The impact of remittances on the monetary transmission mechanism in low-income countries

A thesis

submitted in fulfilment

of the requirements for the degree

of

Doctor of Philosophy in Economics

at

The University of Waikato

by

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THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2025

Abstract

This thesis consists of three studies investigating the impact of remittances on monetary transmission mechanisms. The prime objective of this research is to explore how the inflow of remittances affects the different monetary transmission channels in remittance-receiving economies and what other factors influence remittances in altering their effects on monetary transmission mechanisms. The first two studies were undertaken using a panel of 51 remittance-receiving countries, while the third study used Sri Lanka as the location.

The first study investigates the effects of remittances on bank credit and exchange rate channels, using a panel Structural Vector Autoregression (SVAR) to investigate how remittances affect these intermediate monetary transmission channels. The estimated impulse responses (IRs) of bank credit and exchange rates to a shock in remittances show a significant variation between countries in responding to a shock in remittances. In the second stage, we regress the IRs of selected horizons on selected economically significant variables to find out what other factors contribute to this variation. The cross-sectional regression suggests that the magnitude of remittances in terms of the remittances-to-GDP ratio affects the exchange rates channel significantly. However, the effect of remittances on bank credit is determined by the level of remittance inflow and the savings-to-GDP ratio. More precisely, remittances significantly affect the bank credit channel in countries where the remittances-to-GDP ratio is higher than five percent of GDP. The overall findings of this study suggest that policymakers, especially in higher remittance-receiving countries, have to pay attention to the role remittances play in weakening the monetary transmission mechanism (MTM).

The second study investigates how institutions play a role in altering the effects of remittances on the bank credit channel. There are arguments about whether remittances contribute to the expansion of credit in remittance-receiving countries. In this study, we use a panel SVAR model to estimate the IRs of bank credit to a shock in remittances and regress these IRs on a set of institutional and other economically significant variables. The regression results indicate that stronger corruption control and regulatory quality, along with savings-to-GDP and remittances-to-GDP ratios, are associated with credit expansion in response to remittances. This empirical finding indicates that monetary policy measures may have difficulty in achieving their objectives through bank credit in higher remittance-receiving countries, which have a strong corruption control and regulatory quality environment.

The third study analyses how the effects of remittances vary with regard to bank credit, exchange rates, and asset price channels in the conflict and post-conflict periods in the Sri Lankan economy. We apply a country-specific SVAR model by using the monthly data from 1996 to 2019. The empirical analysis suggests that remittances significantly affect these monetary transmission channels in the post-conflict period, and their effects on bank credit and asset prices are relatively stronger than the exchange rate channel in this period.

Notes on Publications

Chapter 2: The impact of remittances on monetary transmission mechanisms in remittance-recipient countries, with a focus on credit and exchange rate channels

Presented at the DevNet 2022 conference held at the University of Auckland, 7-9 December 2022.

Published as Waikato University Economics Working Paper 23/06 and to be submitted to a journal.

Chapter 3: The impact of remittances on monetary transmission mechanism: an investigation into the role of institutions in the bank credit channel.

To be submitted to a journal.

Chapter 4: The impact of remittances on monetary transmission mechanism during pre-and post-conflict eras in Sri Lanka

Published as Waikato University Economics Working Paper 21/10 and to be submitted to a journal.

Acknowledgements

My PhD research has been an interesting and challenging experience from the outset. I am grateful to everyone who has supported and helped me during my PhD studies.

I would like to thank my supervisors for their valuable support and guidance. It has always been very easy for me to approach them and seek help. Firstly, thanks go to my former chief supervisor, Prof. Gazi M Hassan, who helped with my research work from 2020 to 2023. He enhanced my knowledge significantly and guided me in many ways to enable me to complete my research journey. He was not only a supervisor but also a good friend. Equally, I am grateful to my present chief supervisor, Prof. Mark Holmes, who has been involved with my research work from the beginning. He advised and guided me in many ways to make this learning journey a success. I am also thankful to Dr. Michael Ryan, my second supervisor, for his valuable insights and advice.

My wholehearted gratitude also goes to my dearest wife, Milka Atham Lebbe, who has been a tremendous motivator, advisor, and caretaker during my PhD studies. I cannot explain in words how significant her contribution has been to my PhD journey. I would not have completed my research without her support and care. She sacrificed a lot for my success. I am sincerely grateful to you, Milka. I am also thankful to my children, Fathima Afaf Hiba, and Muhammad Ansaf, for their patience, and for sacrificing time with me. I am grateful to my mother, Sithihani, and my uncle, Muhammad Sahabdeen, who have contributed to my education since primary school. I would not have reached this stage of my studies without their support. My sincere thanks also go to my PhD colleague Sandamalee, and my friend Muhamed Theseem for their valuable contributions.

I am grateful to Judy McDonald, Amanda Sircombe, and Denise Martin for their support during my study period. Finally, I sincerely acknowledge the financial support given by the New Zealand Postgraduate Development Research Awards, which enabled me to complete the second research paper in this thesis.

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Glossary of Terms

ASPI	All share price index
CBSL	Central Bank of Sri Lanka
CPI	Consumer price index
CSE	Colombo stock exchange
FDI	Foreign direct investment
GDP	Gross domestic product
GNI	Gross national income
GTOS	General-to-specific
IFS	International financial statistics
IMF	International monetary fund
IRs	Impulse responses
IRFs	Impulse response function
LMICs	Low- and middle-income countries
LICs	Low-income countries
MTM	Monetary transmission mechanism
ODI	Official development assistance
SDFR	Standing deposit facility rate
SSA	Sub-Saharan Africa
SVAR	Structural vector autoregression
VAR	Vector autoregression

Chapter 1

Introduction

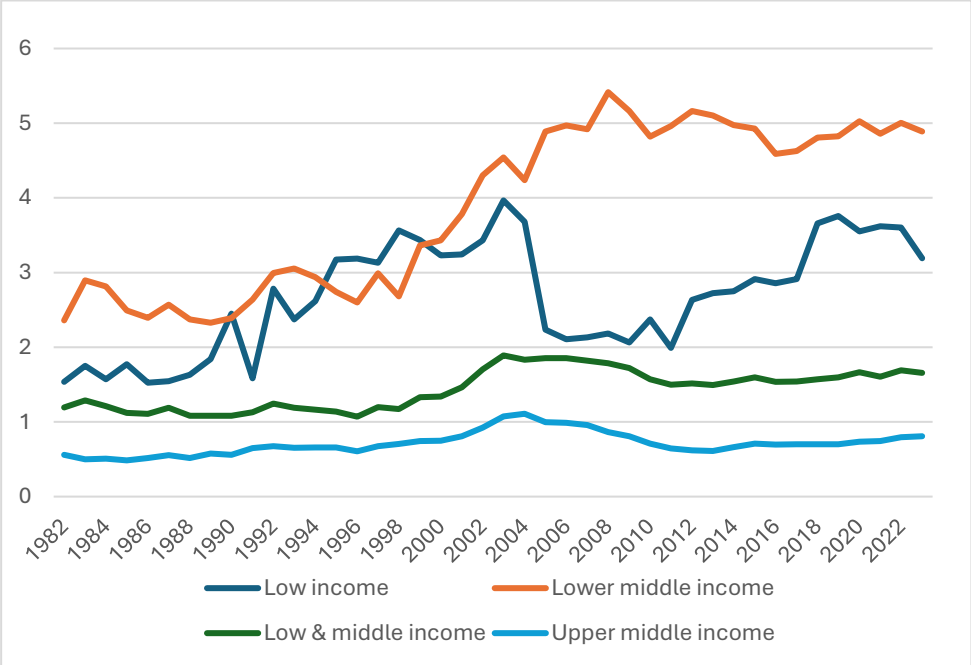
1.1 Background of the study

Remittances are defined as the money sent by migrant workers to their family members and relatives for various reasons, including altruistic, savings and investment purposes in their home countries. Remittances have become a significant external source of funds in many countries, particularly in low- and middle-income countries (LMICs). In 1970, personal remittances received by all countries were only US$ 1.93 billion and they grew slowly, reaching US$ 120 billion in 2000. Since then, remittances have recorded a steady increase, reaching US$ 857 billion in 2023. According to the World Bank (2024), the remittances to global GDP ratio was 0.3 to 0.4 percent between the years 1970 and 2000. This percentage has been growing steadily since the year 2000 and reached 0.8 percent of global GDP in 2023. The remittances-to-GDP ratio is higher in low-income and lower-middle-income countries, reaching 3.19 percent and 4.89 percent, respectively, in 2023 (see Figure 1.1). The gap between foreign direct investment (FDI) and remittances in LMICs began to fall in 2012 (see Figure 1.2) and remittances now dominate the external financing sources in LMICs, exceeding the inflow of FDI and official development assistance (ODI).

Remittances in many remittance-receiving countries serve primarily altruistic purposes. However, remittances also generate multiplier effects on economic growth when they are spent by remittance recipients in their home countries (Ratha, 2005b). In addition, remittance inflows into many remittance-receiving economies make up a significant proportion of their current account, which helps these countries safeguard against severe currency fluctuation and offset deficits in other components of their current accounts (Čakajac et al., 2023; Hassan & Holmes, 2016; Lartey, 2017). The channels discussed above indicate the importance of remittances in many remittance-inflowing countries, especially LMICs. Some studies reveal, however, that remittances cause several macroeconomic challenges in the home countries. These include real exchange rate appreciation (Azizi, 2021; Hassan & Holmes, 2013; Lopez et al., 2007; Nketiah et al., 2019), delay in fiscal adjustment (Abdih et al., 2012; Gnangnon, 2014) and weakening of institutions (Abdih et al., 2012; Ahmed, 2012; Regan & Frank, 2014). The effect of remittances on the monetary transmission mechanism (MTM) is another significant potential issue, which is the focus of this study.

The primary objective of monetary policy is to achieve economic stability by having economically desired price and employment levels in a country. Monetary policy measures are transmitted into the real economy through the MTM. Central Banks use the interest rate as the primary tool to achieve their monetary policy targets, while asset prices, exchange rates, and bank lending contribute to translating policy effects into real economic activities. The link between monetary transmission channels and remittances may affect the operation of monetary transmission channels and, eventually, hinder monetary policy's ability to meet its macroeconomic goals.

Figure 1.1 Remittances-to-GDP ratio

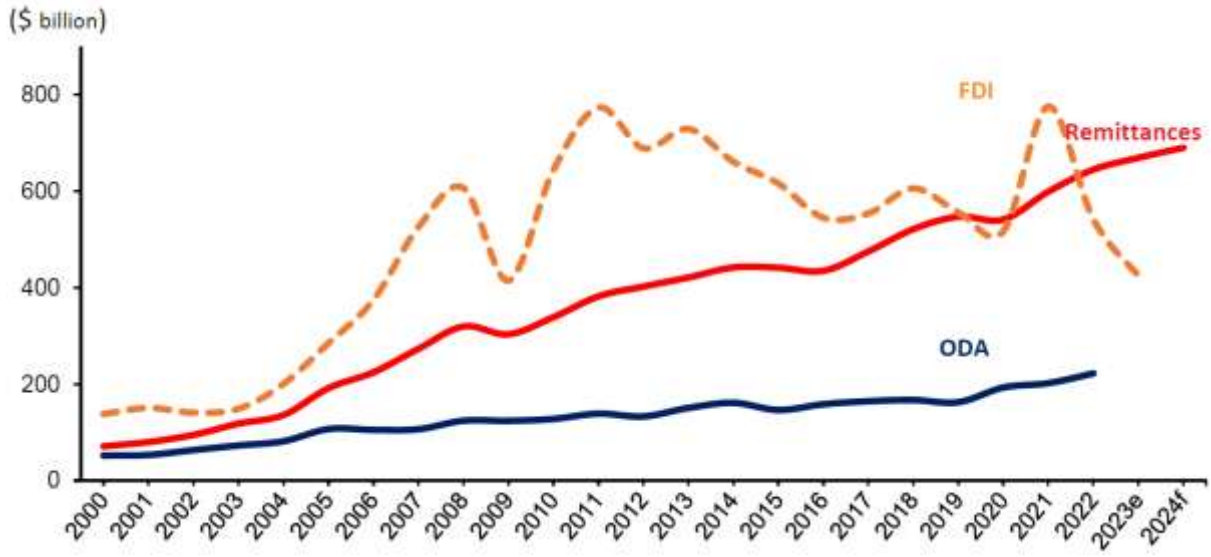


Source: World Bank 2024

Although the various macroeconomic effects of remittances have been quite intensively studied, the challenges posed by remittance inflows on MTMs have not been sufficiently explored to determine how remittances might hinder the operation of monetary transmission channels, consequently limiting the achievement of broader macroeconomic targets. This research explores the effects of remittances on MTMs. In addition, this research also focuses on how other factors, especially institutions and internal conflicts, play a role in altering the effects of remittances on MTMs. This research broadly contributes to the existing literature exploring the macroeconomic consequences of remittance inflow and guides the formulation of appropriate remittance-related policies, primarily in remittance-dependent economies. The study distinguishes itself from earlier studies on the effect of remittances on MTM by also studying the factors that shape the effects of remittances on MTMs. The primary focus

of this study is categorised into three thematic areas: monetary transmission channels, institutions and internal conflict.

Figure 1.2 External financial flows to low- and middle-income countries



Source: World Bank 2024

1.1.1 Monetary transmission channels

Remittances interact with monetary transmission channels, particularly with bank credit, exchange rates and asset prices while they flow into an economy. Remittances primarily flow into an economy through the banking system; therefore, these remittances increase the loanable funds available with commercial banks (Barajas et al., 2018; Naceur et al., 2019; Polat, 2018). Remittances interact with exchange rates as they are transferred from the host country to the home country in the form of foreign currency. The inflow of remittances in the form of foreign currencies results in the accumulation of foreign reserves, which affect the domestic currency value against foreign currencies (Kim, 2013; Kuncoro, 2020; Vacaflores & Kishan, 2014). Remittances are also used to purchase real assets in the home countries by family members; therefore, they also influence real asset prices in remittance-receiving countries (Adams Jr, 1998; Chiodi et al., 2012; Chowdhury & Radicic, 2019).

Research has begun to focus on the effect of remittances on MTMs, particularly in recent years. Barajas et al. (2018) find that remittances create an obstacle to the smooth functioning of monetary transmission channels. Their study focuses only on the effect of remittances on bank credit in remittance-receiving economies, but does not examine the effect on other means of monetary transmission in remittance-receiving countries. In addition, the

SVAR model used by Barajas et al. (2018) excludes other intermediate monetary transmission variables. Another investigation of the effects of remittances on monetary policy variables in the Mexican economy indicates that the influx of remittances does not have a significant effect on monetary policy variables (Ruiz & Vargas-Silva, 2010), but is limited to monetary policy variables and to the Mexican economy only.

The narrow focus of these two studies leaves a significant gap in the literature, especially with respect to how remittances affect the non-bank lending channels of the MTM. Chapter two focuses on the effects of remittance inflows via two alternative monetary transmission channels in 51 remittance-receiving economies.

1.1.2 Institutions

Institutions provide a suitable background for the smooth functioning of MTMs. The existence of a weak institutional setup can undermine the smooth functioning of the MTM, through the diminished role of the securities market, disassociation between asset price and interest rate, increased cost of bank lending, and the increased prevalence of Central Bank interventions in foreign exchange markets (Barajas et al., 2018; Prachi et al., 2012). The prevalence of strong institutional backgrounds strengthens creditor protection and thus decreases volatility and increases the functioning of securities market (and vice versa). In contrast, the prevalence of weak institutions leads to pledging more collaterals, stringent credit terms by banks and higher lending interest rates: therefore, a decrease or increase in interest rates may result in different outcomes in countries with strong and weak institutions.

Bank credit has been a primary monetary transmission channel, especially in the remittance-dependent LMICs (Agha et al., 2005; Alam & Waheed, 2006; Aleem, 2010). The existence of strong institutional arrangements is necessary for the banking sector to undertake its lending operations smoothly. The availability of a sound institutional background enables the banking sector to provide more loans and mortgage facilities to the private sector and helps monetary policy transmission to have effects on credit expansion or contraction (Christie, 2013; Haselmann & Wachtel, 2010; Modugu & Dempere, 2022).

Remittances that transfer through the banking sector build up funds available with commercial banks. Therefore, commercial banks become relatively less reliant on interbank financial markets for their short-term borrowings (Aggarwal et al., 2011; Barajas et al., 2018; Demirgüç-Kunt et al., 2011; Fromentin & Leon, 2019; Raheem et al., 2023). However, the question arises of whether the increase in availability of loanable funds driven by remittances

enables commercial banks to extend their lending facilities in all circumstances. There are two different schools of thought. One argues that remittances result in an increase in bank credit (Aggarwal et al., 2011; Basnet et al., 2021; Dutta, 2024; Gani & Sharma, 2013), while the other points out that remittances reduce the demand for credit as they are a substitute for bank lending (Ambrosius & Cuecuecha, 2013; Awdeh, 2017; Gautam, 2019). However, the interlinkage between remittances and institutional elements may also play a pivotal role in determining the effects of remittances on bank credit. This has not been the focus of any research to our knowledge: therefore, in chapter three we determine whether the institutional elements play a role in determining the effects of remittances in bank lending in remittance-receiving economies.

1.1.3 Internal conflicts

The presence of internal conflict in remittance-receiving countries is another element that contributes to migration and an increase in the inflow of remittances (Raheem et al., 2021). Studies have shown that conflict-affected countries receive significant amounts of remittances, as a significant proportion of people migrate to other countries because of the conflict rather than for economic reasons (Carling et al., 2012; Raheem et al., 2021). In addition, migrant diasporas also send remittances to their home countries to help their association members. Hence, an increasing level of remittances due to conflict may contribute to an increase in the magnitude of the effects of remittances on economic variables in conflict-affected countries (Raheem et al., 2021). Conflict also plays an important role in a country's institutional elements. A country that suffers from internal conflict tends to experience weakening of its institutional qualities (Jawad et al., 2020; Voors & Bulte, 2014), while peacebuilding and reconciliation efforts strengthen institutional qualities (Hegre & Nygård, 2015; Simonsen, 2005). Given that weak institutions could weaken the MTM (Barajas et al., 2018; Dimakou, 2006; Eren & Başar, 2023), intermediate monetary transmission channels could suffer from the effects of internal conflict. In contrast, peacebuilding measures could strengthen the functioning of intermediate monetary transmission channels in an economy. However, the varying effects of remittances on MTM in conflict and post-conflict periods have not been analysed in any research, to our knowledge. In chapter four we explore the effects of remittances on three monetary transmission channels – bank credit, exchange rates and asset prices – in conflict and post-conflict periods, using Sri Lanka as a model for our study.

1.2 Study context

We chose 51 remittance-receiving countries for our studies in Chapters two and three to investigate the impact of remittances on MTM and the influence of institutions on remittances in affecting the credit channel. The selection of countries was primarily limited by the availability of data. We selected 4 low-income countries, 22 LMICs, 23 upper-middle income and 6 high-income countries. These countries recorded a remittance-to-GDP ratio of 1 percent to 30 percent on average over a 20-year period between 2000 and 2019. Eighteen countries in the sample received remittances of more than 5 percent of their GDP and 11 countries received remittances amounting to more than 10 percent of their GDP. The remaining 23 countries received remittances equivalent to less than 5 percent of their GDP. We selected the 51 countries for these studies from Asia, Africa, Europe and Latin America.

We chose Sri Lanka as a case study for our fourth chapter because Sri Lanka has a history of steady reception of remittances from overseas. According to the World Bank (2024), remittance inflow into Sri Lanka was 7.1 percent of its GDP, equivalent to US$ 6.02 billion in 2023. In contrast, remittances were only US$ 60 million, equivalent to 1.8 percent of GDP in 1979, showing a significant increase in the inflow of remittances into Sri Lanka. Moreover, according to CBSL (2024), remittance inflow into Sri Lanka was US$ 5,970 million, equivalent to 50 percent of total goods exported in 2023, whereas in 1979 remittances were equal to only 6 percent of total goods exported (Athukorala, 2000; World Bank, 2024). This indicates a significant contribution of remittances to foreign exchange earnings in Sri Lanka and a steady growth in remittance inflow.

Secondly, the inflow of remittances began after the 1977 economic change and increase in migration. The steady increase in remittance inflow began after the commencement of a nearly 30-year-long civil conflict, which lasted from the early part of the 1980s to 2009. While the internal conflict in Sri Lanka led to emigration of the workforce from the country and a consequent increase in remittances, it also resulted in the deterioration of institutions. However, conflict-affected countries begin to strengthen their institutional background after internal conflicts end (O'Reilly, 2014). Sri Lanka was, therefore, an ideal choice for this study as it had the major characteristics of being a country receiving a significant amount of remittances compared to its GDP, and in two different eras, with conflict and post-conflict periods.

1.3 Chapter summary

This thesis consists of four main chapters, each examining different research questions. In chapter two, we examine the following questions: 1. Do remittances affect credit and exchange rate channels in remittance-receiving economies? 2. How does the effect of remittances on the credit and exchange rate channels vary across remittance-receiving economies? 3. What factors contribute to the varied effects on these transmission channels? To address these research questions, this study uses a SVAR and a cross-sectional regression analysis. Firstly, we generate the impulse response (IRs) of bank credit and exchange rate to a shock in remittances using the SVAR approach by Pedroni (2013). We apply an unbalanced panel SVAR model to estimate the effects of remittances on bank credit and exchange rate channels in 51 remittance-receiving countries. Secondly, we regress the IRs at selected time horizons on a set of other variables to describe what factors are correlated with the responses of bank credit and exchange rates to remittances. We also apply both short-run and long-run restrictions on the panel SVAR model as a distinguishing element of this study. In this study, we also consider both the demand and supply-side effects on bank lending by remittances as remittance inflow not only strengthen commercial banks' lending ability through remittances (Barajas et al., 2018), but they also lower the demand (Calderon et al., 2008) for loans because remittances are substituted for loans from commercial banks (Awdeh, 2017; Brown & Carmignani, 2015).

Our empirical findings in this chapter indicate that the estimated IRs of bank credit and exchange rates show a significant variation between countries in reacting to a shock in remittances. To explore the reason behind the variations in IRs, we use a cross-section regression with other economically significant variables. The regression analysis shows that the remittances-to-GDP ratio is positively correlated with the responsiveness of exchange rates to a shock to remittances. Further, the variations in IRs of bank credit are associated not only with the magnitude of remittances received but also with the national savings level in an economy. Further, the empirical results indicate that remittances could weaken the operation of bank credit channels when the percentage of remittances received by an economy exceed 5 percent of its GDP.

The third chapter analyses the role of institutions in altering the impact of remittances on MTM, with a focus on bank credit, which functions as the primary intermediate monetary transmission channel in many remittance-receiving economies. An increase in remittance inflow has been found to have a profound impact on bank credit (Aggarwal et al., 2011; Barajas

et al., 2018; Calderon et al., 2008) as well as on institutions in remittance-dependent economies (Abdih et al., 2012; Ahmed, 2012; Morrison, 2009), while institutional factors also influence the availability of credit facilities (Bayar, 2019; Boudriga et al., 2009; Vaithilingam et al., 2006), Therefore, this research investigates how institutional elements change the effects of remittances on bank credit in remittance-receiving economies. This study involves the same panel of 51 countries.

Some literature argues that remittances contribute to more bank lending because of the increasing amounts of loanable funds accumulated by commercial banks through remittances (Barajas et al., 2018). Some other literature indicates that remittances result in reducing demands for bank loans as remittances act as supplements to bank loans (Awdeh, 2017; Brown & Carmignani, 2015; Calderon et al., 2008). In this study, we investigate how the institutional environment prevailing in an economy alters the effect of remittances on bank lending. We also investigate what institutional characteristics influence the effects of remittances on bank credit particularly. We generate the IRs of bank credit to a shock in remittances in a SVAR model with short- and long-run restrictions and regress the IRs from selected time horizons on various institutional variables and other economically significant variables. The IRs generated in the SVAR model show a variation among the 51 countries in responding to a remittance shock, and the cross-section regression shows that increased corruption control and regulatory quality contribute to increasing the effect of remittances on bank credit. The empirical findings also indicate that these institutional variables have significant explanatory power where remittances to GDP and savings to GDP ratios are significantly high.

In chapter four we investigate the impact of remittances on MTM in the pre- and post-conflict periods in Sri Lanka. Our primary focus in this chapter is analysing (1) whether remittances have varying effects on intermediate monetary transmission channels, particularly credit, asset prices, and exchange rate channels, and (2) whether conflict alters the effects of remittances on these intermediate monetary transmission channels. We apply the SVAR model to estimate the effects of remittances on these intermediate monetary transmission channels in conflict and post-conflict periods in Sri Lanka. The findings reveal that remittances impact the intermediate monetary transmission channels differently during the conflict and the post-conflict periods. The empirical findings also suggest that remittances had a more intense effect on credit and asset prices during the post-conflict period. We reason that increased remittances due to conflict-driven migration could result in a more intense impact on MTMs due to wealth

and liquidity effects during the post-conflict period. This is because the prevalence of conflict brings more remittances into conflict-affected countries in the long run due to increased migration. The increased remittances provide more liquidity assets for the banking sector. These remittances are also used to invest in assets, as well as to rebuild assets destroyed during the conflict, resulting in an increased value of assets in the post-conflict period. The outcomes of this study also indicate that the variation in the impact of remittances on the MTM in the post-conflict period may be linked to the strengthening of institutions in the post-conflict period.

This chapter provides a general overview of the three different studies that focus on the impact of remittances on MTMs. The following three chapters will explain the individual studies in detail.

The focus of our study is on three intermediate transmission channels: bank credit, exchange rates, and asset prices. These intermediate transmission channels help to transmit monetary policy shocks to real economic variables, resulting in changes in inflation and employment levels in an economy. The architecture of this thesis is designed to examine the complexities of how remittances disrupt the standard MTM in remittance-receiving developing countries. Rather than examining all intermediate monetary transmission channels simultaneously across all contexts, the research purposefully sequences its investigation to provide both breadth and depth of analysis. In the second chapter, we focus mainly on two intermediate transmission channels, bank credit and exchange rate channels, as the primary, broad-scale arteries of the MTM in our panel of 51 countries. The exchange rate channel is vital to explore as remittances inflow in the form of foreign currencies, which impact the domestic currency value and export competitiveness overseas. Concurrently, the bank credit channel is introduced because remittances naturally build funds available with commercial banks, enabling their ability to expand the credit facilities in the market, recognizing that the credit channel is often the most dominant yet vulnerable pathway in low-income countries. In the third chapter, we analyse the bank credit channel and its interlinkages along with the institutional factors prevailing in the remittance-receiving economies. In this chapter, we examine why bank credit reacts differently in remittance-receiving countries. By introducing institutional factors, we investigate whether they play a role in expanding bank credit in remittance-receiving countries. In the fourth chapter, we incorporate asset prices along with bank credit and exchange rates within a single and dynamic case study of Sri Lanka. We incorporate asset prices in pre-and-post-conflict settings as the increasing inflow of remittances in the post-conflict period results in the surge of real estate and stock market investments. This

systematic progression—from a broad dual-channel overview to a targeted institutional analysis of the dominant credit pathway, culminating in a comprehensive three-channel country-specific model—provides a holistic narrative of how remittances permeate an economy under varying macroeconomic and structural realities.

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Chapter 2

The impact of remittances on monetary transmission mechanisms in remittance-receiving countries, with a focus on credit and exchange rate channels

Abstract: Remittances contribute to welfare enhancement and poverty alleviation in many remittance-receiving economies. However, recent literature also focuses on the macroeconomic impact of remittances due to their increasing inflow into these economies. We use an unbalanced heterogeneous panel Structural Vector Autoregression (SVAR) methodology to study the impact of remittances on intermediate monetary transmission channels in remittance-receiving countries. In particular, we analyse the effect of remittances on credit and exchange rate channels in these economies. We initially estimate credit and exchange rate impulse responses (IRs) to a shock in remittances. The IR estimates suggest a significant variation between countries in terms of credit and exchange rates in response to a shock in remittances. In the next stage, we run a cross-section regression of these responses to identify the factors influencing the IRs of these variables. The magnitude of remittances received by an economy significantly impacts the exchange rate channel, affecting the smooth functioning of the monetary transmission mechanism. However, the effect of remittances on the credit channel is dependent on the level of remittance inflows and savings in remittance-receiving economies. Our findings also show that remittances weaken the functioning of the credit channel at a higher level of remittance inflows, especially when the remittances are higher than approximately five percent of GDP in remittance-receiving economies. Overall, our findings have broad policy implications, suggesting that policymakers must pay attention to the possible effects of remittances on intermediate monetary transmission channels in achieving monetary policy targets.

Keywords: remittances, monetary policy, monetary transmission mechanism

JEL Classification: E5, E52, F24

2.1 Introduction

Remittances contribute to poverty reduction and economic growth objectives in many remittance-receiving economies. They form a major part of the current account in the balance of payments (BOP) in many developing economies, helping these countries relax their BOP constraints. Every day, thousands of migrant workers living in different parts of the world send small amounts of money home, primarily for altruistic reasons. However, the accumulated amount of remittances these migrant workers send home has become a very significant amount, which has surpassed official development assistance (ODA) and foreign direct investment (FDI) in low and middle-income countries (LMICs) in recent years. According to the World Bank (2019b), the inflow of remittances into LMICs reached US$ 529 billion in 2018, an increase of 9.6 per cent compared to the previous year, and reached nearly US$ 554 billion in 2019 (World Bank, 2020). However, the value of remittance inflows into remittance-receiving countries is expected to be greater than the reported figures (Barajas et al., 2008a; Ratha, 2005a).

Remittances lead to macroeconomic challenges (Jansen et al., 2012), despite their benefits in reducing poverty levels and improvement in economic and social welfare (Acosta et al., 2008; Olowa et al., 2011); therefore, remittance-receiving countries have to be cautious about remittance-driven challenges, particularly real exchange rate appreciation (Hassan & Holmes, 2013), inflation, deteriorating terms of trade (Amuedo-Dorantes & Pozo, 2004), income inequality (Howell, 2017), and disturbance to monetary transmission mechanisms (Barajas et al., 2018). Although most of these macroeconomic impacts of remittances are widely researched, the impact of remittances on individual monetary policy transmission channels has not received sufficient focus. Very few studies have been undertaken to analyse the effects of remittances on monetary transmission mechanisms, leaving room for further investigation into the implications of the effects of remittances on individual transmission channels. Vacaflores (2012) uses a limited participation model to examine the relationship between the share of remittances and monetary policy in a small open economy model. Ruiz and Vargas-Silva (2010) analyse the effect of remittances on Mexico's monetary policy variables, and Barajas et al. (2018) examine the relationship between remittances and pass-through of policy rates into bank lending rate in a panel study. However, the question of the effect of remittances on other transmission channels in the wider cluster of remittance-receiving economies still needs answers.

Bank credit and exchange rate channels are operative monetary transmission channels in most developing countries, where remittances play a significant role in the economy. These countries are heavily dependent on remittance inflows. Remittances may significantly alter the functioning of these intermediate monetary transmission channels; therefore, policymakers have to consider the effect of remittances on these channels in remittance-receiving countries. The credit market is important for credit growth and consequent production and consumption in an expansionary monetary policy. Policymakers also expect a decline in credit through contractionary monetary policy measures to achieve inflation targets. The influence of remittances may alter the expected policy outcomes when remittances delink the banks and the interbank credit market by increasing the loanable funds available with banks. Likewise, the inflow of remittances directly contributes to monetary aggregates and consequent inflationary pressure in the economy. This may trigger the introduction of contractionary monetary policy measures to control inflation in the economy; therefore, remittance-driven monetary aggregates may result in appreciation of the domestic currency. Policymakers in remittance-receiving economies need to assess their inflation-targeting monetary policy decisions considering the fluctuations in remittance inflows into their economies.

Our study examines the implications of remittances, investigating the following questions: 1. Do remittances affect credit and exchange rate channels in remittance-receiving economies? 2. How does the effect of remittances on credit and exchange rate channels vary across remittance-receiving economies? 3. What factors contribute to the varying effect on these transmission channels? To answer these questions, we use a two-stage approach. In the first stage, we estimate the IRs of bank credit and exchange rate to a shock in remittances using the methodology introduced by Pedroni (2013). In the second stage, we regress the IRs on a set of other variables, motivated by the previous empirical literature, to describe how remittances affect these monetary transmission channels.

This study is distinguished from previous studies by its use of a panel SVAR model with long-run and short-run restrictions. In addition, remittances are used as one of the variables in the SVAR model itself, reflecting its interrelationship with other variables. Furthermore, the SVAR approach addresses the endogeneity issue in the statistical analysis by ordering variables to form the interrelationship of the structure the variables and imposing restrictions on the contemporaneous relationship between the variables in the model. In addition, the panel SVAR approach proposed by Pedroni (2013) can capture the dynamic effects of variables in an unbalanced panel of heterogeneous economies. This research also

considers the demand and supply-side effects of remittances on credit channels, as remittances are not only channeled into the formal financial system, thereby increasing the loanable funds available from banks (Barajas et al., 2018), but they may also reduce the demand (Calderon et al., 2008) for bank credit with the substitution of remittances for borrowings from banks (Awdeh, 2016; Brown & Carmignani, 2015). Remittances may not contribute to credit growth if households spend all their remittances on consumption due to distrust of the financial system, or opt to choose different forms of savings funds (Aggarwal et al., 2011). We used the quarterly data from 2000 to 2019 for 51 remittance-receiving economies in different regions with different socio-economic conditions to capture the responses of transmission channels to structural shocks and minimize the possible bias in the statistical outcome by the combination of countries in different regions with different socio-economic conditions.

This research expands the literature on the implications of remittances in the effectiveness of monetary transmission channels in remittance-receiving economies. In addition, the outcomes of this study will assist policymakers in remittance-receiving economies in formulating monetary policy to achieve employment and inflation targets.

2.2 Literature review

Monetary policy measures are used to maintain economic stability in a country by maintaining appropriate employment and inflation rates. Central Banks around the world execute this policy measure by altering policy rates in the economy. The monetary policy transmission mechanism is how monetary policy decisions are transferred into the real economy. The primary medium of monetary policy transmission is interest rates; however, bank lending, stock market prices, real estate prices, and exchange rates play a significant role in monetary policy transmission as changes in interest rates are transferred to the real economy through these channels (Bernanke & Blinder, 1992; Mishkin, 2001; Mishra et al., 2014; Romer et al., 1990; Taylor, 1995).

Monetary policy transmission in developing economies differs from developed countries, due to their financial structures, banking systems, and institutional arrangements. Mishra et al. (2012) emphasize that monetary transmission is weak in developing economies since the institutional weaknesses that exist in these countries limit the role of security markets. Bhattacharyya and Sensarma (2008) also support this view. In addition to these factors, heavy intervention by Central Banks in developing economies on their exchange rates affects the functioning of the exchange rate channels in these countries. An uncompetitive banking sector is also a hindrance to the lending channels in developing economies.

Many studies on monetary transmission mechanisms in developing countries have found the bank-lending channel to be the primary monetary transmission channel. Mishra et al. (2012) note that bank lending is the dominant transmission channel in developing countries, at least in relative terms. Agha et al. (2005), in their research on monetary transmission mechanisms in Pakistan, find that the bank-lending channel is the primary transmission channel. The same outcome is noted by Aleem (2010) in India. Although these studies identify bank lending as the leading transmission channel, they do not rule out the functioning of other transmission channels. Most of the studies that emphasize the function of bank lending channels in developing economies do not confirm the nonexistence of other transmission channels in these economies.

Although several studies (Agha et al., 2005; Aleem, 2010; Isakova, 2008; Martínez et al., 2001; Mishra & Montiel, 2013; Mishra et al., 2012) indicate that developing countries have different monetary transmission mechanisms compared to high-income economies due to rudimentary financial market development. Some studies in developing countries show the function of interest rates and exchange rates as leading transmission channels. A study of the operation of the monetary transmission mechanism in the Georgian economy reveals that exchange is the primary transmission channel (Aslanidi, 2007). Isakova (2008), in research in three Central Asian countries – Kazakhstan, the Kyrgyz Republic, and Tajikistan – shows that the exchange rate has the strongest pass-through among the monetary transmission channels in these economies. In addition, research on transmission mechanisms in the Mexican economy indicates that interest rates and exchange rates have dominated monetary transmission mechanisms (Martínez et al., 2001). The dominance of the interest rates channel is also emphasized by Carrasquilla (1998) in a study of the Columbian economy.

Remittance inflows interact with monetary transmission channels in remittance-receiving economies. The inflow of remittances into these economies is believed to impact the monetary transmission channels, affecting the smooth functioning of the MTMs and obstructing the achievement of intended macroeconomic targets. A higher level of inflow of remittances may reduce the effectiveness of monetary policy transmission mechanisms in the economy (Vacaflores, 2012). At the same time, remittance inflows may transmit the monetary policy effects of other countries into the domestic economy. A study on the Jordanian economy by Al-Hindawi (2016) indicates that monetary policy effects of the United States economy were transmitted to the Jordanian economy through remittance inflows.

Barajas et al. (2018) show that increasing remittance inflows can impact bank lending by creating a resistance between the policy rate and interbank market lending. They note that increasing inflows of remittances build the loanable funds available with commercial banks; therefore, the banks become less reliant on the interbank market. This can disconnect the pass-through of the policy rate to retail lending rates. However, substituting remittances for borrowings from the financial markets can lead to a decline in demand for domestic credit (Aggarwal et al., 2011; Calderon et al., 2008; Demirgüç-Kunt et al., 2011). A study by Brown and Carmignani (2015) indicates that remittances can lead to a fall in bank credit; however, a higher remittances-to-GDP ratio can increase domestic credit. However, banks in developing countries are reluctant to extend lending to all of their customers due to weak institutional setup, poor investment opportunities, and collateral issues (Coulibaly, 2015; Mishra et al., 2014), though lending capacity increases due to remittances. Onyeisi et al. (2018) also show that remittances have an insignificant positive relationship with domestic credit in the private sector in Nigeria. However, a study on the relationship between bank credit and remittances in the Bangladesh economy suggests that remittances positively impact bank credit in the long run (Muktadir-Al-Mukit & Islam, 2016). Moreover, Ajide (2019) indicates that remittances, along with bank concentration, can have a positive effect on domestic credit in the long run.

Several studies demonstrate that the exchange rate is the other prominent transmission channel affected by remittance inflows. The inflow of remittances can affect exchange rates; as a result, resistance to the pass-through of interest rates can develop in the economy. The inflow of remittances increases the money supply (Narayan et al., 2011) in remittance-receiving countries; therefore, monetary authorities introduce contractionary monetary policy measures to contain inflation. Increased interest rates to control inflation driven by remittances result in the appreciation of nominal exchange rates (Kim, 2019; Mandelman, 2013). This is one of the reasons for remittance-receiving economies to choose fixed exchange rate regimes (Singer, 2010) to minimise the stress on their exchange rates. The policy of following fixed exchange rate regimes restricts the exchange rate channel's functioning in remittance-receiving economies. In addition, the inflow of remittances in countries that have flexible exchange rates regimes results in appreciation of the domestic currency, making domestic exports uncompetitive and leading to "Dutch Disease" (Acosta et al., 2009; Amuedo-Dorantes & Pozo, 2004). However, Barajas et al. (2011), while accepting this as a standard developed based on the assumptions in a theoretical model, propose modifying the phenomenon with reasonable changes in the modelling. They provide empirical evidence that remittances lead to real

exchange rate appreciation while concluding that this effect is very small. In addition, Acosta et al. (2009) show that a higher level of financial development in remittance-receiving economies can lower the effect of remittances on the real exchange rates. Hassan and Holmes (2013), in their investigation of 24 countries, find that remittance inflows lead to real exchange rate appreciation, resulting in an uncompetitive tradable sector. Lartey et al. (2012) also report similar empirical outcomes in their study on 109 remittance recipient economies. The same result has also been obtained in other investigations regarding the relationship between remittances and real exchange rates (Adejumo & Ikhide, 2019; Bourdet & Falck, 2006).

2.3 Methodology

This study uses the panel SVAR methodology proposed by Pedroni (2013), which decomposes common and idiosyncratic shocks from structural shocks. This methodology is suitable for a large group of heterogeneous economies to detect dynamic relationships between macroeconomic variables. This approach considers the fact that each member of the panel responds both to their idiosyncratic shocks and to common shocks among the members of the panel. This methodology also enables inference for any member of an unbalanced panel for which the time series data is not available for the complete period of the study. The application of this methodology also helps to estimate the responses of domestic variables to changes in the domestic macroeconomic conditions, while controlling for changes that take place outside domestic boundaries. In addition, this methodology addresses the issues of cross-sectional dependencies and dynamic heterogeneity in an unbalanced panel (Montiel & Pedroni, 2019). Controlling for dynamic heterogeneity and cross-sectional dependency is necessary because they may cause inconsistent dynamic responses of variables, and inferences about these responses may also become inconsistent. This approach resolves these issues by decomposing structural shocks into common and idiosyncratic elements and generating efficient estimates of common elements of the country-specific loadings. Robust and consistent estimates of the common and idiosyncratic impulse responses and variance decomposition quantiles can be generated using this methodology.

2.3.1 Model specification

We estimate the panel SVAR model to analyse the dynamic effect of remittance inflows on monetary transmission channels. The equation below describes the reduced form of panel VAR

$$Y_{i,t}=B_i(\mathrm{L})\, Y_{i,t}+ \varepsilon_{i,t}$$

where Y is a vector of variables, B_i(L) is the lagged coefficients' polynomials, and $\varepsilon_{i,t}$ is the error term in the reduced-form of panel VAR. The lag length is selected using the general-to-specific (GTOS) criteria proposed by Pedroni (2013). A panel SVAR is obtained using a long-run non-recursive identification approach to the reduced-form of the panel VAR. This enables the formation of the structural VAR as follows:

$$A_{0,i}y_{i,t}=A_i(\mathrm{L})\,y_{i,t}+\varepsilon_{it}\ , \qquad (1)$$

where $A_{0,i}$ is the matrix of contemporaneous coefficients, A_i is the matrix of lagged coefficients, $Y_{i,t}$ is the vector of endogenous variables, including the log of remittances, money supply (M1), domestic credit and nominal exchange rates of individual countries, and ε_{it} is the vector of composite structural shocks, which may be independently distributed over time and cross-sectionally dependent. Each composite structural shock in the vector of ε_{it} is decomposed into (M x 1) vector of $\vec{\epsilon}_{it}$ individual country-specific idiosyncratic and $\bar{\epsilon}_t$ orthogonal common shocks as follows:

$$\varepsilon_{it}=\Lambda_i\bar{\epsilon}_t+\vec{\epsilon}_{it} \text{ where } \mathrm{E}\left(\xi_{it}\xi'_{it}\right)=\begin{bmatrix}\Omega_{i,\bar{\epsilon}_t} & 0\\ 0 & \Omega_{i,\vec{\epsilon}_t}\end{bmatrix} \quad \forall\, i,\ t, \qquad \mathrm{E}\left(\xi_{it}\right)= \quad \forall\, i,\ t,$$

$$\mathrm{E}\left(\xi_{it}\xi'_{it}\right)=0 \qquad \forall\, i,\ s\neq l, \qquad \mathrm{E}\left(\bar{\epsilon}_t\vec{\epsilon}'_{it}\right)= \quad \forall\, i,\ t\neq j \qquad (2)$$

where $\xi_{it}=(\vec{\epsilon}'_t,\ \vec{\epsilon}'_{it})$' and Λ_i is M × M diagonal matrix where the diagonal elements are the coefficients $\lambda_{i,m}$ m = 1,….M. The restriction imposed suggests that covariance of the composite white noise takes the form E $(\epsilon_{it}\epsilon'_{it})=\Omega_{i,t}$. This is also a diagonal covariance matrix with randomly normalized variances with adding up constraints described by equation (2).

The reduced forms of M+1 VARs are estimated to obtain estimates for composite shocks ε_{it}shown in the equation: one for each country and another using the cross sectional mean value

$$y_{1,t}=K_i(\mathrm{L})\,y_{1,t}+\mathrm{e}_{1,t}$$

. (3)

.

$$y_{M,t} = K_M(\mathrm{L})\, y_{M,t} + \mathrm{e}_{M,t}$$

$$\bar{y}_{,t} = \bar{K}\,(\mathrm{L})\, \bar{y}_{,t} + \bar{\mathrm{e}}_{,t}$$

where

$$K_i(\mathrm{L}) = A^{-1}{}_{0,i}\, A_i(\mathrm{L}), \quad \mathrm{e}_{i,t} = A^{-1}{}_{0,i}\, \varepsilon_{i,t}\,, \; \bar{K}\,(\mathrm{L}) = \bar{A}^{-1}\bar{A}\,(\mathrm{L}), \; \bar{\mathrm{e}}_t = \bar{A}_0^{-1}\bar{\varepsilon}_t$$

generates the composite and common shocks from the residuals of the reduced form. Hence, estimating the idiosyncratic shock $\bar{\epsilon}_{it}$ is the next step in the estimation process. This can be performed using the properties of equation (2), in which structural shocks are white noise and covariance between $\bar{\epsilon}_t$ and $\bar{\epsilon}_{it}$ is zero. The loading matrix of common factors is constructed by estimating equation (2) for each country *i* with OLS regressions. This results in the estimates of an M × M diagonal matrix of Λ_i with sample estimates of E $(\varepsilon_{it,m}\, \bar{\varepsilon}_{t,m})$/ E $(\epsilon_{t,m}^{-2})$ for m = 1,….., M along the diagonals.

The next step is decomposing the composite responses for each country *i* into common and idiosyncratic responses using the equation below for each country.

$$A_i(\mathrm{L}) = A_i(\mathrm{L})\, \Lambda_i + A_i(\mathrm{L})\, (\mathrm{I} - \Lambda_i\, \Lambda'_i)^{-½} \qquad (4)$$

where

$A_i(\mathrm{L}) \equiv \bar{A}_i(\mathrm{L})$ and $A_i(\mathrm{L})\, (\mathrm{I} - \Lambda_i\, \Lambda'_i)^{-½} \equiv \check{\mathrm{A}}_i(\mathrm{L})$

represent common and idiosyncratic responses, respectively.

As we estimate the effect of remittance inflows over the intermediate monetary transmission channels, namely, bank credit and exchange rate, we use four variables consisting of remittances, money supply (M1), bank credit, and nominal exchange rate in our panel SVAR model, and they are arranged in the corresponding order.

Many previous studies dealing with monetary policy transmission use the short-run approach to identify the dynamic relationship among macroeconomic variables by imposing restrictions on contemporaneous responses to structural shocks (Bernanke, 1986; Blanchard, 1989; Christiano et al., 1994; Raghavan et al., 2012). Some other studies use only long-run restrictions, ignoring the short-run relationships among the variables (Mishra et al., 2014). These studies highlight that imposing restrictions on contemporaneous relationships requires

information regarding timing and responses by authorities. However, we use both the short-run and long-run restrictions, considering countries' common characteristics in implementing monetary policy measures and traditionally used restrictions in the macroeconomic literature.

The matrices below show a non-recursively identified model with short-run restrictions.

$$A_{0i}y_{it} = \begin{bmatrix} - & 0 & 0 & - \\ - & - & 0 & 0 \\ - & - & - & 0 \\ - & - & - & - \end{bmatrix} \begin{bmatrix} r_{i,t} \\ m_{i,t} \\ c_{i,t} \\ e_{i,t} \end{bmatrix}$$

where "–" and "0" represent unrestricted and restricted parameters, respectively. The identification strategy is based on the idea that remittances affect the domestic money supply, bank credit, and nominal exchange rate in the short run, whereas only the nominal exchange rate affects remittance inflows in the current period. Money supply affects bank credit and exchange rate in the short run, but only remittances affect money supply. The exchange rate, which is a forward-looking asset price, is affected by all the variables in the short run. However, it is assumed that the exchange rate does not influence all other variables, except remittances, in the short run. These short-run restrictions are based on the instantaneous relationship between money supply, nominal exchange rate, and remittances (Adenutsi & Ahortor, 2008; Kim, 2019), bank credit, and remittances (Awdeh, 2016; Brown & Carmignani, 2015). The matrices below show non-recursively identified models with long-run restrictions.

$$A_{0i}y_{it} = \begin{bmatrix} - & 0 & 0 & 0 \\ - & - & - & - \\ - & - & - & - \\ - & - & - & - \end{bmatrix} \begin{bmatrix} r_{i,t} \\ m_{i,t} \\ c_{i,t} \\ e_{i,t} \end{bmatrix}$$

where "–" represents the unrestricted parameters, and "0" represents zero restriction. It assumes that remittances affect all the variables in the long run; however, all other variables do not affect remittances in the long run. This assumption is based on the idea that remittances are an external flow of funds transferred to the domestic economy. They are not sensitive to domestic

interest rates (Chami et al., 2009a); therefore, other factors would not influence remittances significantly in the long run.

2.3.2 Data

This study uses quarterly data covering 20 years from 2000 : 1to 2019 : 4 for 51 remittance-receiving countries. The domestic credit and money supply (M1) data were obtained from the respective Central Banks' databases. The remittances and nominal exchange rates data were collected from the IMF's International Financial Statistics (IFS) database. The data for this sample were unbalanced, with 2010 country-year observations from 51 countries, and compiled based on data availability for the members of the panel.

This study imposed a restriction to remove data for the period during which the members of the panel fixed their exchange rates continuously for four quarters. In addition, each member of the panel had data for at least 5 years continuously, to enable the choice of suitable lag truncation while maintaining enough degrees of freedom to ensure the reasonable estimation of average variable values and structural shocks. This panel also had sufficient cross-sectional dimensions for each time period chosen in this study. These measures ensured cross-sectional and temporal variation in the data for the sample of countries. The appendix provides a list of the countries chosen and the time period of data used for each member of the panel.

The data were tested to check for the stationarity condition at the initial stage of estimating the panel SVAR model. The results of the stationary tests in terms of level and first difference of remittances, money supply, bank credit, and nominal exchange rates are presented in Table 1. The results show that the variables of all panel members are stationary in their first difference by rejecting the null hypothesis that these variables have unit roots in their first difference. In the next step, the variables used in the estimation are tested for panel co-integration, and the outcome of the tests indicate that the variables are not co-integrated.[1]

[1] The test results will be made available if required.

Table 2.1 Unit root analysis

Variables	Fisher-PP		Fisher-ADF		Im, Pesaran, Shin	
	Level	1st Difference	Level	1st Difference	Level	1st Difference
Remittances	63.44	7979.07***	59.68	3126.83***	-0.77	-39.34***
Money Supply	2.12	2880.40***	2.74	638.86***	19.54	-17.23***
Credit	5.12	978.26***	11.63	475.91***	19.97	-20.40***
Exchange rate	340.92***	2778.45***	335.70***	2519.38***	-0.72	-38.35***

Note: *** indicates $p < 0.01$ significance level

2.3.3 Estimation results

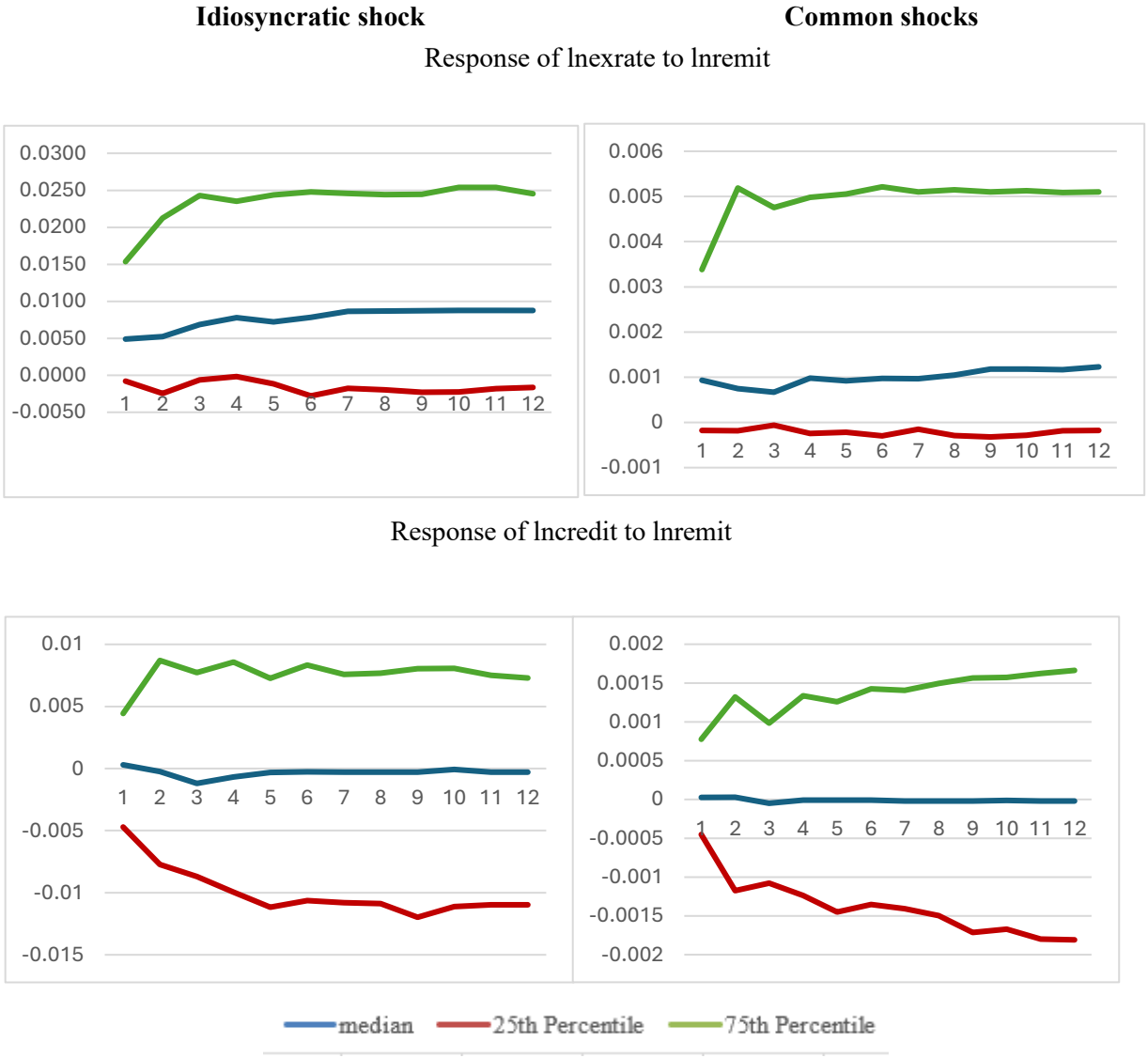
The idiosyncratic and common IRs are estimated using Pedroni's (2013) approach. The descriptive statistics for idiosyncratic and common IRs are reported for the median, 25th and 75th percent quantile ranges. The IRs of variables to idiosyncratic and common shocks are reported in Figure 2.1 and variance decomposition is shown in Figure 2.2. The middle line represents the median IRs and variance decomposition of the sample of countries, while the upper and lower lines depict the 75th and 25th percent quantile responses, respectively. The deviation between these two lines shows the heterogeneity of the countries in responding to structural shocks.

We find the expected positive response in the nominal exchange rate for a large group of countries, and the IRs of nominal exchange rates showed a persistent appreciation effect in their median and 75th percentile responses; however, the 25th percentile response do not show significant change throughout its time horizon in the sample of countries. The median response of the nominal exchange rate to one unit country-specific shock in remittances results in 0.005 per cent of appreciation of the domestic currency in the following quarter and 0.009 per cent in the 12th quarter. The 75th percentile response results in 0.015 per cent of appreciation in the next quarter and 0.025 per cent in the 12th quarter. However, the 25th percentile response reveals a subset of countries in the sample that do not show a noticeable change in their nominal exchange rates.

The IRs of bank credit also reveal heterogeneous responses among the countries chosen for this study. We find the expected positive response of bank credit to country-specific shock in remittances in a large set of countries; however, there are large variations in the IRs of bank credit. The median and 75th percentile responses to country-specific one-unit shocks in

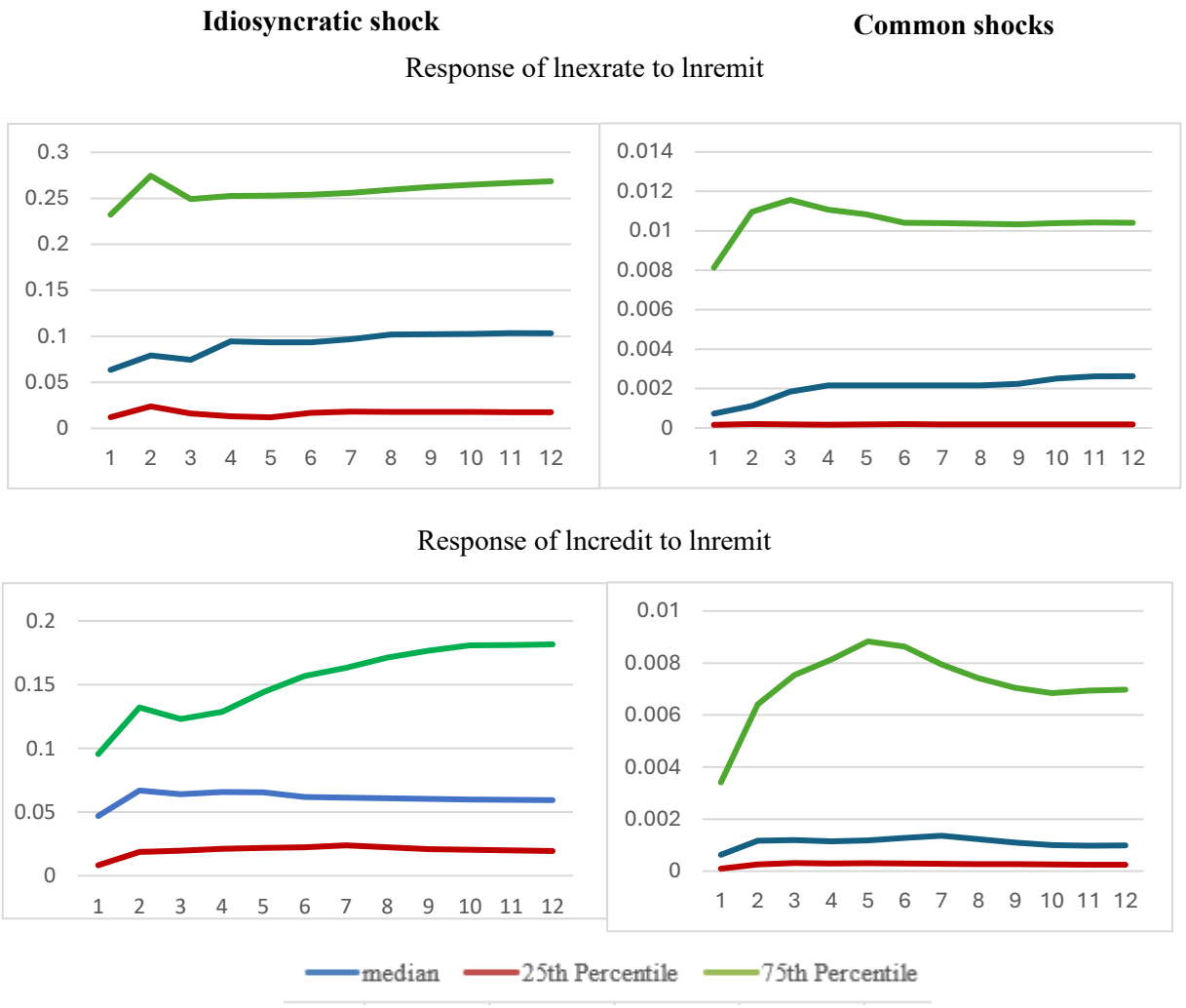
remittances result in 0.0003 and 0.004 per cent increases in bank credit in the following quarter, 0.0003, and 0.007 per cent in the 12th quarter, respectively. The 25th percentile response results in a 0.005 per cent decline in bank credit in the following quarter 0.011 per cent in the 12th quarter. The IRs of bank credit shows wide deviations among the sample of countries in responding to a shock in remittances.

Figure 2.1 Impulse response from panel SVAR model



The variance decompositions of these two variables also show a similar pattern of variations in responding to a shock in remittances in the sample of countries. In the first quarter, 0.01 per cent to 0.23 per cent of the forecast error variance constitutes the variation in the nominal exchange rate and in the 12th quarter, it ranges from 0.02 per cent to 0.27 per cent. In addition, the variation in bank credit in the first quarter is 0.01 percent to 0.1 per cent of the forecast error variance, while in the 12th quarter it ranges from 0.02 per cent to 0.18 per cent.

Figure 2.2 Variance decomposition from panel SVAR model



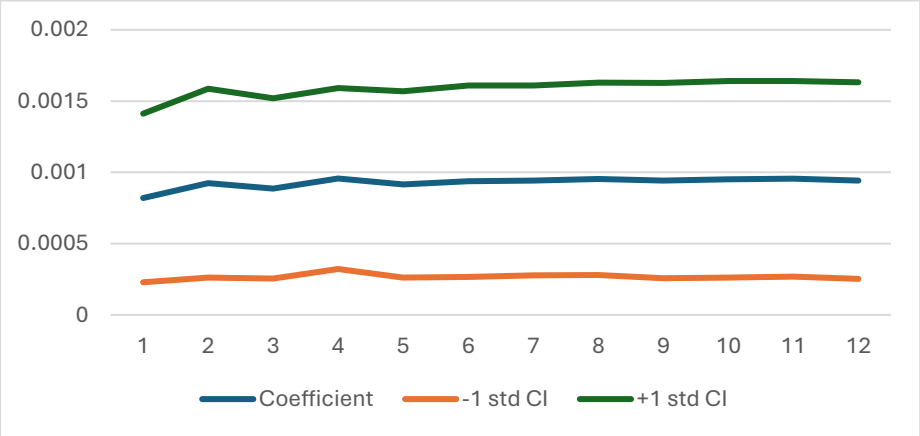
In the next stage, we investigate whether these IRs are random effects or whether there are any factors that determine the pattern of IRs among the sample of countries. We further examine the heterogeneous individual country responses by regressing the individual IRs to idiosyncratic shock on individual remittances-to-GDP ratios to determine whether the level of

remittance inflows into these countries has an impact on the response of nominal exchange rates and bank credit.

The regression results of the IRs of nominal exchange rates and bank credit to an idiosyncratic shock on remittances and remittances-to-GDP ratios are shown in Figure 2.3 and 2.4, respectively. The horizontal axis corresponds with the time period of IRs, while the middle line represents the estimated coefficients from cross-country regression of the estimated IRs and the remittances to GDP ratio. This shows the cross-country association between the response of these intermediate monetary transmission channels and the remittances-to-GDP ratios in the sample of remittance-receiving countries.

As shown in Figure 2.3, the coefficients of the IRs of exchange rates and remittances-to-GDP ratios are positive at all time horizons of the IRs. The graph also shows the one standard deviation band estimated from the regression of these two variables. The relationship between remittances-to-GDP ratio and the IRs of nominal exchange rates suggests a persistent positive association among remittance-receiving countries. This indicates that the remittances-to-GDP ratio is positively associated with the appreciation effect of nominal exchange rates across the sample of remittance-receiving countries.

Figure 2.3 IRs of exchange rate and remittances to GDP ratio

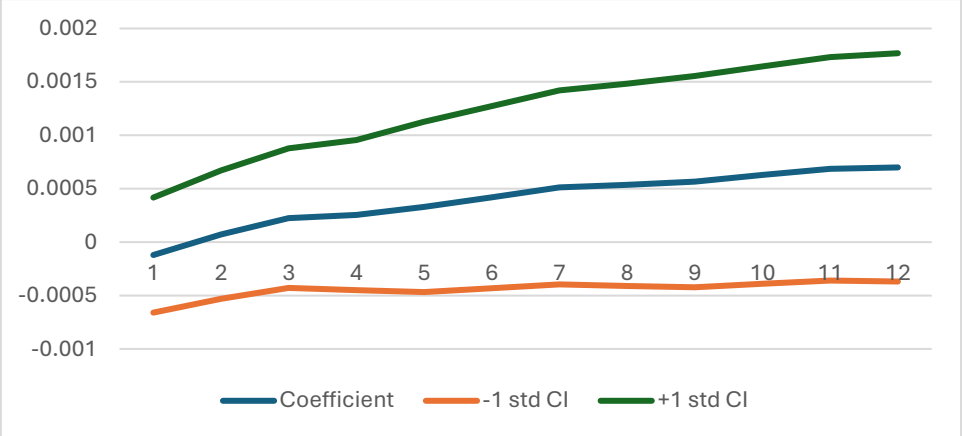


Our empirical findings, while complementing previous studies on the impact of remittances, also expand the scope, including the effect of remittances on the exchange rate channel in the MTM. The previous empirical findings show that the impact of remittances varies based on the exchange rate regimes and other macroeconomic conditions in remittance-

receiving economies. Ball et al. (2013) note that the impact of remittances on money supply and inflation varies depending on the exchange rate regimes, whereas Narayan et al. (2011) conclude that remittances have a pronounced effect on inflation in remittance-receiving economies, regardless of their exchange rate regime. Lartey et al. (2012), in their study on developing and transition economies, find that an exogenous shock in remittances results in appreciation of the nominal exchange rate in flexible exchange rate regimes. Consistent with this, we find that remittances generally led to the appreciation of nominal exchange rates in remittance-receiving economies, thus affecting the smooth functioning of the MTM. In addition, our empirical findings also indicate that the effect of remittances on the exchange rate channel is dependent on the magnitude of remittance inflows into an economy. A plausible reason for this is that the increasing remittance inflows lead to inflationary pressure (Narayan et al., 2011); therefore, monetary authorities increase interest rates to contain inflation. This contractionary monetary policy measure results in exchange rate appreciation in remittance-receiving economies.

As displayed in Figure 2.4, the association between the IRs of bank credit and remittances-to-GDP ratio is positive from the second period onward at all time horizons of the IRs. However, the positive relationship between these two variables is insignificantly different from zero; therefore, we run another cross-section regression on the IRs of bank credit to idiosyncratic shock in remittances in the next stage.

Figure 2.4 IRs of credit and remittances to GDP ratio



This cross-section regression identifies the other influencing factors in the response of bank credit to remittance inflows in the sample of remittance-receiving economies. We use a similar methodology to that of Aslan et al. (2021), Hao et al. (2017), and Mishra et al. (2014), which uses individual IRs from SVAR in the second stage of cross-section regression. Our

cross-section regression results are presented in Table 2.2, using IRs from the panel SVAR as the dependent variable and the rest as explanatory variables. In the first four columns, we use the IRs of bank credit in the first four quarters as dependent variables, respectively. The dependent variable in the fifth column is the average of IRs of bank credit in the first four quarters.

Considering the previous empirical literature that examines the relationship between remittances and bank credit, we use four explanatory variables in our regression model. We include the 10-year (2000-2019) average national savings ratio and bank branches per 100,000 adults as dependent variables in the regression. In addition, we add two dummy variables to the regression. The first dummy variable is used for the higher remittance-receiving category. We follow Barajas et al. (2018) and Brown and Carmignani (2015) in classifying the countries into high and low remittance-receiving countries. We assign a value of one if a country, on average, has a contribution of more than five per cent by remittances to GDP in the 10-year (2000-2019) period, and otherwise a value of zero. The second dummy variable is used to represent the upper-income category. We use World Bank criteria to classify countries based on the GNI per capita in the current US dollar. We assign a value of one if a country is in the upper-middle-income category or above in the 10-year (2000-2019) period; otherwise, zero.

The motivation behind selecting these explanatory variables in the cross-section regression was the potential for these variables to influence the effect of remittances in the responses of bank credit in remittance-receiving countries. The private savings-to-GDP ratio is one of the prominent indicators that reveals gross savings in private sectors in the economy. This also represents the savings made by households from migrants' remittances, as migrants also transfer remittances for savings and investment purposes (Batu, 2017; Fullenkamp et al., 2008). The second variable we use in the regression model is the higher remittance category. We divide the sample of countries into two main categories based on their remittances-to-GDP ratios in the most recent 10-year period of our study. We categorize one set of countries as higher remittance-receivers if there is a contribution of more than five per cent by remittances to GDP in the 10-year (2010-2019) period on average. Our categorization of countries is based on previous empirical findings (Barajas et al., 2018; Brown & Carmignani, 2015) which indicate that varying remittance-to-GDP ratios have a differential impact on remittance-receiving economies. We chose the other two explanatory variables to control for income level and access to banking facilities to address the possible criticism that the statistical outcome could be linked to income level and access to credit facilities.

The regression result indicates that the savings-to-GDP ratio coefficient is positive and statistically significant. This explains why the bank credit in countries with higher levels of savings to GDP responds more strongly than in countries with low savings-to-GDP ratios to the same remittances shocks. This result is in line with the empirical literature, which emphasises that remittances-driven fund flows into commercial banks would influence those banks' lending capacity (Aggarwal et al., 2011; Barajas et al., 2018). This finding suggests that when migrants' remittances contribute to savings in their home countries, the banking sector will increase its capacity to provide more credit facilities to its borrowers. At the same time, fluctuation in the inflow of remittances will significantly affect the lending capacity of the banks as long as remittances dominate the composition of their lending capital.

In addition, the coefficient estimate of the dummy variable for the higher remittance-receiving category is also positive and statistically significant. This indicates that bank credit in countries with higher remittances-to-GDP ratios responds more strongly to remittances shocks than in countries with low remittances-to-GDP ratios. This finding is also in line with previous empirical work. Brown and Carmignani (2015) find that at higher levels of remittances, the effect of remittances on bank credit is stronger. This suggests that migrants' remittances initially flow into their home countries for altruistic purposes, and then migrants transfer more remittances for savings and investment purposes. At higher levels of remittance inflows, a part of those remittances is deposited at banks; therefore, they become one of the lending sources of banks. This ultimately influences the banks' lending capacity.

The coefficients of the other two explanatory variables are positive at all periods as expected; however, only bank branches per 100,000 adults is significant in the first quarter at the 10 per cent level of testing, and the upper-income level is not significant at all periods. We use these explanatory variables to control for the possible influence of accessibility to banks and income level on bank lending.

We analyse the effect of capital control measures in the regression analysis to find out what role capital control plays in the effect of remittances on bank credit in remittance-receiving economies. We include a 10-year average of the Chinn-Ito index with the other variables in the model and regress against the IRs. The statistical result is provided in Appendix 2.6.2. The regression result indicates that capital control measures may not play a significant role in transmitting the effects of remittances on credit channels in the remittance-receiving countries. A plausible reason for this may be that capital controls are applied to mainly restrict

the outflow of volatile and speculative corporate investments, whereas remittances flow into remittance-receiving economies primarily for altruistic purposes. Further, remittances, which are micro-level transfers for household survival, do not respond to these kinds of macro-level restrictions. In addition to this, 96 percent of the sample members represent low- and middle-income countries in this study. These developing economies typically deploy capital control measures, especially to prevent the outflow of capital funds, whereas they promote the inflow of foreign funds coming into their countries to build up foreign exchange reserves; therefore, restrictions aimed at the outflow of corporate investments may not affect the inflow of remittances and their influence on bank credit.

Table 2.2 Second stage regression results

Variables	IR1	IR2	IR3	IR4	IR avg
Savings to GDP	0.0005**	0.0005**	0.0005*	0.0005*	0.0005**
	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0002)
Higher remittance recipient	0.0101**	0.0129**	0.0155***	0.0165***	0.0138***
	(0.0046)	(0.0053)	(0.0057)	(0.0062)	(0.0053)
Bank branches per 100,000 adults	0.0003*	0.0002	0.0002	0.0002	0.0002
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Upper income level	0.0005	0.0013	0.0019	0.0033	0.0018
	(0.0040)	(0.0045)	(0.0049)	(0.0054)	(0.0045)
Observations	51	51	51	51	51
R-squared	0.191	0.161	0.168	0.159	0.174
F-statistic	2.604	2.118	2.228	2.084	2.321

Note: Standard errors are in parentheses, *** p < 0.01 ** P < 0.05 * p < 0.10 significance levels

2.4 Conclusion

The existing literature has shown that the underdeveloped financial markets and poor institutional qualities found in many developing countries affect the MTM. Most of these countries have been identified as remittance-receiving economies, and remittances provide a significant proportion of their balance of payments. Remittances exceed capital flows and export revenues in many of these economies. This study finds remittances to be a significant factor affecting the MTM in these remittance-receiving economies.

This study investigates the impact of remittances on intermediate monetary transmission channels; namely bank credit and nominal exchange rates in remittance-receiving economies. Our initial empirical evidence suggests that the responses of bank credit and

nominal exchange rates are heterogeneous among remittance-receiving economies. Our empirical results show that the remittances-to-GDP ratio has a significant effect on nominal exchange rates.

Our second step cross-section regression results indicate that the savings-to-GDP ratio and the higher level of remittance inflows have significant explanatory power with regard to the response of bank credit to a shock in remittance inflows. This result may be interpreted as showing that in countries where savings-to-GDP ratios and remittance inflows are high; remittances may significantly affect the bank credit channel. Increasing remittance inflows through banks expands the lending capacity of banks; therefore, the banks in countries receiving higher levels of remittances are likely to lend more even under tightening monetary policy measures. In particular, when remittances contribute to savings at banks, the banks may not be dependent on the interbank market; therefore, the linkage between the policy rate and bank lending may deteriorate. This has implications for the operation of the credit channel by decreasing the dependency of banks on the interbank market.

Remittance-receiving economies may not be able to pursue independent monetary policy as remittances may weaken the monetary transmission channels. In particular, central banks in these countries may find it difficult to achieve credible targets to control inflation through changes in policy rate; therefore, they may fail to implement their policy framework, including measures such as inflation targeting. At the same time, countries with an increasing amount of remittances would possibly opt for a fixed exchange rate regime (Singer, 2010) rather than a flexible exchange rate. The measures taken to follow a fixed exchange rate regime would restrict the pass-through of interest rate shocks to exchange rates, thus affecting the functioning of the exchange rate channel.

Our empirical findings suggest that countries need to effectively implement policies to handle the excess funds built by remittances to allow central banks to achieve their targets through monetary policy measures. Firstly, we suggest insulating the monetary base by providing government bonds with a premium for remittance-based deposits. Issuing bonds for remittance-based deposits would help maintain the inflow of remittances and shield the monetary base against remittances. This measure would prevent immediate inflationary pressure on the economy, minimizing the need for contractionary monetary policy measures. This may also reduce the excess stress on nominal exchange rates. Secondly, we recommend increasing banks' reserve requirements; in this way, excess reserve funds created by

remittances can be eliminated from the banking system. This would make banks more reliant on borrowings from the interbank market; therefore, changes in policy rates would effectively change bank lending and borrowing patterns. However, it is necessary to assess the effect of the initial credit crunch due to the decline in bank lending because of this policy measure.

Overall, there is a need for a balanced policy approach in mitigating the impact of remittances when dealing with macroeconomic challenges, as remittances play a crucial role in welfare enhancement and the relief of poverty in many developing countries. Policies purely targeting the mitigation of macroeconomic challenges caused by remittances may undermine the beneficial effects of remittances in remittance-receiving developing countries.

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2.6 Appendices

Appendix 2.6.1 List of countries

#	Countries	Data availability		#	Countries	Data availability	
		From	To			From	To
1	Albania	2002q4	2019q4	27	Kyrgyz Republic	2009q1	2019q4
2	Armenia	2003q1	2019q4	28	Lao PDR	2012q3	2019q4
3	Bolivia	2001q1	2019q4	29	Lesotho	2009q1	2019q2
4	Bosnia	2001q1	2019q4	30	Mauritius	2014q1	2018q3
5	Brazil	2001q4	2019q4	31	Mexico	2003q4	2019q4
6	Bulgaria	2009q1	2019q4	32	Morocco	2003q1	2019q4
7	Cabo Verde	2010q4	2019q4	33	Mozambique	2005q1	2019q4
8	Cambodia	2008q3	2019q4	34	Nigeria	2014q1	2019q4
9	Colombia	2000q1	2019q4	35	North Macedonia	2003q1	2019q4
10	Costa Rica	2001q1	2019q4	36	Peru	2001q1	2019q4
11	Croatia	2000q1	2019q4	37	Philippines	2000q1	2005q4
12	Czech Republic	2014q1	2019q4	38	Poland	2009q1	2017q4
13	Dominican Republic	2011q1	2019q4	39	Romania	2013q1	2019q4
14	Fiji	2002q1	2019q4	40	Sao Tome	2011q1	2019q4
15	Gambia, The	2007q1	2019q1	41	Serbia	2007q1	2019q4
16	Georgia	2003q1	2019q4	42	Seychelles	2006q3	2019q4
17	Ghana	2011q1	2019q4	43	Solomon Islands	2011q1	2019q4
18	Guatemala	2000q1	2019q4	44	Sri Lanka	2000q1	2019q4
19	Guinea	2011q4	2019q4	45	Tajikistan	2008q1	2019q4
20	Honduras	2011q2	2019q4	46	Thailand	2011q2	2019q4
21	Hungary	2000q1	2019q4	47	Trinidad	2015q1	2019q4
22	Iceland	2000q1	2008q3	48	Turkey	2008q4	2019q4
23	India	2000q1	2019q4	49	Uganda	2000q3	2019q4
24	Indonesia	2002q1	2017q2	50	Ukraine	2014q1	2019q4
25	Jamaica	2000q1	2019q4	51	Uruguay	2009q4	2019q4
26	Kazakhstan	2000q1	2019q4				

Appendix 2.6.2 Second stage regression results with capital controls (Chinn-Ito) index

Variables	IR1	IR2	IR3	IR4	IR avg
Savings to GDP	0.0005**	0.0005**	0.0005*	0.0005*	0.0005**
	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0002)
Higher remittance recipient	0.01**	0.0131**	0.0159***	0.0171***	0.0140**
	(0.0048)	(0.0054)	(0.0059)	(0.0064)	(0.0054)
Bank branches per 100,000 adults	0.0003*	0.0002	0.0002	0.0002	0.0002
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Upper income level	0.0002	0.0008	0.0016	0.0029	0.0014
	(0.0043)	(0.0049)	(0.0053)	(0.0057)	(0.0049)
Capital controls	0.00001	0.00004	0.00003	0.00005	0.00003
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	48	48	48	48	48
R-squared	0.192	0.166	0.172	0.167	0.178
p-value for F-statistic	0.099	0.162	0.146	0.160	0.131

Note: Standard errors are in parentheses, *** p < 0.01 ** P < 0.05 * p < 0.10 significance levels

Chapter 3

The impact of remittances on monetary transmission mechanism: an investigation into the role of institutions in the bank credit channel

Abstract: Remittances have become an important source of external funds in many LMICs, and they occupy a substantial proportion of their current account financing. The increasing inflow of remittances plays a significant role in the macroeconomic conditions of the remittance-receiving countries. However, remittances also affect the monetary transmission mechanism in these countries. Some existing literature argues that remittances help the expansion of bank credit and could thus weaken bank credit channels, while other studies point out that remittances do not help credit expansion. We argue that institutional factors play a role in altering the effect of remittances on bank credit. We apply a panel SVAR methodology to generate the IRs of bank credit and use a cross-sectional regression to find out what institutional factors contribute to the changes in the effects of remittances on bank credit. The empirical analysis of this study indicates that remittances help the expansion of bank credit when institutional factors, especially corruption control and regulatory qualities, are strong. The findings of this study suggest that countries with strong institutional factors will experience intense effects of remittances on bank credit channels.

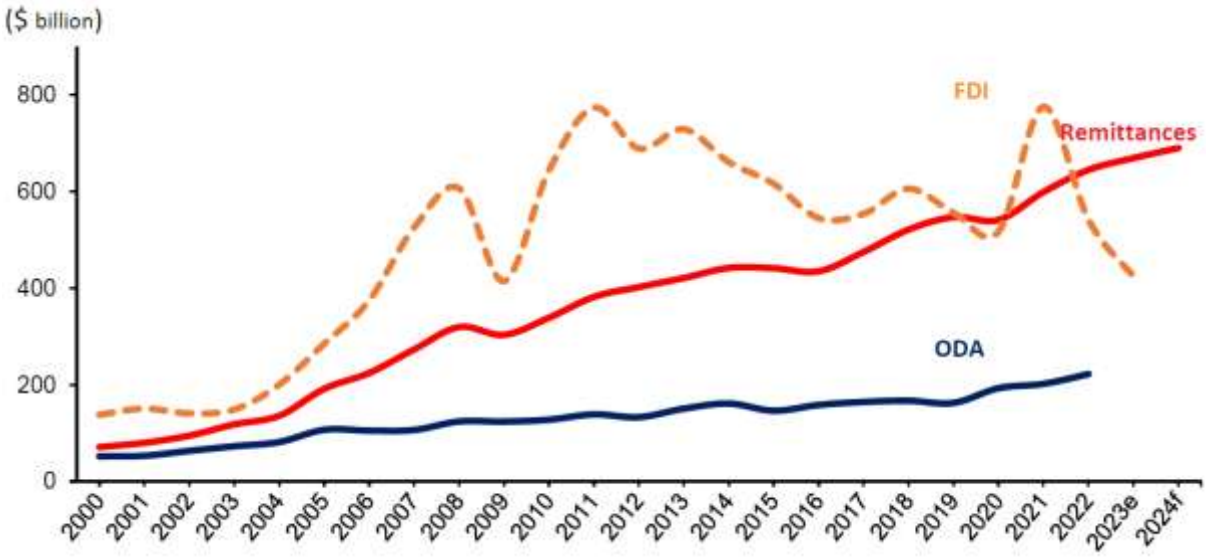
Keywords: remittances, institutions, bank credit

JEL Classification: E02, E52, F24

3.1 Introduction

Remittances have become a significant source of external funds for many low- and middle-income countries (LMICs) worldwide. The World Bank (2023) states that the total remittance inflows to LMICs alone were recorded as US$669 billion in 2023, with an increase of 3.8 percent compared to 2022, and projected to reach US$690 in 2024. Remittances exceeded foreign direct investment (FDI) by US$ 250 billion in these countries in 2023. In 2023, significant remittance inflow growth was recorded in Latin America and the Caribbean (8 percent) followed by South Asia (7.2 percent), East Asia and the Pacific (3 percent), and Sub-Saharan Africa (1.9 percent). However, remittances fell by 5.3 percent in the Middle East and North Africa (World Bank, 2023).

Figure 3.1 External financial flows to low- and middle-income countries in the 2000 – 2024 period



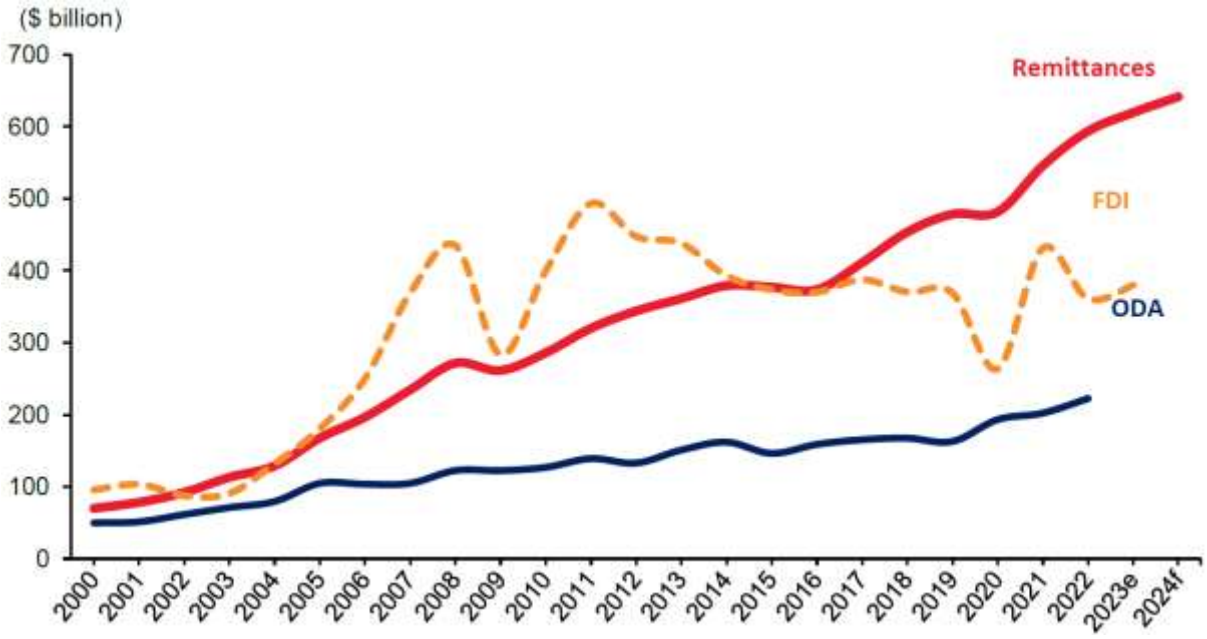
Source: World Bank 2023

In 2023, India (US$ 125 billion) received the highest remittances, followed by Mexico (US$ 67 billion), and China (US$ 50 billion). Tajikistan recorded the highest remittance-to-GDP ratio (48 percent), followed by Tonga (41 percent) and Samoa (32 percent) (World Bank, 2023).

Remittance inflows primarily serve altruistic purposes, helping remittance-receiving households to supplement their incomes for consumption, health, and education, especially in developing countries. Remittance inflows also help many developing countries to strive for poverty reduction and economic growth targets. In addition, remittances significantly contribute to the current account, which helps these countries to safeguard against severe

currency fluctuations and enable repayment of external debts. Although remittances create these economic benefits, they also pose macroeconomic challenges, which could result in either delayed or unrealised macroeconomic targets. This requires remittance-receiving countries to decide what kind of policies they should adopt to address these challenges, while moving towards their primary poverty reduction and economic growth objectives.

Figure 3.2 External financial flows to low- and middle-income countries, excluding China, in the period 2000 – 2024



Source: World Bank 2023

Existing studies have scrutinised the effect of remittances on economic growth, poverty reduction and financial development. There are varied findings on the relationship between remittances and economic growth. Some studies undertaken to investigate the relationship between economic growth and remittance inflows have found it to be positive (Cooray, 2012; Dilshad, 2013; Meyer & Shera, 2017; Ramirez, 2014; Salahuddin & Gow, 2015). Ratha (2005a), for example, demonstrates that remittances can contribute to economic growth if invested and even consumed. However, some studies present different outcomes for remittances and economic growth. A study by Rao and Hassan (2011), consisting of 40 countries, finds that remittances do not have any direct effect on economic growth, but the authors point out that remittances influence growth indirectly via investment and financial sector development. A study by Kadozi (2019) of 45 Sub-Saharan African (SSA) countries shows that the growth effect of remittances is conditional upon countries' level of financial development and education. Kratou and Gazdar (2016), in their investigation of the effects of

remittances on economic growth, show that remittances have a positive impact on long-run growth while having a negative effect in the short term. Research in Turkey reveals a negative impact of remittance inflow on economic growth (Karagöz, 2009). In addition, studies investigating the linkage between remittances and poverty reduction show that remittances have contributed significantly to poverty reduction in many developing countries (Ekanayake & Moslares, 2020; Huay & Bani, 2018; Masron & Subramaniam, 2018; Yoshino et al., 2018). Some literature reveals that remittances promote financial development in remittance-receiving developing economies (Aggarwal et al., 2011; Bhattacharya et al., 2018; Fromentin, 2017, 2018; Kakhkharov & Rohde, 2020); however, some argue that remittances do not contribute to financial development in developing economies (Brown et al., 2013; Coulibaly, 2015).

Studies investigating the effect of remittances on monetary policy transmission mechanisms in remittance-receiving countries find that remittances influence the monetary transmission mechanism. Bank credit is found to be the primary intermediate transmission channel in many low-income economies. Economic theories do not provide conclusive predictions on the impact of remittances on bank credit (Aggarwal et al., 2011). However, a body of literature has investigated the effect of remittances on bank credit. One view claims that remittances function as substitutes for bank credit by lessening household liquidity constraints, while other studies claim that remittances promote bank credit by increasing the loanable funds available with commercial banks and creating a cushion between policy rate and commercial banks' lending rates (Aggarwal et al., 2011; Barajas et al., 2018; Calderon et al., 2008; Demirgüç-Kunt et al., 2011).

The banking sector serves as an intermediary between borrowers and investors by accepting deposits from investors and providing various financial products, including loans, to individuals and businesses. Commercial banks and other lending agencies normally require collateral, legal protection, and a secure business environment to lend to individuals and businesses. The banking sector finds regulated environments relatively less risky to lend to when compared to poorly regulated ones, as the presence of better institutional quality reduces non-performing loans (Bayar, 2019; Boudriga et al., 2010; Tanasković & Jandrić, 2015). In addition, the presence of a well-regulated environment helps to increase competition among banks (Delis, 2012; Elfeituri, 2022; Muizzuddin et al., 2021); therefore, the availability of banking products, including the availability of bank loans, should increase. Increased levels of competition would push banking sector expansion towards wider areas of a country, rather than limiting its services to particular regions or cities. In addition, the existence of a strong

institutional setup is a key element for the development of the banking sector in order to provide credit facilities to individuals and businesses. Banks will be less reluctant to expand their credit facilities if a country's institutional setup is strong, as institutions help to prevent fraud and maintain stability in the credit market. It is evident from the existing research that countries with improved regulatory qualities tend to have stronger financial systems, which help the banking sector to expand its credit facilities (Boudriga et al., 2010; Doumpos et al., 2017; Larionova et al., 2018; Vaithilingam et al., 2006). In the presence of improved regulatory qualities, banks tend to have more confidence, thus increasing the issuance of loans to individuals and businesses.

This study focuses primarily on how institutional arrangement in an economy can influence the effects of remittances on bank credits. There is a school of thought that argues that remittances result in more bank lending through increased loanable funds being made available to the banking sector. Another view suggests that remittances lead to reduced demands for bank credit by providing financial supplements to households. However, we argue that the influence of remittances on bank credit is dependent on the institutional arrangement prevailing in an economy. Countries with stronger institutional backgrounds could see more influence from remittances on their bank lending, while countries with weaker institutions could experience less influence by remittances.

3.2 Literature review

Remittance inflows into many developing countries have been among the major sources of foreign exchange earnings in these countries. The inflow of foreign remittances has been proven to reduce poverty and accelerate growth in several developing countries. Shirazi et al. (2018), in their research in relation to remittances and their impacts on seven African countries, find that remittance inflow reduces the level of poverty and contributes to the acceleration of economic growth. This finding also aligns with the results of a study by Kadozi (2019) on 45 African countries. Ale et al. (2018) also find a positive relationship between remittance and economic growth in Bangladesh, India, and Pakistan. Hassan et al. (2012) have the same empirical finding in their study of Bangladesh; however, the authors point out that the remittance-growth relationship is non-linear and remittances reduce growth in the early stages and increase it later. In addition, research by Ramanayake and Wijetunga (2018) on the economic impact of remittance in Sri Lanka indicates that remittance inflow contributes to the acceleration of economic growth. Adams and Cuecuecha (2010), in a study on the impact of

remittance in Indonesia, note that remittance inflow reduces poverty, and that remittance-receiving households spend more on consumption than on investments. Adams (2004) finds that remittance inflow reduces the severity of poverty rather than the level of poverty in Guatemala. Also, in a study on the Pacific island countries of Fiji and Tonga, Brown (2008), finds that remittances reduce the level of poverty in both countries.

Remittances and bank credit are major elements of an economy that play an important role in stimulating economic activities and driving economic growth (Cooray, 2012; Dilshad, 2013; Meyer & Shera, 2017). Remittances can positively contribute to the banking sector in remittance-receiving economies by increasing the volume of deposits, thereby removing liquidity constraints in the banking sector (Aggarwal et al., 2011; Barajas et al., 2018; Fromentin & Leon, 2019). As the number of households receiving remittances increases, these households are likely to engage with banks by opening bank accounts and depositing their money. The banking sector will be able to use these increased savings in loanable funds and provide credit to individuals and businesses. This inflow of funds through remittances can help banks expand their loan portfolios.

Bank credit plays a significant role in the monetary policy mechanism within the wider macroeconomic environment in remittance-receiving economies. Several studies undertaken on MTM in developing countries have revealed that the main element transmitting monetary policy shock into real economy is bank credit. Mishra et al. (2012) state that bank credit is the most influential channel in low-income economies. Agha et al. (2005), also find that bank credit functions as the main monetary transmission channel in Pakistan. A study carried out by Aleem (2010) in India also reveals a similar outcome. These studies do not exclude the functioning of other intermediate monetary transmission channels, though they note bank credit as the main monetary transmission channel in low-income countries.

Remittances are known to support remittance-receiving economies in several ways; however, they also cause some issues. Remittance inflow tends to weaken institutions in many remittance-receiving developing countries. The literature that deals with the effects of remittances on institutions finds evidence that remittances weaken governance in remittance-receiving countries (Abdih et al., 2012; Ahmed, 2012; Morrison, 2009). The prevalence of weak institutions could create obstacles to the smooth functioning of monetary transmission channels such as bank credit. Prachi et al. (2012) also emphasize that weak institutional arrangements in developing countries weaken the traditional interest rate and asset price

transmission channels in those countries. Several studies establish that bank lending channels have been the primary monetary transmission channels in a number of developing countries (Agha et al., 2005; Aleem, 2010; Barajas et al., 2018). In developing countries, which are characterized by the presence of weak institutions and inadequate property rights, commercial banks prefer to offer loans to a select group of customers only. This could probably affect bank credit, which is the primary transmission channel in many developing economies.

Abdih et al. (2012) demonstrate that remittances reduce institutional quality by lessening the accountability of the government, thereby degrading governance in remittance-receiving countries. Furthermore, remittances enable households to substitute public services through remittance-supported income: as a result, corruption becomes less costly for the government. Remittance inflow also widens the gap between the people and the government as it reduces dependence on state-funded benefits. There is evidence for remittance-funded projects in Mexico, Senegal, and Yemen, where people have used remittances to fund social welfare and infrastructure development works (Adida & Girod, 2011; Chaudhry, 1989; Diedhiou, 2015). Deterioration of institutions in remittance-receiving countries could cause further emigration, resulting in an increase of remittance inflow, which further decreases the quality of institutions. In addition, non-tax revenue such as remittances can prolong the survival of autocratic governments in remittance-receiving countries (Ahmed, 2012). Abdih et al. (2012) explain that remittance inflow can increase the level of corruption and leave space for the incumbent government to use the funds for its own purposes. Miller and Ritter (2014) argue that remittance inflow could be used as a source of funds for the emergence of armed conflict. This view is further supported by Collier and Hoeffler (2004), who state that emigrant diasporas provide funds for the renewal of conflicts in the source countries. Furthermore, this type of remittance-based funding for insurgencies could worsen the institutions in the source countries and lead to more violent and possibly autocratic rule, rather than democracy (Geddes et al., 2014). These outcomes from remittance inflow could contribute to destabilization in remittance-receiving countries, and weaken institutions.

Autonomous operation of Central Banks is a feature of strong institutions that ensures the smooth functioning of bank credits. Central Banks' autonomous function and their policies are influenced more in developing economies with weak institutions than in developed economies. Crowe and Meade (2007) report a strong relationship between the transparency of the central bank and its intended monetary policy outcome in a study covering 82 industrial

and developing countries. In addition, Prachi et al. (2012) emphasize that Central Banks' transparency can enhance the smooth functioning of monetary transmission channels, including bank credit. However, studies also show that remittance inflow helps the survival of autocratic governments in remittance-receiving countries (Ahmed, 2012), which could result in policy manipulation by such autocratic regimes in their favour. Interventions in the independent and transparent operation of central banks, which is normally seen in autocratic regimes, could weaken institutions.

3.3 Data

We used quarterly data from 51 remittance-receiving countries covering a 20-year period from 2000 Q1 to 2019 Q4. The data on domestic credit are collected from the respective Central Banks' databases. The data on remittances are obtained from the IMF's International Financial Statistics (IFS) database. We use the World Bank data for the selected institutional variables: voice and accountability, control of corruption, government effectiveness, regulatory quality, and rule of law. Ten-year average (2010 – 2019) values of these variables are used in the regression analysis as the data on these institutional variables are available from 2010 to 2019 for most of the countries chosen for this study. We also use a 10-year average of savings- to-GDP ratio, remittances-to-GDP ratio and bank branches per 100,000 adults from the World Bank publications. The institutional variables are described as follows:

Voice and Accountability: Represents opinion about the involvement of people in choosing their own government, freedom for association, expression of opinion, and the media freedom.

Control of Corruption: Represents to what extent public authority is used for private benefits including both small and large-scale corruption, and the influence of superior groups and private returns.

Government Effectiveness: Represents opinions about the standard of public services, the standard of the public service and how independent it is from political pressure, the standard of policymaking and implementation, and the integrity of the government's commitment to its intentions.

Regulatory Quality: Reflects opinions about the government's scope to formulate and execute strong rules and regulations that allow and motivate the growth of the private sector.

Rule of Law: Represents opinions of agents' trust in social norms and adherence to these norms, specifically the standard of property rights, contract enforcement, the police, and the courts, as well as the probability of crime and violence.

The estimates of all these variables range from -2.5 (weak) to 2.5 (strong).

3.4 Methodology

We use the panel SVAR approach introduced by Pedroni (2013) and used by Raheem et al. (2023) in a similar study. This methodology breaks down the structural shocks into common and idiosyncratic shocks, and it is also suitable for use with a large number of diversified countries to diagnose the dynamic relationships between different economic variables. This methodology also enables the panel members to respond between countries to their common and idiosyncratic shocks. In addition, this methodology allows for the time-series-based statistical estimation for an unbalanced panel that does not have adequate data for a panel member. This approach also helps to predict the response of local variables to changes in local economic conditions, while controlling any changes happening in the foreign environment (Raheem et al., 2023). This approach also resolves the issues of dynamic heterogeneity and cross-sectional dependencies in an unbalanced panel data set (Montiel & Pedroni, 2019). It is necessary to control cross-sectional dependency and dynamic heterogeneity in an unbalanced panel study; otherwise, the inferences from responses could become inconsistent (Raheem et al., 2023). This methodology addresses these problems by breaking the structural shocks into idiosyncratic and common components. This methodology enables us to produce robust results of the idiosyncratic and common impulse responses and variance decomposition quantiles (Montiel & Pedroni, 2019; Raheem et al., 2023).

We use the panel SVAR to estimate the dynamic effect of remittances on bank credit. The equation below elaborates the concise form of panel VAR:

$M_{i,t}=B_i(\mathrm{L})\, Y_{i,t}+\mathrm{x}_{i,t}$

where Y is a vector, $B_i(L)$ is the polynomials of lagged coefficients, and x is the error term. We use the general-to-specific (GTOS) criteria to select the lag length for the estimation as suggested by Pedroni (2013). Applying a non-recursive long-run identification method to the concise form of a panel VAR produces a panel SVAR. This results in the creation of SVAR as described below:

$A_{0,i}y_{i,t}=A_i(\mathrm{L})\, y_{i,t}+\varepsilon_{it}$, (1)

where $A_{0,i}$ and A_i represent the matrices of contemporaneous coefficients and lagged coefficients, respectively. $Y_{i,t}$ represents the endogenous variables' vector consisting of log of remittance inflow and bank credit in the individual economy and ε_{it} represents the vector of cross-sectionally dependent and independently distributed composite structural shocks over time. This composite structural shock in the vector of ε_{it} is further broken down into (M x 1) the vector of $\acute{\epsilon}_{it}$ member-specified idiosyncratic and $\bar{\epsilon}_t$ common shocks as described below:

$$\varepsilon_{it} = \Lambda_i \bar{\epsilon}_t + \acute{\epsilon}_{it} \text{ where } E(\xi_{it}\xi'_{it}) = \begin{bmatrix} \Omega_{i,\bar{\epsilon}_t} & 0 \\ 0 & \Omega_{i,\acute{\epsilon}_t} \end{bmatrix} \quad \forall\, i, t, \qquad E(\xi_{it}) = \forall\, i, t,$$

$$E(\xi_{it}\xi'_{it}) = 0 \qquad \forall\, i, s \neq \qquad E(\bar{\epsilon}_t\acute{\epsilon}'_{it}) = \forall\, i, t \neq \qquad (2)$$

where $\xi_{it} = (\bar{\epsilon}'_t, \acute{\epsilon}'_{it})$' and Λ_i is an M × M diagonal matrix in which $\lambda_{i,m}$ m = 1,…..M represent the coefficients of diagonal elements. The covariance of the composite noise produces the structure of $E(\epsilon_{it}\epsilon'_{it}) = \Omega_{i,t}$ from the restrictions imposed. Equation (2) also describes a diagonal covariance matrix with randomly normalized constraints.

The estimate for composite shocks ε_{it} is obtained by estimating the reduced form of M+1 VARs for each member by using the cross-sectional average value as shown below:

$$y_{1,t} = K_i(L)\, y_{1,t} + e_{1,t}$$

$$. \qquad (3)$$

$$.$$

$$y_{M,t} = K_M(L)\, y_{M,t} + e_{M,t}$$

$$\bar{y}_{,t} = \bar{K}(L)\, \bar{y}_{,t} + \bar{e}_{,t}$$

where

$$K_i(L) = A^{-1}{}_{0,i}\, A_i(L), \quad e_{i,t} = A^{-1}{}_{0,i}\, \varepsilon_{i,t}\,, \; \bar{K}(L) = \bar{A}^{-1}\bar{A}(L), \; \bar{e}_t = \bar{A}_0^{-1}\bar{\varepsilon}_t$$

From the residuals of the reduced form, the common and composite shocks are generated. In the next stage, the idiosyncratic shock $\acute{\epsilon}_{it}$ is estimated using the elements of equation (2). As explained in the structural shocks, the covariance between $\bar{\epsilon}_t$ and $\acute{\epsilon}_{it}$ is zero, which is white noise. The estimation of equation (2) leads to the formation of the loading matrix of common

factors for each member *i* in the panel, using OLS regressions. This leads to the prediction of the M × M diagonal matrix of $\dot{\Lambda}_i$ with sample estimation of E ($\varepsilon_{it,m}\ \bar{\varepsilon}_{t,m}$)/ E ($\epsilon_{t,m}^{-2}$) for m = 1,….., M along the diagonals.

In the following stage, the composite responses for every member of the panel are decomposed into common and idiosyncratic responses respectively as shown below:

$A_i(L) = A_i(L)\ \Lambda_i + A_i(L)\ (I - \Lambda_i\ \Lambda'_i)^{-½}$ (4)

where

$A_i(L) \equiv \bar{A}_i(L)$ and $A_i(L)\ (I - \Lambda_i\ \Lambda'_i)^{-½} \equiv \check{A}_i(L)$

We use two-step estimation in this study. The impulse responses (IRs) of bank credit to a shock in remittances is estimated in the first stage. In the next stage, various institutional variables are regressed on the IRs of bank credit.

Initially, we estimate a panel SVAR model to study the dynamic effect of remittance inflow on bank credit. The matrices below show that model with a short-run restriction but no long-run restriction. We estimate the idiosyncratic and common IRs by using the SVAR methodology proposed by Pedroni (2013).

The input matrix for the short run is as follows.

$$A_{0i}y_{it} = \begin{bmatrix} - & 0 \\ - & - \end{bmatrix} \quad \begin{bmatrix} r_{i,t} \\ c_{i,t} \end{bmatrix}$$

The input matrix for the long run is written as.

$$A_{0i}y_{it} = \begin{bmatrix} - & - \\ - & - \end{bmatrix} \quad \begin{bmatrix} r_{i,t} \\ c_{i,t} \end{bmatrix}$$

where $\bar{}$ represents unrestricted parameter and 0 represents restricted parameter. The identification method is applied based on the fact that remittances affect bank credit in both the short and the long term. In both cases, remittances could increase the availability of loanable funds with commercial banks. Remittances can also be used as substitutes for borrowing by households. However, bank credit affects remittances in the long run only (Fromentin & Leon, 2019). In the short run, people borrow money to send workers abroad for employment purposes

and send remittances home; therefore, these borrowings help increase the inflow of remittances in the long run.

Table 3.1 Unit root test statistics (1st difference)

	Levin, Lin & Chu t*		Im, Pesaran and Shin W-stat)		ADF - Fisher Chi-square		PP - Fisher Chi-square	
Variables	Statistic	Prob	Statistic	Prob	Statistic	Prob	Statistic	Prob
REMIT	-44.0773	0.0000	-45.6967	0.0000	1313.3800	0.0000	1797.9700	0.0000
CREDIT	-12.5526	0.0000	-17.3755	0.0000	529.7190	0.0000	1286.1500	0.0000

We first test the data to check that the stationarity condition holds before performing the estimation of the panel SVAR model. The outcome of the non-stationary tests of remittances and bank credit data is shown in Table 3.1. The statistical estimation of the test shows that the remittances and bank credit data obtained for all members in this panel are stationary in their first difference.

We report selected descriptive statistics for idiosyncratic IRs of bank credit to a shock in remittances in the median, 25th and 75th percent quantile ranges. The IRs of bank credit to idiosyncratic shock in remittances are shown in Figure 3.1. The upper and lower lines represent the 75th and 25th percent quantile responses, while the middle line represents the median responses. The gap between the upper and lower lines depicts the diversity of the members in the panel in responding to a shock in remittances.

The 51 countries selected for this study show a diverse response in their IRs of bank credit. We observe that the IRs of bank credit exhibit a persistent increase in their 75th percentile and median responses; however, the 25th percentile response shows a persistent decline throughout its time horizon. The median response of bank credit to a one-unit idiosyncratic shock in remittances leads to a 0.002 to 0.003 percent increase in bank credit from the first period to the twelfth period. The 75th percentile shows an increase from 0.002 to 0.02 percent. However, the 25th percentile response shows a decline from 0.0027 to 0.0045 percent. A shock in remittances also shows a similar kind of change in the variance decomposition of bank credit. From the first period to the twelfth period the variation in the bank credit is 0.028 percent to 0.083 percent of the median forecast error variance, 0.073 percent to 0.18 percent for the 75th percentile, and 0.01 percent to 0.02 percent for the 25th percentile. The IRs and variance decomposition of the 51 countries are presented in Figures 3.3 and 3.4 respectively.

Figure 3.3 Impulse response of 51 countries

Response to lncredit to idiosyncratic remittance shock

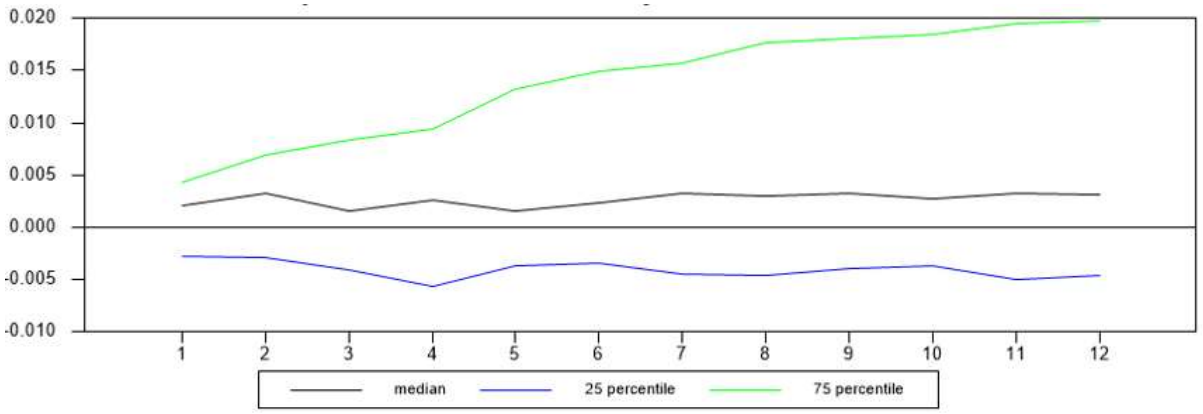
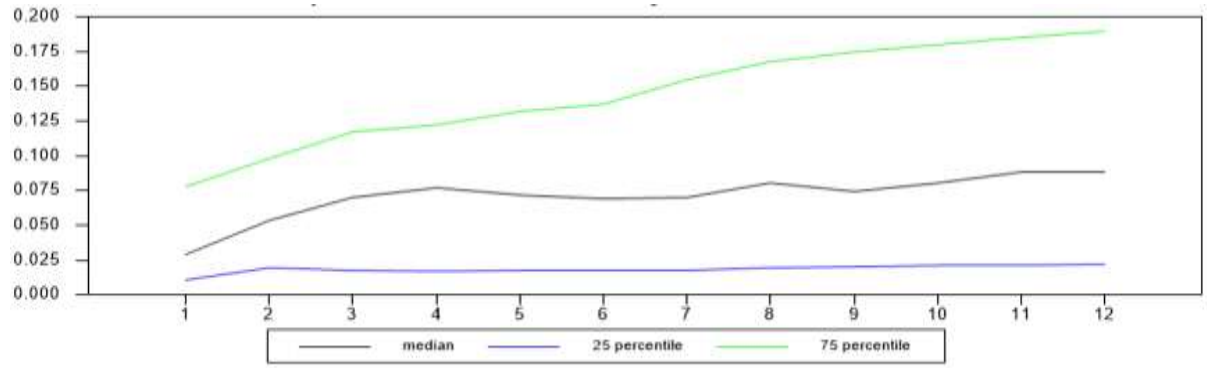


Figure 3.4 Variance decomposition of 51 countries

Response to lncredit to idiosyncratic remittance shock



To determine the reason for the heterogeneous IRs of bank credit, we further analyse the responses of each country by regressing the individual IRs on various institutional factors that may influence the behavior of bank lending in remittance recipient countries. We regress the first three quarter IRs (IR1, IR2 and IR3) of these countries on their individual institutional variables. We include a 10-year average (2010 -2019) of five significant institutional indicators as explanatory variables in the regression model. In Table 3.2 we present the results of this regression. The reasoning is that the banking sector in countries with stronger institutional setups will increase its lending with remittance inflow and the banking sector in countries with weaker institutional setups will not be able to lend more even under a significant inflow of remittances. We also include the savings-to-GDP ratio, remittances-to-GDP ratio and bank branches per 100,000 adults as additional variables to control for their possible effects of remittances on bank credit in remittance-receiving economies. We include the savings-to-GDP

ratio in the regression models as it represents savings in all sectors, including the household savings contributed by migrant workers in the remittance-receiving countries. This can influence bank credit through commercial banks' balance sheets. The other variable chosen is the remittance-to-GDP ratio, which represents the contribution of remittances to economic activities in remittance-receiving countries. Several previous studies on remittances reveal that the higher the remittance-to-GDP ratio, the greater is the effect of remittances on an economy. We include bank branches per 100,000 adults, as access to banking services determines the availability of and access to bank credits.

The initial regression results reveal that corruption control and regulatory quality have a positive impact on the IRs of bank credit in all three periods following a shock in remittance inflow when we regressed all institutional variables along with savings-to-GDP ratio, remittances-to-GDP ratio and bank branches per 100,000 adults on IRs of bank credit. The regression results are presented in Table 3.2.

In the next step, we classify the countries into two groups based on their institutional performance indicators. We estimate the average values of five institutional variables and classify 26 countries as institutionally high-performing as they have above-average cumulative values in institutional variables. We categorize the other group of 25 countries as institutionally low-performing as they have below-average cumulative values in institutional variables.

Table 3.2 Regression results of 51 countries

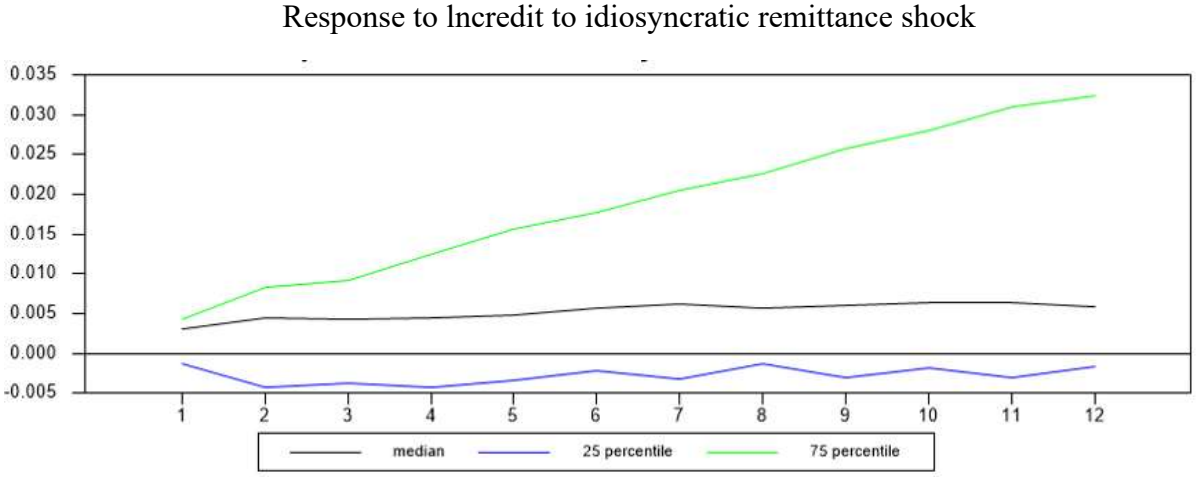
Independent variables	IR for Period - 1		IR for Period - 2		IR for Period - 3	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Accountability	-0.0035	0.2581	-0.0059	0.1139	-0.0049	0.2203
Corruption control	0.0142	0.0053	0.0122	0.0419	0.0146	0.0257
Regulatory quality	0.0124	0.0177	0.0206	0.0016	0.0230	0.0011
Governance	-0.0130	0.0782	-0.0171	0.0557	-0.0182	0.0598
Rule of law	-0.0108	0.0680	-0.0063	0.3737	-0.0099	0.1962
Savings to GDP ratio	0.0004	0.0164	0.0002	0.3371	0.0002	0.2946
Remittance to GDP Ratio	0.0003	0.3000	0.0003	0.3595	0.0005	0.1052
Bank branches	0.0002	0.0910	0.0002	0.1664	0.0001	0.2438
R-Squared	0.294536		0.252604		0.283725	

We remove the 25 institutionally low-performing countries from our list of countries and estimate the IRs of bank credit. The IRs and variance decomposition of 26 institutionally high-performing countries are presented in Figures 3.5 and 3.6 respectively. We find that the 25th percentile declining response diminished significantly compared to the response of 51 countries. The median of the IRs show a significant increase. A similar change is also observed

in the corresponding variance decompositions. We present this comparison of changes in IRs in Figures 3.5 – 3.7.

The IRs of bank credit display diverse responses for the 26 institutionally high-performing countries, showing an increase in the median and 75th percentile responses, but a decline in the 25th percentile in its time horizon. The median response of bank credit to a one-unit idiosyncratic remittance-shock leads to a 0.003 to 0.006 percent increase in bank credit from the first period to the eleventh period and starts to decline thereafter. The 75th percentile shows an increase from 0.004 to 0.032 percent from the first to the eleventh period and also then begins to decline. However, the 25th percentile response shows a decline from -0.001 to -0.003 percent from the first period to the eleventh. A remittance shock displays a similar pattern of change in the variance decomposition of bank credit. The median variance decomposition increases from 0.033 to 0.117 percent from the first period to the twelfth period and the 75th percentile increases from 0.081 to 0.257 percent. The 25th percentile also increases from 0.011 to 0.061 percent.

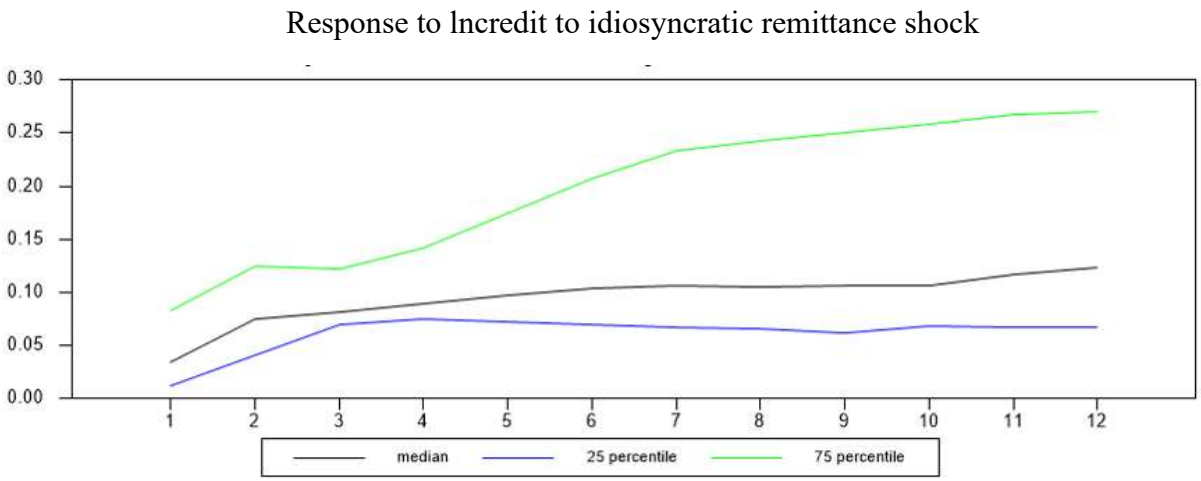
Figure 3.5 Impulse response of 26 institutionally high-performing countries



We use the same regression model for the 26 institutionally high-performing countries. The statistical estimation is presented in Table 3.3. The institutional variables of corruption control and regulatory quality are significant in all three periods. This indicates that corruption control and regulatory quality are positively associated with bank credit in responding to a shock in remittances. Other variables, including the savings-to-GDP ratio and the remittances-to-GDP ratio also become significant in all three forecast horizons. This explains that in countries with higher savings-to-GDP ratios and higher remittances-to-GDP ratios, bank credit responds more strongly to a shock in remittances. However, the rule of law becomes significant,

with a negative coefficient in all 3 periods. This could be associated with the weakening of some institutional factors by the influence of remittance inflow. Remittance inflow weakens some institutional factors by creating a buffer between people and government: this lessens the accountability of government, leading to the degrading of institutional qualities (Y. Abdih et al., 2012; Ahmed, 2012; Morrison, 2009; Regan & Frank, 2014). Non-tax revenue remittances can lead to autocratic government, resulting in the degradation of the rule of law (Ahmed, 2012). In addition, remittance-based funding from insurgent groups promotes the survival of autocratic rule (Collier & Hoeffler, 2004; Geddes et al., 2014), which can cause deterioration of some institutional characteristics, especially the rule of law.

Figure 3.6 Variance decomposition of 26 institutionally high-performing countries



We then estimate the IRs of 25 institutionally low-performing countries and run the regression with the same variables used in the first two regressions. The IRs and variance decompositions are presented in Figures 7 and 8 respectively. We observe a decline in the IRs of the median, 25th, and 75th percentiles, compared to the IRs estimated for the whole sample of 51 countries, and a significant decline compared to the IRs estimated for 26 institutionally high-performing countries. A similar pattern of change is also observed in the corresponding variance decomposition.

Table 3.3 Regression results of 26 institutionally high-performing countries

Independent variables	IR for Period - 1		IR for Period - 2		IR for Period - 3	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Accountability	0.0030	0.4356	-0.0011	0.8208	-0.0003	0.9649
Corruption control	0.0192	0.0008	0.0210	0.0030	0.0247	0.0044
Regulatory quality	0.0131	0.0268	0.0270	0.0013	0.0323	0.0017
Governance	-0.0079	0.2830	-0.0119	0.2142	-0.0133	0.2590
Rule of law	-0.0278	0.0012	-0.0273	0.0091	-0.0333	0.0099
Savings to GDP ratio	0.0010	0.0002	0.0007	0.0205	0.0007	0.0336
Remittance to GDP Ratio	0.0015	0.0022	0.0016	0.0061	0.0020	0.0078
Bank branches	0.0005	0.0099	0.0003	0.2375	0.0003	0.3449
R-Squared	0.766743		0.624001		0.606373	

The IRs of bank credit show an increase in their 75th percentile responses; however, the median and 25th percentile responses show a decline in their time horizons. The 75th percentile response of bank credit to a one-unit idiosyncratic shock in remittances results in a 0.004 to 0.016 percent increase in bank credit from the first period to the twelfth period. However, the median response shows a decline from 0.001 to -0.0003 percent from the first to twelfth forecast horizons, and the 25th percentile response also shows a decline from -0.004 to -0.005 percent from the first to the twelfth forecast horizons. The median variance decomposition increases from 0.022 to 0.029 percent from the first to the twelfth forecast horizons and the 75th percentile increases from 0.051 to 0.115 percent. However, the 25th percentile declines from 0.009 to 0.005 percent.

Figure 3.7 Impulse response of 25 institutionally low-performing countries

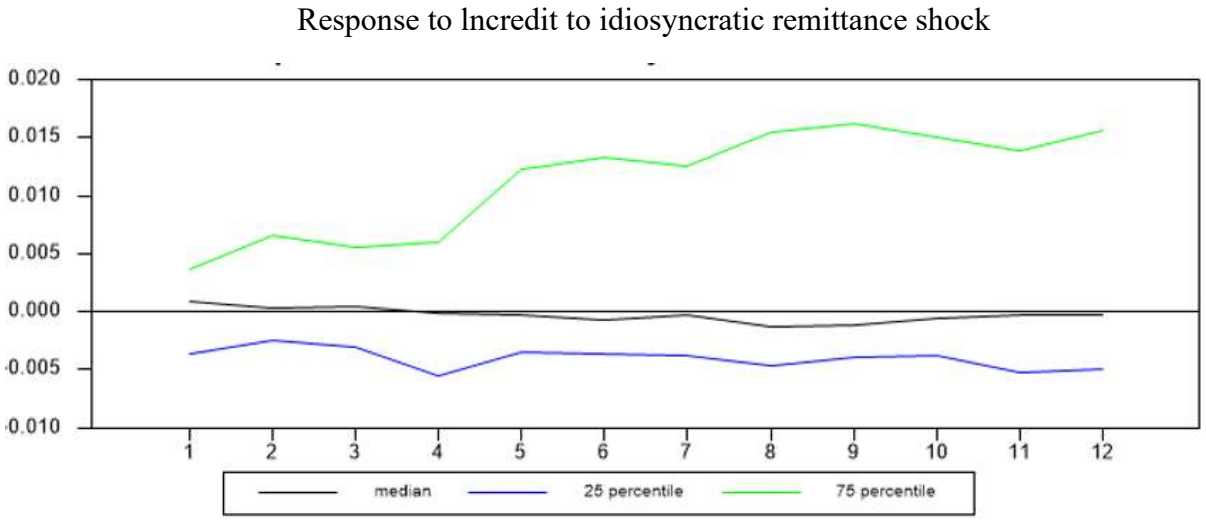
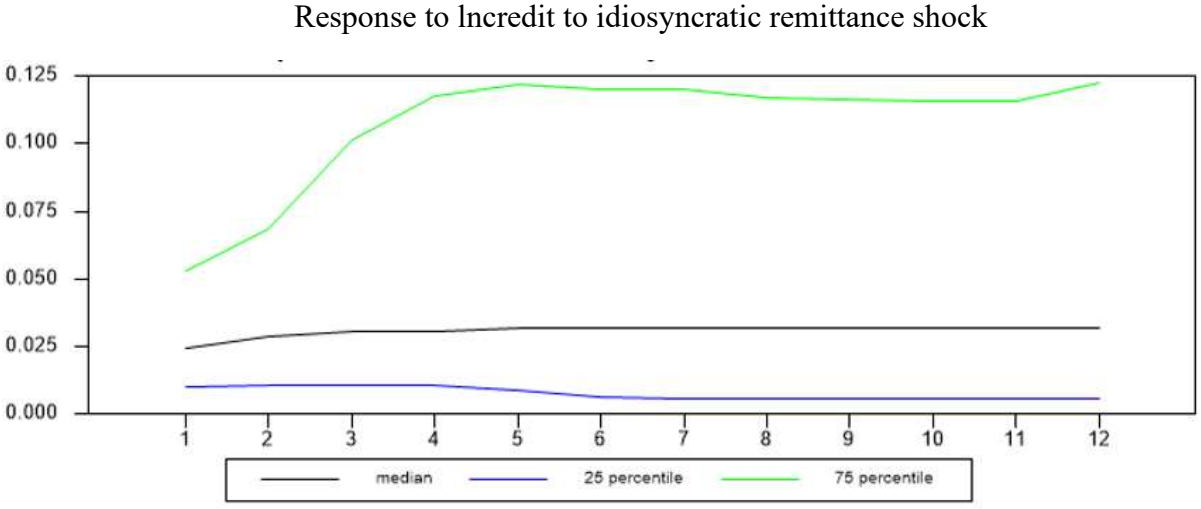


Figure 3.8 Variance decomposition of 25 institutionally low-performing countries



In addition, we run the regression for these 25 institutionally low-performing countries. The results are presented in Table 3.4. The coefficients of all variables become insignificant at the 5 percent significance level in all three forecast horizons.

Table 3.4 Regression results of 25 institutionally low-performing countries

Independent variables	IR for Period - 1		IR for Period - 2		IR for Period - 3	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Accountability	-0.0067	0.0554	-0.0098	0.0531	-0.0089	0.0787
Corruption control	0.0094	0.3285	0.0090	0.5166	0.0120	0.3929
Regulatory quality	0.0114	0.1375	0.0190	0.0943	0.0159	0.1584
Governance	0.0018	0.8723	-0.0054	0.7328	-0.0033	0.8383
Rule of law	-0.0026	0.7193	0.0035	0.7362	0.0014	0.8937
Savings to GDP ratio	-0.0002	0.5275	-0.0002	0.5847	-0.0003	0.5274
Remittance to GDP Ratio	-0.0003	0.2448	-0.0002	0.5674	0.0000	0.9499
Bank branches	0.0001	0.3823	0.0002	0.3022	0.0001	0.4085
R-Squared	0.447508		0.407926		0.379767	

We compare the median, 75th and 25th percentile IRs of bank credit of these countries and present these in Figures 3.9 – 3.11. The 75th percentile IRs of the whole sample of 51 countries, institutionally high and low-performing countries show an increase in their responses. The 75th percentile IRs of institutionally high-performing countries increase from 0.004 to 0.03 from the first to the twelfth forecast horizons when compared to the IRs of 51 countries, which increase from 0.004 to 0.02. The 75th percentile IRs of the 25 institutionally low-performing countries increases from 0.0036 to 0.016. This indicates that the 75th percentile of IRs of institutionally high-performing countries shows a persistent increase throughout the time

horizon. The median IRs of institutionally high-performing countries increase from 0.003 to 0.005 from the first to the twelfth forecast horizons, while the median IRs of 51 countries increase from 0.002 to 0.003. However, the median IRs of institutionally low-performing countries decline from 0.001 to -0.00026 from the first to the twelfth forecast horizons. This indicates that the median IRs of institutionally high-performing countries also show an increase over the time horizon when compared to the whole sample of 51 countries and the low-performing 25 countries. The 25th percentile IRs of institutionally high-performing 26 countries stay at -0.001 from the first to the twelfth forecast horizons with a decline between these periods, while the IRs of 51 countries decline from -0.002 to -0.004. However, the 25th percentile IRs of 25 low-performing countries decline from -0.003 to -0.005. The movement of the IRs of the institutionally high-performing countries shows a significant difference compared to the whole sample of 51 countries and the institutionally low-performing 25 countries.

In addition, the regression result of institutionally high-performing countries is significantly different from the results of the whole sample of 51 countries and the institutionally low-performing 25 countries. In the regression results of the 26 institutionally high-performing countries the two institutional variables, corruption control and regulatory quality, along with the savings-to-GDP ratio and the remittances-to-GDP ratio, are significant at the 5 percent significance level in all 3 periods chosen for the regression of IRs on these variables. However, in the regression results of the 25 institutionally low-performing countries, the coefficients of these variables are not significant at the 5 percent level in any period.

Figure 3.9 Comparison of IRs – 75th percentile

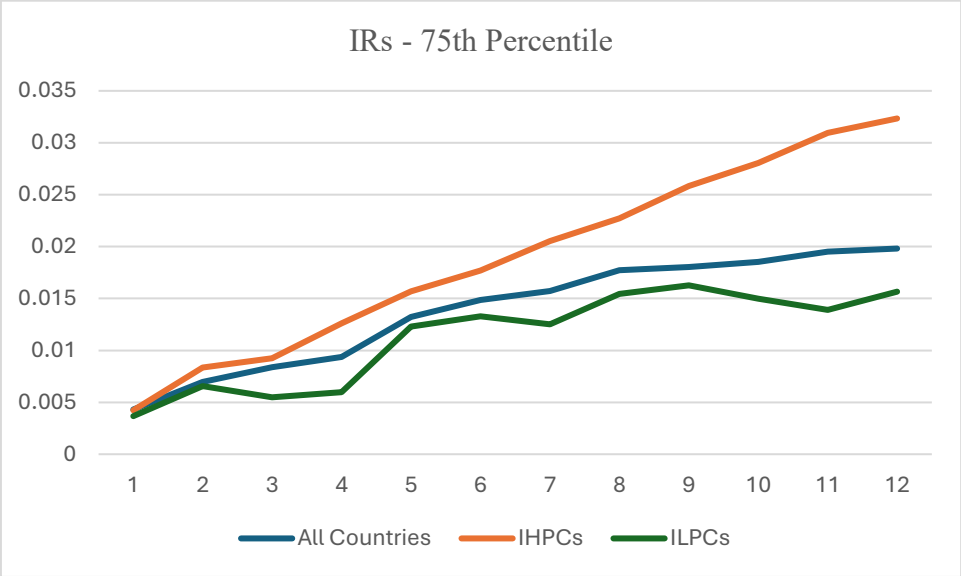


Figure 3.10 Comparison of IRs – median

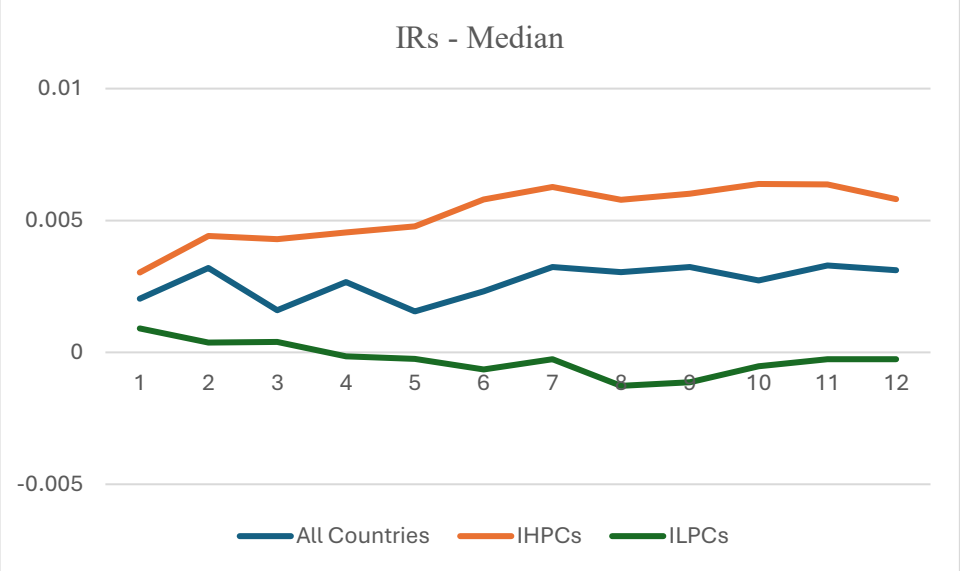
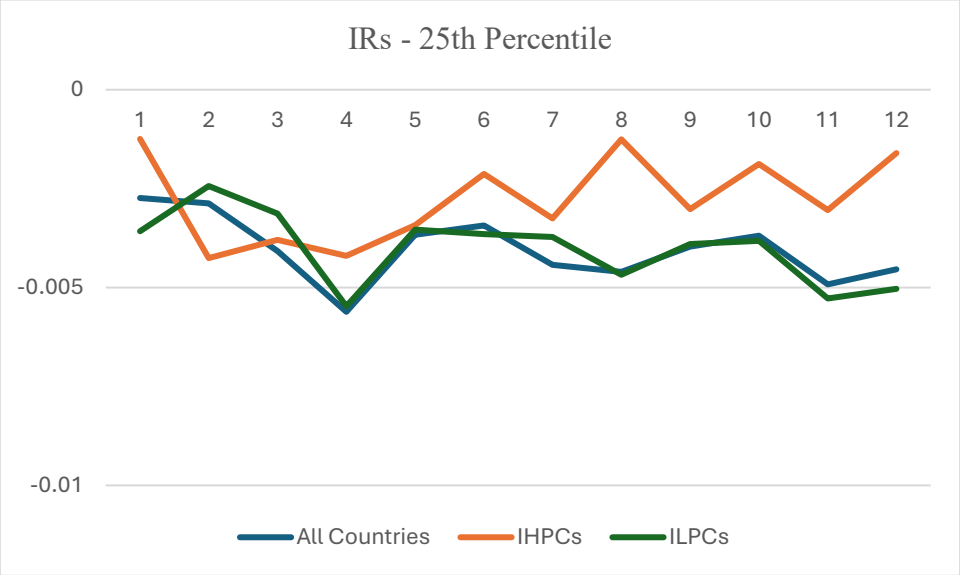


Figure 3.11 Comparison of IRs – 25th percentile



Note: IHPCs - Institutionally High-performing Countries
ILPCs - Institutionally Low-performing Countries

3.5 Conclusion

Remittances play an important role in many developing countries, which are often characterized by the presence of weak institutional qualities and poorly developed financial markets. Remittances aid economic growth and poverty reduction in many of these countries, and at the same time, remittance inflows exceed export revenue and capital inflows. The existing literature shows that remittances impact bank credit, which is identified as a crucial monetary transmission channel in many remittance-receiving developing economies. This study indicates that institutions moderate the effect of remittances on credit in remittance-receiving economies.

This study investigates the role of institutions in the effect of remittances on bank credit. There are two different views on how remittances impact bank credit in remittance-receiving countries. One set of studies argues that remittances help to increase bank credit in these countries, while the other argues that remittances reduce the expansion of bank credit. However, we argue that the effect of remittances on bank credit in remittance-receiving economies depends on the institutional environment that prevails in those economies. The IRs estimated through the SVAR approach in the first stage reveal that remittances have varied impacts on bank credit across remittance-receiving countries. The second-stage regression results indicate that some institutional factors play a significant role in determining the effect remittances have on bank credit. Furthermore, the regression results indicate that, among the institutional factors,

corruption control and regulatory quality play an important role in moderating the effect of remittances on bank credit. The second stage cross-section regression results also reveal that institutional variables including corruption control and regulatory quality significantly moderate the effect of remittances on bank credit in countries where the savings-to-GDP ratio and the remittances-to-GDP ratio are high. This empirical finding aligns with Brown and Carmignani (2015), who explain that bank credit becomes positive at higher levels of remittance inflows. When remittance inflows increase to a significant level along with the national savings level, banking sectors will increase their credit facilities against the background of a strong institutional environment. The banking sector in countries with weaker institutional setups will not be able to expand its credit facilities to the same degree as in countries with a stronger institutional environment. This study also finds that remittances could weaken some institutional factors, especially the rule of law. This finding agrees with those of Abdih et al. (2012), who explain that remittances create a barrier between people and government in remittance-receiving economies.

Our empirical findings have implications in the wider macroeconomic environment where institutional factors play an important role. Our findings indicate that institutional factors play a significant role in determining the effect of remittances on credit channels. Furthermore, our empirical findings explain that monetary policy measures may suffer from achieving their objectives through credit channels when the banking sector receives a significant inflow of remittances. The excess funds received from remittance-driven savings may enable commercial banks to be less reliant on the interbank market for borrowings, and to increase their lending facilities to borrowers when their repayment possibility increases in a strong institutional environment. This may result in a situation where central banks in these countries could face challenges in achieving their monetary policy targets through credit channels. Policymakers in these countries have to be cautious about the abundant flow of remittances in the presence of a strong institutional environment. The inflow of remittances may result in uncontrollable macroeconomic consequences and difficulty in achieving price stability and desired employment levels in the economy.

Policymakers have to be cautious about this issue. They could take measures to monitor the level of remittances flowing into commercial banks and to eliminate the excess funds accumulated through remittance inflow. Central banks in these countries could explore the possibility of increasing commercial banks' reserves based on remittance-based savings.

Policymakers could also take action to provide equal access lending facilities to all bank account holders, considering the role the institutional environment plays in remittance-receiving countries. In addition, increasing the presence of bank branches in rural areas and creating awareness of the availability of lending facilities among the public, especially in rural areas, could increase access to lending facilities for the rural population. This measure could improve access to lending facilities, minimizing the impact of institutional factors on the provision of lending facilities by commercial banks.

This study opens avenues for individual country-specific studies, as every country has specific cultural and socio-economic conditions. In addition, the institutional background and the strengths of each institutional factor vary from one country to another, especially in low-developed remittance-receiving economies.

3.6 **References**

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Chapter 4

The impact of remittances on monetary transmission mechanism during pre-and post-conflict eras in Sri Lanka

Abstract: This study analyses the impact of remittances on the monetary transmission mechanism (MTM) of the Sri Lankan economy during its conflict and post-conflict eras. The SVAR model is used to analyse the impact of remittances in the transmission of monetary policy shocks to real economic variables, using monthly data from 1996 to 2019. In addition, the study focuses on how the impact of remittances varied over different intermediate transmission channels, especially credit, asset prices and exchange rates, in transmitting the monetary policy shock to the economy. The empirical findings indicate that remittances have affected the MTM of Sri Lanka in the post-conflict period significantly and their impact on bank credit and asset prices is relatively more intense than the exchange rate channel.

Keywords: remittances, monetary policy, transmission channels, conflict

JEL Classification: E5, E52, F24, D74

4.1 Introduction

Remittance inflow has been a crucial source of foreign exchange earnings for many low and middle-income countries (LMICs) and emerging economies. Foreign exchange earnings sent by the migrant workers to their home countries have been a major source of income to reduce poverty and improve economic well-being. According to the World Bank (2019a) the remittance inflow into LMICs reached US$ 529 billion in 2018 and increased to US$554 billion in 2019 (World Bank, 2020). However, the economic slowdown caused by the COVID-19 pandemic and the consequent shutdown is expected to affect the remittance inflow in developing countries significantly. An estimate by the World Bank (2020) showed that remittance flows into recipient countries would fall by nearly 20 percent in Europe, with declines also occurring in Central Asia (27.5 percent), Sub-Saharan Africa (23 percent), South Asia (22 percent), the Middle East and North Africa (19.5 percent), Latin America and the Caribbean (19 percent) and East Asia and the Pacific (13 percent) respectively.

Remittances have been identified as one of the sources of several macroeconomic challenges, including exchange rate appreciation, fiscal adjustment delay, weakening institutions, and indeterminate effects on economic growth. The influx of remittances is also believed to have impacts on the MTMs of remittance-receiving countries, challenging their macroeconomic targets (Barajas et al., 2018). Many studies focus on the effects of remittance inflow on different macroeconomic variables such as GDP, exchange rate, and institutions in low-income countries (LICs). However, only a few studies have so far been undertaken to determine the effects of remittance inflow on MTMs. A study of 163 countries by Barajas et al. (2018) indicates that remittance inflow contributes to weakening the MTM through the accumulation of loanable funds available from commercial banks. Research by Vacaflores (2012) on Latin American countries also shows that remittances affect monetary policy measures. However, an investigation by Ruiz and Vargas-Silva (2010) on the impact of remittances on monetary policy variables suggests that remittances do not have significant effects on monetary transmission channels.

Monetary policy is used to maintain economic stability in a country by maintaining appropriate inflation rates and employment levels. Central banks around the world execute these policy measures by altering the money supply in the economy. The monetary policy transmission mechanism is the channel through which monetary policy measures are transferred into the real economy. The primary tool of monetary policy is interest rates, while

bank credit, asset prices and exchange rates play an intermediate role in transmitting policy effects into the real economy.

The linkage between remittances and monetary transmission channels can impact the smooth functioning of transmission channels and prevent monetary policy from achieving its desired outcomes. Monetary policy transmission differs between countries depending on their economic and institutional backgrounds. Low Income Countries (LICs), which heavily depend on remittances to finance their current accounts, have weaker transmission because of their rudimentary financial markets and existing institutional setups. The dominance of remittance inflow into these less developed economies can intensify the effects on monetary transmission channels, leading to prolonged macroeconomic challenges.

The prevalence of civil conflict in remittance-dependent economies is another factor that contributes to migration and increased inflows of remittances. Studies have shown that a sizable proportion of remittances flows into conflict-affected countries, as more people migrate to other countries due to conflict than to economic reasons (Carling et al., 2012). Migrant diasporas also transfer funds to their home countries to support their community members during and in the aftermath of conflict (Erdal & Stokke, 2009; Gioli et al., 2013). Increasing amounts of remittances due to conflict can increase the magnitude of the effects of remittances on economic variables such as gross domestic product (GDP), price levels, money aggregation, exchange rates and investments. The purpose of remittance inflows includes savings and investments in addition to primary altruistic reasons. During periods of conflict remittances flow into the country of origin, primarily for altruistic reasons to support consumption by family members (El-Sakka & McNabb, 1999; Lucas & Stark, 1985), whereas the transfer of remittances during a post-conflict period is also intended for investment purposes (Alleyne et al., 2008; El-Sakka & McNabb, 1999; Yoshino et al., 2020).

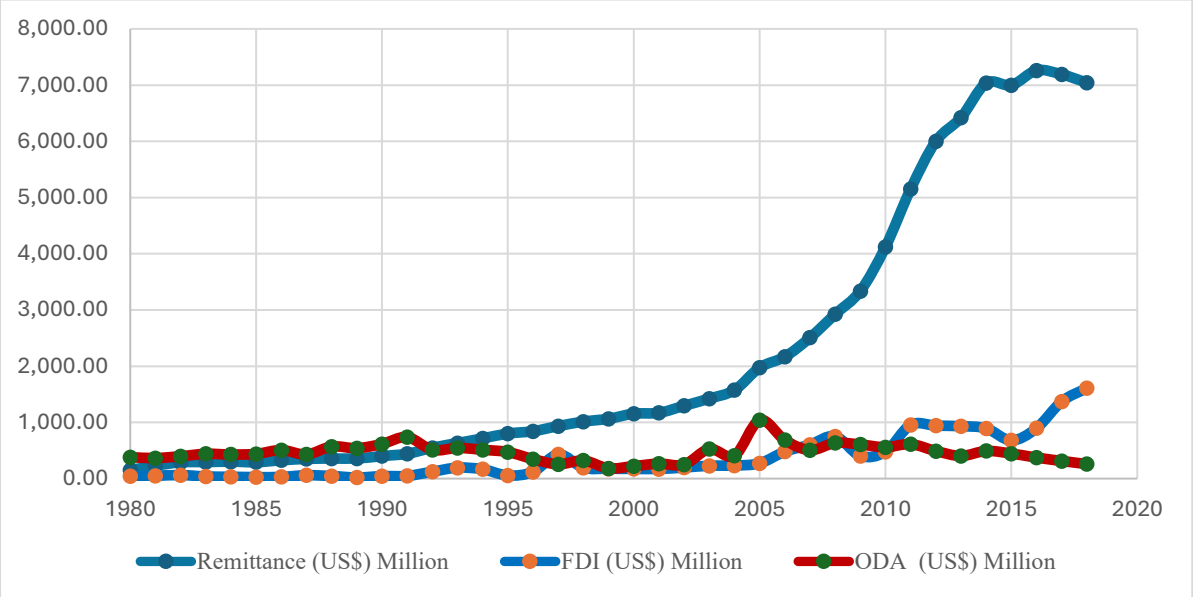
Although some of the existing literature shows the relationship between remittances and monetary policy transmission mechanism, to our knowledge research has not focused on the impact of remittances on different monetary transmission channels, especially in the context of pre- and post-conflict eras. This study investigates whether remittances affect the functioning of intermediate monetary transmission channels and whether conflict alters the effects of remittances on these monetary transmission channels. This study contributes to the literature in two ways. Firstly, this research analyses the effect of remittances on different intermediate monetary transmission channels, including credit, asset prices and exchange rate

channels, using the SVAR model. Secondly, this study investigates the role of conflict in moderating the link between remittances and selected variables through which monetary policy operates, which is a novel approach. The outcomes of this study may help policy makers in remittance-dependent economies and those facing conflict-driven migration to consider the impact of remittances on MTMs, and develop appropriate policies and strategies to minimise the impact of remittances on MTMs.

Sri Lanka is used as a model developing economy for this study as it is a remittance-dependent economy in which the contribution of remittances is nearly nine percent of its GDP, and it is a small, open economy recovering from three decades of internal conflict. Sri Lanka's remittance inflow has been significant in terms of its ratio to GDP and foreign exchange earnings in recent years. According to CBSL (2020), remittance inflow into Sri Lanka in 2019 was US$ 6,717 million, equivalent to nearly 8 percent of its GDP and nearly 56 percent of total exports. Moreover, CBSL (2019) notes that worker remittance inflow into Sri Lanka was US$ 7,015 million, equivalent to 59 percent of total exports in 2018. CBSL (2020) reports that the decline in remittance inflow in 2019 was due to the Easter Sunday attack in April 2019. However, remittances have provided a significant proportion of foreign exchange earnings in the Sri Lankan economy in recent years and have shown significant increases since 1980, when the remittance inflow into Sri Lanka was US$ 152 million. Although the official record of remittance inflow shows considerable increases over time, De and Ratha (2012) suggest that the inflow could be even higher than the published figures. The inflow of foreign remittances into Sri Lanka commenced following the 1977 economic upheaval and migration, which began to increase after the commencement of nearly three decades of civil conflict that lasted from the early part of the 1980s to the middle of 2009.

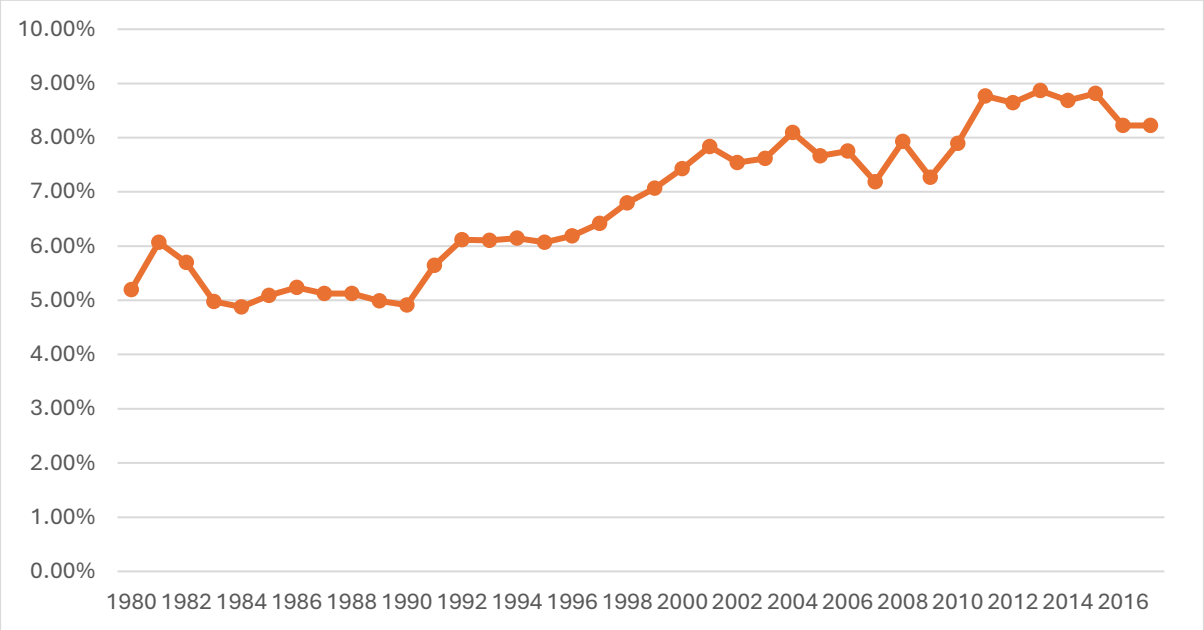
In the recent past, economic growth and job creation was expected through increased foreign direct investment after the end of the civil conflict in 2009; however, no significant progress has yet been achieved in practice. Worker remittances have been crucial to reduce exchange rate fluctuations and finance loan repayments caused by the infrastructure developments in the aftermath of the civil conflict (Withers, 2019). Although remittances support the Sri Lankan economy in this respect, they also have an impact on its monetary transmission channels, potentially disturbing the smooth functioning of these transmission channels and thus creating challenges to macroeconomic stability.

Figure 4.1 Remittances, FDI and ODA inflow into Sri Lanka



Source: IMF and World Bank statistics 2021

Figure 4.2 Remittances-to-GDP ratios in Sri Lanka



Source: IMF and World Bank statistics 2021

The prevalence of domestic conflict demands more remittances to support family members in the home country. Studies have revealed that ongoing conflict in home countries exerts upward pressure on emigrants to send remittances (Carling et al., 2012; Lindley, 2016), and remittances have been used for investment purposes in the aftermath of conflicts (Fagen, 2006; Gioli et al., 2013). In addition, income levels in the home country also affect remittance inflows, since a sudden drop in income can demand more in remittance inflows (Jackman,

2013). Fluctuations in remittance inflows also affect remittance-receiving countries because of their economic significance (Jackman, 2013). However, volatility in remittance flow is relatively lower in its effect than other external factors such as FDI and ODA (Aggarwal & Spatafora, 2005; Ratha, 2005).

This study focuses on the impact of foreign remittances on monetary transmission channels in Sri Lanka, especially bank credit, exchange rate and asset prices in pre- and post-conflict eras. The findings of this study indicate that policy makers should design appropriate strategies to minimize the impact of remittances on monetary transmission channels so that monetary policy can still work effectively.

In this study, we use an SVAR model, which is suitable to capture the dynamic effects of economic variables (Bernanke, 1986a; Sims, 1986). A significant number of previous studies on MTMs have used this model for empirical research. This study also uses SVAR methodology to capture the impulse responses of the transmission channels to a shock in the interest rate, while using remittances as an endogenous variable in the base model and as an exogenous variable in the constrained model. The variation in the impulse responses of monetary transmissions channels reveals the impact of remittances in two different time periods. The empirical findings of the SVAR modelling for the period of conflict and post-conflict show a clear deviation in the IRFs of GDP and price levels. In addition, inclusion of remittances in the SVAR models shows explicit deviations in the outcome of empirical analysis between the two periods. Similarly, the impulse responses of the intermediate transmission channels, which are investigated in this study, also show changes in their behaviour in transmitting the policy shock to real variables. The inclusion of remittances significantly impacts the transmission of policy shock to output and price level in the post-conflict period compared to the conflict era in Sri Lanka. In addition, credit and asset price channels experience more intense effects from remittances in the post-conflict period.

4.2 Literature review

Remittances have been widely researched in terms of their linkage with welfare enhancement and growth acceleration (Adams & Cuecuecha, 2010; Ale et al., 2018; De & Ratha, 2012; Kadozi, 2019; Lim & Simmons, 2015; Meyer & Shera, 2017; Shirazi et al., 2018; Walker & Brown, 1995). However, recent empirical studies (Barajas et al., 2018; Vacaflores, 2012) suggest that foreign remittances cause disturbances to the smooth functioning of monetary transmission channels in remittance-receiving LICs. The literature has traditionally focused on

monetary transmission in developed economies, rather than in developing economies. Mishra et al. (2012) point out that monetary transmission is believed to be weak and unreliable in LICs and the authors further explain that this occurs because of poorly developed financial markets and weak institutional characteristics. In contrast, Bulíř and Vlček (2016) point out that monetary transmission can operate in countries with underdeveloped financial markets. However, recent research by Barajas et al. (2018) on the effects of remittances in 131 countries, including advanced, emerging and developing economies, reveals that remittance inflow weakens the monetary transmission channels, shutting down the link between policy rates and bank lending rates, which is the leading transmission channel in LICs. In addition, a number of studies analyse the operation of monetary transmission channels in LICs, noting that bank lending channels are the primary transmission channel compared to other channels such as interest rates, exchange rates and asset prices. Nevertheless, the empirical findings of these investigations do not rule out the operation of other channels of monetary transmission in LICs (Agha et al., 2005; Alam & Waheed, 2006; Aleem, 2010). In contrast, research undertaken by Isakova (2008) in three central Asian countries – Kazakhstan, the Kyrgyz Republic, and Tajikistan – indicates that exchange rates are the leading monetary transmission channel in these countries. In the case of Sri Lanka, only a few studies have been carried out. The empirical results of Perera and Wickramanayake (2013) indicate that interest rate channels are the leading operator among the available monetary transmission channels, although other channels are also functional in the economy.

Remittance inflow also has significant effects on exchange rates, which constitute one of the monetary transmission channels in remittance-receiving countries, resulting in their exports become less competitive on the world market. A study by Amuedo-Dorantes and Pozo (2004) of 13 Latin American countries finds that remittance inflow results in real exchange rate appreciation. This finding does agree with a recent study by Hassan and Holmes (2013), who find that remittance inflow into 24 high remittance-receiving countries leads to real exchange rate appreciation, resulting in an uncompetitive tradable goods sector. Barajas et al. (2011) also point out that remittance inflow causes exchange rate appreciation in remittance-receiving countries, and Mandelman (2013) in research on the impact of remittances in the Philippines, finds the same result. In a study on the nexus of remittances and exchange rates in Mexico, Rahman et al. (2013) also find appreciation of the local currency in response to remittances. Research by Acosta et al. (2009) in 109 developing and transition economies on the impact of remittances on exchange rates finds that remittances tend to exert upward pressure on exchange

rates; however, this effect becomes weaker with financial development.

Furthermore, Mottaleb et al. (2016) find that remittance inflow has a significant impact on housing prices in Bangladesh. Changes in property prices can impact household wealth and thus alter the intended outcome of monetary policy actions. In addition, Jhandir (2013) finds a positive relationship between stock market development and foreign remittances in three South Asian countries: Bangladesh, India and Pakistan. Furthermore, research on migrants from Ghana shows that part of the remittances flowing into Ghana is invested in housing construction (Obeng-Odoom, 2010).

Although remittances can be viewed as a foreign variable that affects the domestic economic variable, there is a strong linkage between remittance inflow and migrants' domestic socio-economic background. At the micro level, remittances flow into home countries primarily from altruistic purposes, and secondly to transfer migrants' savings to invest in assets and durable goods, (Barajas et al., 2008b; Batu, 2017; Chami et al., 2009b; Lucas & Stark, 1985). Macroeconomic factors, such as domestic income level, price level, asset prices and exchange rate, also influence remittance inflows. The relationship between domestic income and remittance inflows can be either positive or negative. Migrants may remit more to support their family members, altruistically, in times of depressed local income (Alleyne et al., 2008) while increased income levels may attract more remittances because of investment motives and optimism about the performance of the domestic economy. Increasing prices in their country of origin would motivate migrants to remit more to maintain the consumption levels of their families, and to invest in real assets (El-Sakka & McNabb, 1999). In contrast, higher inflation in the home country and its consequent depreciation of the domestic currency could result in migrants sending less foreign currency.

4.3 Data

Monthly data from various sources, including the IMF, the World Bank, the Central Bank of Sri Lanka and the Colombo Stock Exchange (CSE), are used in this study. The primary variables in the study are remittances and intermediate monetary transmission channels, specifically bank credit, exchange rates and asset prices. For remittances, which are monetary transfers by migrant workers employed outside Sri Lanka, data come from the International Financial Statistics (IFS) of the IMF data base and the Central Bank of Sri Lanka (CBSL). The nominal exchange rate data also comes from the IMF. Data on GDP and the Consumer Price Index (CPI) are from the World Bank and IMF data bases, respectively. The Standing Deposit

Facility Rate (SDFR), which is used to represent interest rates, narrow money (M1) and bank credit is sourced from the Central Bank of Sri Lanka. The All Share Price Index (ASPI), which is used as the proxy for asset prices, is obtained from CSE.

The sample period of the study covers 1996 M1 to 2019 M12. In view of changes in the socio-economics conditions that prevailed in Sri Lanka, the study period is divided into the conflict era (1996 M1 to 2009 M6), which covers the period of severe armed conflict, and the post-conflict era (2009 M6 to 2019 M12), which covers the aftermath of the armed conflict. The two periods are used to assess the impact of remittances on the Sri Lankan MTM during the conflict and post-conflict periods. All variables except interest rate are used in logarithmic form. Data that were subject to seasonal variations were seasonally adjusted using the X-12 process.

4.4 Methodology

This study uses structural vector auto regression (SVAR), which is one of the main empirical tools used in modern macroeconomic analysis. Vector Auto Regression (VAR) has been used in many studies to analyse the effects of monetary policy shocks (Agha et al., 2005; Aleem, 2010; Barajas et al., 2018; Mishra et al., 2014; Perera & Wickramanayake, 2013). The SVAR model is an extension of the VAR approach, and it measures the dynamic response of economic variables to structural shocks. The SVAR model is preferred due to criticism of the VAR model by Cooley and LeRoy (1985) based on the inconsistency between economic theory and shocks generated by the VAR model, which are believed to have no economic interpretation. The primary requirement of the VAR model is the application of necessary restrictions on the reduced form of the model to identify structural shocks. The SVAR model isolates the structural shocks and obtains the responses of the endogenous variable. In addition, SVAR can be used to analyse a small number of variables compared to other existing models. Economic or policy shocks are used to generate impulse responses (IRs) of the different economic variables to estimate the dynamic response. These functions can be used to compare the dynamic effects on economic variables as economic theories predict. This research applies the SVAR model to determine the impact of remittances on monetary transmission channels; i.e., credit, exchange rates and asset prices. To identify the shocks we impose restrictions on the contemporaneous relationship between variables in the model, rather than depending on the ordering of the variables (Bernanke, 1986; Kim & Roubini, 2000).

In addition, shutdown methodology is applied as proposed by Disyatat and Vongsinsirikul (2003), Nizamani et al. (2016) and Raghavan et al. (2012) to examine the effect of remittance inflows on each transmission channel during the pre and post-conflict periods.

This study is modelled with the primary economic variables, GDP, price index, interest rate, and money supply (M1), with the interaction of monetary transmission channels, credit, exchange rate and asset price in the constrained SVAR model, and with remittances in the extended base model to determine how the impact of remittances over these transmission channels varies in the pre- and post-conflict periods.

The SVAR used for this study states the relationship between the variables as:

$$M_0 Y_t = M_1 Y_{t-1} + \cdots + M_p Y_{t-p} + \varepsilon_t \qquad (1)$$

where, Y_t is a (K × 1) vector of endogenous variables at time *t*. M_i is a (K × K) matrix of parameters *i*=0, 1…….p. ε_t is a (K × 1) matrix of multivariate white noise error with the properties of E (ε_t) = 0 and E (ε_t , ε'_t)= $\sum_\varepsilon$.

The coefficients of M_0 ……M_p and values of ε_t cannot be estimated directly; therefore, the parameters of SVAR are estimated in two stages.

The reduced form of VAR is

$$Y_t = K_1 Y_{t-1} + \cdots + K_p Y_{t-p} + e_t \quad (2)$$

where $K_i = M_0^{-1} M_i$, $e_t = M_0^{-1} \varepsilon_t$ and $e_t \sim$ N (0, $\sum$) is estimated by the ordinary least squares equation method. Therefore, the residuals of e_t are innovations corresponding to the VAR reduced form. The innovations of SVAR, ε_t are related to the innovations of the reduced form by

$$\sum_e = M_0^{-1} \sum_\varepsilon (M_0^{-1})' \quad (3)$$

By imposing necessary restrictions, the contemporaneous matrix of M_0 is identified in the second stage and the covariance matrix of $\sum_\varepsilon$ is estimated by likelihood function maximization conditional upon the estimates of parameters of the first stage VAR. SVAR with unrestricted dynamics with maximum likelihood estimation is as follows:

$$\ln A = -\frac{B}{2} \ln(2\pi) - \frac{1}{2} \ln [M_0^{-1} \sum_\varepsilon M_0^{-1\prime}] - \frac{1}{2} \hat{e}_t' (M_0^{-1} \sum_\varepsilon M_0^{-1\prime})^{-1} \hat{e}_t \quad (4)$$

where ê are the estimated residuals of VAR from first stage. The logarithm of the function of a sample of t= 1,2…… T observation is $lnA = \sum_{t=1}^{T} ln\ A_t$

In this study the dynamic effects of macroeconomic variables are estimated to a shock to policy variable, which is interest rate, in the presence of remittances in the base model and without remittances in the constrained model described below. Each model basically consists of at least seven domestic variables, which represent both goods and money markets and the channels of monetary transmission investigated in this research.

The orthogonal monetary policy shocks obtained from the SVAR model estimate the effects of monetary policy shocks on various macroeconomic variables in the economy. A number of previous studies have used existing economic theories and stylised facts to identify the SVAR system. The present study uses theory and empirical findings to identify the SVAR system for a small economy (Sri Lanka), incorporating the general ideas of Kim and Roubini (2000) for the imposition of restrictions in the model. The matrices summarize the identification of parameters for SVAR approach for MTM with the inclusion and exclusion of remittances in the models.

Monetary policy measures are transmitted into real economic variables, GDP and price levels via monetary transmission channels, particularly money supply, interest rates, bank credit, asset prices and exchange rates. The changes in these channels ultimately impact the goods and money market operations, leading to changes in outputs and price levels in the economy. However, interaction of these channels with other influencing economic variables results in changes in the intended policy outcome. In this respect, this study developed an SVAR model to identify the impact of remittances in the monetary transmission channels.

4.5 Estimation results

In constructing the SVAR model, a stationarity test is carried out to ensure that all variables of interest are stationary. This study uses the Phillips-Perron (PP) and Augmented Dickey-Fuller tests to analyse the stationarity of the data. The results of the stationarity tests in terms of level and first difference for SDFR and log level and first differences for all other variables are presented in Table 4.1. All variables are stationary at their first difference; therefore, it is concluded that all variables are integrated with order I (1). Secondly, the proposed SVAR models are tested for stability of the models and serial correlation.

Schwarz information criteria (SC) and Hannan-Quinn (HQ) information criterion propose a lag length of 2 as optimal. This study uses a lag length of 4 for all estimations since a shorter lag length may result in failure to identify the underlying mechanics in the model and lead to autocorrelation of residuals (Disyatat & Vongsinsirikul, 2003). Choosing a longer lag length could lead to loss of degrees of freedom.

Table 4.1 Unit root test statistics

	Phillips-Perron test statistic		Augmented Dickey fuller (AIC)		Augmented Dickey fuller (SCI)		Augmented Dickey fuller (HQ)	
Variables	Log	1st Difference	Log	1st Difference	Log	1st Difference	Log	1st Difference
	test-stat	test-stat	test-stat	test-stat	test-stat	test-stat	test-stat	test-stat
GDP	5.0714	-2.1231	1.6787	-2.1088	1.6787	-2.1088	1.6787	-2.1088
CPI	6.9119	-12.7004	4.5486	-4.2460	6.7990	-4.7552	4.5486	-4.2460
M1	7.6837	-19.5512	4.1954	-3.7054	4.1954	-3.7054	4.1954	-3.7054
CREDIT	9.4107	-10.7867	4.1312	-2.2895	5.0609	-2.5720	4.1312	-2.5720
ER	4.5269	-12.5511	4.4016	-6.7357	4.4016	-11.6411	4.4016	-6.7357
ASPI	1.5767	-14.9811	1.6096	-6.5446	2.0906	-14.4760	1.7897	-14.4760
REMIT	0.8193	-18.9263	0.8190	-11.5619	0.6214	-18.6632	0.6214	-18.6632
	Level	1st Difference	Level	1st Difference	Level	1st Difference	Level	1st Difference
	test-stat	test-stat	test-stat	test-stat	test-stat	test-stat	test-stat	test-stat
SDFR	-1.3695	-17.1393	-0.7369	-9.3283	-0.7369	-9.3283	-0.7369	-9.3283

CPI- Consumer price index, SDFR-Standing deposit facility rate, Exrate-Exchange rate, ASPI-All share price index, REMIT: Remittances.
*** Indicates statistically significant at 1 percent level of testing, ** indicates statistically significant at 5 percent level of testing.

Identification for SVAR base model

vGDP	1	0	0	0	0	0	0	0	uGDP
vCPI	a21	1	0	0	0	0	0	a28	uCPI
vM1	a31	a32	1	0	0	0	0	a38	uM1
vSDFR	0	0	a43	1	0	0	0	0	uSDFR
vCredit	0	0	0	a54	1	0	0	a58	uCredit
vASPI	0	0	a63	a64	1	1	0	a68	uASPI
vExrate	a71	a72	a73	a74	a75	a76	1	a78	uExrate
vRemit	0	0	0	0	0	0	0	1	uRemit

Where vGDP, vCPI, vM, vSDFR, vCredit, vASPI, vExrate and vRemit are, respectively, the shocks to output, price level, money supply, interest rate, bank credit, asset prices, exchange rate and remittances. uGDP, uCPI, uM1, uSDFR, uCredit, uASPI, uExrate and uRemit are the residuals that reveal the unanticipated movements of regressors respectively.

The first block in the model is the non-policy block, which represents the goods market equilibrium of the economy. The first equation represents output that is not contemporaneously affected by all other variables; however, it is affected by a lag in these variables as indicated in a significant number of studies (Anh et al., 2018; Can et al., 2020; Raghavan et al., 2012). Secondly, price level is subject to contemporaneous effects of GDP (Can et al., 2020; Raghavan et al., 2012; Vinayagathasan, 2014) and remittances. All other variables in the model affect price levels with a lag.

The second block consists of the policy instruments of the central bank, representing money market equilibrium in the economy. Money and interest rates contemporaneously respond to price levels (Cushman & Zha, 1997; Kim & Roubini, 2000; Rafiq & Mallick, 2008). This is consistent with the Taylor rule. M1, which is the real money balance contemporaneously, responds to output, price level and inflow of remittances into the country. The policy makers in central banks make monetary policy decisions largely based on information regarding current price levels; therefore, the interest rate contemporaneously depends on price level and money supply.

The next block, which consists of bank credit, asset prices and exchange rate, represents the remaining monetary policy transmission channels in the economy. Bank credit is contemporaneously affected by interest rates and remittances and by the lag of other variables in the economy. The reason behind this assumption is that customer borrowing changes with prevailing market interest rates (Berkelmans, 2005; Rabab'ah, 2015). Stronger credit growth is also associated with expansionary monetary policy measures (Berkelmans, 2005). Furthermore, the traditional monetary view emphasizes that consumers and investors react to monetary policy measures with a lag; therefore, it is assumed that variables other than interest rate would affect credit channels with a lag. The lagged relationship between output and lending behavior has also been identified in previous studies of credit channels (Romer et al., 1990). The immediate relationship between remittances and bank credit has also been emphasised in previous studies (Awdeh, 2016; Brown & Carmignani, 2015). The asset price, contemporaneously, responds to money, interest rate (Raghavan et al., 2012) and remittance inflow, as remittances increase the availability of funds for investment in stock markets (Issahaku et al., 2017), and therefore influence stock market prices in the current period. It is also assumed that all the variables contemporaneously affect the exchange rate, since it is a forward-looking asset price, which reacts immediately to all market variables (Can et al., 2020;

Cushman & Zha, 1997; Kim & Roubini, 2000; Raghavan et al., 2012). However, the exchange rate is assumed to have no instantaneous effect on other variables in the SVAR model.

Finally, remittances do not contemporaneously depend on other variables; however, all variables affect remittances with a lag. Although remittances can be viewed as a foreign variable, the transfer of remittances into the domestic economy, and its volume, is affected by domestic output, price levels, interest rates, credit and exchange rates (Alleyne et al., 2008; El-Sakka & McNabb, 1999).

Identification for SVAR constrained model

vGDP	1	0	0	0	0	0	0	uGDP
vCPI	a21	1	0	0	0	0	0	uCPI
vM1	a31	a32	1	0	0	0	0	uM1
vSDFR	0	0	a43	1	0	0	0	uSDFR
vCredit	0	0	0	a54	1	0	0	uCredit
vASPI	0	0	a63	a64	1	1	0	uASPI
vExrate	a71	a72	a73	a74	a75	a76	1	uExrate

The base model is modified by applying the shutdown methodology as proposed by Disyatat and Vongsinsirikul (2003), Nizamani et al. (2016) and Raghavan et al. (2012) and Ramey (1993) to assess the impact of remittances on monetary transmission channels in the model. In this constrained SVAR model, remittances are muted to eliminate the effect of remittances on the MTM. The constrained model eliminates all the effects of remittances passed through monetary transmission channels in the base SVAR model.

Table 4.2 summarizes the IRFs of economic variables to a contractionary monetary policy shock during conflict and post-conflict periods, tested with both the base and constrained SVAR models. The first column in the table shows the expected outcome of IRFs according to theoretical expectations. The estimations in the second and third columns show that some of the IRFs movements are not statistically significant; however, most of the IRFs in the models are economically significant. All the IRFs, apart from price level, show expected, economically significant movement aligning with the economic theories and previous empirical studies on MTM. Price puzzles exist not only in both models but also in the two sub-periods. The existence of price puzzles has been a common issue in many previous empirical studies of MTM (Cheng & Yang, 2020; Hanson, 2004; Zaidi et al., 2016); however, this issue invites further investigation to study the presence of price puzzles in the Sri Lankan case.

Table 4.2 IRFs of variables to a contractionary monetary policy shock in interest rate

Variables	Expected outcome	Base SVAR Model	Constrained SVAR Model
Conflict period			
GDP	-	-	-
CPI	-	+ *	+ *
Money	-	-	-
Interest rate	+	+	+
Share Prices	-	-	-
Exchange rate	+	+	+
Remittances	-	-	
Post-conflict period			
GDP	-	-	-
CPI	-	+ *	+ *
Money	-	-	-
Interest rate	+	+	+
Share Prices	-	-	-
Exchange rate	+	+	+
Remittances	-	-	

*Price puzzle: Increase in price level instead of decrease due to a contractionary monetary policy innovation.

The movement of impulse responses shows a theoretically consistent relationship between GDP and interest rates. A positive shock to interest rates initially leads to a fall in GDP, which gradually increases to reach its initial level in both post-conflict and conflict periods. Similarly, money aggregates fall in response to a positive shock to interest rates in both periods. Bank credit also falls, with a positive change in the interest rate with an increase initially in both conflict and post-conflict periods. An initial increase in bank credit with a positive shock to the interest rate, which is similar to the findings in the previous studies, reveals that immediately after the shock to the interest rate, borrowing increases to minimise the impact of foreseen economic downturn (Bernanke & Blinder, 1992; Romer et al., 1990), so that upcoming expenses can be settled. ASPI falls due to a positive shock to the interest rate in both conflict and post-conflict periods. The fall in share prices is associated with falling share returns following an interest rate hike. A positive shock to interest rates also leads to appreciation of the domestic currency in both periods. Positive changes in interest rates lead to a fall in remittances and increases towards the initial level later. The impulse response of remittances to a positive shock in interest rate shows a decline in the inflow of remittances in both periods. The decline in remittance inflow is due to appreciation of the domestic currency

as remitters are not motivated to transfer funds (Lin, 2011; Rahman et al., 2013). Price levels increase following a positive shock to interest rates, instead of declining.

The existence of price puzzles in both conflict and post-conflict periods can be related to price rigidity, exchange rate appreciation and increased costs of borrowing due to interest rate hikes. Price puzzles have been a common issue in many previous studies on monetary policy transmission mechanisms. All the impulse responses of the variables, except price level, in the model describe economically significant relationships to a contractionary monetary policy shock in both conflict and post-conflict periods. The impulse responses are presented in the appendix.

This section explains how monetary transmission channels, which are the subject of investigation in this study, react to an orthogonal shock in the policy variable (interest rate) in conflict and post-conflict periods. The shocks are measured as 1 standard deviation of the orthogonal errors for the two periods analysed in this study. Table 4.3 summarises the IRFs of intermediate transmission channels, as well as GDP and CPI, in both the base and constrained SVAR models for the two sub-periods.

Figure 4.3 shows that a contractionary monetary policy shock leads to similar reactions in the credit channel in both SVAR models, with an increase in borrowing during the initial period when short-term borrowing increases, which then begins to fall during both the conflict and post-conflict periods. It is plausible that firms' short-term borrowing increases after an unanticipated contractionary monetary policy shock in order to finance the expenses caused by recession. A positive shock in SDFR leads to a fall in credit because of increased market interest rates and a declining demand for credit. After nearly a year, the inclusion of remittances in the SVAR model leads to worsening contraction of credit to a contractionary monetary policy shock in the post-conflict period, compared to the period of conflict. The explanation could be that remittances build up loanable funds available at commercial banks (Barajas et al., 2018); therefore, credit becomes less responsive to interest rate shocks in the post-conflict period. In addition, the main purpose of remittance inflow into the economy during a conflict period is to support the living expenses of family members (Carling et al., 2012). However, after the conflict ends, inflowing remittances could contribute to savings and investment purposes (Issahaku et al., 2017); therefore, remittance inflows deposited with commercial banks could build up loanable funds.

A positive shock in SDFR leads to a fall in ASPI due to increases in the market interest rate, and therefore a fall in demand for shares due to the falling future returns on shares. The IRFs' performance of ASPI to a contractionary monetary policy shock has the same outcome in both the conflict and post-conflict periods. However, in the post-conflict period, the contraction of ASPI worsens with the inclusion of remittances in the SVAR model nearly six months after the interest shock. This shows that remittances weaken the functioning of the asset price channel, especially in the post-conflict period. An explanation for this outcome is possibly the use of remittances for savings and investment purposes; therefore, remittances build a resistance (Barajas et al., 2018) to interest rate shock that is transmitted via share prices.

A positive shock in SDFR leads to appreciation in the domestic currency as the result of an increased market interest rate. The inclusion of remittances in the model seems to affect the exchange rate channel in both periods. However, the pattern and existence of exchange rate effects vary in the two sub-periods. In the post-conflict period, inclusion of remittances leads to short-lived appreciation followed by depreciation till the seventh month, while in the conflict period, inclusion of remittances seems to undermine appreciation from the sixth to the fourteenth month. As Sri Lanka has a managed floating exchange rate regime, it is difficult to measure the impact of interest rate shocks on the exchange rate and the influence of remittances on the transmission of monetary policy shock.

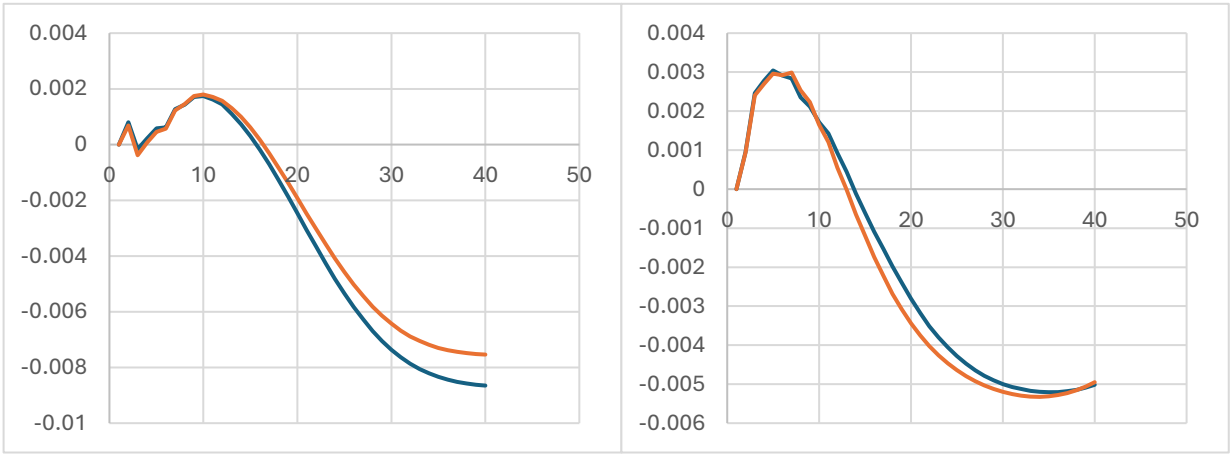
Table 4.3 Summary of IRF movements

Economic Variables	Conflict Period		Post-conflict period	
	Base model	Constrained model	Base model	Constrained model
Credit	Persistent decline with initial increase	Persistent decline with initial increase	* Persistent decline with initial increase * Worsening contraction of credit	Persistent decline with initial increase
Asset Prices	Transitory decline	Transitory decline	* Transitory decline * Worsening contraction of asset prices	Transitory decline
Exchange rate	Persistent increase	* Persistent increase * More appreciation effect	* Transitory increase * More appreciation effect	Transitory increase
GDP	Persistent decline	Persistent decline	* Transitory decline * Worsening contraction	* Transitory decline
CPI	Transitory decline with initial price puzzle	Transitory decline with initial price puzzle	* Persistent increase * Worsening price puzzle	* Persistent increase

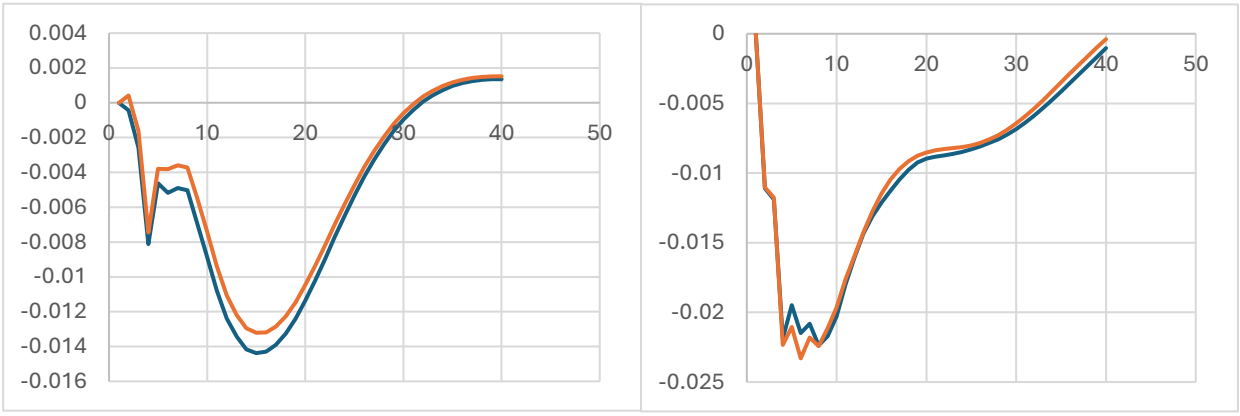
Figure 4.3 IRFs of transmission channels to 1 SD shock in SDFR

Post-conflict period **Conflict period**

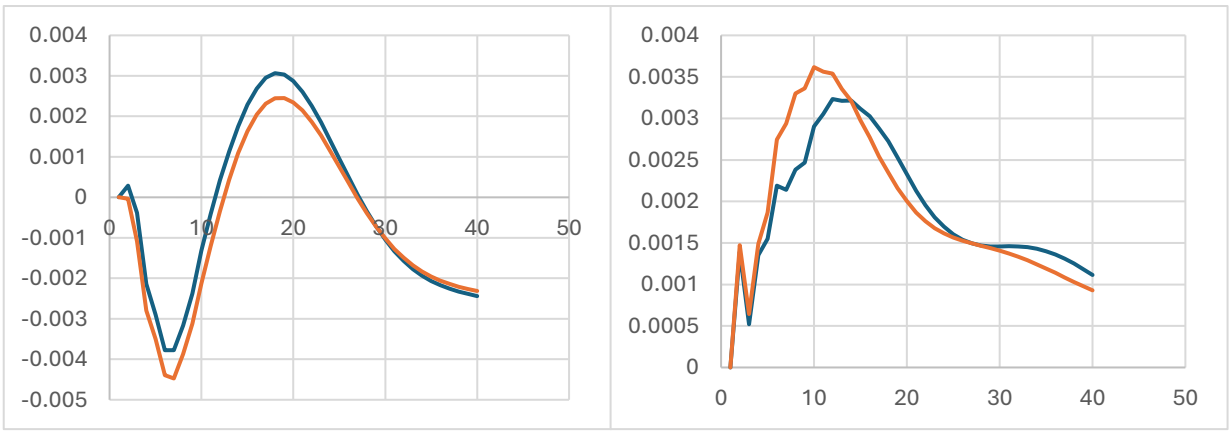
Response of credit to a shock in SDFR



Response of share prices to a shock in SDFR



Response of exchange rates to a shock in SDFR



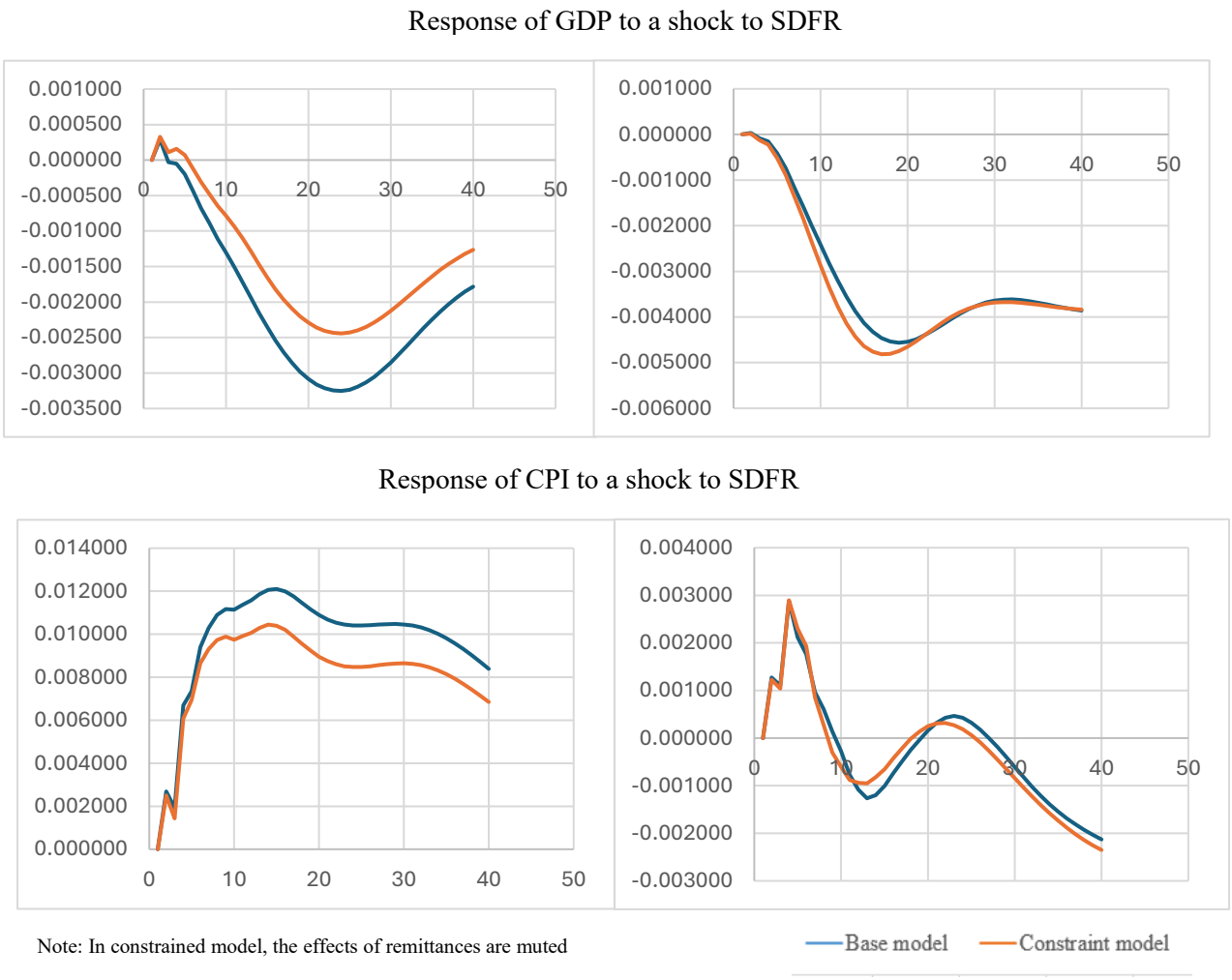
Note: In constrained model, the effects of remittances are muted

Base model Constraint model

Figure 4.4 shows that a shock to interest rates leads to worsening contractions in GDP and the prolonged existence of a price puzzle with the inclusion of remittances (base model) in the

post-conflict period. The constrained model in the post-conflict period improves the contraction in GDP and reduces the existence of price puzzles in comparison. In contrast, the base model shows improved transmission of interest rate shocks to GDP and CPI in the conflict period. The inclusion of remittances leads to improvement in the contraction of GDP and minimizes the existence of price puzzles in a contractionary monetary policy shock. However, the differences in the performance of IRFs of both GDP and CPI are relatively minimal between the base and constrained model during the conflict period. The IRFs of GDP and CPI show that remittances did not seem to have a significant impact on MTMs in Sri Lanka during the period of conflict. However, they seem to have significantly weakened transmission in the post-conflict period.

Figure 4.4 Response of GDP and CPI to 1 SD shock to SDFR



Note: In constrained model, the effects of remittances are muted

Figure 4.5 shows that muting credit channels along with remittances leads to worsening contraction in GDP in response to a positive change in SDFR in the post-conflict period.

However, muting credit along with or without remittances results in less contraction in GDP during the period of conflict. In addition, exogenising credit without remittances does not result in significant change in the IRF of GDP in the period of conflict. The worsening contraction of GDP in response to a positive shock to SDFR could be associated with an increase in credit prompted by the increase in loanable funds by remittances in the post-conflict period. Exogenising credit with or without remittances does not produce significant changes in the prolonged effect of price puzzles in the conflict period. However, exogenising credit with remittances leads to relatively more prolonged price puzzles in the post-conflict period. These findings show that remittances influence the operation of credit channels in transmitting interest rate shocks to CPI in the post-conflict period compared to conflict period. A common observation is that the effect of remittances on the functioning of credit channels has been more intense in the post-conflict period compared to the period of conflict in Sri Lanka.

Figure 4.5 Response of GDP to a shock in SDFR- credit channel

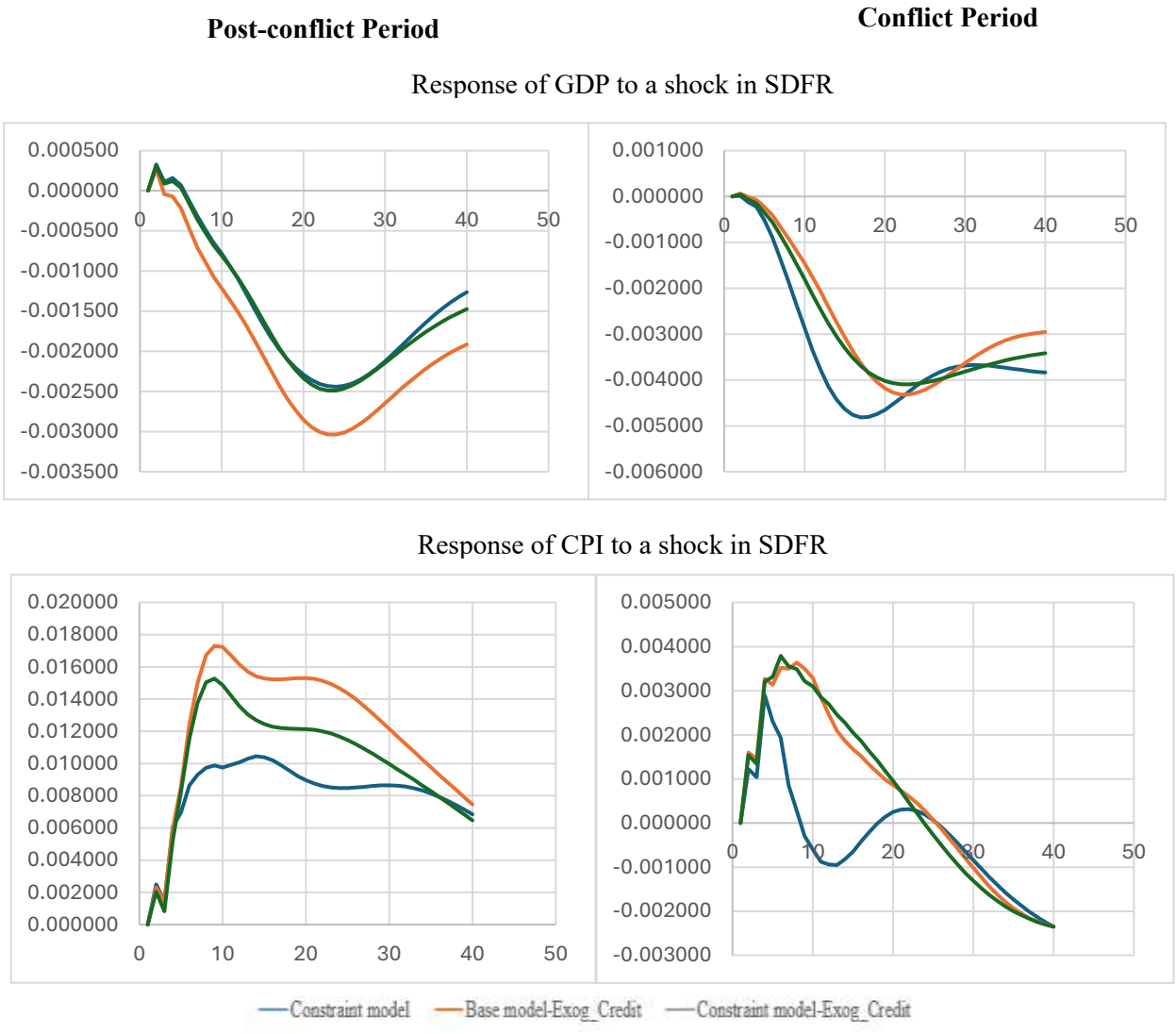
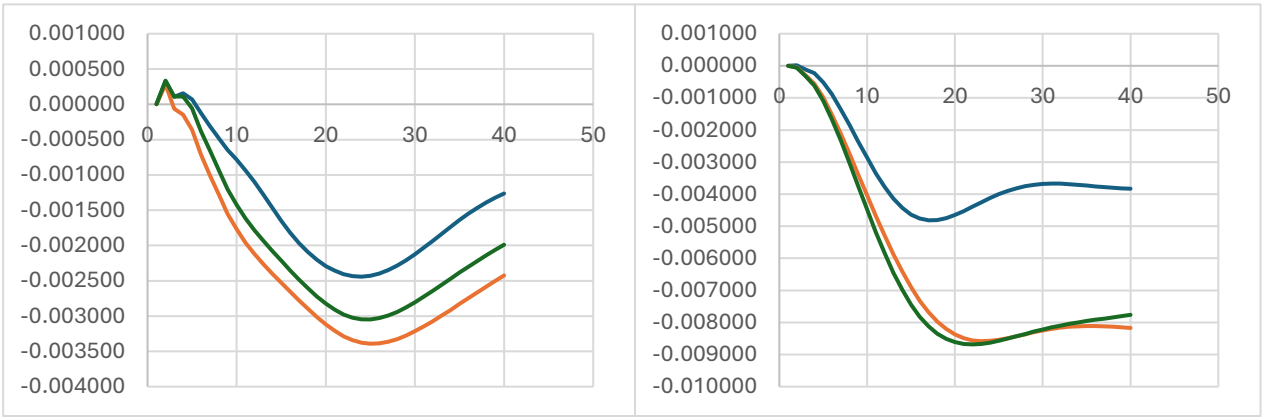


Figure 4.6 shows that muting ASPI with or without remittances leads to worsening contraction in GDP during the conflict as well as post-conflict periods. Muting ASPI with or without remittances does not show significant change in the IRFs for GDP during the conflict period. However, remittances have an apparent impact on the asset price channel in transmitting contractionary monetary policy shocks to GDP in the post-conflict period. Similarly, muting ASPI with remittances leads to a more prolonged existence of price puzzles in the post-conflict period. However, exogenising ASPI with or without remittances does not produce significant change in the IRFs of CPI in the conflict period. The outcome of IRFs estimates shows that remittances significantly influence share prices in the post-conflict period.

Figure 4.6 Response of GDP to a shock in SDFR-asset price channel

Post-conflict Period **Conflict Period**

Response of GDP to a shock in SDFR



Response of CPI to a shock in SDFR

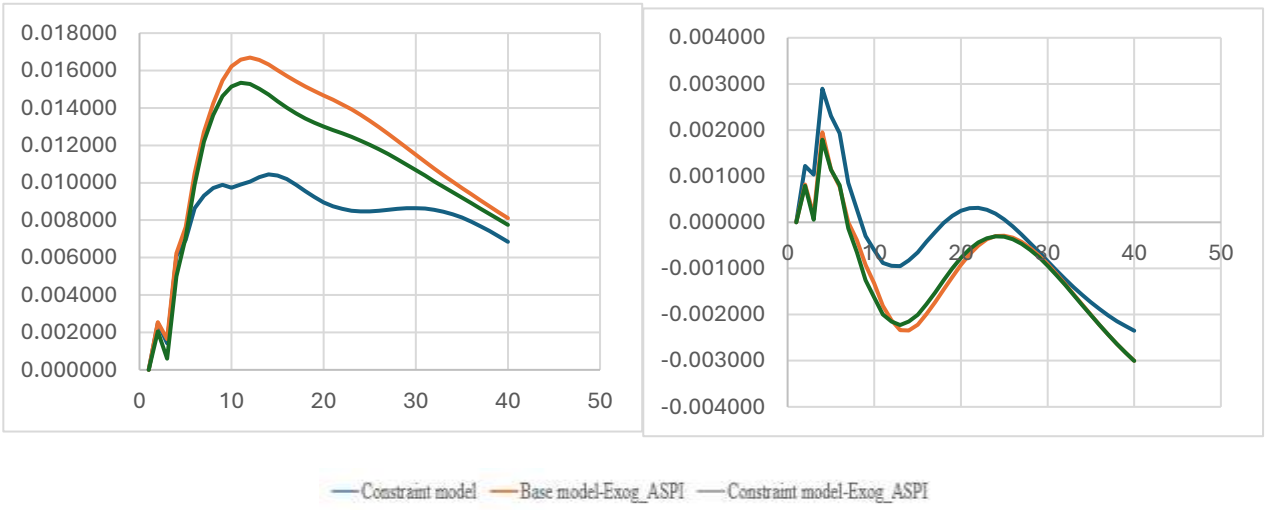
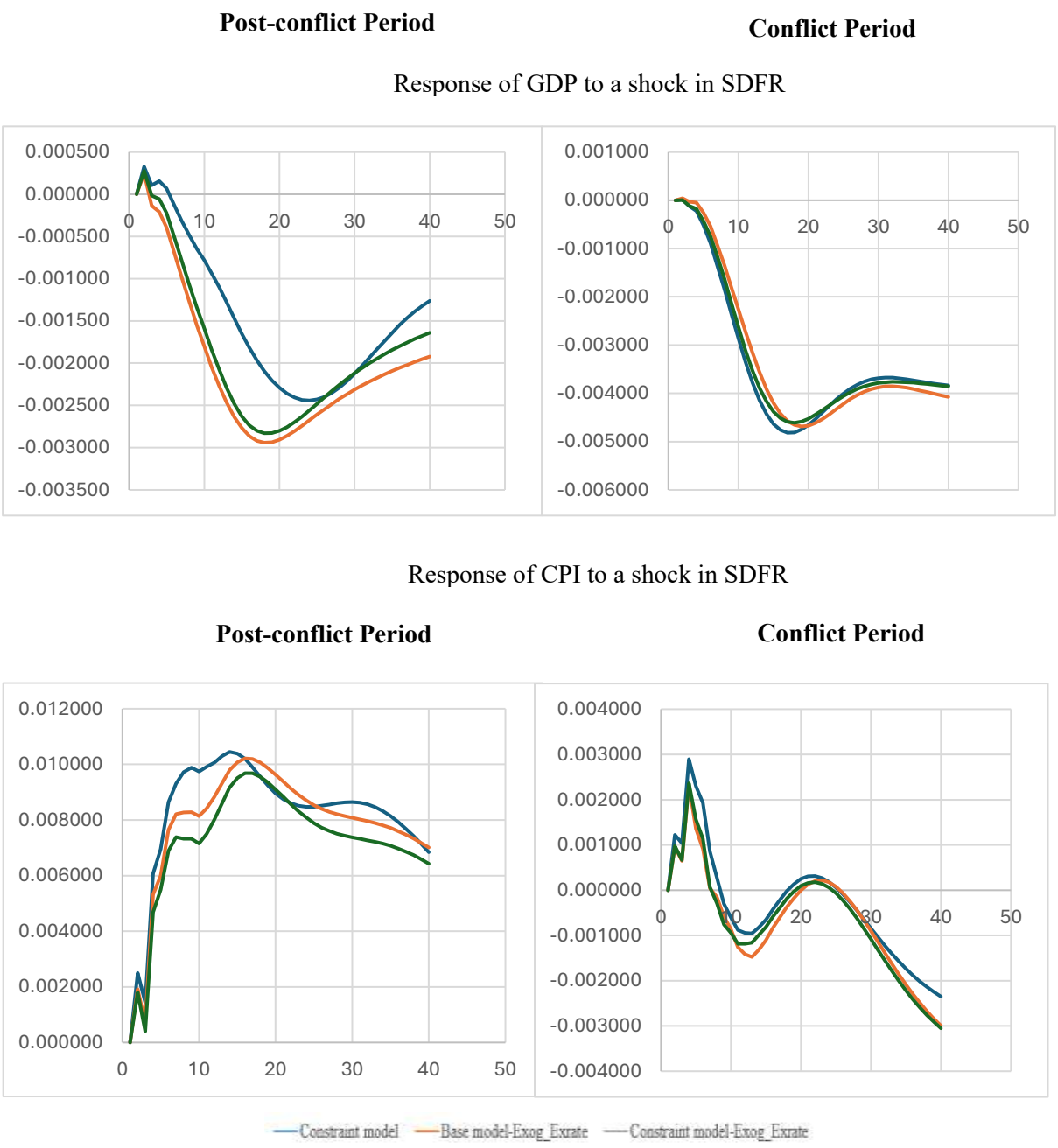


Figure 4.7 shows that muting the exchange rate channel with or without remittances produces significant change in the IRFs of GDP following a contractionary interest rate shock in the period of conflict. However, muting the exchange rate in the post-conflict period results in worsening contraction in GDP in response to a positive interest rate shock. Similarly, muting the exchange rate produces significant change in the IRF of CPI in response to a contractionary monetary policy shock in most of the months during the conflict period. However, exogenising the exchange rate leads to varied changes in the IRF of CPI from the month after the shock occurred.

Figure 4.7 Response of GDP to a shock in SDFR - exchange rates channel



4.6 Summary of empirical analysis

The impact of monetary transmission channels can be analyzed based on the impulse responses of the real variables, output and price level, and the movement of intermediate transmission channels. The IRFs reveal the cumulative impact of transmission channels on output and price level in response to a shock to the policy variable: i.e., the interest rate. The impact of remittances is also transmitted to real variables through intermediate monetary transmission channels, including bank credit, share prices and exchange rates. In addition, changes in the movement of these intermediate channels also reveal the impact of remittances on these channels in response to a shock in policy variables. This study applies two SVAR models to identify the impact of remittances through the intermediate monetary transmission channels. The base model treats remittances as an endogenous variable, whereas the constrained model treats remittances as an exogenous variable, thereby muting all the impact of remittances on these intermediate channels.

The IRFs estimated for the base SVAR model and the constrained model with the mutation of remittances in both the conflict and post-conflict periods are mostly consistent with the predictions of economic theories and existing empirical works carried out on MTM. The IRFs to 1 SD shock in SDFR in the base model lead to significant changes in the responses of intermediate transmission channels compared to the constrained model, thus significantly affecting GDP and price level in the post-conflict period. This indicates that remittances play a crucial role in influencing monetary policy transmission mechanisms, especially in the post-conflict period in Sri Lanka.

Most of the monetary transmission channels react to interest rate shocks within a short period after the shock occurs. Credit channels are the prominent transmission channel for transmitting interest rate shocks to GDP, followed by exchange rate and asset price in the conflict and post-conflict periods. The inclusion of remittances in the model generates changes in the outcomes for IRFs in the two sub-periods. However, inclusion of remittances influences the transmission of policy shocks to GDP more in the post-conflict period than in the period of conflict in Sri Lanka. Similarly, the impact of remittances on the MTM is also present in the transmission of policy shocks to CPI in the post-conflict period. In addition, changes in the movement of intermediate transmission channels, particularly in credit and share prices, also influence these effects. A plausible explanation for this is the use of remittances as a source of savings and investment rather than solely as a financing source for consumption smoothing

during the post-conflict period, which could lead to more wealth and liquidity effects. The peaceful environment now prevailing in Sri Lanka has been conducive to establishing new investment opportunities, and the restoration of means of livelihood may have diverted the remittance inflows more towards saving and investment opportunities. Overall, remittances have noticeable impacts on monetary transmission channels in Sri Lanka, especially during the post-conflict period, and therefore they affect outputs and price levels through intermediate monetary transmission channels.

4.7 Concluding remarks

This study has demonstrated how remittance inflows affect the monetary policy transmission channels and the intended outcomes of monetary policy in the conflict and post-conflict periods in Sri Lanka. After a review of the literature related to MTM and remittance inflow, SVARs models were developed to differentiate the effects of remittances in the transmission of monetary policy shock to real economic activities during the two sub-periods identified for this investigation. Although some of the IRFs movements are not statistically significant, most are consistent with economic theory. Including more observations in the model could rectify the statistical issue, and suggests the need for further investigation in the future.

The outcomes of the empirical study show that monetary policy works through all the intermediate channels investigated, while credit channels play a dominant role in transmitting policy shocks to GDP during the conflict and post-conflict periods. Asset price and exchange rate channels dominate the transmission of policy shocks to price level respectively in the periods of conflict and post-conflict, followed by bank credit. This study establishes that remittances play a significant role in altering the functioning of intermediate monetary transmission channels, affecting the outcome of policy shocks to real economic variables in Sri Lanka, especially in the post-conflict period. This study also indicates that conflict plays a role by altering the effect of remittances on the MTM in Sri Lanka.

Considering the differences in the effects of remittances in the functioning of the MTM in Sri Lanka in the conflict and post-conflict periods, it is crucial for policy makers to understand how increasing inflows of remittances can affect the MTM, especially in the post-conflict period. This study also provides facts for policy makers in remittance-dependent economies and those experiencing high volumes of remittances due to conflict-driven migration, enabling them to develop appropriate policies and strategies to manage remittances

so monetary policy can still function as an effective tool for sustainable long-term economic growth and price stability.

4.8 **References**

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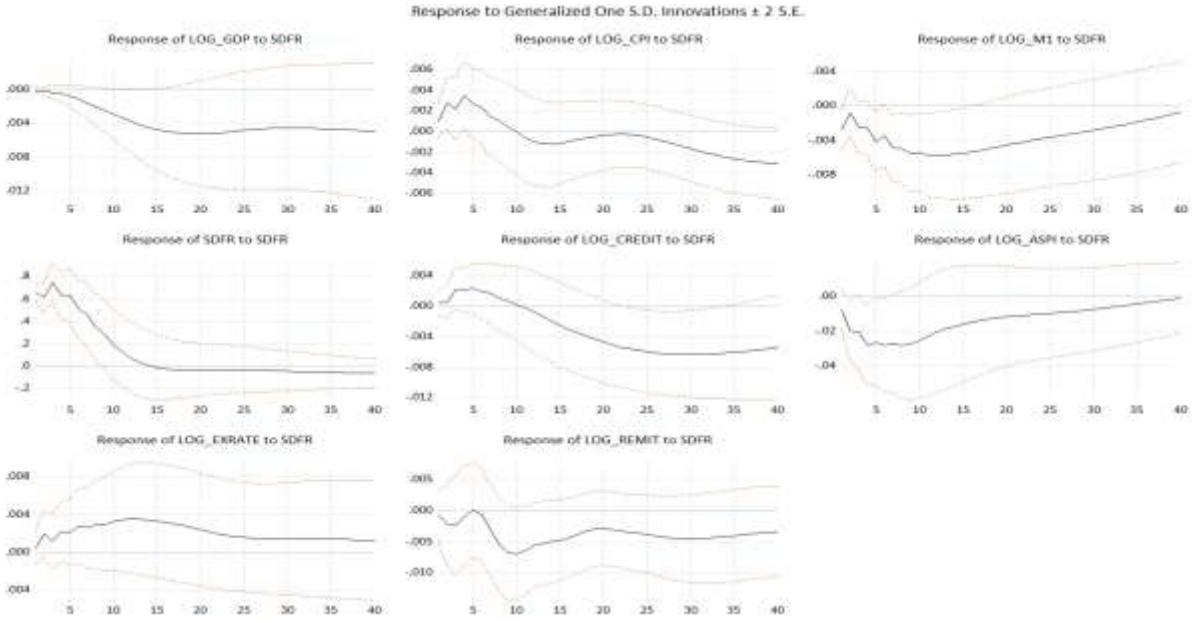
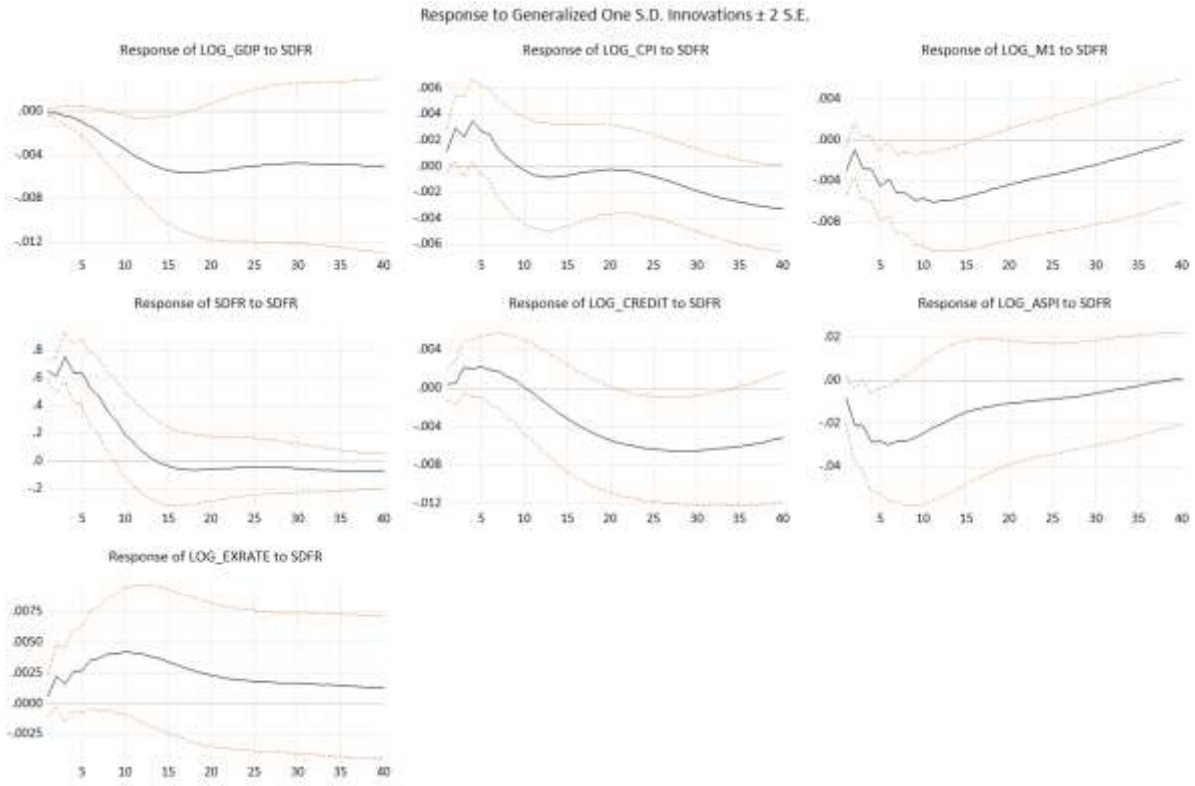
4.9 Appendices

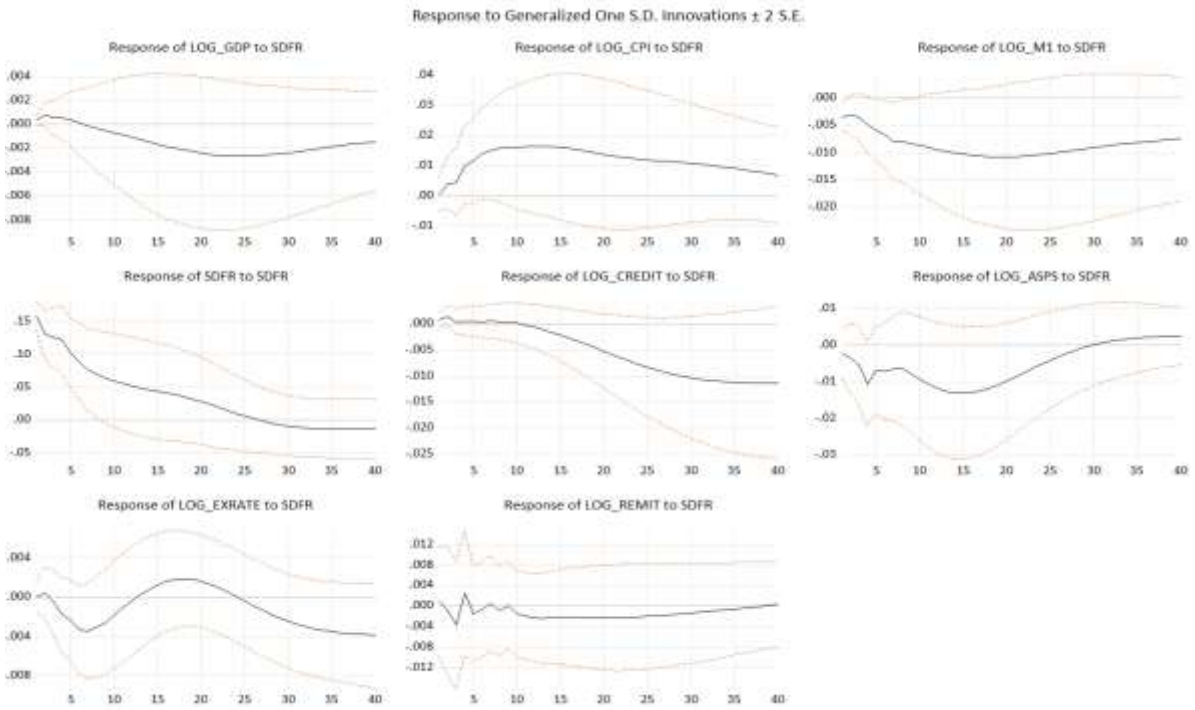
Appendix 4.9.1 Impulse response to a shock in SDFR in SVAR base model: conflict period



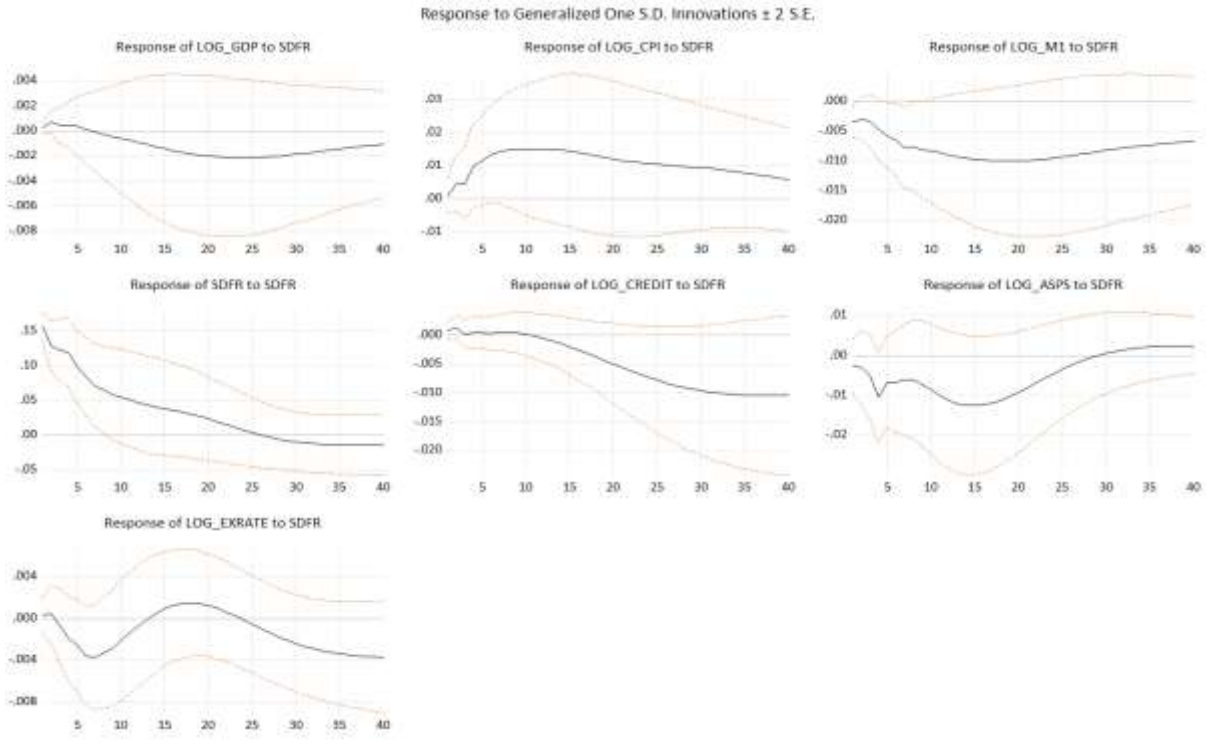
Appendix 4.9.2 Impulse response to a shock in SDFR in SVAR constrained model: conflict period



Appendix 4.9.3 Impulse response to a shock in SDFR in SVAR base model: post-conflict period



Appendix 4.9.4 Impulse response to a shock in SDFR in SVAR constrained model: post-conflict period



Chapter 5

Conclusion

This chapter presents the overall conclusions of this thesis. The first section summarises the key findings from the three studies presented in this thesis. Secondly, policy recommendations for controlling remittance-related impacts on the monetary transmission mechanism (MTM) in different institutional settings are discussed. Finally, this chapter discusses the limitations of the three studies and presents avenues for future research.

5.1 Main findings

Remittances have become a significant source of external funds in many countries around the world, most importantly in low- and middle-income countries (LMICs). The inflow of remittances has been identified as a factor that could harm the outcome of monetary policies by interacting with monetary policy transmission channels in remittance-receiving countries. Analysing the effects of remittances on MTMs will have crucial implications for policymakers. Studies have started to focus on the effects of remittances on MTMs in recent years; however, there are gaps and contradictory claims in the recent literature. This thesis contributes to the literature by analysing (i) how remittances affect different monetary transmission channels, (ii) how institutional background alters the effect of remittances on bank credit channels and, (iii) how conflict and post-conflict periods change the effects of remittances on monetary transmission channels.

In the first study, we conduct an empirical analysis to determine the responsiveness of bank credit and exchange rates to remittance inflows. In the first stage, we use a panel structural vector autoregression (SVAR) model with quarterly data for the period 2000 to 2019, for 51 countries, to estimate the responsiveness of bank credit and exchange rates. The initial empirical analysis shows that the responses of bank credit and exchange rates to a shock in remittance inflow vary across the remittance-receiving economies in our sample. In the second stage, we regress the impulse responses (IRs) of bank credit and exchange rates on a range of economically significant variables. Cross-sectional regression analysis indicates that the remittances-to-GDP ratio is positively associated with the response of nominal exchange rates to remittances across the remittance-receiving countries. Further, the savings-to-GDP ratio and a higher level of remittances in terms of the remittances-to-GDP ratio are positively related to the response of bank credit to remittances in these countries. This means that when remittance inflow increases to a higher level, the excess money can be deposited in the banks as savings. As a result, banks will be able to lend more by using the excess funds received via remittance inflows.

The second study investigates whether institutional factors play a role in determining the effects of remittances on bank credit channels. There is a contradiction between two sets of literature. One

argues that remittances increase bank credit due to the increasing loanable funds accumulated by commercial banks. However, the other set of literature argues that increasing remittance inflows reduce the demand for bank credit as remittances lessen the liquidity constraints on households; therefore, bank credit will not expand with increasing remittance inflows into an economy. In this study, we find that remittances positively influence bank credit in economies with strong institutions. For this, we use the same panel of 51 countries, with quarterly data covering the period 2000 to 2019. We generate the IRs of bank credit to a shock in remittances in a panel SVAR model. We then regress the IRs on a number of institutional factors and other significant economic variables. The empirical analysis reveals that stronger regulatory quality and corruption control, along with higher savings to GDP and remittances to GDP ratios, are positively associated with the effect of remittances on bank credit. This can be interpreted as strong corruption control and regulatory quality, along with higher savings-to-GDP and remittances-to-GDP ratios, positively influencing bank credit. This empirical finding shows that banks in remittance-receiving economies can expand their credit by using the excess savings received through increased remittance inflows when institutional characteristics, particularly regulatory quality and corruption control, are strong.

The third study is country-specific. Some existing literature indicates that internal conflicts create an environment favouring the migration of the workforce away from conflict-affected countries, which brings in more remittances in the long run. However, conflict also plays a significant role in altering the institutional environment in conflict-affected countries. Keeping these facts in mind, the third study focuses on the role of conflict in determining the effects of remittances on the monetary transmission channels, particularly bank credit, exchange rates, and asset prices. We use Sri Lanka as a case study for this empirical analysis, which is performed using monthly data from 1996 to 2019. We apply the SVAR methodology to estimate the differentiated effect of remittances on monetary transmission channels during the conflict and post-conflict periods. We find that the responses of bank credit, exchange rates, and asset prices vary significantly during Sri Lanka's conflict and post-conflict periods. During both the conflict and post-conflict periods, bank credit plays a prepotent role in transferring policy shocks to GDP in the presence of remittance inflow, while asset prices and exchange rate influence the transmission of policy shocks to price levels. We also observe a significant change in the in overall effect of remittances on bank credit, exchange rates, and asset prices. The effect of remittances on these monetary transmission channels is more intense during Sri Lanka's post-conflict period than in the conflict period. This study shows that remittances play an important role in moderating the operation of intermediate transmission channels in transferring policy shocks to real economic variables during the conflict and post-conflict periods.

5.2 Implications and policy recommendations

In this section, we elaborate on the policy implications of the empirical findings in the three studies presented in this thesis. We describe the major policy implications of remittances affecting the functioning of monetary transmission channels. These policy implications will help policymakers to understand the role of remittances in the process of monetary policy transmission and help them to propose adequate policy measures to mitigate the impact of remittances on MTMs.

The first policy implication is that remittance-receiving economies will not be able to execute independent monetary policies, as remittances moderate the operation of monetary transmission channels. Policymakers find it harder to achieve inflation targets and desired employment levels. In addition to this, countries experiencing an increasing inflow of remittances may choose a fixed exchange rate regime because of possible appreciation of the domestic currency against foreign currencies. This will cause further challenges in pursuing an independent monetary policy.

The second policy implication is that countries with a stronger institutional background, especially with better regulatory quality and stronger corruption control, can suffer from the accumulation of remittance-based deposits and the consequent expansion of credit facilities with increasing remittance inflow. The banking sector in countries with a strong institutional environment will be able to expand its credit facilities by using the excess of funds received through remittances. The increasing remittance inflows can make banks less dependent on the interbank market; therefore, achieving monetary policy targets through credit channels may become more challenging in these situations.

The third policy implication is more relevant to those countries that face internal conflict and experience an increasing inflow of remittances in the long run. Increasing remittances in these countries will have a differential effect on each monetary transmission channel during the period of conflict and post-conflict. In addition to this, an improving institutional environment in the post-conflict period will also intensify the effect of remittances compared to the period of conflict. Here, policymakers may find it difficult to evaluate the possible effects of remittances on different monetary transmission channels in the short and long run.

Based on the empirical findings of this study and their policy implications, we propose some policy recommendations to mitigate the possible impact of remittances on the MTM, and their ultimate impact on monetary policy targets. Firstly, we recommend building a cushion to protect the monetary base. This measure has to be implemented carefully without discouraging the inflow of remittances, as they have become a significant external source of funds, especially in LMICs. This could be carried out by issuing premium bonds to collect the savings made through remittances. We expect that providing a premium for bonds issued for remittance-sourced deposits would not discourage remittance inflows and,

at the same time, would safeguard the country's monetary base. This measure also needs to be carried out with government measures to strengthen institutional factors. Governments normally take measures to strengthen institutional factors while progressing toward development. However, countries with increasing remittance inflows have to take strengthening corruption control and regulatory quality into consideration, as these factors can play a significant role in weakening the bank credit channel when the remittance inflow increases significantly. Policymakers have to pay attention to eliminating the effect of remittances on bank credit while strengthening institutional factors, especially corruption control and regulatory quality.

Secondly, we recommend altering banks' reserve requirements to control the availability of loanable funds with commercial banks. Central banks have to assess the excess funds generated by remittances and take measures to manipulate reserve requirements. Manipulating the reserve requirement would reduce the ability of commercial banks to use remittances-based deposits. This would force commercial banks to be dependent on the interbank market for their borrowings; therefore, the banks would be forced to borrow at the market-determined interest rate, meaning that policy rate changes can easily be transmitted into interbank market borrowing rates.

Remittances in countries that are dealing with conflict have different effects on those countries' MTMs during and in the aftermath of the conflict; therefore, thirdly, we recommend that policymakers make their policy decisions not only considering their goals but also the possible effects of remittances on MTMs in the conflict and post-conflict periods. If policymakers plan to target employment levels, their focus has to be on targeting bank credit, as this plays a primary role in transmitting the policy rate effect to employment levels. Where policymakers' intention is either to tighten or relax inflationary pressure, they also have to focus on asset prices and exchange rates in addition to bank credit, especially in the post-conflict period, as asset prices and exchange rates play a significant role in price levels.

Overall, we emphasise that policy measures to mitigate the effects of remittances in dealing with macroeconomic challenges in remittance-receiving economies have to be balanced, as remittances play a significant role in relieving poverty and improving welfare in many of these countries. Policy measures that ignore these facts may create significant negative effects, particularly in LMICs.

5.3 Limitations of the study and future research

The findings and policy implications of this research have limitations, primarily in terms of the availability of data, which could be addressed in the future. However, the findings offer potential for further research in this area, to assist policymakers in addressing the impact of remittances on MTMs.

In chapters two and three, we selected only 51 remittance-receiving countries due to the limited availability of data. This research could be expanded by increasing the number of countries if appropriate data are made available in the future. In addition, our empirical analysis used quarterly data

for some of the variables, particularly remittances, money supply, bank credit, and exchange rates. The availability of monthly data for these variables could provide an avenue for further investigation to compare the findings with our studies. Also, we used only the available annual data for national savings, number of bank branches per 100,000 people, income per capita, GDP, and institutional variables for the 20-year period from 2000 to 2019. Expansion of the period beyond 2019 will enable further investigation in the future. The application of different methodologies in similar studies is another avenue for determining what research outcomes alternative methodologies may reveal.

In chapter 2, we split the sample of countries based on the remittances-to-GDP ratio. We chose a five percent remittances-to-GDP ratio average as the critical threshold where bank credit expands with the funds created by remittances. We acknowledge that there are more sophisticated methodologies to identify this tripping point endogenously. Threshold Vector Autoregression (TVAR) models, Panel Smooth Transition Regression (PSTR) models, and Markov-Switching VARs are some of these alternative estimation methods. For example, the TVAR model is capable of switching the dynamic behaviour of the system between different regimes based on a threshold and calculating the threshold point within the system by using the available data itself rather than imposing it exogenously.

In chapter 3, we apply the simple average methodology to divide the sample into institutionally low and high performing countries. Dividing the countries into institutionally high and low performing groups presents a straightforward way to divide the countries based on the average values. Further, we selected 4 low-income countries, 22 lower-middle income countries, 23 upper-middle income countries, and 2 high-income countries. In our sample, 45 countries are middle income countries; therefore, 88% of the total sample represents middle income countries, 8% of the sample is represented by low-income countries, and the remaining 4% of the sample is represented by high-income countries. The way that the sample members are selected may prevent the skewness of the data of the institutional factors. Further, the stark contrast in the statistical results between the two groups reveals that the underlying economic signal is strong with the use of simple average cutoff points. However, it should be acknowledged that threshold VARs or Quantile Regressions could perform superior robustness checks when compared to our methodology, which creates room for further research in the future.

In our investigation, we use variables that relate to MTM and remittance inflow to determine the impact of remittances on MTM in remittances-receiving countries. We apply Petroni's SVAR methodology and use quarterly and monthly data to assess how remittances cause changes in MTM. Further application of this methodology and monthly and quarterly data would reduce the noise in the statistical outcome. The SVAR methodology applied in this thesis is capable of identifying the dynamic relationships among the variables while mitigating simultaneity. However, it is important to differentiate between correlation and causation in the research findings. In this SVAR approach, we use both short- and long-run restrictions with theoretical motivation to fine tune the statistical outcome.

Despite our effort to apply these short- and long-run restrictions, the endogeneity may not be eliminated completely as there is a complex relationship between remittances and the macroeconomic variables used in the study. For example, remittances weaken the institutional factors while affecting the bank credit market. Similarly, weak institutions and restricted credit markets contribute to increasing migration of the labour force and consequent increase in remittance inflows. Although Pedroni's methodology is capable of capturing the dynamic effects of other variables that may interact with the variables included in our study, the methodology might miss the effects of some of the variables that may be linked to this statistical analysis; therefore, the explanatory variable may be correlated with the error term. Thus, the impulse response functions capture dynamic associations rather than unidirectional causal laws.

In addition, the second-stage cross-sectional regressions reveal how the IRs generated in the SVAR model covary with other variables like remittance to GDP ratio, savings to GDP ratio, and institutional factors. The regression analysis reveals that the IRs are strongly correlated with the remittances to GDP, savings to GDP ratios, and institutional factors like regulatory quality and corruption control. This statistical outcome reveals a statistically significant correlation - revealing for example banks in countries with strong regulatory quality expand the credit facility by using the remittance-generated funds. However, this statistical outcome may not prove that the introduction of a new banking regulation would expand the credit facilities provided by the banking sector. In the context of this thesis, omitted variables—such as unobserved cultural attitudes toward saving or informal financial networks—might simultaneously influence both the institutional indices and the transmission channels. Therefore, while the empirical results provide compelling evidence of how remittances are associated with weakened monetary transmission, they should be interpreted as strong conditional correlations that guide policy, rather than absolute causal certainties. The application of instrumental variables (IV) is an approach that could be used to estimate the causal relationship when a model suffers from endogeneity. This gives room for further analysis in future research in this area.

In chapter four, we chose only Sri Lanka as a model. The findings are thus limited to the scope of the socio-economic conditions prevailing in Sri Lanka. This research could be expanded to other conflict-affected remittance-receiving economies, which may have different socio-economic conditions and values. Expanding this research into other conflict-affected countries could produce findings that can help to generalise the role remittances play in affecting MTMs, and guide policymakers in developing appropriate measures to mitigate the effects of remittances on MTMs.

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Chapter 2: The impact of remittances on monetary transmission mechanisms in remittance-receiving countries: with a focus on credit and exchange rate channels

Nature of contribution by PhD candidate	Conceptualizing the research idea, data collection, identifying and designing research methodology, data analysis, writing the draft research paper, and finalizing and submitting the research paper.
Extent of contribution by PhD candidate (%)	75

CO-AUTHORS

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Mark Holmes	Providing guidance, reviewing the research paper, and providing comments and feedback.
Michael Ryan	Review the research paper and provide comments and feedback.

Certification by Co-Authors

The undersigned hereby certify that:

- the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
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Chapter 3: The impact of remittances on monetary transmission mechanism: an investigation into the role of institutions in the bank credit channel

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Extent of contribution by PhD candidate (%)	75

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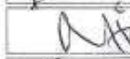
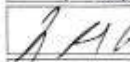
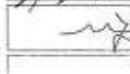
Mark Holmes		23/7/25
Gazi M Hassan		26/7/25
Michael Ryan		23/7/25

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Chapter 4: The impact of remittances on monetary transmission mechanism during pre-and post-conflict eras in Sri Lanka

Nature of contribution by PhD candidate	Conceptualizing the research idea, data collection, identifying and designing research methodology, data analysis, writing the draft research paper, and finalizing and submitting the research paper.
Extent of contribution by PhD candidate (%)	75

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