Can Mobile Money-Induced Cost Reduction Spur More Remittances to Uganda? Would the Resultant Large Remittances Affect Monetary Policy Effectiveness?

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Abstract

The increased use of mobile money for cross-border transfers can lower the costs of cross-border remittances. The reduction in costs in turn can spur additional increases in remittances as it frees up the incomes of the senders. This study first estimated the remittance elasticity to cost by applying the pooled mean group method to quarterly panel data of three country sources of remittances to Uganda for the period 2013Q1-2022Q4. The results showed that remittances are highly elastic to costs. This implies that a reduction in costs can spur larger remittances than is currently observed. The study then created two regimes (one with lower and another with higher growth of remittances) in which we assess the impact of remittances on monetary policy effectiveness. We use the local projection model on quarterly data for the period 2002Q3-2023Q1. The results showed that the responses of output gap, inflation, and policy rates to shock in monetary policy are broadly similar in magnitude and direction across both regimes. However, the policy rate and inflation responded sluggishly in the regime with higher growth of remittances, which suggests that in this regime, monetary policy is not as potent as it would be in the regime with lower remittance growth. Thus, in a regime with higher remittance growth, the case for an independent monetary policy is weakened. Thus, in this regime, for a central bank to credibly commit to an inflation target, it must adopt a fixed exchange rate system (or variants therein).

Keywords: *Uganda, mobile money, cross-border remittances, monetary policy transmission*

JEL Classification: *E51 E52 E58*

1. Introduction

Remittances are a stable source of bank deposits in recipient countries. It is, however, unclear how large and rapid flows of remittances affect monetary policy. Remittances can enhance monetary policy efficacy if intermediation were efficient, as banks would intermediate the additional deposits one-for-one to private sector credit. However, in recipient countries, which in most cases are emerging and developing economies, poor-quality legal and regulatory systems, undeveloped financial markets, and limited competition hinder perfect intermediation. In this case, any remittance-induced increases in bank deposits are not intermediated one-for-one into credit. Instead, banks use the additional deposits to acquire more safe or liquid assets. In the end, the holding of large liquid assets weakens the association between the marginal cost of funds for banks and changes in monetary policy. Large remittance inflows can thus weaken monetary policy efficacy (Barajas et al., 2016).

If not for the high transaction cost, remittance flows to recipient countries would probably be larger than currently observed. Lowering transaction costs would therefore stimulate more remittance inflows. Mobile Money has emerged as the cheapest channel for cross-border remittance transfers.[1] Since it was launched in Uganda, the use of mobile money for cross-border transfers registered a spectacular increase. For instance, of the available products, inward and outward mobile money remittances grew the fastest (96.4% and 158.3%) from 2016 to 2022. With mobile money, since transactions can be initiated directly from the handset without the need to visit the outlets, customers can transact only when the exchange rates are most favourable. In the process, customers can also transact only when the costs are lowest. Indeed, sending mobile money to Uganda from remittance source countries attracted the lowest fees in comparison to the traditional operators. Thus, the increased use of mobile money for cross-border money transfers can lower transaction costs, in turn stimulating more remittance inflows.

It is long accepted that fiscal and monetary policies are the main macroeconomic stabilization tools. However, in most developing countries, fiscal policy has been less potent, if not a source of macroeconomic instability as it tends to be procyclical, exacerbating business cycle swings, which puts undue burdens on monetary policy for stabilization. However, in developing countries, limited monetary autonomy, poor quality of institutions, and undeveloped financial markets hinder monetary policy effectiveness. If large remittances also impair the ability of monetary policy, then relying on monetary policy as a stabilization tool is overly misguided. It is, therefore, important to understand the impact of large remittances on monetary policy.

This study first estimated the cost elasticity of remittances and using the estimated elasticity, it examines how the resultant additional remittances affect monetary policy effectiveness in Uganda. The study applied the pooled mean group (Pesaran, 1997; Pesaran et al., 1999) method on quarterly data for the period 2013Q4-2022Q4 to estimate the remittance cost elasticity. The results are as follows: the cost elasticity of remittances is between -0.11 and -0.16. That is, a 10% decrease in transaction costs stimulates between 1.1% and 1.6% more inflows of remittances. Therefore, if the transaction cost were to be lowered from 14.1% to 3.2% cost through the mobile money operators, between 8.5% and 12.3% increase in remittance inflows would be realized. Thus, a reduction in transaction costs is a very powerful tool to boost remittance inflows to developing countries.

We developed two regimes: one with higher and another with lower remittance growth relative to median growth. We estimated the impact of remittance flows on monetary policy across the two regimes using the local projection method (Jordà, 2005) on quarterly data for 2002Q3 to 2023Q1. The results are as follows: in the baseline model, an exogenous shock to monetary policy has insignificant effects on the output gap and inflation. Although the directions of the responses are as expected apriori, the magnitudes of the responses are small. When we condition on the two regimes, the results showed that the responses of the output gap, inflation, and policy rates to a monetary policy shock are similar across the two regimes in magnitudes and directions. However, the responses of the policy rate and inflation are sluggish in the regime with higher growth rates, which suggests that higher growth of remittances reduces the potency of monetary policy. Therefore, in a regime with higher remittance growth, the case for an independent monetary policy is weakened. In this regime, for a central bank to credibly commit to an inflation target, it must adopt a fixed exchange rate system.

The rest of the article is organized as follows. Section 2 presents a survey of the literature. Section 3 presents stylized facts on remittances and transaction costs. Section 4 presents remittance elasticity to costs and computes the potential increase in remittances that a reduction in the costs would induce. Section 5 discusses the theoretical framework showing large remittance inflows can pose challenges to the conduct of monetary policy, especially in the presence of problems resulting from market failure in developing countries. The section further presents the methodology used to examine the likely impact of higher remittance growth on the effectiveness of monetary policy. In addition, it discusses the empirical results and their implications for policy. Section 6 provides the concluding remarks and policy recommendations.

2. Review of literature

The literature on financial innovation and monetary policy is growing but remains inconclusive[2]. One set of the existing literature supports the view that financial innovations lend support to monetary policy by, for example, strengthening the interest rate and exchange rate channels of monetary transmission (Weber, 2010; Noyer, 2007). A small change in the monetary base therefore directly drives a higher impact on money supply, thereby improving the effectiveness of monetary policy. The assertion that financial innovations may affect the velocity of money has received mixed outcomes. In studying the Uganda economy, Nampewo and Opolot (2016) noted that financial innovations did not affect the stability of monetary aggregates as they observed the existence of long-run stability in money velocity. This finding implied that the magnitude of the impact of mobile money on monetary policy is somewhat diminished. Also, mobile money gives more households access to the formal financial markets, facilitating increased saving and borrowing, in turn increasing the share of economic activity under the sway of central bank interest rates. Thus, changes in monetary policy will have a more direct effect on household and firm intertemporal consumption and investment decisions.

Weber (2010) documented how financial innovation facilitates greater integration of domestic and international financial markets, which in turn strengthens the exchange rate channel of monetary transmission as it makes the exchange rate more responsive to the interest rate differentials between currency areas. Noyer (2007) discussed how financial innovation fosters faster dissemination of information and faster factoring of information in the financial asset prices, which in turn increases the effectiveness of monetary policy, especially the interest rate channel. Also, financial innovation contributes to an increased holding of financial assets, by lowering transaction costs, facilitating arbitrage, hedging, funding and investment strategies. Noyer (2007) further argued that financial innovation allows hedge funds to customarily borrow short-term funds to finance long-term investments.

As a financial innovation, mobile money has the potential to realize a broad range of new capabilities, including direct payments by the government to individuals and firms, frictionless payments by consumers at points of sale, and transfers person-to-person, bank-to-wallet, wallet-to-bank and cross-border, which in turn brings the unbanked sections of the population into the formal financial system and under the purview of monetary policy. In this way, financial innovations would strengthen the effectiveness of monetary policy in low-income countries. The recent entry of mobile money in the cross-border remittance transfer business can help lower the costs of transfers through costless price discovery, enhancing competition and increasing convenience[3]. The lower cost would then free the incomes of the remitters and add to increased total cross-border personal transfers or remittances. Thus, the increase in total cross-border transfers/remittances would be a stable source of funds to banks, increasing their deposits. In the presence of efficient intermediation, remittances would strengthen the banking lending channel of monetary policy transmission.

Financial intermediation is, however, limited in low-income countries by lack of competition in the banking sector, low quality of institutions (inadequate property rights systems and ineffective contracts enforcement laws), underdeveloped financial markets (segmentation, undiversified markets, etc.), and information asymmetry (see Mishra et al. (2012)), which means the increase in bank deposits is not intermediated one-for-one into increased credit to the private sector. As a result, banks would hold more liquid assets (including government securities). Large holdings of liquid assets by banks could result in the marginal cost of funds becoming delinked from the changes in the central bank policy rate. Thus, increased remittances ultimately weaken the transmission of monetary policy.

Indeed, growing evidence exists that monetary policy transmission is much weaker in low-income countries. Monetary policy is transmitted to the economy through various channels: interest rate, exchange rate, asset price, and credit (divided into bank lending and balance sheet channels). Most of these channels are weak or non-existent in low-income countries due to the undeveloped financial sector, including the lack of domestic securities markets, imperfect integration with the global financial markets and undeveloped asset markets (Mishra et al., 2012; Mishra et al., 2013; Mishra et al., 2014). It is only the bank lending channel that is the most important in low-income countries (Mishra et al., 2012; Mishra et al., 2013; Mishra et al., 2014). However, the lack of banking competition, the low quality of institutions, the underdevelopment of the interbank markets and asymmetric information (see Mishra et al., 2012) make the bank lending channel even more doubtful.

Barajas et al. (2016) developed and estimated a model that analytically shows that the remittance components of the deposits make the marginal costs of funds delinked from the policy rates. The empirical results showed that as remittances increase, the transmission of the policy rate to that on domestic credit becomes weaker. Several studies have examined the implications of remittances for monetary policy transmission. Gapen et al. (2006) showed that remittances increase volatility in the real business cycle, causing deviations in the optimal level of monetary policy rules. They noted that in remittance-dependent countries, households whose incomes constitute both production-related income and remittances tend to distribute the gains from remittances to leisure, causing a fall in domestic output, consequently altering optimal monetary and fiscal policy. This implies that in times of shocks in the dependent countries of the remittance, household incomes reflect counter-cyclical trends. When domestic production income declines, the transfers to these households increase causing them to weather shocks. This view is also held by Bugamelli and Paternò (2011), who argued that remittances support households to smooth their consumption in the face of shocks, although this study diverges on the issue of output volatility. They instead noted that remittances complement aggregate output by supporting household investments, consequently reducing output volatility.

Ruiz and Vargas-Silva (2010) added to the debate by showing that shocks to international remittances have minimal impact on the transmission of monetary policy. In studying the Mexican economy, they noted that shocks are not significantly transmitted to monetary policy-related variables such as the exchange rate and interest rates. However, Heilman (2006) had earlier held an opposing view by showing that remittances significantly affect the level of the exchange rate and may create inflationary pressures if remittances induce demand for imported and non-tradable goods. Moreover, Vacaflores (2012) showed that high levels of remittances alter the transmission mechanism of monetary policy by acting as a monetary aggregate that in the short run lowers nominal interest rates and work effort, which effectively lowers output.

Chami et al (2008) used a dynamic stochastic general equilibrium (DSGE) framework to derive an optimal policy rule for a recipient country and found that the optimal policy deviates from the Friedman rule, which highlights the need for independent policy instruments. Vocaflores (2012) incorporated the negative effects of remittances on labour supply and showed that remittances can dampen the gains from positive monetary policy impulses, while Mandelman (2013) developed a general equilibrium model for a small open economy with volatile remittance inflows and considered the welfare implications of different monetary and exchange rate regimes. The results showed that, in the absence of business-cycle fluctuations, a nominal fixed exchange rate regime does not result in a rapid real appreciation and performs better in the face of an increasing trend for remittances, while a floating exchange rate regime is preferred when the business cycle is driven by macroeconomic disturbances.

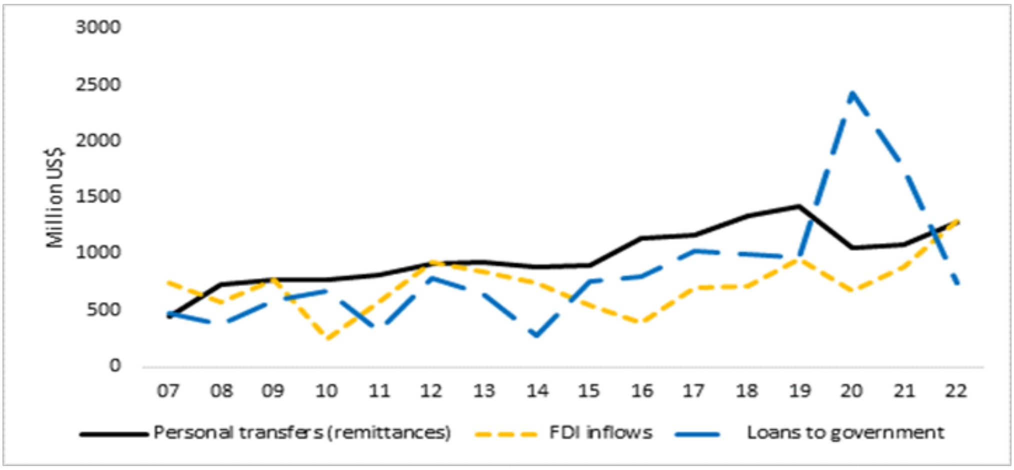
The potential reduction in the cost of inward international remittances could spur large and rapid growth in total remittance inflows in Uganda. In as much as remittances are a stable source of funding, if not managed well they can pose challenges to the conduct of monetary policy. Transactions with mobile money including deposits, withdrawals, person-to-person, person-to-business, bank-to-wallet, wallet-to-bank, and airtime and data purchases, etc., are transactions that are backed one-for-one by fiat money in the domestic banking system, which are part of bank deposits and broad money. These transactions bring on board the unbanked population, which increases the proportion of the economy that is under the purview of the central bank and could help monetary policy effectiveness. The impact of these transactions on monetary policy has been well documented but the evidence has been generally inconclusive (see, for example, Mawejje and Lakuma, 2017; Kipkemboi and Bahia, 2019; Patnam and Yao, 2020; Shirono et al., 2021).

Remittance inflows are, however, a source of deposit growth (as they bring new money into the economy) for domestic banks. In perfect markets, the growth in deposits would be intermediated one-for-one into credit to the private sector. However, due to market imperfections (information asymmetry, weak institutional quality, limited competition, and underdeveloped financial markets), the intermediation is constrained as banks would prefer to invest these additional funds into safe and liquid assets instead, including lending to the government. As such, banks end up with more liquid assets and as a result, the marginal cost of the loanable funds becomes delinked from the changes in interest rates, which in turn weaken the effectiveness of monetary policy. Our major contribution is to compute the dynamic reactions of key macroeconomic variables, such as output gap, inflation rates, and policy rates to changes in monetary policy in the presence of low and high rates of growth of remittance inflows.

3. Stylized facts

As shown in Figure 1, remittance is among the major sources of financing for developing countries. In some cases, remittances are more than official development assistance and foreign investment inflows.

Figure 1: Remittances, foreign direct investment and external loans (% of GDP)



Source: Bank of Uganda, (https://bou.or.ug/bouwebsite/Statistics/)

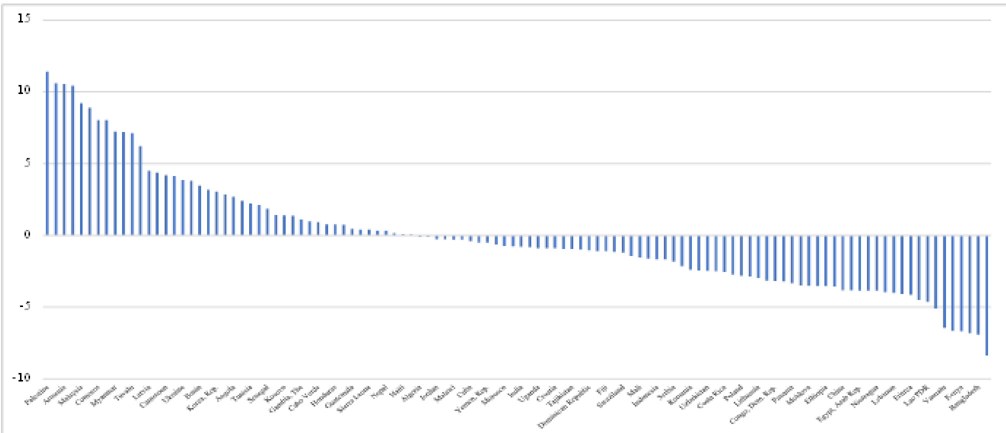
The increased use of mobile money to transact cross-border transfers brings some reprieve. Mobile money can alleviate market failure problems in remittance markets in developing countries. It provides convenience, security and a price discovery mechanism. Remittance recipients receive money directly on their phones (sim cards) without having to travel to agents' outlets. Also, users can initiate transactions directly from their handsets, which allows for checking transaction costs (fees, exchange rates and other costs) without the need to visit a remittance operator. The self-check allows users to transact only when exchange rates are most favourable. In another way, mobile money can disrupt market structures or modify existing structures, which increases competition and efficiency[4].

In Uganda, cross-border remittance via mobile money began in 2012. Since then, there has been an observed rapid rise in remittances through mobile money. Inward cross-border remittances stood at US$45.5 million in December 2021, up from just

US$6.5 million in 2013. At the same time, total inward aggregate remittances jumped to US$1.3 billion from US$800 million in 2011[5]. Moreover, of the products provided via mobile money, such as deposits, withdrawals, person-to-person, person-to-business, airtime and data purchase, cross-border inward and outward remittances stood out as the fastest-growing products in 2016—2022, with year-on-year increases of between 96.4% and 158.3%.

Figure 2 shows the average cost of sending US$200 by a group of countries during 2011Q1—2022Q4. The cost of sending this amount remains high, but there is significant heterogeneity among countries depending on the exchange rate margins, levels of development and remittance corridor-specific characteristics. For Uganda, the average cost of sending US$200 stood at 14.1%, which is one of the highest in the world.

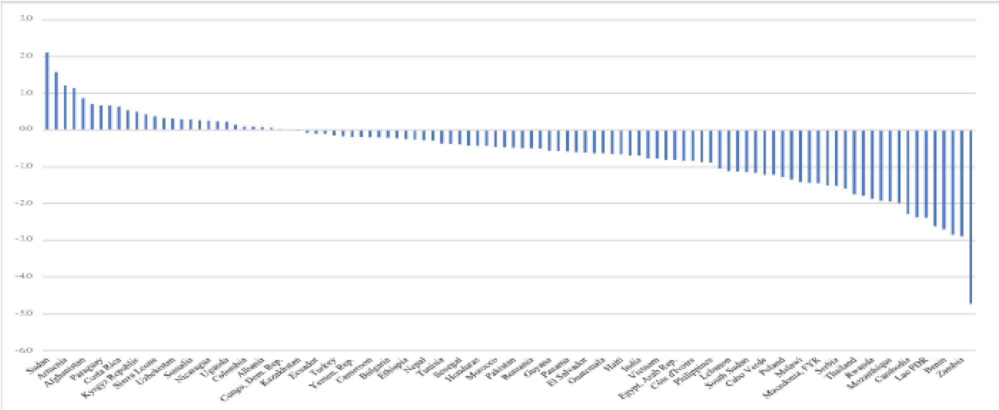
Figure 2: The average distance from the mean cost for sending US$200



Source: Remittance Prices Worldwide (World Bank, 2022) and author's computation

Figure 3 presents the change in the average cost of sending US$200 between 2016/18 and 2019/21 in percentage points. Most (72%) of the countries in the sample witnessed a significant percentage decline in the cost of sending remittances between 2016/18 and 2019/21. In some countries, such as Lesotho, Benin, Vanuatu, Zambia and Namibia, the costs declined by 2.6—4.7 percentage points, whereas in others such as Sudan, Madagascar, and Armenia, the costs increased by 1.2—2.1 percentage points[6]. The cost of sending money to Uganda increased by 0.2 percentage points over the 2016/18—2019/21 period.

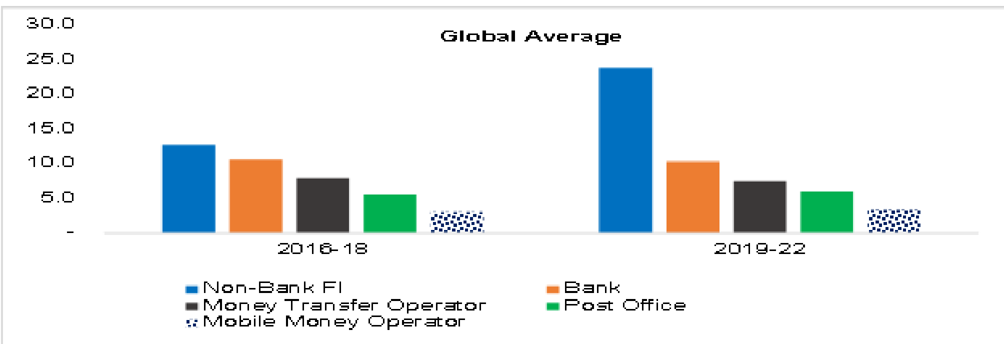
Figure 3: Change in average cost of sending US$200, 2016/18–2019/21



Source: Remittance Prices Worldwide (World Bank, 2022) and author's Computation

Figure 4 shows the average transaction costs of sending US$200 via various providers. Mobile money providers charged the lowest transaction fees as compared to traditional financial institutions, such as banks and non-banks, which charged the highest fees. There is a noticeable increase in the fees charged by banks and non-banks attributable to increased regulatory requirements such as anti-money laundering and the countering of the financing of terrorism.

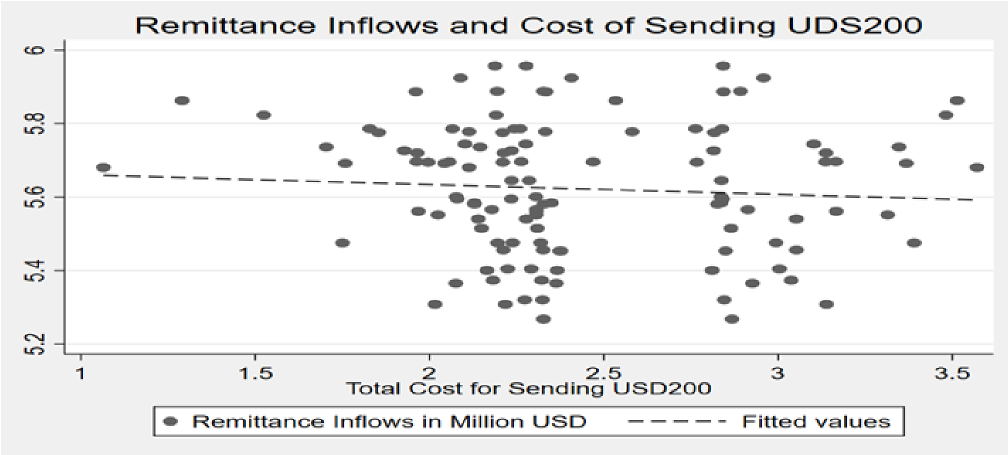
Figure 4: Average transaction cost for sending US$200



Source: Authors' computation based on Remittance Prices Worldwide (World Bank, 2022)

Figure 5 shows a negative relationship between remittance costs and remittance inflows. The negative association implies that higher transaction costs impede remittance inflows. In other words, a reduction in the transaction costs could spur more remittance inflows.

Figure 5: Remittance inflows and transaction costs



Source: Author's computation

4. Cost elasticity of remittances

To estimate the elasticity of remittances to costs, the study applied a pooled mean group (PMG) model on quarterly panel data of three countries, which are the sources of remittances to Uganda over the period 2013Q1—2022Q4. In panel data with large time series, T, non-stationarity is a concern (see Blackburne III and Frank, 2007). To solve this concern, Pesaran (1997) and Pesaran et al. (1999) developed the Mean Group (MG) and PMG estimator, which uses the Autoregressive Distributed Lag (ARDL) approach. The ARDL is suited for mixed order of integration, which does not require testing whether unit roots exist in the panel. The PMG allows the intercepts, short-run coefficients, and error variances to vary across groups. The long-run coefficients are, however, constrained to be homogenous across groups (Blackburne III and Frank, 2007). The Hausman test confirms the PMG estimator to be efficient and consistent. The results are presented in Table 5. In the PMG, the intercepts, short-run coefficients and error variances are allowed to vary across groups, but the long-run coefficients are constrained to be homogenous across groups [blackburne2007estimation]. Constraining the long-run coefficients to be uniform for all groups is plausible in our case, given that banks may be influenced by common macroeconomic and regulation environments, which lead to similar reaction patterns.

The PMG model or ARDL (1,1,1,1,1) is specified as follows:

$$\log(remit_{it}) = \alpha + \delta_{10}\log(cost_{it}) + \delta_{11}\log(cost_{i,t-1}) + \delta_{20}\log(ex_{it}) + \delta_{21}\log(ex_{i,t-1}) + \delta_{30}\log(qgdp_{it}) + \delta_{31}\log(qgdp_{i,t-1}) + \delta_{40}(Ucap_{it}) + \delta_{41}(Ucap_{i,t-1}) + \varepsilon_{it} \tag{1}$$

where $i = 1,2,\ldots,N$ and $t = 1,2,\ldots,T$. The error correction term (the speed of adjustment of the variable to their long-term equilibrium after the shocks) is a key feature of a cointegrated relationship.

Rewriting Equation 1 in an error correction model yield:

$$\log(remit_{it}) = \varphi[\log(remit_{it}) - \beta_0 - \beta_1\log(cost_{it}) - \beta_2\log(ex_{it}) - \beta_3\log(qgdp_{it}) - \beta_4(Ucap_{it})] - \delta_{11}\log(cost_{it}) - \delta_{21}\log(ex_{it}) - \delta_{31}\log(qgdp_{it}) - \delta_{41}(Ucap_{it}) + \varepsilon_{it} \tag{2}$$

where $\varphi = -(1-\gamma), \beta_0 = \frac{\alpha}{1-\gamma}, \beta_1 = \frac{\delta_{10}+\delta_{11}}{1-\gamma}, \beta_2 = \frac{\delta_{20}+\delta_{21}}{1-\gamma}, \beta_3 = \frac{\delta_{30}+\delta_{31}}{1-\gamma}, \beta_4 = \frac{\delta_{40}+\delta_{41}}{1-\gamma}$.

The term φ is the error-correction term. Pesaran et al. (1999) assumes that for the system to be cointegrated, the term φ should not be equal to zero, is negative and statistically significant to allow the system to return to the long-run equilibrium after a shock. Equation 2 being non-linear in parameters is estimated using a maximum likelihood estimator (Pesaran et al., 1999).

The data used are: *remit* is the quarterly remittance inflows to Uganda, measured in USD dollars; is the cost of sending US$200 in percent; *qgdp* is the exchange rate, measured as the units of domestic currency per US dollars; *Ucap* is the quarterly gross domestic product of each country, measured in US dollars; and is the per capita gross domestic product for Uganda, measured in US dollars.

The PMG (1,0,0,2,3) was estimated on quarterly data for the period 2013Q4-2022Q4 with unrestricted constant and unrestricted trend inclusive. Also, a PMG (1,0,0,2,3) with unrestricted constant and restricted trend was estimated. The lag lengths were selected automatically using the Akaike Information Criteria (AIC). The results are presented in Table 1, columns (1) and (2) respectively.

The coefficient of the error correction term, which shows the speed of adjustment to the long run after a shock was negative and statistically significant at the 5% level. A negative coefficient of the error correction term indicates the presence of cointegration between the dependent and independent variables. The coefficient of the error term being above average (-1.12 to -1.13) implies that the adjustment process of remittances to the long run path after a shock is faster.

The explanatory variable of interest is the log of transaction cost for sending US200. The coefficient of the log of transaction cost was -0.11 and -0.16 and was statistically significant at the 5% level in all specifications. With a -0.11 and -0.16 elasticity, a 10% decrease in transaction costs could stimulate remittance inflows by about 1.6% (column 1) and 1.1% (column 2).

The results suggest that exchange rate is an important cost factor driving remittance inflows. The coefficient of the exchange rate was 3.42 and 3.39, which suggests that a 1% depreciation of the exchange rate stimulates remittance inflows by 3.4%. The positive association between the exchange rate and remittances suggests that remittances in US dollar terms increase with a depreciation of the local currency. The depreciation of the local currency means that a stronger dollar provides immigrants with additional incentives to send more resources home. The result is intuitive in the sense that from a cost perspective, because a depreciation of the currency of the recipient country means that the cost of acquiring one unit of the local currency has dropped, meaning that the demand for the local currency by migrants increases, ceteris paribus. Income per capita in the receiving country and the total income in the sending country are positively associated with remittance inflows.

Table 1: Elasticity of remittances to transaction costs: PMG estimates

	(1)	(2)
	Long-run (pooled) coefficients	
Log (transaction cost, %)	-0.1550***	-0.1145***
	(0.0482)	(0.0357)
Log (exchange rate)	3.4173***	3.3921***
	(0.3417)	(0.3464)
Log (real GDP, sending country)	0.5685**	0.5901***
	(0.1853)	(0.1865)
Log (per capita GDP, Uganda)	2.1676***	2.1187***
	(0.3592)	(0.3626)
@TREND		-0.0135***
		(0.0016)
COINTEQ (error correction)	-1.1294***	-1.1228***
	(0.0789)	(0.0781)
	Short-run (mean-group) coefficients	
D (Log (real GDP, sending country))	0.5242**	0.5438***
	(0.2257)	(0.1938)
D (Log (real GDP, sending country)), lag 1	-0.3365	-0.3400
	(0.9134)	(0.1938)
D (Log (per capita GDP, Uganda))	0.0832	0.0940
	(0.0789)	(0.1398)
D (Log (per capita GDP, Uganda)), lag 1	2.3230***	2.3102***
	(0.4045)	(0.3910)
D (Log (per capita GDP, Uganda)), lag 2	1.2994***	1.3071***
	(0.0844)	(0.0947)
@TREND	-0.0150***	
	(0.0003)	
Constant	-44.5298***	-44.1263***
	(2.1399)	(2.0657)
Log likelihood	121.75	120.83
Observations	111	111
Groups	3	3

Note: The standard errors are in parenthesis. */**/*** denotes 10%/5%/1% level of significance. The dependent variable is the natural log of remittances.
Source: Author's computation

Given the cost elasticity of remittances, the observed values of remittances (in million US dollars) for Uganda, and the average transaction cost of US200, we compute potential increases in remittances that would be induced by the reduction in transaction costs. As Table 2 shows, the average cost by all channels stood at 14.1%, whereas the cost via the mobile money channel stood at 3.2% over the period.

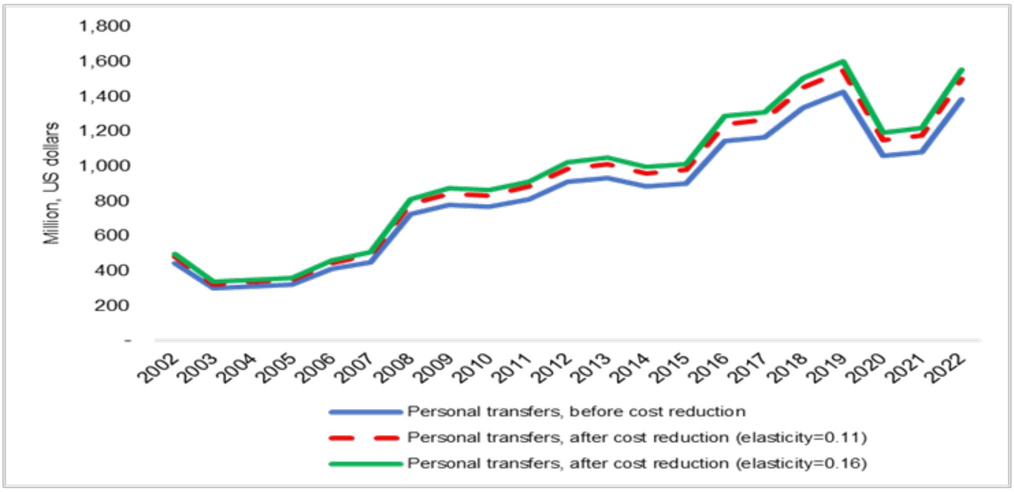
Table 2: Transaction costs by various channels (% of US$200)

	Non-bank	Bank	Post office	MTO	Mobile operator	Average
2016	25.9	15.2	9.7	8.0	1.4	12.0
2017	26.5	15.4	9.9	7.8	2.3	12.4
2018	28.6	15.6	12.1	7.2	2.7	13.2
2019	32.3	18.3	14.0	8.0	4.4	15.4
2020	39.3	18.0	11.2	7.5	3.0	15.8
2021	34.1	21.9	10.6	6.5	3.5	15.3
2022	33.6	24.9	…	5.4	5.2	17.2

Source: Remittance Prices Worldwide (World Bank, 2022)

A reduction in transaction costs from 14.1% to 3.2% is a 77.3% decline. This decline, multiplied by the elasticity of -0.11 and -0.16 results in an 8.5% and 12.3% increase in remittances respectively. Figure 6 shows the additional remittance inflows that would be stimulated by the reduction in transaction costs. The estimates showed that remittances would increase by a factor of 1.1 as the transaction cost was lowered from 14.1% to 3.2%. The results suggest that a reduction in transaction costs is a powerful tool to spur remittance inflows to developing countries.

Figure 6: Increase in remittances due to cost reduction



Source: Author's computation

5. Remittances and monetary policy

Theoretical framework

For most central banks, the objective of monetary policy is price stability. To attain this objective, the central bank sets a policy rate and must sell and purchase financial instruments to and from the interbank money market to influence the interbank interest rate to move in close association with the policy rate. With deposits being the biggest source of funds for most banks, when a central bank increases/decreases its policy rate, the costs of funds for banks would subsequently increase/decrease, leading to a reduction in the supply of bank lending as the high cost of funds is passed onto borrowers. Thus, any change in the central bank policy rate is passed onto lending rates in the following way:

$$i_p \uparrow \rightarrow \; i_L \uparrow \qquad (3)$$

where i_p is the policy rate and i_L is the bank lending rate.

In Equation 3, changes in policy rates affect the marginal costs of funds, which are subsequently passed onto borrowers through higher lending rates. This is the so-called bank lending channel of monetary policy transmission (see Mishra et al., 2014). But for the bank lending channel to operate effectively, banks must intermediate funds efficiently. However, particularly in low-income countries, limited competition (which curtails the ability of banks to pass the changes in cost of funds to borrowers and poor institutional quality, such as costly enforcement of loan contracts (which prevents lending to take place in formal markets) prevent efficient intermediation taking place. Further, the interbank market, which is vital for the bank lending channel, is shallow and underdeveloped in developing countries. As a result, banks would rather hold safe and liquid assets; the holding of a large proportion of liquid assets weakens the relationship between the marginal cost of funds and the central bank policy rate leading to ineffective monetary policy.

Remittances provide a stable source of funds for banks. In the presence of efficient intermediation, the remittances would be intermediated one-for-one into credit to the private sector. In this environment, remittances would contribute to strengthening the transmission of monetary policy. However, due to market failure, the increase in funds from remittances would not be intermediated one-for-one into credit, as banks would rather use the increase in deposit to acquire safer and liquid assets. Thus, the increase in deposit due to remittances weakens the effectiveness of monetary policy (see Barajas et al., 2016).

Methodology and data

The estimation relied on the local projection approach (Jordà, 2005). Using this approach, we conditioned the reactions of the variables to a monetary policy shock under two regimes, namely a regime with rapid growth rates and a regime with slow growth rates relative to a median growth rate in remittances. Economic time series have often been analyzed using Vector Auto-Regressive (VAR) models (see Sims, 1980) to recover structural shocks to further estimate their propagating effects on economic variables. However, VAR models have several drawbacks, including the imposed dynamics on the system, problems with dimensionality and difficulties with application to nonlinearities (see Auerbach and Gorodnichenko, 2012). Kilian and Kim (2011), and Montiel Olea and Plagborg-Moller (2021) did simulations comparing the local projection estimator against the VAR impulse response functions and noted that the VAR impulse response functions perform poorly.

The local projection method, however, offers three advantages over the VAR approach, namely: it is easier to estimate since it relies on simple linear regressions; the point-wise inference is easily conducted; and the impulse responses are more robust when a linear VAR is misspecified (see Jordà, 2005). The local projection method has been broadly applied to both panel and time series data (see Hamilton, 2011; Owyang et al., 2013; Auerbach and Gorodnichenko, 2012; Jordà et al., 2015; Favara and Imbs, 2015; Jordà and Taylor, 2016; Jordà et al., 2020;). However, the disadvantage of the local projection estimator arises from its direct multi-step method, which reduces sample size compared with an equivalent VAR. Both local projection and VAR condition on p initial values, but local projection also conditions on $H-1$ trailing values, where $H-1$ is the maximum desired impulse response step (horizon). Conditioning on the trailing values severely reduces the sample size when attempting to estimate long horizon responses using a small sample.

We first estimated a linear model to show how the output gap, inflation rate, and policy rate react to the corresponding shocks to monetary policy. We then tested for non-linearities by estimating the model under the two regimes.

The dependent variable is dated $t+h$ on the independent variable dated t, together with a set of control variables. The linear model is specified as follows:

$$y_{t+h} = \alpha_h + \beta_h R_t + \gamma' \sum_{s=1}^{q} X_{t-s} + \epsilon_{t+h}, \tag{4}$$

where y_{t+h} is the dependent variable (or y_{t+h} is the response variable) and R_t is the monetary policy variable and X_{t-s} are the control variables.

The parameter of interest is the impulse coefficient, β_h. It measures the impact of a shock (defined as a one percentage point increase in monetary policy, here measured by interest rate) on the dependent variable, *h* periods ahead. Plotting β_h as a function of *h* results in an impulse response function. Additional control variables, X_{t-s} are included, but their associated coefficients are nuisance parameters. This is a typical characterization of the bank lending channel of monetary policy transmission. The results, that is, the impulse response functions should indicate whether this identification represents a typical bank lending channel of monetary transmission mechanism.

As for the non-linear model, we created two observable regimes, I and II, that govern the impact of monetary policy on output, inflation and interest rates. Our aim was to assess whether the impact of monetary policy on the economy is different under the two regimes. The regimes were constructed as dummy variables, named I_t, which equals one to when the economy is in regime one, and zero, when it is in regime II. Regime I has rates of remittance inflows that are above the median growth rate and regime II has the rates below the median growth rate. This way, therefore, the regimes are observable, unlike in Markov-switching models (Hamilton, 1988; Hamilton, 1989), where the regimes are unobservable. The two regimes are divided based on the annual percent change in the value of remittances. We created a dummy equal to one for the regime with remittance growth rates above the median and zero for the regime with growth rates below the median as follows:

$$I_t \begin{cases} 1 \; if \; v_t > \tau \\ 0 \; if \; v_t \leq \tau \end{cases}$$

where τ is the median growth rate, v_t; β_h^I reflects the impact of monetary policy on the output gap or inflation in a regime with higher remittance growth rates; and β_h^{II} reflects the effect of monetary policy in a regime with lower growth rates.

The non-linear model is thus specified as:

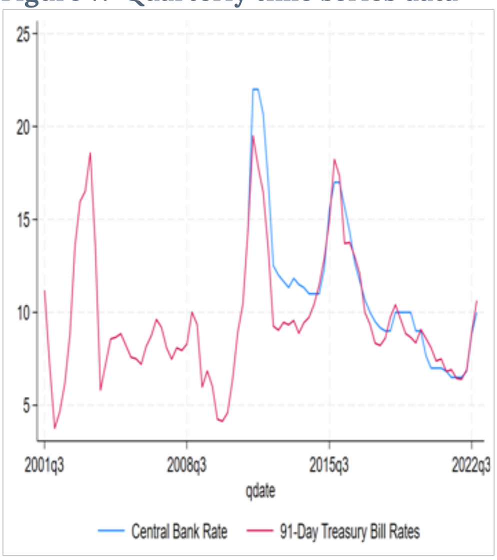
$$\begin{aligned} y_{t+h} = I_{t-1}[\alpha_h^I + \beta_h^I R_t + (\gamma_h^I)' \sum_{s=1}^{q} X_{t-s}] + (1 - I_{t-1})[\alpha_h^{II} + \beta_h^{II} R_t \\ + (\gamma_h^{II})' \sum_{s=1}^{q} X_{t-s}] + \epsilon_{t+h}, \end{aligned} \tag{5}$$

The constant α, the coefficient on the monetary policy variable β, and the coefficient on the domestic control variables γ, are allowed to be regime- dependent. For $I_t = 1 \; \forall \; t$, the non-linear model collapses to a linear model.

We used quarterly data for the period 2002Q3 to 2023Q1. All the data were obtained from the Bank of Uganda databases (https://bou.or.ug/bouwebsite/Statistics/).

Personal cash transfers are used to proxy remittances, while the monetary policy variable was represented by the 91-day treasury bill rate in line with the existing literature (see Barajas et al., 2016). Barajas et al. (2016) used the rate on government securities as a proxy for the monetary policy rate. Uganda implements an inflation targeting regime in which the central bank uses the central bank rate as its policy rate. The use of the 91-day treasury bill rate is dictated by the fact that it goes as far back as 2006, whereas the central bank rate starts in 2011. In any case, the two rates are closely related (see Figure 7). The other variables were output gap, measured as the percent difference between the observed output and potential output, and core inflation rates. Potential output was estimated using the Hoddrick-Prescott filter method. Unlike headline inflation, core inflation excludes volatile food crops and energy prices. Core inflation, therefore, is most appropriate for assessing the impact of monetary policy on inflation. Except for the 91-day treasury bill rates, all the data are seasonally adjusted using the Census X12 method. The data are depicted in Figure 7.

Figure 7: Quarterly time series data



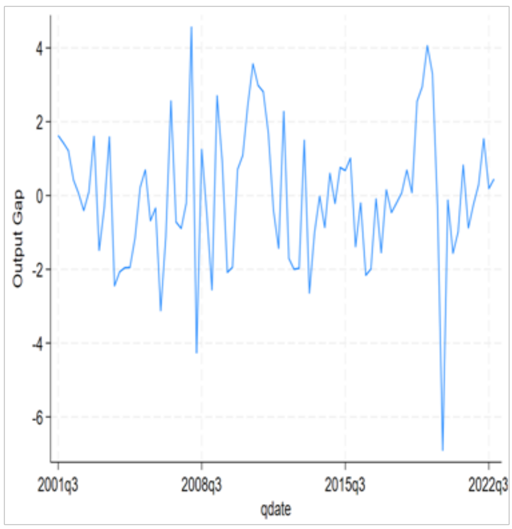


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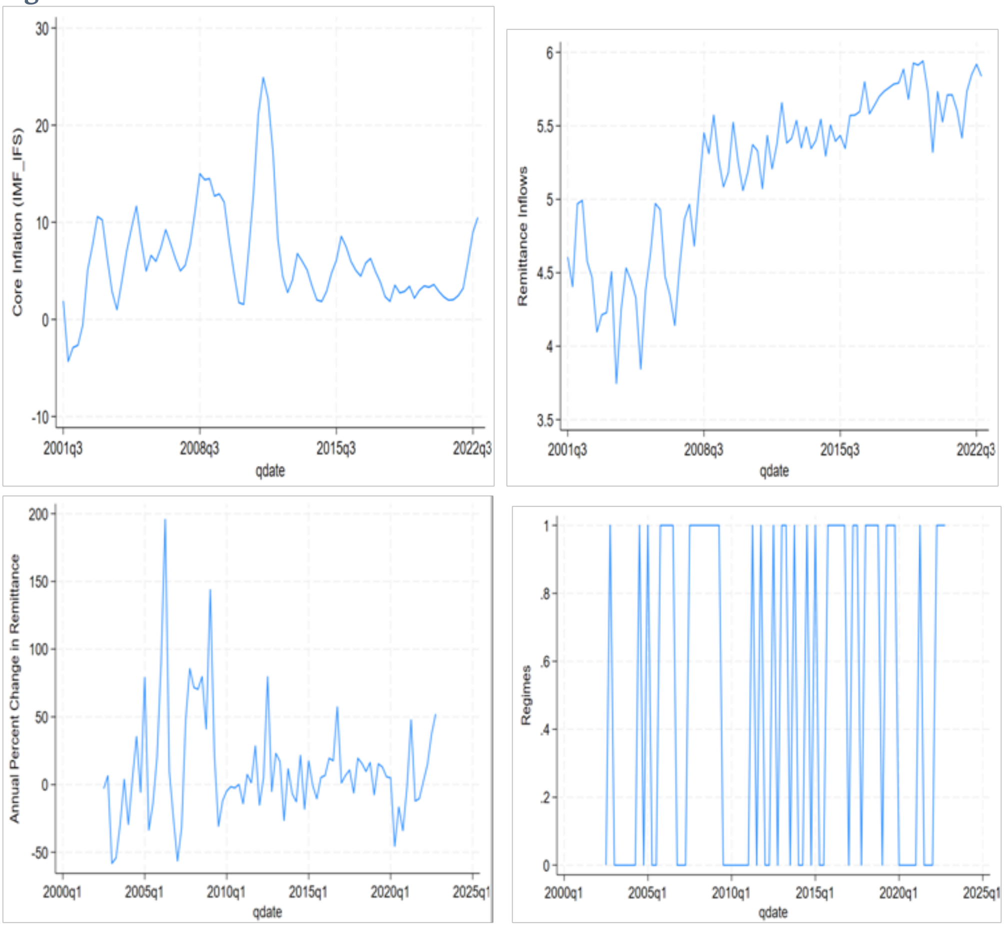
Figure 7 Continued



Source: Author's computation and Bank of Uganda

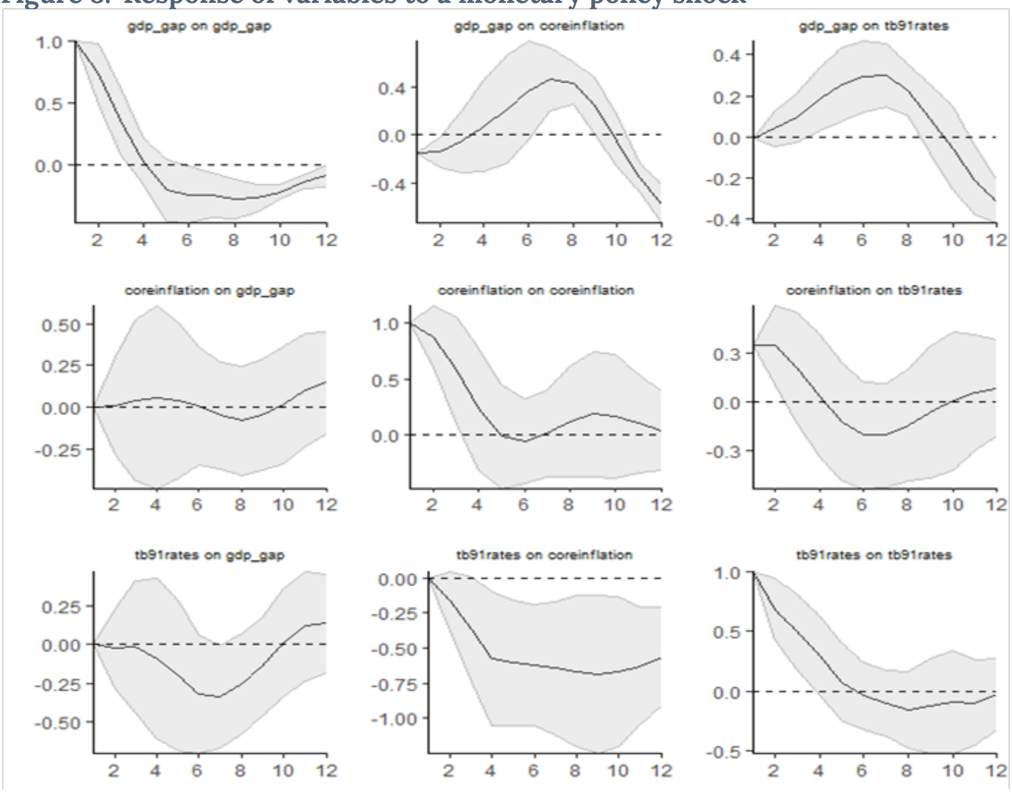
Empirical results

The responses of output gap and inflation to a 100 basis points increase in the policy rate are presented in this section. We first present the results from the baseline model. The objective of the baseline model was to assess whether the estimated dynamic responses (in terms of the magnitudes, lags and directions) of the output gap and inflation characterize an effective monetary transmission mechanism. The results are presented in Figure 8. The vertical axes of Figure 8 represent percent changes, while the horizontal axes represent the h-periods. The responses are surrounded by 95% confidence bands.

The responses of the output gap, inflation and treasury bill rates to a shock to the output gap are presented in the top row. The responses to an inflation shock are presented in the middle row and the third row depicts the responses to a treasury bill rate shock. The second panel of the top row shows an unexpected increase in the output gap causes inflation to rise slightly in the quarter after the shock to eight quarters before declining, reaching the zero line (steady state) about ten quarters after the shock. The treasury bill rate also rose the year after the shock, reached its peak about seven steps after the shock, declined and reached its steady state after ten quarters. In the middle row, the output gap responds to the inflation shock by falling initially before rising marginally then begins to move back to the steady state after about six quarters after the shock. The inflation shock causes inflation itself to rise and fall back immediately to the steady state after five quarters. The inflation shock causes the treasury bill rates to rise to about two quarters after the shock, before declining to the steady state after four quarters.

The responses of inflation and output gap to the interest rate shock are shown in the third row. In the far-right chart of Figure 8, a 100 basis points increase in the 91-day treasury bill rate leads to an increase in this rate by a 100 basis points in the first quarter and declines immediately afterwards. On the left chart of Figure 8, a +100 basis points (1 percentage point) increase in the policy rate leads to a marginal decline in output gap in the first three quarters and afterwards, the output gap falls rapidly, reaching a minimum of approximately 0.25 percentage points below its long-run level at the 6^{th}–7th quarter (or 18—21 months), before it starts to move back to its long-run level (zero line). The results imply that a 10 percentage points increase in the policy rate results in a 2.5 percentage point decline in the output gap, which is not sizable. Also, the results show that it takes a maximum of 21 months for the change in the policy rate to reach its maximum impact, which implies that the transmission of monetary policy to the economy is weak. The response of the output gap to a change in the interest rate was statistically insignificant as depicted by the confidence bands.

Figure 8. Response of variables to a monetary policy shock

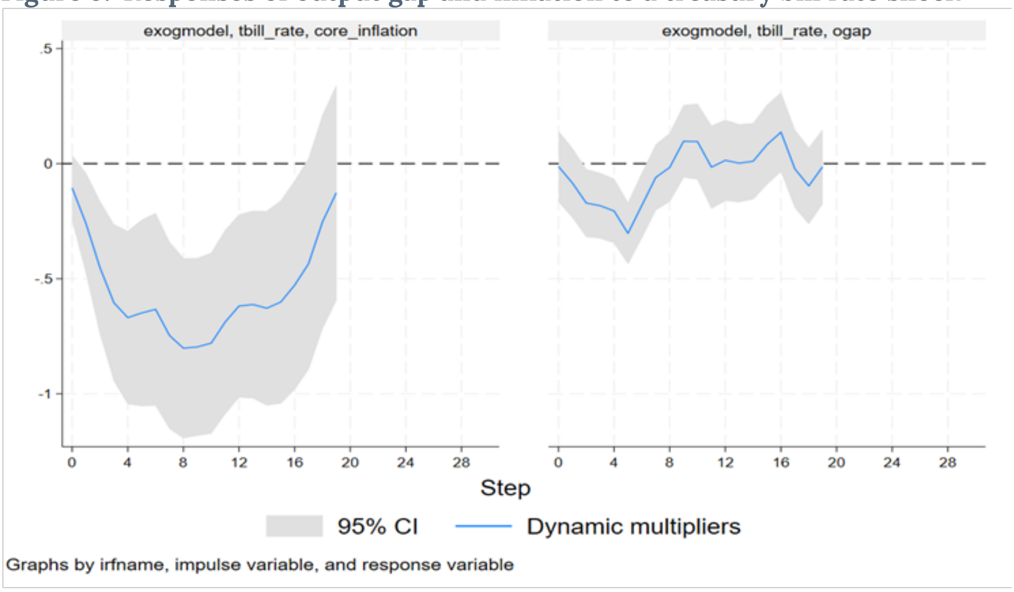


Source: Author’s computation

We extracted the responses of the output and inflation to the shock in the treasury bill rates, which is a one-unit increase in the treasury bill rate. Inflation fell and reached a trough of about seven quarters after the shock, before it rose towards its trend for about 16 quarters but remains below trend. In contrast, the output gap fell initially, reaching a trough of about four quarters after the shock. The output gap then recovered by four periods after the trough and even overshot its trend. Sixteen periods after the shock, the output remained above its long-run value.

Broadly speaking, the results showed that an exogenous shock to the policy rate had insignificant effects on the output gap and inflation. Although the directions of the responses are as expected apriori, the magnitude of the responses and the lags with which it took for policy to hit its maximum impact were insignificant. These results thus showed that, for Uganda, the monetary transmission exists, but remained weak. Some studies (Mishra et al., 2012; Mishra et al., 2013 and Mishra et al., 2014) found that the bank lending channel of monetary transmission was weak in developing countries.

Figure 9. Responses of output gap and inflation to a treasury bill rate shock



Source: Author's computation

We then assessed whether the output gap and inflation respond to the treasury bill shock under the two regimes. A dummy variable equals one if the rates of growth of remittance inflows were above the median and zero otherwise, which was applied to the third lag of the treasury bill rate.

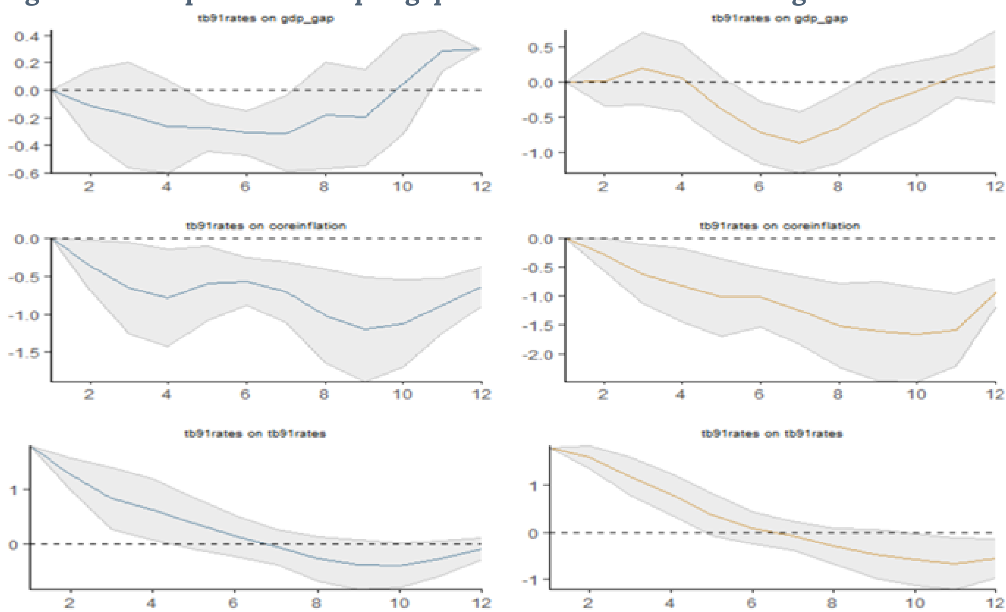
The results are presented in Figure 9. Each row of Figure 9 has two charts: The left panel shows the responses of the output gap, inflation and the treasury bill rate to a 100 basis points increase in the treasury bill rate under low growth rates of remittance inflows and right panel shows the responses under high growth rates.

The first row of Figure 9 shows the response of the output gap to a 100 basis points increase in the treasury bill rates. Under the low growth regime, the output gap falls immediately after a 100 basis points increase in the treasury bill rates, reaching a minimum of 0.3 percentage points below its long-run level about 7 quarters before it rises to trend. Under the high growth regime, it takes 2 quarters for the impact of a 100 basis points increase in the treasury bill rates to be reflected in the decline in the output gap after which the output gap rises about the third quarter before it starts to decline. In effect, the decline in the output gap begins in the fourth quarter after the shock under the high growth regime. These results show that high growth rates in remittances delayed the impact of monetary policy on output.

The second row shows the response of inflation to a 100-basis point increase in the treasury bill rate. The response of inflation to a 100-basis point increase in the treasury bill rate is similar both in magnitude and direction under both low and high growth regimes. However, it takes a longer period, about 11 quarters for inflation to bottom out under the high growth regime in contrast to 9 quarters under the low growth regime. These results suggest that under the high growth regime, the impact of a change in monetary policy on inflation was delayed. The last row shows the response of the treasury bill rate to its shocks. A 100-basis point increase in the treasury bill rate leads to a steady decline in the treasury bill rate under both the low and high growth regimes. However, it took a longer period for the impact to die out under the high growth regime.

In a nutshell, the effectiveness of monetary policy under the low and high growth rates were almost similar. Except for the delay in response to inflation and treasury bill rates, there were no significant differences in the magnitudes and directions of the responses to a shock to treasury bill rate.

Figure 10: Responses of output gap and inflation under two regimes



Source: Author's Computation

6. Conclusion and policy recommendation

The increased use of mobile money has the potential to lower the costs of cross-border transfers. The reduction in costs could spur additional increases in remittances as the lower costs can free up the income of the senders. In as much as remittances are a welcome source of financing, large inflows, if not properly managed, could impair the transmission process of monetary policy, weakening its influence on output and inflation.

Remittances could affect monetary policy in two ways, each with opposing effects. On one hand, it is a stable and interest-insensitive source of funds to banks, and with efficient intermediation, the additional funds would contribute to strengthening the efficacy of monetary policy. However, with information asymmetry, poor institutional and regulatory quality, and limited competition in the banking sector in low-income countries, the additional funds may not be fully intermediate one-for-one to credit. Due to the market failure, banks would prefer to invest the additional funds in safe and liquid assets. The holding of more liquid assets causes the marginal cost of funds to delink from the changes in monetary policy, thereby weakening the effectiveness of the monetary policy. Barajas et al (2016) argue that this effect dominates.

This paper first estimated the elasticity of remittances to costs. The results show that remittances are highly elastic to cost, thereby a reduction in costs would spur remittances to grow by a factor of 1.1. In other words, were it not for the high costs, of remittances, remittances to Uganda would be significantly higher than is currently observed. The paper then assessed the impact of the potential high growth rates of remittances on the efficacy of monetary policy. The results are summarised as follows:

- First, from the linear model, the results show that an exogenous shock to the policy rate has insignificant effects on the output gap and inflation. Although the directions of the responses are as expected apriori, the magnitudes of the responses are small, and it takes longer for the full impact to materialize. Second, conditioned on two regimes of the growth rates of remittances, the results show that the output gap, inflation, and policy rates respond in similar ways in both regimes in terms of magnitudes and directions. But the responses of inflation and treasury bill rates are delayed, which suggests that there are differences albeit insignificant in the responses of the real variables to changes in monetary policy in the face of large remittances.

- Fiscal policy is often not a very potent instrument for macroeconomic stabilization in low-income countries and sometimes can be a source of macroeconomic shocks as it often behaves procyclical, aggravating macroeconomic shocks. This places an undue burden on monetary policy for stabilization. However, with central banks autonomy limited both de jure and de facto, the ability to use an independent monetary policy for macroeconomic stabilization is also limited. For a central bank to use monetary policy, its policy changes must be effective in influencing output and inflation. But in developing countries, this influence is hindered by poor institutional quality, limited competition, and information asymmetry.

- If the potential increases in remittances further limit the potency of monetary policy, the need for independent monetary policy is strongly weakened. That is, in the face of large and rapid remittance inflows, central banks would not credibly commit to a given inflation target. In this circumstance, central banks may have to adopt a fixed type of exchange rate system to credibly commit to an inflation target. This is consistent with the empirical finding that shows that remittance inflows increase the likelihood that a country will choose a fixed exchange rate regime (see Singer, 2010).

- In the face of rapid remittance inflows blurring the potency of monetary policy, the first-best policy action is to eliminate impediments to banks' intermediation to allow the additional remittances to be lent to the private sector. The policy actions would include reducing information asymmetry, enhancing contract enforcement to allow financial contracts to take place in formal markets, and enhancing property rights. However, these policy actions can only bear fruits in the medium to long run. In the short run, policymakers could use quantitative measures, including raising the cash reserve requirements to eliminate excess structural reserves. In addition, if the central bank faces challenges in implementing an effective independent monetary policy in the medium term, it may be necessary to adopt a more managed exchange rate regime.

Nevertheless, the policies to deal with the impact of large remittances must not directly impact the remittance inflows as there is ample evidence showing that remittances are welfare-enhancing. There is a need for policies to balance these challenges with the beneficial effects of remittances.

Notes

1. Mobile Money is a mobile phone-based money transfer system operated by cellular phone providers. It allows users to exchange cash for e-money, send the e-money to other phone users, and exchange the e-money back into cash.

2. Financial innovation is the emergence of new financial products, services and of new forms of organization in more sophisticated and complete financial markets (See Noyer, 2007).

3. For anyone to conduct mobile money transactions, he/she must possess a cell phone. Cell phones have capabilities to efficiently gather information and facilitate price discovery as well as convenience and competition.

4. Lack of competition has long been identified as the main cause of the high cost of financial services in low-income countries (Beck, Janfils, and Kpodar, 2022).

5. Aggregate remittances include transfers by all transfer operators, including remittances through mobile money.

6. We excluded the Syrian Arab Republic from the analysis as it had the cost rising by 7.5 percentage points (from 5% to 12.5%) over the period.

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