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Examining the sustainable development approach of migrants' remittances and financial development in sub-Saharan African countries

Abstract

In achieving a desirable sustainable economic growth in developing countries, the role of financial development and international migrant remittances cannot be underplayed. This study attempts to investigate the dynamic interactions between the migrant remittances and the financial sector development from a multidimensional perspective in 22 Sub-Sahara African countries using a Panel vector autoregression (VAR) model over the period 2004 to 2017. Specifically, the study focuses on the multi-dimensions of financial development including financial depth, financial access, and financial efficiency in financial institutions (FI) and their relationship with the remittances. The findings suggest that: First, the migrant's remittances are detrimental for the overall financial institutions while the financial institutions are found to positively influence the remittances inflows. Second, the relationship between the remittances and the financial institutions varies with the dimensions of financial institutions. There is a positive dynamic interaction between the remittances, the financial efficiency and financial access, except for the financial depth. The analysis in this investigation offers relevant policy directives especially on the role of remittances in building stable financial institutions of the sub-Saharan African economies and other developing states.

Keywords: Remittances; Financial depth; Financial access; Financial efficiency; Sustainable development; Sub-Saharan Africa.

1. Introduction

In developing countries, the remittances flows hold an important place with regards to financing development due to their relative stability and reliability compared to others international capital flows (World Bank, 2019). The steady increase of money transfers from the migrants to their home countries remains at the top of policy agenda due to their economic importance and great source of resilience for households. In sub-Saharan Africa (SSA), remittances were formerly estimated at US\$46 billion in 2019 and projected to increase to US\$65 billion in 2021 (UNECA, 2020). However, with the economic crisis caused by the COVID-19 pandemic and shutdown, remittances to SSA are predicted to fall by 23.1 percent in the year 2020 (World Bank, 2020¹). Any change in remittances flows in SSA should probably have some implications for the financial development since the financial system is one of the dimensions among many others on which several studies have been conducted to examine the development impact of remittances (Coulibaly, 2015). Thus, the aim of this study is to examine the dynamic relationships between the migrant remittances and the financial sector development from a multidimensional perspective in SSA countries using a Panel vector autoregression (VAR) model. In a novel approach, this study utilizes the disaggregated or components of financial development by examining the role of financial depth, financial access, and financial efficiency and their relationship with the migrant remittances.

This study is closely related to the literature investigating the role of remittances in financial sector development. The remittance flows foster financial development in recipient countries through several mechanisms. The remittances help the financial sector to become more efficient by decreasing the overhead costs and net interest margins. Moreover, remittances improve the availability of the bank's loanable funds and saving facilities (Gupta et al, 2009; Aggarwal et al., 2011; Cooray, 2012). However, the relationship between the remittances and the financial development as illustrated in some other studies still remained unclear. For instance, a contrary opinion about the nexus of remittances and financial development is that the remittances act as a substitute for credit demand by easing the borrowing constraints of recipient remittances. Relaxing the financial constraints have a restraining impact on the credit markets development (Fromentin and Leon, 2019). Furthermore, a new aspect of the literature emphasizes the dynamic relationship between the remittances and the financial development. The link between the remittance and financial development differs across the short- and long-term horizons. In short run, remittances may substitute the financial development while they may complement the financial development in the long run (Deonanan et al, 2020). Empirically, the relationship between the remittances and the financial development in developing countries (including SSA countries) remains also controversial. Some studies have found a

¹ <https://www.worldbank.org/en/news/press-release/2020/04/22/world-bank-predicts-sharpest-decline-of-remittances-in-recent-history>

positive association between the remittances and the financial development (Aggarwal et al., 2011; Chowdhury, 2011; Demirgüç-Kunt et al., 2011; Cooray, 2012; Fromentin, 2018; Gupta et al, 2009; Williams, 2016) whilst others studies have found negative association, or even no association (Calderon et al, 2008; Brown et al, 2013; Fromentin, 2017; Fromentin and Leon, 2019; Coulibaly, 2015).

Our study contributes to the ongoing debate and provides important insights. First, the former studies used different methodologies (cross-section panel data, time series framework, panel granger causality tests) to investigate the relation between the remittances and financial development. This study adopts a panel VAR approach to extend the discussion on the lack of consensus found in the previous empirical results. The panel VAR model has the advantage to capture the common unobserved factors to all economics and thus overcome the cross-country dependencies problem (Liaqat, 2019). Second, the previous studies suffer from endogeneity issues induced by the feedback effect between the remittances and the financial development. Indeed, a well-defined and efficient financial institution can promote the transfer of remittances through banking institutions as costs associated with remittances are reduced and also encourages accessibility for recipients (Freund and Spatafora 2008; Aggarwal et al., 2011). Alternatively, a well-developed financial sector may provide a better financial resource and thus can decrease the need for remittances (Bettin, Lucchetti, and Zazzaro 2012). The panel VAR model treats all variables as endogenous and thus allows us to address the endogeneity problem. Third, using the impulse response functions provide an additional contribution to the empirical literature on the dynamic relationship between the remittances and the financial development. The impulse response functions provide an interesting framework to investigate if the impact of remittances on financial development are short-lived, long-lived or both. Such dynamic effects are not considered by the previous empirical studies that have used panel regressions (Antonakakis et al, 2017). Fourth, the ambiguity in the previous findings can result from the nature of financial development indicators used. Those findings are attributable to the fact that each proxy measures a particular aspect of the financial development. Our paper adds a plus-value to the empirical literature by extending our analysis to the multi-dimension of the financial development. Thus, the current study takes into consideration the dimensions of the financial development (the financial depth, financial access and financial efficiency) along with the classification of the financial system as suggested by Sviryzdenka (2016). Thus, considering different dimensions of the financial development allows us to disentangle the dynamic effects of remittances on financial development and vice versa.

The remainder of the paper is structured as follows. In the second section, A brief review of literature on the link between the remittances and financial development is presented. Section 3 is devoted to the methodology as well as the details of the data. Section 4 presents the main findings, and section 5 formalizes the conclusion of the study with insight for policy and opportunities for future studies.

2. Related literature review

The relationship between the remittances and the financial development in developing countries (including SSA countries) is empirically controversial. Some studies have identified a positive association between the remittances and the financial development. Using a homogenous panel model Aggarwal et al. (2011) investigated the impact of remittances on financial system development for 99 developing countries over the period 1975-2003. The authors found that the remittances increase the aggregate levels of deposits and credits and thus help to promote the financial development. Likewise, Chowdhury (2011) attempts to examine the effect of remittances on financial development in Bangladesh by using a time series econometrics approach. The results of the study show evidence that the remittances promote the financial sector. However, the magnitude of the effect of remittance flows is much larger in money and private domestic deposit than bank credit. Demirgüç-Kunt et al. (2011) used a cross country model and found that the remittances flows contribute to enhance the number of branches and accounts per capita and the deposits, which in turn increase banking breadth and depth in Mexico. Cooray (2012) used a panel data analysis to conclude that the remittances positively influence the financial sector efficiency and size, especially on non-OECD countries. In addition, the impact of remittances relies on the level of government ownership of banks. The remittances increase financial sector efficiency in countries with higher government ownership of banks, at the same time they increase the financial sector size in countries with lower government ownership of banks. Fromentin (2018) provide evidence of a positive feedback effect in the relationship between the remittance and the financial development for panel of 32 Latin American and the Caribbean countries.

Despite the positive relationship between remittances and financial development, some papers have found negative association, or even no association. Calderon et al (2008) indicate that remittances can hinder the credit demands and thus have a diminishing impact on credit demand markets. Using a cross-country panel on 138 countries, Brown et al (2013) investigate the link between the remittances and financial development. They conclude that remittances do not promote the financial development after controlling for various factors. Fromentin (2017) examine the long-run and short-run link between the remittances and financial development for developing countries by using a Pooled Mean Group (PMG) approach. The findings highlight a strong positive relationship between remittances and financial development in the long and short run, except for the low-income countries. Fromentin and Leon (2019) investigated the disentangle impact of remittances on credit in in both the short run and the long run for 57 countries (including 30 developing countries) over the period 2000-2014. For developing countries, they found a positive impact of remittances on household credit in the long term but no impact in the short term.

The findings of the previous studies in sub-Saharan African countries are as inconclusive as those in developing countries. Gupta et al (2009) investigated the impact of remittances on financial development in 44 SSA countries from 1975 to 2004. The results of their panel specification suggested that remittances significantly contribute to the Bank deposit and broad money. Williams (2016) supports the positive effect of remittances on financial development in 45 SSA countries over the period 1970-2013. This result is made possible through a system panel GMM. In contrast, Coulibaly (2015) use a panel granger causality based on system approach to investigate the causality between the remittances and the financial development in 19 SSA countries over the period 1980-2010. From the results, the author concludes that there is no strong evidence that the remittances play a role in financial sector development and also the financial development is irrelevant to stimulate the remittances flows toward SSA countries. For instance, the positive effect of remittances on financial development is observed only in four countries (Niger, Senegal, Sierra Leone and Sudan) and financial development positively influences remittances only in Gambia when the financial development is measured by the liabilities. The results are totally different when the credit is used as proxy of financial sector development. Indeed, the remittances positively influence financial development only in Sudan and financial development does not affect remittances in any country.

In addition, following a sustainable development approach, other recent studies that have examined the link between remittances-related factors and environment quality (Qin et al., 2021; Zafar et al., 2021) and financial development (as a holistic proxy to capture all financial factors that include remittances) in an environmental framework (Kihombo et al., 2021; Kirikkaleli et al., 2021; Usman et al., 2021; Wang et al., 2021). Specifically, Zafar et al (2021) explored the case of 22 world highest remittance-receiving countries to examine the link between remittances (as a proxy for financial development), export diversification, economic growth, education, energy variable, and carbon emission over the period 1986-2017. By implementing series of empirical tools, the investigation found that remittances, export diversification, and renewable energy utilization are desirable factors that helps to mitigate carbon emission in the panel of the examined countries unlike education and economic growth. Similarly, Qin et al (2021) implemented panel quantile regression approach for the case of seven emerging economies over the period 2004-2016 and found a significant cointegrating relationship between carbon emission, renewable electricity generation, economic growth, globalization, and financial inclusion. Specifically, the study revealed that financial inclusion is a significant agent of carbon mitigation in the 25th and 50th quantiles but the impact remained unexplainable in the last two quantiles (75th and 90th). Moreover, Usman et al (2021) checked for the role of renewable energy innovations and financial development in improving the ecological footprint amid other factors for the case of the United States by using the quarterly period 1985: Q1-2014: Q4. Interestingly, the findings showed that the desirable environmental effect of financial development on

ecological footprint only happens when threshold of development in the financial system is attained while such occurrence is not observed with the carbon dioxide model.

3. Data and Methodology

In this section, the description of the employed dataset and the implied empirical method are carefully presented in a structured pattern.

3.1. Data

The study uses a balanced annual panel data over the period 2004-2017 for 22 sub-Saharan African countries. The 22 countries include Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cote d'Ivoire, Gambia, Ghana, Kenya, Madagascar, Malawi, Mali, Mauritius, Namibia, Niger, Nigeria, Senegal, South Africa, Sudan, Tanzania, Togo, Uganda. Our study has three main variables for the benchmark model (migrant's remittances, financial development and natural resources rents) and two additional covariates (government spending and trade openness) for the robustness exercises. The remittances inflows (REM) are obtained from the World Bank Development Indicators (WDI) database. The data for the remittances reflects the current transfers sent by non-resident workers from overseas countries normalized by the Gross Domestic Product (GDP).

Since, the study mainly focus on the financial institutions (FI)² which is one important component of the financial sector development, we use it aggregate measure and three other indices that summarize how developed financial institutions are in terms of depth (i.e., size and liquidity of markets), access (i.e. the ability of individuals and companies to access financial services) and efficiency (i.e. the ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets). The financial data come from the Financial Development Database of IMF (Svirydzenka, 2016).

Next, to avoid the potential pitfalls associated with model misspecifications, the natural resources, especially the natural resources rents (NRR) are incorporated into our multivariate model. The data is collected from the World Bank Development Indicators (WDI) dataset and measured as a percentage of the GDP. The choice of this variable is primarily based on a theoretical consideration. Several studies emphasized theoretical mechanisms among the remittances, financial development and natural resources rents. Indeed, the remittances can enhance or diminish the pressure on natural resources. The remittances by alleviating the liquidity constraints, allow the household to engage in activities with lumpy investments rather than natural resources extraction activities. Contrary, remittances could increase the demand for

² The financial institutions include banks, insurance companies, funds, venture capital firms, and other types of non-bank financial institutions.

goods that put more pressure on the local environment (López-Feldman and Chávez, 2017). On the other hand, several papers attempted to answer whether natural resources are a curse or blessing for the financial sector in terms of stability or development of the financial sector (Dwumfour and Ntow-Gyamfi, 2018; Yildirim et al, 2020). Finally, additional macroeconomic variables are employed as control variables. The trade openness and government expenditure are used to account for the role of liberalization and stabilization policies. The data are retrieved from the WDI database. Table 1 (see Appendix) presents the key descriptive statistics.

3.2. Panel VAR methodology

For our econometric framework, a panel vector autoregression (PVAR) model is employed. This model is estimated using a General Method of Moments (GMM) method as provided by Abrigo and Love (2016). The PVAR approach originally developed by Holtz-Eakin et al (1988) extends the traditional VAR model introduced by Sims (1980). This approach treats the multiple variables included in the system as endogenous and into an unrestricted manner.

The Panel VAR of order p can be written by the following system of linear equation:

$$Y_{it} = B_1 Y_{it-1} + B_2 Y_{it-2} + \dots + B_{p-1} Y_{it-p+1} + B_p Y_{it-p} + \mu_{it} \quad (1)$$

Where the subscripts $i = 1, 2, \dots, 22$ represents the country and $t = 2004, 2005, \dots, 2017$ represents the year. Y_{it} is the $(1 \times k)$ vector of endogenous variables. The $(k \times k)$ matrices $B_1, B_2, \dots, B_{p-1}, B_p$ represent the coefficients to be estimated. μ_{it} are $(1 \times k)$ vector of dependent variable-specific panel fixed effects and the idiosyncratic errors, in particular. The vector of errors terms is assumed to be specified as follows:

$$E(\varepsilon_{it}) = 0, E(\varepsilon_{it}' \varepsilon_{it}) = \Sigma, \text{ and } E(\varepsilon_{it}' \varepsilon_{ih}) = 0 \text{ for all } t > h.$$

The panel Var model presented above (equation 1) suffer from cross sectional heterogeneity and dynamic interdependency issues since the error term variables μ_{it} are related with the explanatory variables because of the presence of lagged endogenous variables in the right-hand side of the system of equations. Consequently, the fixed effect estimators and Ordinary Least Square (OLS) are biased (Nickell, 1981). The GMM technique designed to estimate PVAR model has the advantage to overcome this problem (Arrelano and Bond, 1991; Arrelano and Bover, 1995; Blundell and Bond, 1998).

The estimation of the PVAR model follows several steps. First, we need to identify the optimal lag length for the panel VAR. This optimal lag length is determined based on various selection criteria (Andrews and Lu, 2001). Second, we use the Herlmert transformation procedure (i.e., orthogonal deviation)

to eliminate the individual fixed-effects because the panel fixed effects may be correlated to lags of the dependent variables. This procedure makes possible the use of the GMM estimation by employing the lagged values of the explanatory variables as instruments.

After estimating the panel VAR model, we generate the impulse response functions (IRFs). The IRFs is beneficial insofar as it allows to isolate the dynamic responses of one variable caused by shock to another variable in the system while keeping all shock at zero (Love and Zicchino, 2006). The stability of the IRFs is obtained only if all moduli of the companion matrix \bar{B} are strictly less than one, where:

$$\bar{B} = \begin{bmatrix} B_1 & B_2 & \dots & B_{p-1} & B_p \\ I_k & O_k & \dots & O_k & O_k \\ O_k & I_k & \ddots & O_k & O_k \\ \vdots & \vdots & \dots & \vdots & \vdots \\ O_k & O_k & \dots & I_k & O_k \end{bmatrix}$$

Stability implies that the panel VAR is invertible and has an infinite-order vector moving average representation, providing known interpretation to the estimated impulse-responses (Abrigo and Love 2016). The stability of the PVAR ensures that our model is well specified, and the parameters of the VAR model are constant over time. The non-constancy of parameters is one of the key challenges in empirical macroeconomics.

Furthermore, we use the Cholesky decomposition to the IRFs and thus impose a recursive structure. This help to avoid that a shock in one variable trigger shocks in other variables in the system. This condition is justified by the evidence that innovation (μ_{it}) are contemporaneously correlated (Abrigo and Love, 2016). In our analysis, we assume that shock to remittances impact the financial development immediately while financial development has an impact on remittances with a delay. In addition, we check the sensitivity of our analysis by considering an alternative Cholesky ordering using a reverse recursive structure.

4. Empirical results

The prior analysis for this study focus on the correlation between the variables, the stochastic properties of each variable and the optimal lag length for the panel VAR specification. Firstly, the correlation coefficient is found negative between the remittances and the financial indicators with a more pronounced negative correlation in the case of the financial institution depth. The correlation between the others covariate and the remittances (or the financial data) are mostly consistent with the theoretical predictions. Table 2 provides the correlation coefficient estimates (see Appendix). Secondly, the stochastic

properties of our data is made possible by using panel unit root tests, namely the Im et al. (2003), which is known as the IPS and the Fisher-based Augmented Dickey-Fuller (ADF) tests.

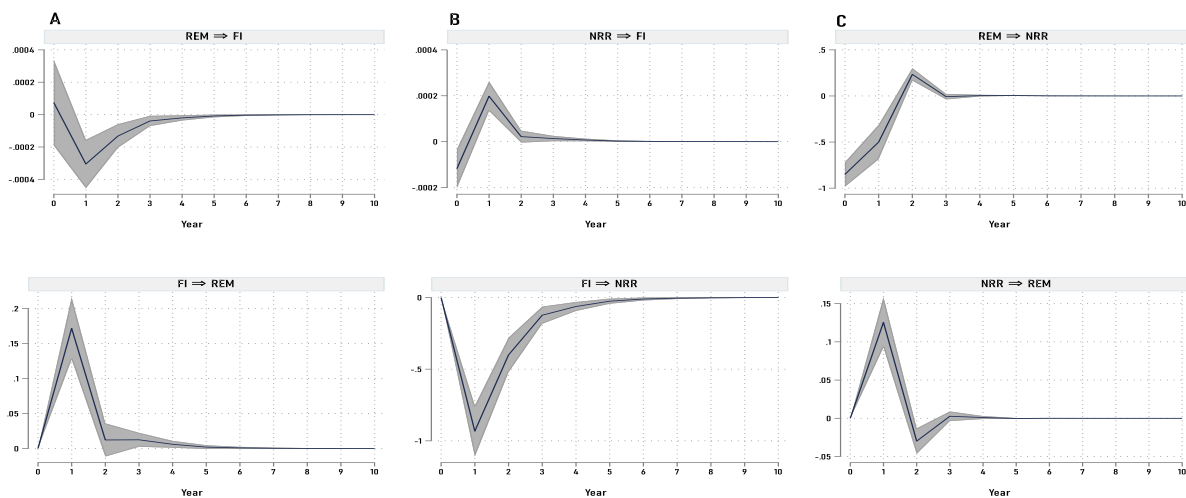


Figure 1: Orthogonalized IRFs for benchmark model for a first-order panel VAR specification. Impulse \Rightarrow Response.

The results is reported in Table 3 (see Appendix). From the unit root tests results, the remittances, the government spending and the trade openness variables are just non-stationary at level. Next, we perform the panel unit roots tests on their log-differences. The findings support the evidence against the null hypothesis of panel unit root and therefore conclude that each of those variables are stationary in differences.

For the specification of the panel VAR model, only these three variables are included in log-differences. The others variables remains in the level form. Finally, the identification of optimal lag length for the panel VAR specification rely on several statistics including the Hansen J-statistic of over-identifying restrictions, the overall coefficient determination (CD) and informations criteria³. Table 4 (see Appendix) give a summary of the findings for our benchmark model⁴. The the Hansen's J statistic fail to reject the null hypothesis of overidentification restriction at the 5% level of significance when lag order is 1. The smallest value of the information criteria are uniformly found at the lag order of 1. Therefore, a panel Var model of order 1 would be used in the subsequent analysis.

³ Andrews and Lu (2001) suggested three information criteria: the modified Bayesian information criteria (MBIC), modified Akaike information criteria (MAIC), and modified Hannan-Quinn information criteria (HQIC).

⁴ Details of the results for the others panel var model specifications can be provided after a request to the authors. It is important to mention that the optimal lag remain 1 for all specifications.

The Figure 1⁵ provides the IRF plots with the 95% confidence bands, which is constructed using 200 Monte Carlo simulations. In Figure 1, the column A, B, and C are employed to give a better understanding of the IRFs among the variables taken in pairs. In column A, the impulse responses indicate that a positive shock to remittances causes a negative response from financial institutions (REM:FI), yet only short-lived (up to 3 years), as it gradually converges towards zero thereafter. This finding supports the substitutability hypothesis between remittances and financial services since higher remittance inflows from relatives abroad relax the household credit constraints and can be considered as alternative sources of financing investment projects. This finding also emphasizes the lower degree of financialization of remittance markets in Africa (Guermond, 2020). Another explanation of this result comes from the lack of 'financial literacy' among the migrants/remittances-receiving households and the distrust in financial and government institutions (Brown et al, 2013). Financially illiterate households are more likely to make suboptimal decisions. These decisions create more information asymmetries in the financial sector which is detrimental for the efficiency and quality of financial institutions (World Bank, 2009). The financial institutions are negatively influenced by the remittances because the migrants probably do not trust the banks and the authorities institutions in their origin countries and prefer other way (informal transfer system) rather than formal bank transfers to send their funds. Conversely, a one standard deviation (SD) shock to the financial institution index significantly increases the remittance inflows by 0.2% of GDP (FI:REM). This is suggestive of the fact that the development of financial institutions can increase remittances by reducing transaction costs through the stimulation of competition among banks in the remittances market (Coulibaly, 2015). In summary, remittances react positively to financial institutions, but not vice versa, indicating that the feedback effect between financial institutions and remittances is not valid in the SSA region.

Furthermore, in column B, the IRFs suggest that natural resource rents decrease in response to a one SD shock to the financial institution index (FI:NRR). This finding implies that better access to capital (through financial institutions) would contribute to the diversification of the economy away from the natural resource sector towards investment-intensive sectors with more value added, which may substantially decrease the size of resource rents. The response of financial institutions is marginal (even close to zero) in response to resource rent shocks (NRR:FI). This confirms the financial resource curse hypothesis in SSA countries (Kassouri et al., 2020).

In column C, upon a positive shock in remittances, the response of NRR is initially negative, in the second year a tiny positive response is observed, and after the third year the impact gradually converges

⁵ All graphs show results for the first 10 years, with the period reflected on the horizontal axis. The dashed lines denote the impulse response of one variable to a one standard deviation shock to a different variable.

towards zero (REM:NRR). This finding indicates that remittances have smaller effect on natural resource rents. As documented by (López-Feldman and Chávez, 2017), remittances decrease the likelihood of households to participate in natural resource extraction activities. Moreover, remittances are mainly used for consumptive purposes and investment in human capital (education and health expenditures). In this case, higher inflows of remittances would negatively affect the size of resource rents. The IRFs (NRR:REM) suggest an inverted U-shaped response of remittances to a one SD shock to resource rents, suggesting the presence of a threshold level beyond which remittances decrease in response to resource rent innovations. The estimated threshold level of remittance is about 0.1% of GDP. One implication is that remittance inflows decrease significantly in SSA countries with higher resource rents.

4.1. Disaggregated financial institution indicators and remittances

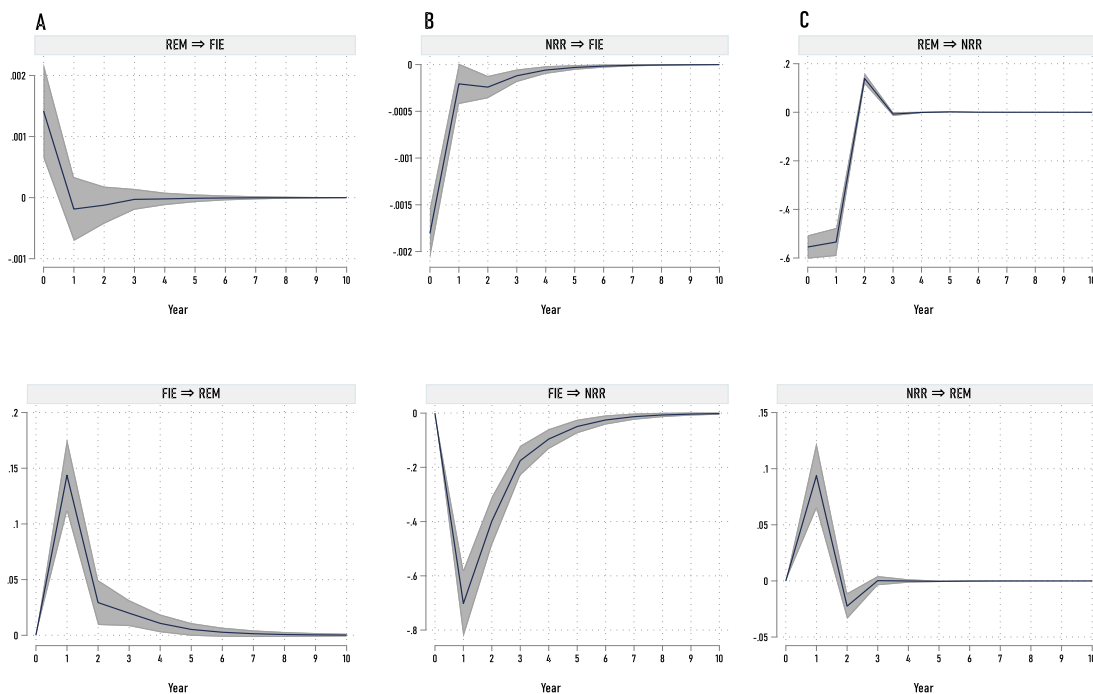


Figure 2: Orthogonalized IRFs of FIE NRR REM for a first-order panel VAR specification. Impulse ⇒ Response.

In order to provide the potential reader with clear information and make our IRFs comparable with the existing literature, we combine and discuss all the results reported in Figures 2-4. Regarding the relationship between financial institution indicators and remittances, we observe different IRFs over different indicators. In all figures, we observe that a shock to remittance improve financial institution efficiency (FIE) and financial institution access (FIA), while the response of financial institution depth

(FID) is negative as in our baseline specification. The negative effect of remittance shock on the financial institution depth are consistent with substitutability hypothesis. In addition, the remittances do not contribute to the financial institutions depth due to the absence of financial literacy among remittance-receiving communities. In other words, the remittances inflows are unable to expose most households to the formal financial sector about which they become better educated. This situation would induce lower financial intermediation, leading to a weak financial deepening as the banking sector responds to decreasing consumer demand by creating less branches and compressing credit (Aggarwal et al., 2011; Brown et al., 2013). However, we find that remittances boost the efficiency of financial institutions and the degree to which individuals can and do use financial institutions (access), confirming the prediction of the financialization of remittance markets hypothesis. The role of remittances inflows for the financial institution efficiency could result from the new remittance products that have been introduced in number of developing countries as mobile phone banking. These new products have stimulated the speed, the cost-effectiveness and efficiency of payment which can be predicted to strengthen the access to finance and boost the efficiency of financial institutions through a fall in the overhead costs and net interest margins (Cooray, 2012). This finding also indicates that the remittances inflows encourage the remittance-receiving households to increase their preferences for bank financial products and services, which in turn would raise the supply for loanable funds and enhance the relation 'banks-reipient households (Bettin et al, 2012). Interestingly, among the shocks to financial institution indexes, innovations to financial institution efficiency and financial institution access lead to a positive and statistically significant increase in remittance inflows, even though the magnitude of the response of remittances to FIA shock is smaller compared to that of FIE shock. In contrast, shock to financial institution depth does not exert a significant effect on remittance flows. Thus, only shocks to the efficiency and access dimensions of financial institutions tend to create statistically positive feedback loops.

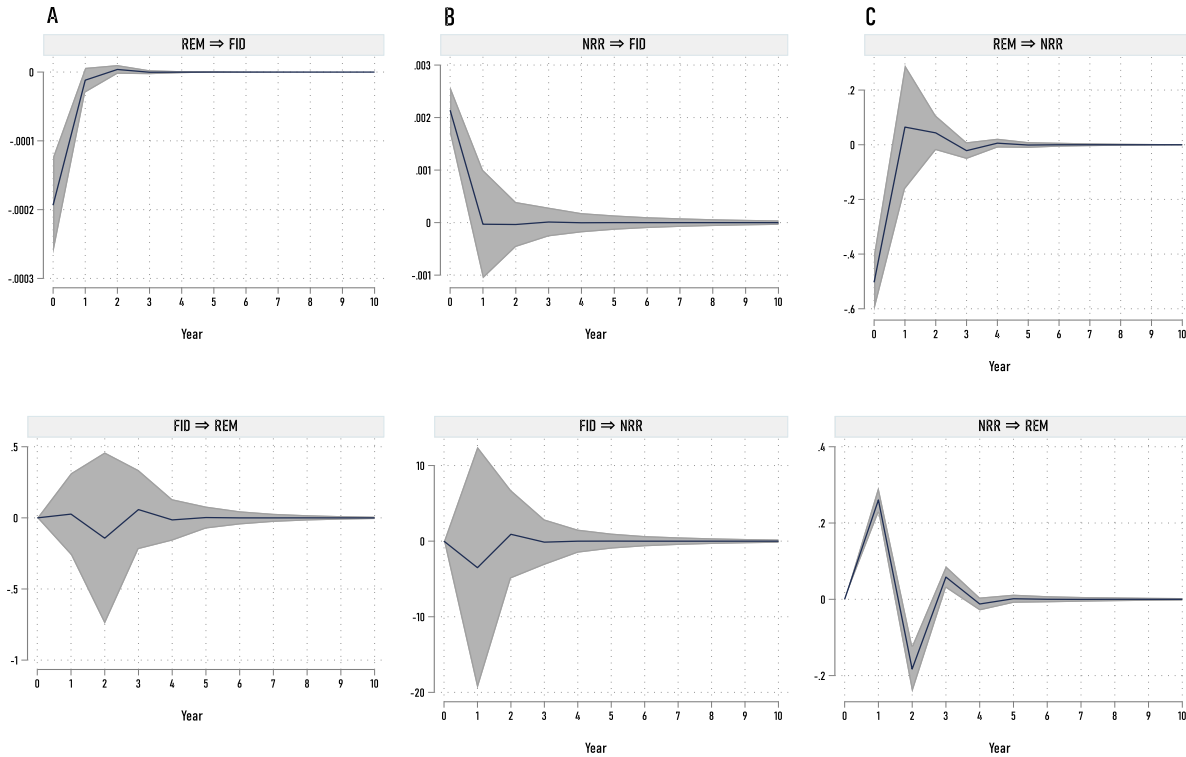


Figure 3: Orthogonalized IRFs of FID NRR REM for a first-order panel VAR specification. Impulse ⇒ Response.

In line with our baseline findings, the financial resource curse hypothesis is supported for financial institution efficiency and financial institution access. However, only financial institution depth reacts positively to resource rent shocks. It is also evidenced that improvements in financial institution access positively influences resource rents, as shown by Shahbaz et al(2020). Moreover, a development in access to financial institutions can mitigate frictions against financing the core developmental projects that stimulate resource rents.

Overall, the analysis with individual index for financial institutions provides us with many interesting insights. As documented by (Léon, 2018; Svirydzenka, 2016), the relation among the variables are highly dependent on the index of financial institutions and varies accordingly.

The results in all figures unanimously imply that the IRFs of remittances to a shock in natural resource rents (NRR:REM) and the IRFs of natural resource rents to remittances (REM:NRR) mostly align with our baseline results. This is indicative that our baseline model is well-specified.

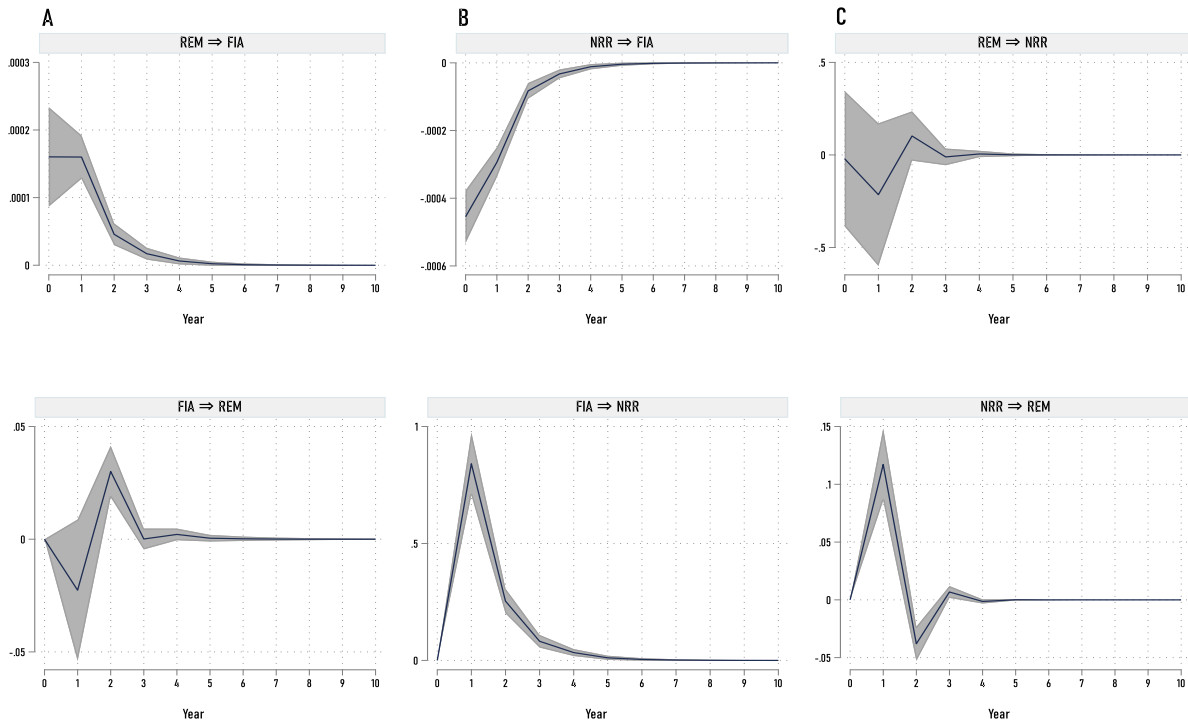


Figure 4: Orthogonalized IRFs of FIA, NRR, REM for a first-order panel VAR specification. Impulse \Rightarrow Response.

4.2. Robustness checks

We discuss the robustness of our findings by performing three robustness exercises. Firstly, we check the sensitivity of our baseline specification by re-ordering the variables. Secondly, we examine the sensitivity of our IRFs by including additional variables such as government spending and trade openness.

Table 5: Causality results

Variables	FI \nRightarrow REM	REM \nRightarrow FI	FIA \nRightarrow REM	REM \nRightarrow FIA	FIE \nRightarrow REM	REM \nRightarrow FIE	FID \nRightarrow REM	REM \nRightarrow FID
Wald Test	2.113	9.686^a	3.699^c	17.759^a	11.510^a	14.230^a	0.554	0.062
P-values	(0.146)	(0.002)	(0.054)	(0.000)	(0.001)	(0.000)	(0.457)	(0.804)

Notes: ^a and ^c indicate the significance level at 1% and 10%, respectively.

Thirdly, to gain a better understanding of the dynamics between variables, we perform Granger causality analyses. Table 5 reports the results.

The underlying IRFs are illustrated in Figures 5, 6 and 7 (in Appendix). In general, irrespective of the robustness exercise, the findings are consistent with our baseline results. Regarding the causality analysis, we find a heterogeneous causality between financial institution indexes and remittances in SSA countries. We find that remittance is the Granger cause for financial institutions, but not vice versa. This is consistent with the IRFs in Figure 1. However, a feedback effect is obtained between financial institution efficiency and remittances as well as between financial institution access and remittances. These causal relationships further support the feedback effect evidenced by our IRFs results (see Figures 2 & 4).

5. Conclusion and policy insight

The debate in the relationship between migrant remittances and the financial development of recipient countries gave rise to several empirical studies. The current study contributes to the ongoing debate by examining the dynamic relationships between the remittances and the financial development from a multidimensional perspective in SSA countries using a Panel VAR model. Relying on a PVAR model for 22 SSA countries over the period 2004-2017. Importantly, the study found that financial institutions react negatively to remittances shocks, but not *vice versa*. The results imply that the sustainability hypothesis in the link between the remittances and the financial development is confirmed but not with the financial literacy hypothesis. Interestingly, the study further demonstrates that the feedback effect between financial development and remittances evidenced in empirical studies in developing countries is driven by the efficiency and access dimensions of financial institutions. This is expected given the multidimensional feature of financial institutions. Furthermore, the results shows that the dynamic relation between the remittances and financial development is conditional to the dimensions of financial institutions.

5.1 Policy and prospects for future study

The policy take-home from the result of this investigation is crucial for the SSA region and especially the developing economies. The negative effect of remittances shock on financial development further instruct on the need to revitalize the financial systems in the examined countries. A stronger and more reformed financial institutions such as the banking and insurance institutions could be achieved by using the re-capitalization or merge and acquisition policy tools. Moreover, more standardized financial laws that aligns with the global best practice could be further entrenched in the operational activities of these financial institutions such as to avoid potential irregularities that comes with migrant remittances such as the financial crimes which could pose a greater danger to the financial institutions. Reminiscent of the regional institutionalization of the financial system across the European Union member countries, a similar approach to the SSA financial system would mean better, strong and re-vitalized institutions. This findings should lead to further research about the possible non linearities in the relationship between the remittances and financial development, particularly with respect to conditional effects. One should account for the role of

economic development, quality of institutions and legislation related to transfers in the relationship between the remittances and financial development. Second, the limit number of countries considered in the study makes difficult to generalize the results to all developing countries. Thus, more evidence at developing countries level is needed to better understand the dynamic in the relationship between remittances and financial development.

Appendix

Table 1: Descriptive statistics

	N	Mean	Sd	Min	Max
Financial institution index (FI)	308	.2972403	.1539973	.15	.74
Financial institution depth (FID)	308	.1787338	.2243935	.03	.88
Financial institution access (FIA)	308	.1304545	.129365	.02	.48
Financial institution efficiency (FIE)	308	.6098052	.1157666	.32	.82
Remittances (% GDP) (REM)	308	2.75055	2.96976	.000901	15.2319
Natural resources rents (% GDP) (NRR)	308	8.817009	6.331498	.001176	33.3867
Government Spending (%GDP) (GOV)	308	14.07357	4.612309	4.40332	28.0146
Trade openness (%GDP) (OPEN)	308	61.13047	23.77315	19.1008	127.063

Table 2: Correlation coefficients

	FI	FID	FIA	FIE	REM	NRR	GOV	OPEN
FI	1							
FID	0.971***	1						
FIA	0.944***	0.916***	1					
FIE	0.546***	0.380***	0.335***	1				
REM	-0.292***	-0.307***	-0.272***	-0.0672	1			
NRR	-0.310***	-0.329***	-0.381***	0.0455	0.177**	1		
GOV	0.597***	0.583***	0.462***	0.475***	-0.224***	0.00464	1	
OPEN	0.536***	0.480***	0.626***	0.208***	-0.0571	-0.244***	0.401***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Panel unit root tests

Variable	Level		First Difference	
	IPS	ADF	IPS	ADF
FI	-12.9881*** (0.000)	-5.2165*** (0.000)		
FID	-3.5E+12*** (0.000)	-6.3284*** (0.000)		
FIA	-1.2E+13*** (0.000)	-4.2301*** (0.000)		
FIE	-17.6982*** (0.000)	-5.3507*** (0.000)		
REM	0.7019 (0.7586)	0.6837 (0.7529)	-2.0585** (0.0198)	-2.6386*** (0.0042)
NRR	-1.4083* (0.0795)	-1.8695** (0.0308)		
GOV	-2.6739 (0.0037)	-2.2771 (0.0114)	-5.8104*** (0.000)	-6.006*** (0.000)
OPEN	0.8649 (0.8065)	0.9449 (0.8277)	-2.0822** (0.0187)	-2.5889*** (0.0048)

Notes: p-values are in parentheses. *** and ** denotes significance at 1% and 5% level, respectively. For the ADF test, the Z-statistics are reported, while for the IPS test, we report the W-statistics. The two tests assume that the whole panel contains unit roots under the null hypothesis, whereas the alternative hypotheses are slightly different.

Table 4: Panel VAR lag selection criteria for benchmark model (REM, NRR, FI)

Lag	CD	J-statistics	p-value of J-statistic	MBIC	MAIC	MQIC
1	1	13.79668	0.8406534	-89.613*	-26.20332*	-51.92197*
2	1	9.928889	0.7673638	-62.45789	-18.07111	-36.07417
3	1	4.913937	0.7667338	-36.44993	-11.08606	-21.37352

Note: The asterisk denotes the selected optimal lag length

Figure 5. IRFs for 1 lag VAR of FI REM NRR

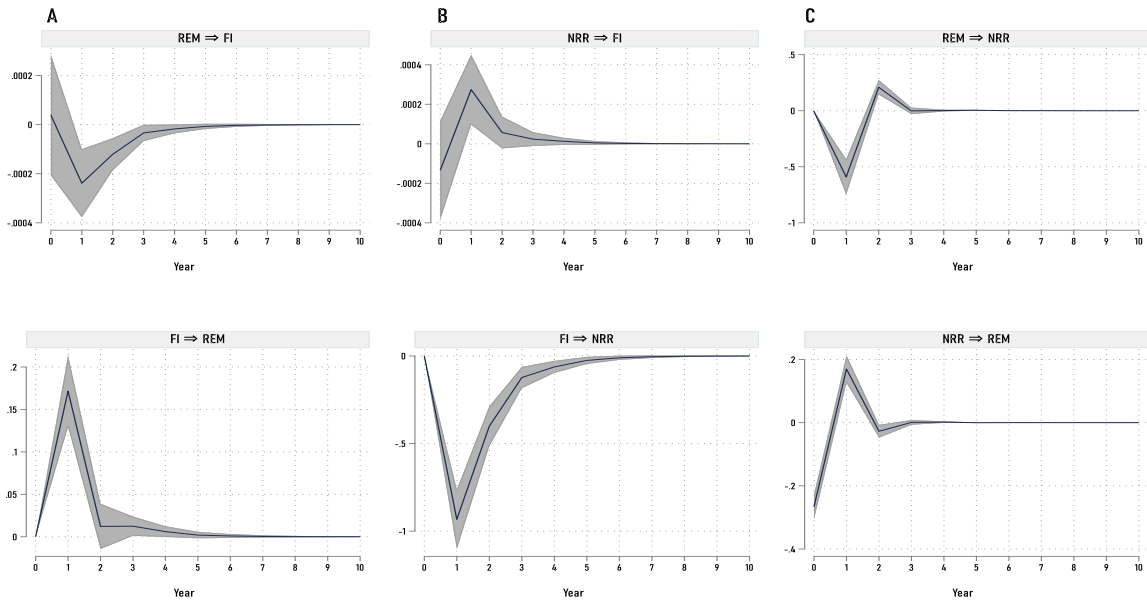


Figure 6. IRFs for 1 lag VAR of REM NRR FI GOV

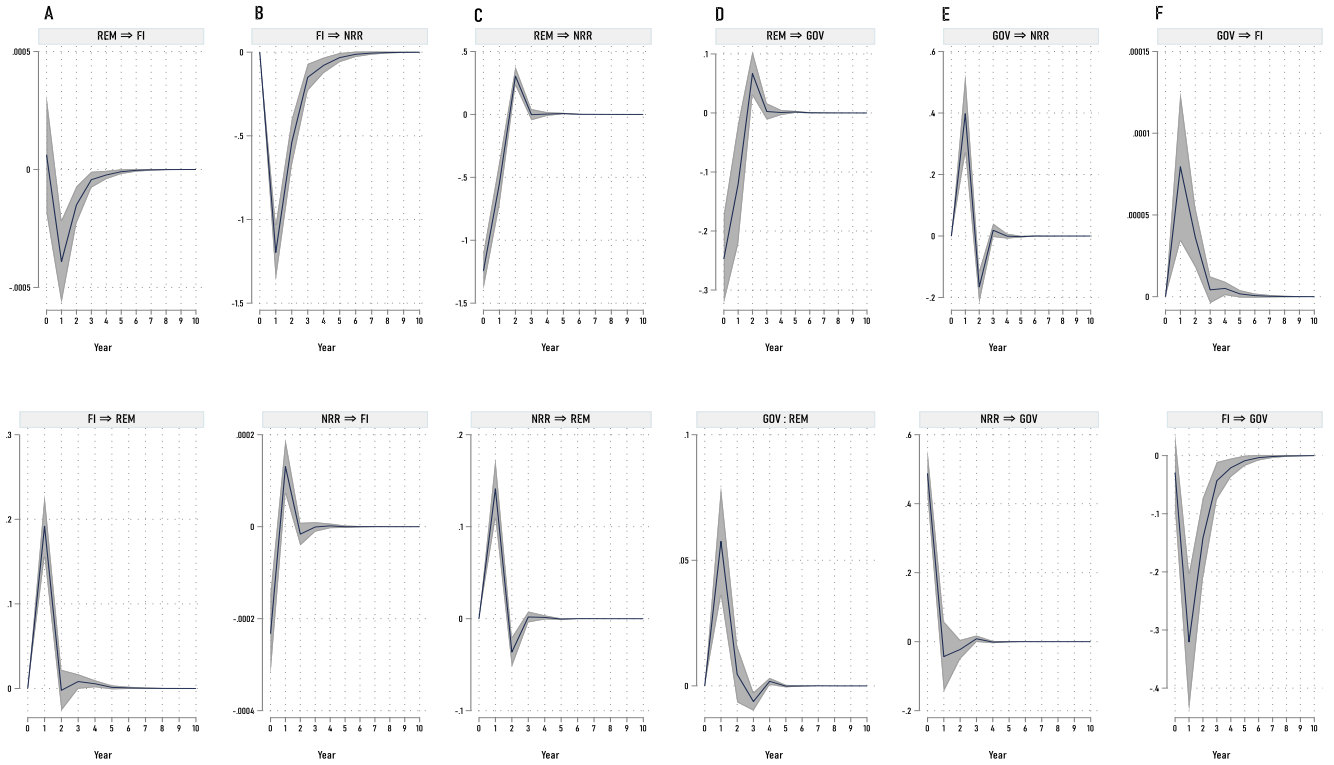
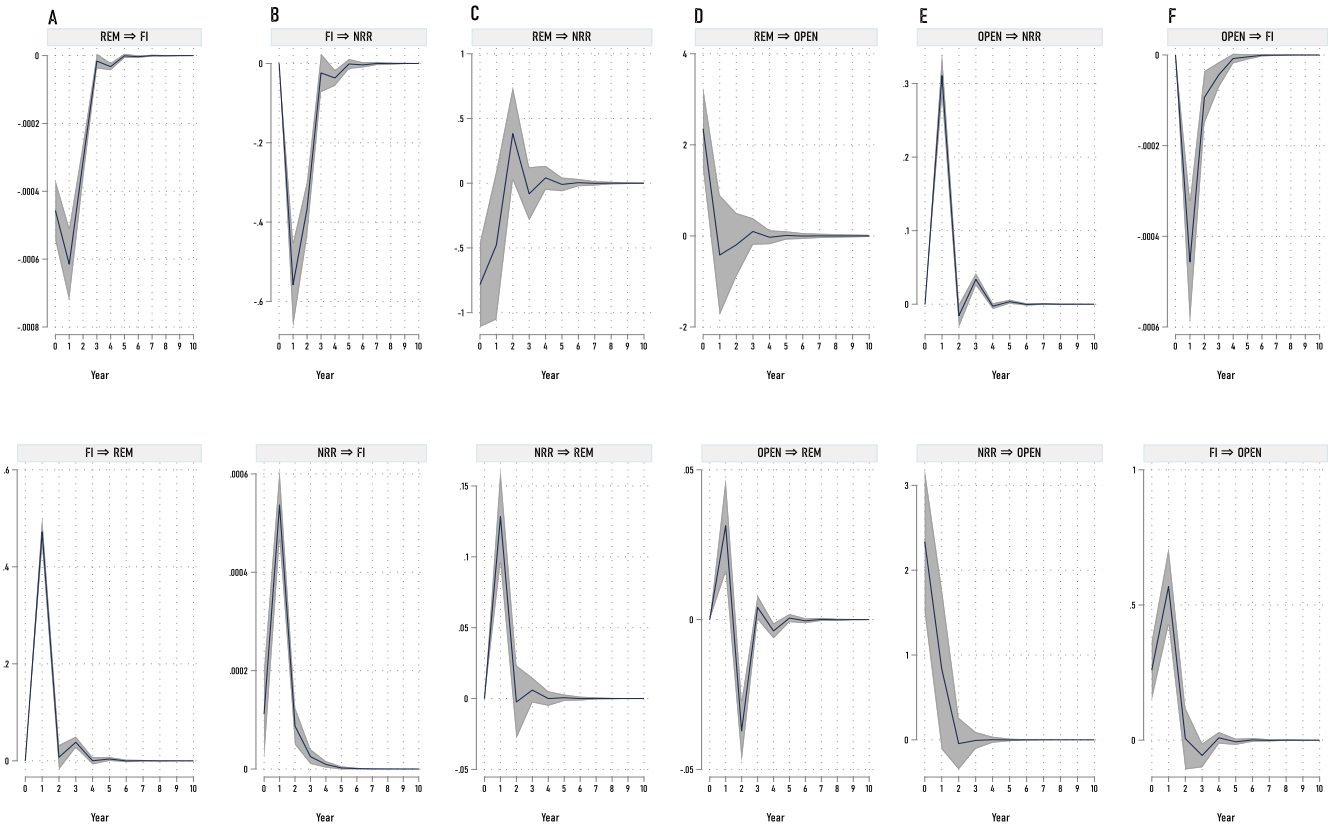


Figure 7. IRFs for 1 lag VAR of REM NRR FI OPEN



References

- Abrigo, M.R.M., Love, I., 2016. Estimation of panel vector autoregression in Stata. *Stata J.* 16, 778–804. <https://doi.org/10.1177/1536867x1601600314>
- Abrigo, M.R.M., Love, I., 2016. Estimation of panel vector autoregression in Stata. *Stata J.* 16, 778–804. <https://doi.org/10.1177/1536867x1601600314>
- Aggarwal, R., Demirgüç-Kunt, A., Pería, M.S.M., 2011. Do remittances promote financial development? *J. Dev. Econ.* 96, 255–264. <https://doi.org/10.1016/j.jdeveco.2010.10.005>
- Andrews, D.W.K., Lu, B., 2001. Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models. *J. Econom.* 101, 123–164. [https://doi.org/10.1016/S0304-4076\(00\)00077-4](https://doi.org/10.1016/S0304-4076(00)00077-4)
- Antonakakis, N., Cunado, J., Filis, G., & De Gracia, F. P. (2017). Oil dependence, quality of political institutions and economic growth: A panel VAR approach. *Resources Policy*, 53, 147-163.
- Arellano, M., and Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277-297.
- Arellano, M., and Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29-51.
- Bettin, Giulia, Riccardo Lucchetti, and Alberto Zazzaro. 2012. “Financial Development and Remittances: Micro-Econometric Evidence.” *Economics Letters* 115 (2): 184–86.
- Blundell, R., and Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143.
- Brown, R.P.C., Carmignani, F., Fayad, G., 2013. Migrants’ remittances and financial development: macro- and micro-level evidence of a perverse effect. *World Econ.* 36 (5), 636–660.
- Calderon, C., Fajnzylber, P., & Lopez, J. H. (2008). Remittances and growth: The role of complementary policies. In P. Fajnzylber & J. H. Lopez (Eds.), *Remittances and development: Lessons from Latin America*. Washington, DC: World Bank.
- Chowdhury, Mamta B. 2011. “Remittances Flow and Financial Development in Bangladesh.” *Economic Modelling* 28 (6): 2600–2608.
- Cooray, A., 2012. Migrant remittances, financial sector development and the government ownership of banks: Evidence from a group of non-OECD economies. *J. Int. Financ. Mark. Institutions Money* 22, 936–957. <https://doi.org/10.1016/j.intfin.2012.05.006>
- Coulibaly, D., 2015. Remittances and financial development in Sub-Saharan African countries: A system approach. *Econ. Model.* 45, 249–258. <https://doi.org/10.1016/j.econmod.2014.12.005>

- Demirgüç-Kunt, A., Córdova, E. L., Pería, M. S. M., & Woodruff, C. (2011). Remittances and banking sector breadth and depth: Evidence from Mexico. *Journal of Development Economics*, 95(2), 229-241.
- Deonanan, R., Ramkissoon, B., Ramkissoon, D., & Hosein, R. (2020). Disentangling the relationship between remittances and financial development: evidence from Jamaica. *International Review of Applied Economics*, 34(2), 193-216.
- Dwumfour, R. A., & Ntow-Gyamfi, M. (2018). Natural resources, financial development and institutional quality in Africa: is there a resource curse?. *Resources Policy*, 59, 411-426.
- Freund, Caroline, and Nikola Spatafora. 2008. "Remittances, Transaction Costs, and Informality." *Journal of Development Economics* 86 (2): 356-66.
- Fromentin, Vincent, and Florian Leon. 2019. "Remittances and Credit in Developed and Developing Countries: A Dynamic Panel Analysis." *Research in International Business and Finance* 48: 310-20.
- Fromentin, Vincent. 2017. "The Long-Run and Short-Run Impacts of Remittances on Financial Development in Developing Countries." *The Quarterly Review of Economics and Finance* 66: 192-201.
- Gupta, S., Pattillo, C.A., Wagh, S., 2009. Effect of remittances on poverty and financial development in Sub-Saharan Africa. *World Dev.* 37 (1), 104-115.
- Hansen, L.P., 1982. Large Sample Properties of Generalized Method of Moments Estimators. *Econometrica* 50, 1029. <https://doi.org/10.2307/1912775>
- Holtz-Eakin, D., Newey, W., Rosen, H.S., 1988. Estimating vector autoregressions with panel data. *Econometrica* 56 (6), 1371-1395.
- Im, K.S., Pesaran, M.H., Shin, Y., 2003. Testing for unit roots in heterogeneous panels. *J. Econom.* 115, 53-74. [https://doi.org/10.1016/S0304-4076\(03\)00092-7](https://doi.org/10.1016/S0304-4076(03)00092-7)
- Kassouri, Y., Altıntaş, H., Bilgili, F., 2020. An investigation of the financial resource curse hypothesis in oil-exporting countries: The threshold effect of democratic accountability. *J. Multinat. Financ. Manag.* 100639. <https://doi.org/10.1016/j.mulfin.2020.100639>
- Kihombo, S., Ahmed, Z., Chen, S., Adebayo, T. S., & Kirikkaleli, D. (2021). Linking financial development, economic growth, and ecological footprint: What is the role of technological innovation? *Environmental Science and Pollution Research*, 1-11.
- Kirikkaleli, D., & Adebayo, T. S. (2021). Do renewable energy consumption and financial development matter for environmental sustainability? New global evidence. *Sustainable Development*, 29(4), 583-594.

- Liaquat, Z. (2019). Does government debt crowd out capital formation? A dynamic approach using panel VAR. *Economics letters*, 178, 86-90.
- López-Feldman, A., Chávez, E., 2017. Remittances and Natural Resource Extraction: Evidence from Mexico. *Ecol. Econ.* 132, 69–79. <https://doi.org/10.1016/j.ecolecon.2016.10.010>
- Love, I., Zicchino, L., 2006. Financial development and dynamic investment behavior: evidence from panel var. *Quart. Rev. Econom. Finance* 46 (2), 190–210.
- Nickell, Stephen. "Biases in dynamic models with fixed effects." *Econometrica: Journal of the econometric society* (1981): 1417-1426.
- Page, J., Plaza, S., 2006. Migration remittances and development: A review of global evidence. *J. Afr. Econ.* <https://doi.org/10.1093/jae/ejl035>
- Qin, L., Raheem, S., Murshed, M., Miao, X., Khan, Z., & Kirikkaleli, D. (2021). Does financial inclusion limit carbon dioxide emissions? Analyzing the role of globalization and renewable electricity output. *Sustainable Development*.
- Sims, C. A. 1980. Macroeconomics and reality. *Econometrica* 48: 1–48.
- Svirydzhenka, K., 2016. IMF Working Paper. Introd. a New Broad-based Index *Financ. Dev.* WP/16/5, 1–43.
- United Nations Economic Commission for Africa (UNECA). 2020. COVID-19 in Africa – Protecting Lives and Economies. April 2020.
- Usman, O., Alola, A. A., & Ike, G. N. (2021, October). Modelling the effect of energy consumption on different environmental indicators in the United States: The role of financial development and renewable energy innovations. In *Natural Resources Forum*. Oxford, UK: Blackwell Publishing Ltd.
- Wang, K. H., Liu, L., Adebayo, T. S., Lobon, O. R., & Claudia, M. N. (2021). Fiscal decentralization, political stability and resources curse hypothesis: A case of fiscal decentralized economies. *Resources Policy*, 72, 102071.
- Williams, K. (2016). Remittances and financial development: Evidence from sub-Saharan Africa. *African Development Review*, 28(3), 357-367.
- World Bank (2009), *The Case For Financial Literacy in Developing Countries: Promoting Access to Finance by Empowering Consumers* (Washington, DC: World Bank).
- World Bank. 2019. *Leveraging Economic Migration for Development: A Briefing for the World Bank Board*. Washington, DC: World Bank.
- Zafar, M. W., Saleem, M. M., Destek, M. A., & Caglar, A. E. (2021). The dynamic linkage between remittances, export diversification, education, renewable energy consumption, economic growth, and CO2 emissions in top remittance-receiving countries. *Sustainable Development*.