock	UNCTAD	Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs.
Natural disaster	CenRED	This is the total cost incurred as a fall out of damages that occurred as a result of natural disasters.

Note: WDI is World Development Index; WGI is World Governance Index; UNCTAD is the United Nation Conference of Trade and Development; CenRED is the Center for Research on the Epidemiology of Disasters.

APPENDIX A2: LIST OF COUNTRIES

Algeria	Finland	Paraguay	Philippines
Argentina	France	Jamaica	Portugal
Australia	Gabon	Jordan	Senegal
Austria	Gambia	Kenya	Sierra Leone
Bangladesh	Germany	Latvia	South Africa
Belgium	Ghana	Luxemburg	South Korea
Bolivia	Greece	Malawi	Spain
Brazil	Guatemala	Mali	Sri Lanka
Cameroun	Guyana	Mexico	Sudan
Colombia	Honduras	Morocco	Sweden
Congo Rep.	Hong Kong	Netherland	Switzerland
Costa Rica	Hungary	New Zealand	Thailand
Cote D'Ivoire	Iceland	Niger	Togo
Denmark	India	Norway	Trinidad and Tobago
Ecuador	Indonesia	Pakistan	Tunisia
Egypt	Iran	Papua New Guinea	Turkey
El Salvador	Ireland	Panama	
Israel	Italy	Peru	