

# **ESSAYS ON THE ECONOMIC CONSEQUENCES OF REMITTANCES**

**RAJAN KRISHNA PANTA**

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**ARNDT-CORDEN DEPARTMENT OF ECONOMICS  
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# DECLARATION

I certify that this is my own original work except where otherwise acknowledged in the text.

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RAJAN KRISHNA PANTA  
4 JANUARY 2016

# DEDICATION

*To my Father*  
*Ram Krishna Pant*

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# ABSTRACT

This thesis examines three issues relating to the role of remittances in the process of economic development: the impact on economic growth, the implications of remittances on the real exchange compared to other forms of financial inflows, and the impact of remittances on expenditure patterns of households in a major remittance-dependent country, Nepal. The issues are addressed in three self-contained essays, with a stage-setting introductory chapter and a concluding chapter which summarises the key findings. The essays are mainly empirical, but well informed by the relevant analytical literature. The empirical analysis makes use of the latest econometric techniques.

Chapter 2 examines the debate on the impact of remittances on economic growth using a new panel dataset covering 74 developing countries over the period 1976–2010. The novelty of the analysis is that it probes possible nonlinearity and lagged effect of the hypothesized impact of remittances on economic growth using alternative specifications. The results suggest that remittances have a positive impact on growth, with the magnitude of the impact declining beyond a remittance-GDP ratio of 7 to 9 percent. But the marginal impact is not statistically significant. There is also no evidence to suggest that the impact of remittances on growth depends on financial deepening as some previous studies have suggested.

Chapter 3 examines the impact of remittances on real exchange rate (RER) using the standard dependent economy model to derive the estimation equation. The analysis is based on a new panel dataset covering 105 developing countries during 1980–2011. A key novelty of the paper is the use of a theoretically consistent new real effective rate (REER) index as the dependent variable. The index uses the wholesale price index (WPI) to measure foreign prices and the GDP deflator as the measure of domestic prices whereas the REER index of the IMF, which has been commonly used in the previous studies, uses CPI to measure both prices.

The results reveal that remittances lead to significant appreciation of RER, and the magnitude of appreciation depends on the nature of the exchange rate policy regime. One percentage point increase in the remittance to GDP ratio leads to an appreciation of RER by 0.5 percent and 1.08 percent in the countries with the fixed

and flexible exchange rates, respectively. However, the impact is not statistically significant under both exchange rate regimes when the IMF index is used as the alternative measure of RER. There is also evidence that the degree of appreciation associated with remittance inflow is significantly higher compared to the inflows of official development assistance and foreign direct investment.

The fourth chapter examines the impact of remittances on the expenditure patterns of households in Nepal using a panel dataset constructed from three rounds of the Nepal Living Standard Survey (1995, 2003 and 2010). The findings reveal that, contrary to popular perception about unproductive use of remittances, remittance-receiving households spend a higher proportion of total consumption expenditure on education and health.

# CONTENTS

<b>DECLARATION</b> .....	<b>II</b>
<b>DEDICATION</b> .....	<b>III</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>IV</b>
<b>ABSTRACT</b> .....	<b>VI</b>
<b>CONTENTS</b> .....	<b>VIII</b>
<b>TABLES</b> .....	<b>X</b>
<b>FIGURES</b> .....	<b>XI</b>
<b>APPENDICES</b> .....	<b>XII</b>
<b>ACRONYMS</b> .....	<b>XIII</b>
<b>CHAPTER 1 INTRODUCTION</b> .....	<b>1</b>
1.1 Context .....	1
1.2 Preview .....	8
<b>CHAPTER 2 REMITTANCES AND ECONOMIC GROWTH: A MULTI-COUNTRY PANEL DATA ANALYSIS</b> .....	<b>12</b>
2.1 Introduction .....	12
2.2 Remittances Inflow and Economic Growth: Theory and Evidence..	14
2.2.1 Remittance and Growth: Theory .....	15
2.2.2 Empirical evidence on remittances and economic growth.....	17
2.3 Theoretical framework and model.....	23
2.4 Data sources.....	26
2.5 Estimation method .....	29
2.6 Results.....	32
2.7 Robustness.....	38
2.8 Conclusion .....	43
<b>CHAPTER 3 THE DIFFERENTIAL IMPACT OF INWARD REMITTANCES AND CAPITAL INFLOWS ON THE REAL EXCHANGE RATE</b> .....	<b>55</b>
3.1 Introduction .....	55
3.2 Remittance inflows and real exchange rate .....	57
3.2.1 Analytical framework .....	57
3.2.2 Empirical evidence .....	61
3.3 Model.....	69



3.4	Data sources and variable construction .....	77
3.4.1	Calculation of the real effective exchange rate (REER) .....	78
3.4.2	Construction of the remittances variable .....	82
3.5	Estimation and results.....	95
3.5.1	A simple decomposition of REER effect .....	101
3.6	Robustness check .....	103
3.6.1	Tackling endogeneity.....	104
3.7	Conclusion .....	107
<b>CHAPTER 4 ARE EXPENDITURE PATTERNS DIFFERENT FOR HOUSEHOLDS RECEIVING INTERNATIONAL REMITTANCES? EVIDENCE FROM NEPAL .....</b>		<b>117</b>
4.1	Introduction .....	117
4.2	Background.....	119
4.3	The impact of remittances on household consumption and expenditure: Theory and empirical evidence .....	123
4.4	The model.....	127
4.5	Data .....	130
4.6	Estimation method .....	136
4.6.1	Tackling endogeneity.....	137
4.7	Results.....	140
4.8	Robustness check .....	155
4.9	Conclusion .....	158
<b>CHAPTER 5 CONCLUSION.....</b>		<b>173</b>
<b>REFERENCES .....</b>		<b>176</b>

## Tables

Table 1.1 Classification of the top 30 remittance recipient (as share of GDP) countries by income groups (2012).....	4
Table 1.2 Major remittance receiving countries: Year of graduation according to income categories.....	7
Table 2.1 Summary of literature on remittance and growth .....	19
Table 2.2 Summary statistics .....	28
Table 2.3 Remittances and growth: Random effects estimations .....	34
Table 2.4 Remittance and growth (Dynamic panel estimations) .....	37
Table 3.1 Summary of studies on remittances and real effective exchange rate .....	63
Table 3.2 Remittances and REER.....	97
Table 3.3 Remittances and REER comparison .....	100
Table 3.4 simple decomposition of the remittance on REER .....	102
Table 3.5 Remittances and nontradables-to-tradables ratio .....	104
Table 3.6 Robustness check including full sample and System GMM.....	106
Table 4.1 Foreign migrant workers (absentee population) in Nepal (1942-2001)...	120
Table 4.2 Summary statistics of external and internal remittances in Nepal .....	123
Table 4.3 Sample size of the Nepal Living Standard Surveys.....	130
Table 4.4 Components of major consumption categories.....	132
Table 4.5 Summary statistics .....	134
Table 4.6 The impact of remittance on per capita consumption.....	142
Table 4.7 Determinants of household consumption shares: Pooled OLS estimates	145
Table 4.8 Determinants of household consumption: Decomposition of food consumption shares .....	147
Table 4.9 Determinants of household consumption shares: SUR estimates.....	149
Table 4.10 Determinants of consumption shares using an instrumental variable....	153
Table 4.11 Determinants of consumption shares and domestic remittances: pooled OLS estimates .....	156
Table 4.12 Hedonic pricing coefficients .....	163

# Figures

Figure 1.1 Remittances and other resource flows to developing countries (in US \$ billion).....	2
Figure 1.2 Remittance inflows in developing countries in 2012 (US \$ billion) .....	2
Figure 1.3 Average growth rates of all developing countries and major remittance receiving countries by region (1980-2011) .....	5
Figure 1.4 Growth of high remittance-receiving countries vs other developing countries .....	5
Figure 2.1 Remittance and GDP per capita growth (%) .....	28
Figure 2.2 Detection of outliers using leverage ratio .....	39
Figure 2.3 Influential observations using Cook's distance .....	40
Figure 2.4 Semiparametric graph of partial remittance-growth relationship.....	43
Figure 3.1 Capital inflows and real exchange rate .....	57
Figure 3.2 Computed REER vs IMF REER and remittances by country .....	84
Figure 3.3 Decomposition of impact of remittances on REER.....	102
Figure 4.1 Remittance inflows in Nepal .....	121

# Appendices

Appendix 2.1 Data descriptions and sources .....	45
Appendix 2.2 Sample of countries and period covered .....	46
Appendix 2.3 Extended sample of countries and period.....	47
Appendix 2.4 Remittance and growth: Pooled OLS estimations.....	48
Appendix 2.5 Remittance and growth: Fixed effects estimations.....	49
Appendix 2.6 Summary of literature review on macroeconomic impact of remittances .....	50
Appendix 2.7 Remittance and growth: sensitivity to outliers .....	52
Appendix 2.8 Remittances and growth with interaction terms .....	53
Appendix 2.9 Robustness check with the extended sample.....	54
Appendix 3.1 Variables: definitions and sources.....	108
Appendix 3.2 Ilzetki, Riehart and Rogoff exchange rate regime classification...	110
Appendix 3.3 Coverage of remittance data.....	111
Appendix 3.4 List of countries in the regression sample .....	113
Appendix 3.5 Summary statistics of variables .....	114
Appendix 3.6 Correlation coefficients among major explanatory variables.....	116
Appendix 4.1 Computation of consumption aggregates .....	160
Appendix 4.2 Computation of consumption aggregate (relevant sections of the questionnaires) .....	164
Appendix 4.3 Summary statistics.....	166
Appendix 4.4 Determinants of consumption shares using remittance values: SUR estimates.....	169
Appendix 4.5 Determinants of consumption shares on Rounds 2 and 3: Pooled OLS .....	171

# Acronyms

BoP	Balance of Payments
CBS	Central Bureau of Statistics
CPI	Consumer Price Index
DD	Dutch Disease
FDI	Foreign Direct Investment
FE	Fixed Effects
FMOLS	Fully-Modified OLS
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
IMF	The International Monetary Fund
LDCs	Least Developed Countries
NLSS	Nepal Living Standard Survey
NRB	Nepal Rastra Bank
ODA	Official Development Assistance
OECD	The Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
RE	Random Effects
RER	Real Exchange Rate
REER	Real Effective Exchange Rate
SIDS	Small Island Developing States
SSA	Sub-Saharan Africa
SUR	Seemingly Unrelated Regression
TFP	Total Factor Productivity
WPI	Wholesale Price Index

# Chapter 1

## Introduction

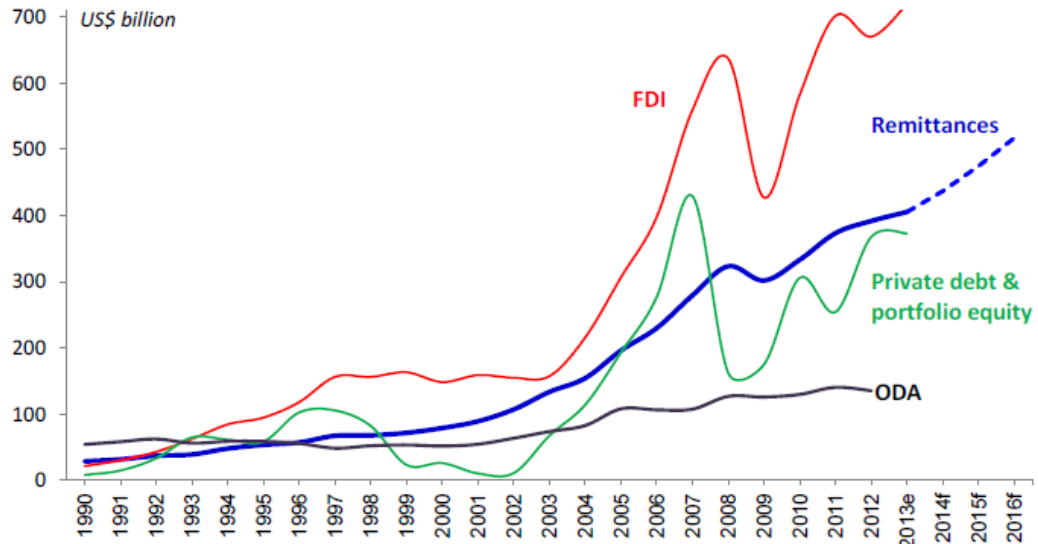
### 1.1 Context

Remittances are generally defined as the sum of three components in the current account of the balance of payments statistics: workers' remittances, compensation of employees, and migrants' transfers (International Monetary Fund 1993).<sup>1</sup> During the past three decades or so, inward remittances have emerged as a significant source of financial inflows to many developing countries. Officially recorded remittance inflows to developing countries reached US \$404 billion in 2013, up from about US \$200 billion in 2003, and are predicted to reach US\$ 516 billion in 2016 (The World Bank 2012, 2014). Since 2005 remittance inflows have exceeded private capital inflows and official development assistance (ODA) to these countries (Figure 1.1). For many developing countries remittances have emerged as a significant source of funds to finance the current account deficit. Total remittances cover more than 20 percent of imports, and this is equivalent to more than 30 percent of exports for the top twenty remittance-receiving countries in terms of the remittance to GDP ratio (The World Bank 2014).

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<sup>1</sup>The standard source of remittances data is the *Balance of Payments Yearbook* published by the International Monetary Fund (IMF). 'Compensation of employees' comprises wages, salaries, and other benefits earned by individuals—in economies other than those in which they are residents—for work performed for and paid for by residents of those economies. 'Workers' remittances' cover current transfers by migrants who are employed in new economies and considered residents there. Migrants' transfers refers to the flows of goods and changes in financial items that arise from the migration of individuals from one economy to another (International Monetary Fund 1993).

**Figure 1.1 Remittances and other resource flows to developing countries (in US \$ billion)**



Source: The World Bank (2014)

Among the developing countries, remittance receipts are spread out across different regions: East Asia and the Pacific and South Asia account for around 50 percent of total remittance inflows. (Figure 1.2).

**Figure 1.2 Remittance inflows in developing countries in 2012 (US \$ billion)**

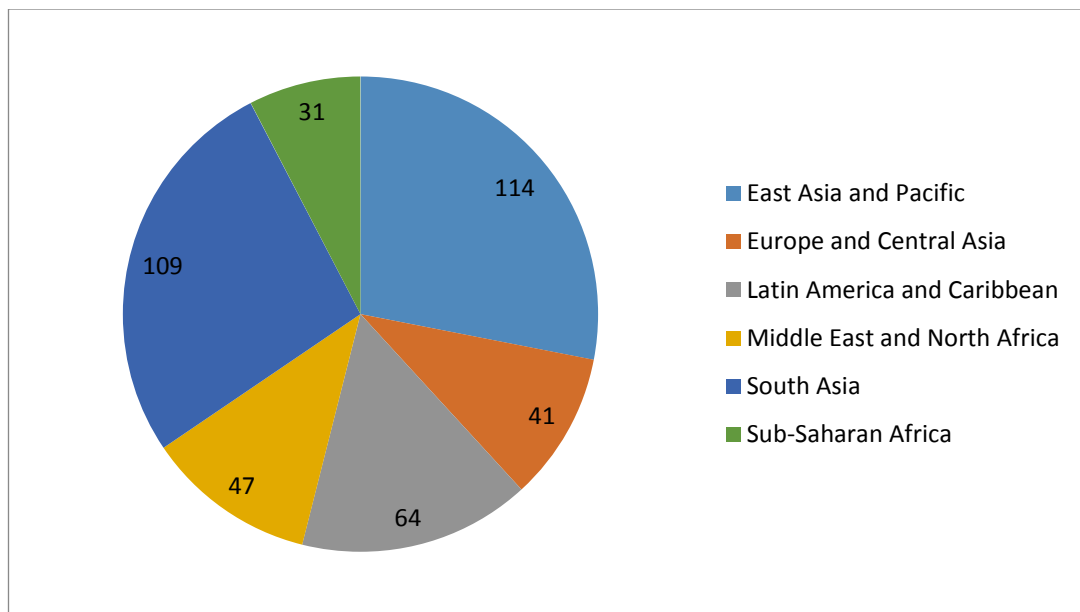


Table 1.1 shows remittance inflows to the top 30 remittance recipient countries, as a percentage to their respective GDP. Most of the high remittances recipient countries fall under low and lower middle-income country groups according to the World Bank classification. Figure 1.3 reveals that average growth rates of the top 30 remittance recipient economies (in percent of GDP) are lower than the total developing countries in most of the regions except in the Middle East and North Africa, and slight deviation in Sub-Saharan Africa.

Similarly, figure 1.4 depicts the per capita real GDP growth rates of the top 30 remittance-recipient countries and the growth rates of developing countries excluding the remittance-dependent economies over the period from 1980 to 2011.<sup>2</sup> The figure reveals that during most of this period, the average per capita GDP growth rates of high remittance receiving countries are lower than rest of the developing countries, except for the brief period in the late 1990s. The average per capita growth rate is negative for high remittance receiving countries for most of the period from 1980 to early 1990s, and also it is more volatile than rest of the developing countries.

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<sup>2</sup> The developing countries here refer to the low, lower-middle and upper-middle-income countries definition by the World Bank.



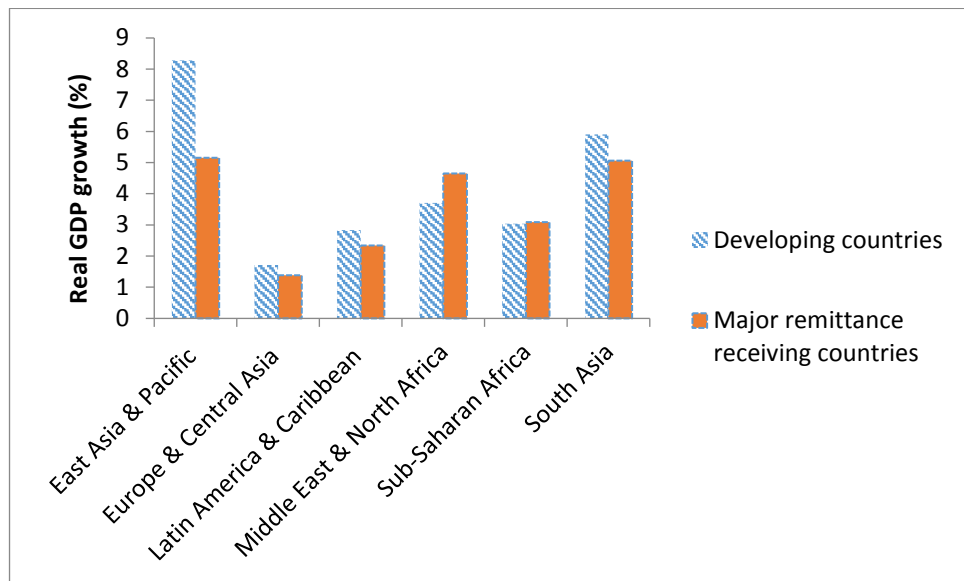
**Table 1.1 Classification of the top 30 remittance recipient (as share of GDP) countries by income groups (2012)**

<b>Low-Income</b>	<b>Lower-middle-Income</b>	<b>Upper-middle-income</b>	<b>High-income</b>
(1) Tajikistan (47%)	(5) Moldova (23%)	(9) Lebanon (18%)	(14) Jamaica (14 %)
(2) Liberia (31%)	(7) Samoa (21%)	(12) Jordan (16 %)	
(3) Kyrgyz Republic (29% )	(10) Kosovo (18%)	(15) Bosnia and Herzegovina (13 %)	
(4) Lesotho (27%)	(11) El Salvador (16%)	(19) Albania (11 %)	
(6) Nepal (22%)	(18) Philippines (12 %)	(16) Serbia (13 %)	
(8) Haiti (21%)	(21) Nicaragua (10 %)	(27) Grenada (9 %)	
(17) Bangladesh (12 %)	(22) Guatemala (10 %)	(30) Dominican Republic (7 %)	
(20) Togo (10%)	(25) Senegal (9 %)		
(24) Guinea-Bissau (9 %)	(26) Armenia (9 %)		
(29) Gambia, The (8 %)	(28) Sri Lanka (8 %)		

Source: World Development Indicators 2013.

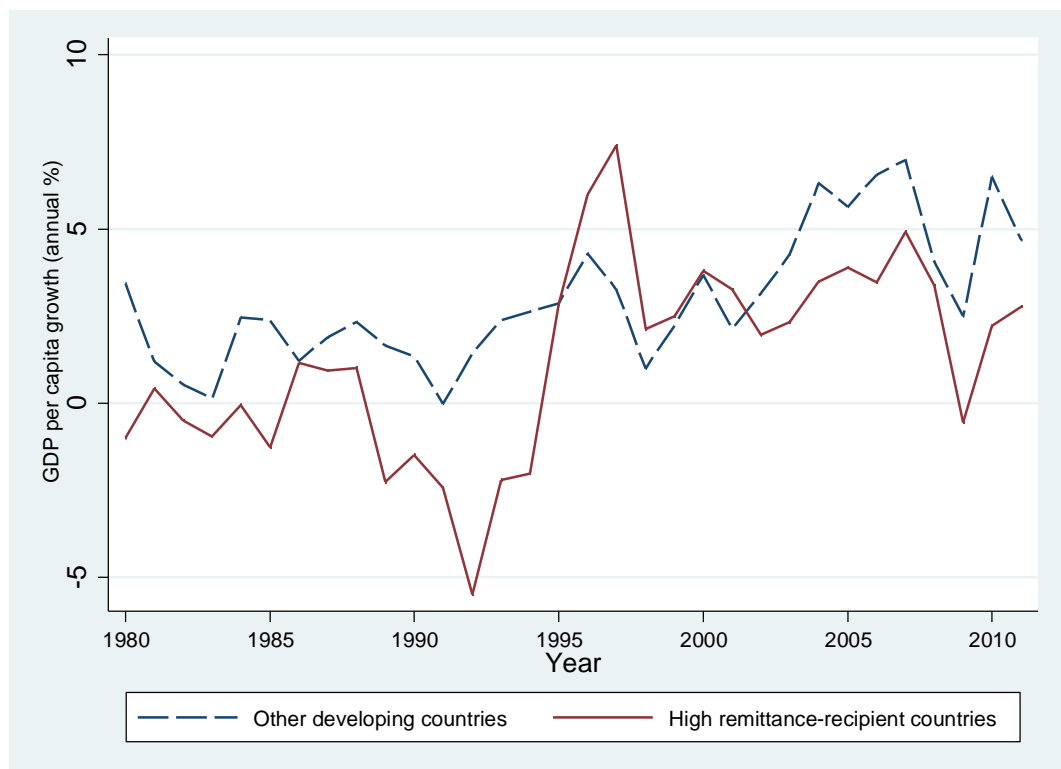
Notes. The World Bank classification of the countries is based on the Gross National Income (GNI) per capita, current US dollars (Atlas method). There are four groups: low income (less than \$1025), lower-middle-income (between \$1026 and \$4035), upper-middle (between \$4036 and \$12475) and high-income (above \$12475)—based on 2011 GNI per capita (<http://data.worldbank.org/about/country-classifications>). The first figure in the parentheses indicates the ranking according to remittance to GDP ratio and the second figure indicates the ratio of remittance inflows to GDP.

**Figure 1.3 Average growth rates of all developing countries and major remittance receiving countries by region (1980-2011)**



Source: Computed from the World Development Indicators (2013).<sup>3</sup>

**Figure 1.4 Growth of high remittance-receiving countries vs other developing countries**



<sup>3</sup> The data from 1980 are not available for some countries.

Table 1.2 shows the dates of ‘graduation’ of the major remittance recipient countries from low to lower-middle income group and from lower-middle to upper- middle income. Most of these countries have graduated only during the last decade or so from the low income to the lower middle income group. Similarly, among the few upper-middle income countries group, most of these countries have graduated from lower middle income in last 5 years or so (Table 1.2).

**Table 1.2 Major remittance receiving countries: Year of graduation according to income categories**

Country	Year	
	From low-income to low-middle-income	From lower-middle-income to upper-middle-income
Indonesia	2004	
Philippines	1995	
Moldova	NA	
El Salvador	1992	
Vietnam	2009	
Samoa	1995	
Tonga	1988	
Armenia	2004	
Ukraine	2004	
Guatemala	1992	
Guyana	2005	
Honduras	2001	
Nicaragua	2004	
Egypt, Arab Rep.	1996	
Morocco	1991	
India	2008	
Pakistan	2010	
Lesotho	2009	
Nigeria	2009	
Senegal	2009	
China	2002	2010
Albania	2000	
Mexico	1974	1993
Sri Lanka	2004	
Bosnia and Herzegovina	1997	2008
Russian Federation		2005
Serbia		2007
Romania		2006
Brazil	1975	1996
Colombia	1979	2007
Dominican Republic	1979	2007
Grenada	NA	2001
Jordan	NA	2010
Lebanon	NA	1998

Source: Author's compilation based on World Bank classification of countries.

*Notes.* The World Bank classification of the countries is based on the Gross National Income (GNI) per capita, current US dollars (Atlas method). There are four groups: low-income (less than \$1025), lower-middle income (between \$1026 and \$4035), upper-middle (between \$4036 and \$12475) and high-income (above \$12475) based on 2011 GNI per capita (<http://data.worldbank.org/about/country-classifications>).

## 1.2 Preview

What is the impact of remittances on economic growth of the receiving countries? Multilateral development agencies, in general, regard remittances as an important and stable source of external financing to developing countries which helps to reduce poverty and promote growth (Fajnzylber & Lopez 2008; Maimbo & Ratha 2005; The Organization for Economic Co-operation and Development (OECD) 2005; The World Bank 2006; Vargas-Silva et al. 2009). Moreover, many countries regard migration and the consequent remittance inflows as a source for development. Since the mid-1990s, the number of developing countries adopting policies to encourage emigration has increased steadily (United Nations 2013).

However, the role of remittances in reducing structural poverty and their impact on long-term economic development remains debatable. Many studies argue that remittances act as an important source of external finance to developing countries, helping to alleviate poverty and inequality, promote human and physical capital accumulation, and create favourable multiplier effects in the economy. On the other hand, some studies contend that remittance is detrimental to economic growth citing several reasons such as moral hazard problems at both the household and government levels; conspicuous consumptions and higher imports; inflationary pressure in the economy; currency appreciation; and perpetuation of migration.<sup>4</sup>

Though the above analyses points to a negative or lack of, correlation between remittances and economic growth, they do not necessarily imply that remittances causes lower economic growth. High remittances may simply reflect the consequence of low economic growth and high migration in the source countries. Another possibility is that in the absence of remittance, growth might have been lower.

In this context, Chapter 2 presents the new empirical evidence on remittances-growth relationship debate using a new panel dataset focussing on 74 developing countries over the period 1976–2010. This chapter draws on the literature of both economic growth and remittance-growth nexus. The empirical model is based on the reduced form of the Solow-Swan growth model. This model examines several

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<sup>4</sup> See Russell (1986), McKenzie (2005), Chami et al. (2008), Rappoport & Docquier (2006), Yasser et al. (2008), Barajas et al. (2009) and Barajas et al. (2011) for surveys of the relevant literature.

alternative specifications with regard to the possible nonlinear and lagged effect of remittances, the role of investment, financial deepening and level of education. The empirical estimation also addresses the potential endogeneity of remittances.

The empirical results of Chapter 2 suggests that there is no evidence to support the view that remittances exert a significant impact on economic growth. However, there is some weak evidence that the impact of remittance on growth declines after remittance-to-GDP passes a threshold of about 7–9 per cent of GDP. There is also no evidence to suggest that the impact of remittances on growth depends on financial deepening, as some previous studies have suggested. The estimations are robust to different estimation time periods, selection of countries and omitting influential observations in the data.

Chapter 3 explores one of the possible channels through which remittances impact on economic growth: appreciation of the real exchange rate (RER). Under several plausible assumptions, the ‘Australian model’ (or the dependent economy model), postulates that a resource inflow (remittance inflows, in this case) would cause appreciation of the RER with adverse implications for tradable goods production and growth in the economy (Salter 1959; Swan 1960). Despite this theoretical postulate, the available empirical evidence on the impact of remittances on the RER is mixed. The literature reports the conflicting findings ranging from real exchange rate appreciation, ranging from no effects to real exchange rate depreciation (Amuedo-Dorantes & Pozo 2004; Barajas et al. 2011; Lopez et al. 2007; Rajan & Subramanian 2005).

The analysis in Chapter 3 is based on a new panel dataset covering 105 developing countries during 1980-2011. The chapter, first formulates an analytical framework for examining the impact of remittances on real exchange rate drawing on the standard Dutch disease literature. It then construct real exchange rate index which differs from the standard International Monetary Fund’s REER index used in the earlier studies. The IMF index uses the consumer price index to measure both the price level of a given country and that of its trading partners. For constructing REER index used in this chapter, I use the wholesale price index (WPI) as a proxy for foreign price and a GDP deflator for the domestic price. The WPI is a better proxy for the price of tradable goods and the GDP deflator better captures the domestic prices of nontradable

goods. Thus, the REER index used here is more consistent with the theoretical concept of the real exchange rate (relative price of tradable prices to non-tradable prices) compared to the IMF index to (Athukorala & Rajapatirana 2003; Lane & Milesi-Ferretti 2004).

The findings from Chapter 3 suggest that remittances induce a significant appreciation of REER compared to the official development assistance. The alternative specifications suggest that a one percentage point increase in remittances leads to about 0.5 and 1.08 unit increase in the real exchange index in countries with fixed exchange rate and flexible exchange rate, respectively. The analysis also suggests that the impact depends on the exchange rate regime. For countries adopting a fixed exchange rate regime, the impact mostly falls on the domestic price, whereas for countries adopting the flexible exchange rate regimes, the impact is mainly on the nominal exchange rate appreciation. Interestingly, the choice of a particular REER index affects the significance of the results. I failed to find a statically significant effect of remittances (or other capital inflows) on the real exchange rate when the IMF index is used as an alternative measure of the real exchange rate.

The third paper (Chapter 4) examines the impact of remittances on household consumption patterns in Nepal. The impact of remittances on the recipient country depends crucially on how these transfers are utilized by the households. Nepal is one of the top five remittance-receiving countries in the world, with a remittance to GDP ratio of around 23 per cent. For Nepal, the inflow of remittances has been a major source of foreign exchange, accounting for around 60 percent of total current account receipts and is equivalent to three times the country's exports. Remittances are a major source of income for many households in Nepal. The Central Bureau of Statistics (2011) estimates that around 56 percent households receive either internal or external remittances. About 12 percent of the poorest quintile households receive remittances, while around 31 percent of the richest quintile household receive remittances.

In this context, Chapter 4 presents the first empirical evidence on whether the expenditure patterns are differently shaped for households receiving remittances in Nepal. I first compute major household consumption items disaggregated into eight major categories from three rounds of the Nepal Living Standard Surveys (Central Bureau of Statistics 1996, 2004, 2011). An empirical analysis is then undertaken to

quantify the differences in the expenditure patterns of remittance-receiving households and other households. The analysis addresses the possible endogeneity of remittances using an instrumental variable approach. The findings suggest that remittances-receiving households spend a smaller share of total consumption on staple food items, but a higher proportion of total consumption on education, durable goods and health. The preferred estimations show that controlling for total consumption, households with remittances spend around a four per cent less share on food items and spend about 0.9 percent, 0.6 percent and 0.7 percent shares more on education, durable goods and health. The magnitudes, though modest, suggest that remittances can induce behavioural changes in households that are independent of total consumption.



## Chapter 2

# Remittances and economic growth: A multi-country panel data analysis

### Summary

*During the past three decades, inward remittances—generally defined as the transfers in cash, or in kind, from a migrant to household residents in the country of origin—have emerged as a significant source of financial inflow for many developing countries. However, the impact of remittances on long-term economic growth of recipient countries remains debatable. This chapter revisits this debate using a panel dataset covering 74 developing countries over the period of 1976–2010 by examining the possible nonlinear and lagged effect of the hypothesized impact of remittances on economic growth. The results suggest that remittances have a positive impact on growth, with the magnitude of the impact declining beyond a threshold of 7 to 9 percent. But the marginal impact is not statistically significant. There is also no evidence to suggest that the impact depends on the level of financial deepening or the education level in the recipient countries.*

## 2.1 Introduction

Remittances, generally defined as the transfers in cash or in kind from a migrant to household residents in the country of origin, have emerged as a significant source of financial inflows to many developing countries. Remittance inflows have exceeded private capital flows and official development assistance for most of these countries, and have helped to finance the current account deficits and provide a steady source of foreign exchange (The World Bank 2012, 2014).

One of the major features of migration after the Second World War is a large flow of people from developing countries to advanced economies (Szirmai 2015). Since the mid-1990s, the proportion of governments encouraging emigration has increased steadily (United Nations 2013). Given this increasing international trend, remittances are likely to continue to increase in future. Despite this, the role of remittances in reducing structural poverty and their effects on long-term economic development are debatable. Of primary interest in this chapter is the impact of remittances on the economic growth of the receiving countries. Multilateral

developmental agencies, in general, regard remittances as an important and stable source of external financing to developing countries which helps to reduce poverty and promotes growth (see for example: The World Bank (2006), OECD (2005), Fajnzylber and Lopez (2008), Vargas-Silva (2009)). For example, to quote The World Bank (2006):

*“Remittances have a large positive effect on national income in many developing countries...in economies where the financial system is underdeveloped, remittances appear to alleviate credit constraints and may stimulate growth”* (The World Bank 2006, p. 86).

However, in the literature there are contradictory results ranging from positive to negative or no impacts on economic growth. For example, one of the recent papers argues that:

*“Remittances do not seem to make a positive contribution to economic growth...Perhaps the most persuasive evidence in support of this finding is the lack of a single example of a remittances success story: a country in which remittance-led growth contributed significantly to its development”* (Barajas et al. 2009, p. 16).

Remittances affect the consumption, saving and investment behaviour of the households which in turn has an impact on economic growth (Ashraf et al. 2011; Chin et al. 2010; Rapoport & Docquier 2005; Yang 2008). Remittances are private transfers and the recipient households make the decision on how to spend them. However, despite the private nature of remittance inflows, policymakers and economists increasingly regard these as a potential source of development finance (Barajas et al. 2009), so much so that developing countries encourage emigration as a source of remittances to repay foreign debts, finance trade deficits, and improve the balance of payments (Hugo & Stahl 2004).

The empirical evidence on the role of remittances on economic growth can guide the policymakers to formulate policies regarding migration and the use of remittances. Specifically, an understanding as to whether remittances can contribute to the long run growth or are detrimental to growth can inform policymakers whether the beneficial effects of remittances in the long-run are truly warranted or not, and when to take necessary steps to mitigate the negative effects.

This paper is motivated by the concern that the findings of the existing studies remain inconclusive, possibly because of limitations relating to model specification and the econometric methodology. In particular, it aims to contribute to the debate on the impact of remittances on growth in the following ways. First, I estimate a non-linear relationship and lagged effect between remittance and growth to take account of the possible non-monotonic and delayed impact of remittances on growth. I use several alternative specifications, along with different sample sizes and periods to allow for any possible country heterogeneity and the consequent impact of remittances on economic growth. Second, I utilize the most recent data available for remittances, covering the longest period available and a broad set of developing countries. Third, the possible endogeneity of the relationship between remittances and growth is addressed by using an estimation method which specifies instrumental variables within the model, rather than using theoretically questionable external instruments (Clemens et al. 2012). Several robustness checks are performed to test the validity of the results.

The results suggest that the null of no impact of remittances on economic growth cannot be rejected. In other words, there is no sufficient evidence to suggest that in general remittances have a significant impact on growth. The results, however, provide some weak evidence of a negative impact of remittances on growth as the remittances-GDP ratio increases beyond a threshold of about 7 to 9 percent

The remainder of the paper is organized as follows. Section 2.2 provides a literature review focussing on the theoretical underpinning and empirical evidence of remittance-growth nexus. Section 2.3 discusses the theoretical framework and the model specification, followed by a description of data sources in Section 2.4. Section 2.5 discusses the estimation method, followed by the results in Section 2.6. Section 2.7 presents several robustness checks and Section 2.8 concludes.

## **2.2 Remittances Inflow and Economic Growth: Theory and Evidence**

Remittances exert various macroeconomic impacts on the economy through various channels including labour supply, consumption, investment, exchange rates, trade, fiscal revenue, financial development, poverty, inequality, institutions and governance

(Barajas et al. 2009; McKenzie & Sasin 2007; Rapoport & Docquier 2005; Russell 1986). Since remittances can have both positive and negative effects on these variables, the overall impact on the economy, or on economic growth, is ambiguous. The complex and the multiplier effects generated by the inflow of remittances, therefore, is not easily amenable to theoretical analysis.

### **2.2.1 Remittance and Growth: Theory**

This section explores the possible theoretical links or the channels through which remittances impact economic growth. Kireyev (2006) discusses the four theoretical approaches on the impact of remittances. The first is the familiar Keynesian approach, which regards remittances as an injection to the economy similar to exports or investment. Remittance increases both injection, and the withdrawal through an increase in savings and imports. The final level of equilibrium depends on the magnitude of marginal propensities to save and import. The second possible approach uses the Mundell-Fleming model. In this framework, the impact of a nominal shock on the economy depends on the degree of capital mobility and exchange rate regimes. Remittances can be treated as an increase in money supply: the remittance inflows cause a domestic currency to appreciate, thus causing the trade balance and balance of payments to deteriorate, resulting in a decline in output. If the exchange rate is fully flexible, then the output is unaffected by international transfers as the level of GDP is determined fully on the money market (Rapoport & Docquier 2005, pp. 49-50).

The third approach is based on modified Heckscher-Ohlin theorem and the Rybczynski effect. A remittance increase caused by increased labour emigration, has an ambiguous effect on capital—on the one hand, less capital is needed to produce labour intensive good, and on the other hand, the associated new inflow of capital can substitute for the declining factor. Thus, the impact of remittances on growth is ambiguous depending on the behaviour of other factors and the degree of substitutability among them. The fourth approach, suggested by Kireyev (2006), is based on the national income accounting. As remittances are private transfers, they increase private consumption and investment directly. The higher consumption will either be supported by an increase in domestic output and/or higher imports. Thus, remittances increase the private component of the aggregate demand. The inflow of remittances will either be consumed, saved, invested or some combinations of those.

Chami et al. (2008) provide a framework for the short-run and long-run implications of remittances on the recipient economies. The short-run macroeconomic impact of remittances depends on the assumption as to whether remittance is considered exogenous or endogenous to the macroeconomic variables of the recipient economy (Chami et al. 2008). If the labour supply is exogenous, and assuming the uncovered interest parity condition holds, an exogenous increase in remittances causes the real appreciation of the domestic currency, due to the reallocation of resources (induced by the higher demand) away from the tradable sector to non-tradable sector. Thus, the trade balance deteriorates by amount equal to remittance inflows, and thus the country's current account balance remains unchanged after the increase in remittances. In this simple case, the distribution of welfare gains among the recipient households depends on the allocation of remittances, and the consumption pattern favours the households whose consumption is oriented towards traded goods.

In the second case, the paper assumes that the utility of a household depends on the consumption of traded and non-traded goods and leisure (Chami et al. 2008). Thus, an increase in remittances leads to an increase in the consumption of both goods and leisure. The increase in consumption however, is less than the increase in the remittance inflow due to intertemporal budget constraints imposed on the households. Also, due to the reduction in labour supply and real appreciation, the current account balance remains unchanged and the trade deficit increases by the same amount (since the change in remittances is same compared to the first case). Thus, in the second case, remittances are countercyclical, with the direction of causation running from higher remittances to lower output due to a reduced labour supply (Chami et al. 2008).

In the third case, Chami et al. (2008) drop the assumption of uncovered interest parity and instead assume that the country risk premium is inversely related to the inflow of remittances in the recipient economy. Thus, an exogenous increase in remittances decreases the domestic interest rate and as a result households shift away from future consumption to present consumption in contrast to previous cases. This has two implications: first, consumption increases by more than the inflow of remittances, thus widening the current account deficit since the households need to borrow internationally to support the consumption in the short run; second, the demand for nontraded goods rise is higher than in the previous cases, therefore,

causing a greater appreciation of the exchange rates. Thus, if the risk premium is endogenous, then the contraction of real domestic output is higher than when this is not the case. However, household welfare increases despite the reduction in output.

In a recent study, using the “growth accounting” framework, Barajas et al. (2009) consider the three main channels through which remittances potentially affect economic growth: capital accumulation, labour force growth and total factor productivity (TFP). First, remittances can provide an additional resource for investment for households, especially in the face of credit constraints. Remittances also tend to reduce output volatility and improve the creditworthiness of domestic investors, and this fosters higher investment. Second, remittances can have a negative effect on labour force participation if the households decide to substitute unearned remittance income for labour income. Remittances can also induce moral hazard problems among the recipient households. Third, remittances may affect the TFP through efficiency of investment by changing the quality of domestic financial intermediation and affecting the formal financial system to allocate capital. In addition, remittances can generate dynamic production externalities in the economy by appreciating the equilibrium exchange rate, or through broader political economy effects.

### **2.2.2 Empirical evidence on remittances and economic growth**

The empirical literature on the macroeconomic impact of remittances on economic growth in recipient countries can be broadly classified into two groups. One group of literature analyses the impact of remittances on economic growth using reduced form equation, following the tradition of the economic growth literature. The second group examines the impact of remittances on a particular determinant of growth such as exchange rate, investment, financial development, savings, and institutions. This paper focuses to the first strand of literature. The cross-country literature on the impact of remittances on economic growth is relatively sparse compared to the literature on the effects of remittances on a particular growth channel, such as financial development, exchange rates or institutions.<sup>5</sup>

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<sup>5</sup>There are several studies which examine the impact of remittances on the economic growth of a particular country or group of countries e.g. Mundaca (2008) in case of Latin America and Caribbean countries, Gupta (2005) in case of India, and Glytos (2001) in case of Egypt.

The cross-country empirical evidence on the impact of remittances on economic growth is mixed. First, several studies find that remittances act as an important source of external finance to developing countries, helping to alleviate poverty and inequality, promote human and physical capital accumulation, and create favourable multiplier effects in the economy. Second, some studies have found that the remittances' impact on growth depends on certain conditions prevailing in the receiving country, such as policy environment or the extent of institutional or financial development. Third, there are studies which find that remittances are harmful for growth. These studies argue that remittances create moral hazard problems, both at the household and government levels; they encourage conspicuous consumption and higher imports, and induce currency appreciation, inflationary pressure in the economy, and dependence on emigration.

Table 2.1 briefly summarizes the major literature on the remittances and economic growth focussing on the coverage, methodology and findings of the study.

**Table 2.1 Summary of literature on remittance and growth**

<b>Study</b>	<b>Sample coverage, dates</b>	<b>Methods/Instruments</b>	<b>Findings</b>
Chami et al. (2003)	111 countries for cross-section and 48 countries for annual panel, 1970–1998	Fixed and random effects and using instrumental variables. Instruments: 1) ratio of country's income to US income, 2) country's real interest rate to the US real interest rate	Remittances have a negative effect on economic growth
International Monetary Fund (2005)	101 countries for annual panel, 1970–2003	Fixed effects, instrumental variables: Instruments: 1) the geographic distance between the remittance receiving country and major migrants' destination country, 2) the presence of a common language in home and host countries	No statistically significant direct link between real per capita output growth/investment and remittance
The World Bank (2006)	67 countries (21 Latin American and Caribbean) for annual panel, 1991–2005	Fixed effects and instrumental variables. Instruments: 1) average output per capita of the top country destination for migrants across the world weighted by the inverse of the distance between the remittance-sender and the remittance-recipient country, 2) average output per capita of the top five country destinations for migrants in the OECD weighted by the share of migrants of the recipient country in each of these five destinations	Remittances have a positive and significant impact on growth
Giuliano and Ruiz-Arranz (2009)	73 developing countries for annual panel, 1975–2002	Generalized methods of moments	Remittance promote growth in less financially developed countries



**Table 2.1 Summary of literature review on remittance and growth** (*continued*)

<b>Study</b>	<b>Sample coverage/dates</b>	<b>Methods/Instruments</b>	<b>Findings</b>
Ramirez and Sharma (2009)	23 Latin American and Caribbean countries, 1990–2005	Panel cointegration and fully-modified OLS	Remittances have a positive and significant effect on economic growth
Singh et al. (2009)	36 Sub-Saharan African countries, 1990–2005	Panel fixed effects and fixed effect two-stage least squares	Remittances have a negative impact on growth, while the effect tends to positive in countries with better institutions
Catrinescu et al. (2009)	89 countries, annual panel, 1970–2003	Fixed effects and GMM.	Remittances exert a weakly positive impact on long-term growth and the impact is increased in the presence of sound economic policies and institutions
Barajas et al. (2009)	59 countries, 5-year panel, 1970–2005	Fixed effects and instrumental variables. Instrument: ratio of remittances to GDP of all other recipient countries	Remittances have no impact on economic growth

**Table 2.1 Summary of literature review on remittance and growth***(continued)*

<b>Study</b>	<b>Sample coverage/dates</b>	<b>Methods/Instruments</b>	<b>Findings</b>
Rao and Hassan (2011)	20 Sub-Saharan African countries, annual panel, 1980–2007	Panel data estimation using the modified specification and system GMM	Remittances do not exert significant impact on economic growth
Zieseemer (2010)	52 developing countries, annual panel, 1971–2005	Error correction model and dynamic panel method	Remittances have positive direct and indirect effects on GDP per capita
Ahmada and Coulibaly (2013)	20 Sub-Saharan African countries, annual panel data, 1980-2007	Granger Causality test based on seemingly unrelated regression System	No causal relation between remittance and growth
Feeny et al. (2014)	25 Small Island Developing States (SIDS), annual panel, 1971–2010	OLS and GMM	Remittances have positive impact on growth in Small Island Developing States but no impact on rest of the developing countries

Source: Author’s compilation. The actual number of countries in the sample varies for the different estimations. The numbers are taken from the authors’ preferred estimates.

The mixed empirical evidence on the impact of remittances on growth can be attributed to the different definitions of remittances, country coverage, period and averaging method, the choice of control variables and the tackling of the endogeneity problem (Barajas et al. 2009; Clemens & McKenzie 2014). Endogeneity of remittances can arise from the reverse causality running from growth to remittances, and/or due to a third factor such as governance and the economic growth of the remittance-sending countries affecting both remittances and growth (Barajas et al. 2009; Clemens & McKenzie 2014). Remittances can affect growth through various microeconomic as well as macroeconomic channels, whereas growth can also affect remittances through the migration, altruism, or investment motives of migrants.

There are three methods used in the literature to address the endogeneity problems: using a set of instrumental variables; using different sets of explanatory variables; and using a different methodology. Most of the instrumental variables for remittances used in the literature are macroeconomic in nature, except Barajas et al. (2009). It is, therefore, hard to satisfy the exclusion restriction. In other words, the instruments that are correlated with remittances may also affect growth via other channels. Moreover, there are no robust tests available to test for the strength of the instruments in the context of dynamic panel GMM regressions (Bazzi & Clemens 2013).

In a recent paper, Clemens and McKenzie (2014) argue that the divergent results in the literature (specifically the negative impact obtained about the remittances-growth relationship), can be attributed to three additional factors. First, the measurement problem in remittances has inflated the actual amount of remittances.<sup>6</sup> They contend that due to changes in the measurement methodology and reporting, remittances figures in recent years do not reflect actual changes in real financial flows. Second, even if the figures represent the true financial flows, a cross-country regression would have too little power to detect their effects on growth. Third, due to higher migration there is an offsetting impact on the domestic economy due to a

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<sup>6</sup> However, due to the high cost, slow transfer service and lack of access to financial services render the informal money transfer more attractive to migrants. Hence, the true figure of remittances might be higher (Buencamino & Gorbunov 2002).

reduced labour supply. Hence, the consequent increase in remittances has an opportunity cost in the domestic economy in terms of reduced output.

### 2.3 Theoretical framework and model

The model specification is based on the augmented Solow-Swan growth model, which incorporates the human capital, apart from the inputs of labour and physical capital (Decker & Lim 2008; Mankiw et al. 1992; Spolaore & Wacziarg 2013). The empirical literature on growth distinguishes two types of determinants or sources of growth: proximate and deep. Following the neo-classical model, per capita growth of output can be expressed in terms of three proximate determinants: (a) physical capital deepening; (b) human capital accumulation; and (c) productivity growth (Rodrik 2003).

In recent times the empirical literature on growth has moved from the ‘proximate’ determinants to ‘deep’ determinants (Spolaore & Wacziarg 2013). ‘Deep’ determinants of growth focus on various factors which impact on the resource endowment and productivity growth. Rodrik (2003) classifies the deep determinants of growth into three categories relating to (a) geography; (b) trade integration; and (c) institutions. In this study, I include remittances as one of the deep determinants of growth.

The next important question is concerning the choice of the other explanatory variables. The empirical studies on remittance and growth utilize a different set of explanatory variables compared to those used in the cross-country growth literature (Barro 1997; Bosworth & Collins 2003; Durlauf et al. 2004; Sala-i-Martin 1997). I follow the remittance growth literature in selecting the explanatory variables in order to increase the comparability of the results with those in the existing literature.<sup>7</sup> The reduced form of the full growth equation takes the following form:

$$gdppcg_{i,t} = y_{i,t} - y_{i,t-1} = \alpha y_{i,t-1} + \gamma_1 remit\_gdp_{i,t} + \gamma_2 remit\_gdp_{i,t}^2 + \gamma_3 remit\_gdp_{i,t-1} + \beta X'_{i,t} + \varphi_i + \tau_t + \varepsilon_{i,t} \quad , \quad (2.1)$$

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<sup>7</sup>In addition, in the robustness check, I include the term incorporating the population growth, growth rate of technical change and depreciation of physical and human capital to conform to the Solow model.

where,  $gdppcg_{it}$ =real GDP per capita growth (average over 5-year period),  $i=1, 2, \dots, N$  is the country, and  $t= 1, 2, \dots, 7$  is the 5 year time period average from 1976 to 2010,  $X'_{i,t}$  is the vector of other explanatory variables containing both the proximate and deep determinants of growth,  $\varphi_i$  are country-specific effects,  $\tau_t$  are period specific effects, and  $\varepsilon_{it}$  is the error term. The variables are listed below, with the postulated signs of the regression coefficients for the explanatory variables in parentheses.

$remit\_gdp_{i,t}$  (+ or -) Remittance inflows in percent of GDP at period  $t$

$remit\_gdp_{i,t}^2$  (+ or -) Remittance-to-GDP (squared)

$remit\_gdp_{i,t-1}$  (+ or -) Remittance-to-GDP lagged by one period

$y_{i,t-1}$  (-) Initial real GDP per capita of the relevant period (in log)

$inv\_gdp_{i,t}$  (+) Investment to GDP (per cent)

$life_{i,t}$  (+) Life expectancy

$institution_i$ (+) Institutional quality (ICRG index)

$infl_{i,t}$  (-) Inflation rate (measured by the consumer price index)

$m2final_{i,t}$  (+ or -) Broad and quasi money as percent of GDP

$ssa_i$ (-) Dummy for Sub-Saharan African countries

$easia_i$  (+) Dummy for East Asian countries

$open\_gdp_{i,t}$  (+ or -) Openness (the ratio of total trade to GDP)

Equation (2.1) represents the dynamic panel data model where the lagged dependent variable appears as the explanatory variable in order to capture the dynamic effects (Bond et al. 2001, p. 15).

The model includes the quadratic term for remittances in order to examine the possible non-linearity in the relationship between remittances and growth. Remittances can increase the welfare of the recipients by increasing the consumption of essential goods, improving the nutrition and health conditions, and ameliorating the credit constraints. However, in the medium and long-run, as the dependence on

remittances increases, it can create undesirable macroeconomic effects such as exchange rate appreciation, inflation, and the deterioration of domestic institutions.<sup>8</sup>

Investment ratio is also included as an explanatory variable—as the majority of the studies argue that it is the only variable found to be robust in most of the empirical growth literature. The investment variable is used as an explanatory variable in several other remittance growth studies (Chami et al. 2005; Giuliano & Ruiz-Arranz 2009; Mankiw et al. 1992; Singh et al. 2010). Thus, controlling for investment means that remittances capture only that subset of growth effects which do not pass through investment (Clemens & McKenzie 2014). I estimate the regressions excluding the domestic investment variable to see if this alter the results for the remittance coefficient.

Most of the studies on the impact of remittances on economic growth have analysed the effect on contemporaneous growth. However, it can be argued that it might takes time for remittances to have any effect on growth. For example, the microeconomic impact of remittances on households' behaviour (such as higher investment in children's health and education) will take a long time to affect the output. Thus, remittances can affect growth with a time lag, as it takes time for remittances to be channelled into productive investment or impact the economy through various multiplier effects (Glystos 2005).

In alternative specifications, I also include the interaction terms of remittance and financial deepening and the level of education. Some earlier studies have shown that countries with a higher level of financial development can better utilize remittances, and thus they affect growth (Giuliano & Ruiz-Arranz 2009). In addition, the level of education can also potentially affect the utilization of remittances by households. For example, households with better-educated members are able to make better use of remittances. Thus I test for the possible interaction between remittance and education levels—something not done in earlier studies.

The other explanatory variables are standard in the empirical growth literature. The initial level of per capita GDP captures the conditional 'convergence effect'. The

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<sup>8</sup> See for example, Russell (1986), Chami et al. (2008) and Rapoport and Docquier (2005) for a literature review on the macroeconomic impact of remittances.

coefficient of initial per capita GDP is expected to be negative because convergence hypothesis postulates that richer countries tend to grow more slowly compared to poorer countries. Similarly, life expectancy and years of schooling capture the levels of human capital. Several empirical studies have emphasized the role of institutions in economic growth (Acemoglu et al. 2005). I use the International Country Risk Guide (ICRG) institution quality index to capture the effect of institution on growth.

Trade openness has also been widely used in the empirical literature as one the determinants growth. However, trade openness, as measured by the total trade to GDP ratio, has shortcomings compared to the effective rate of protection (Athukorala & Hill 2010; Krugman 1995). In the absence of detailed data on the effective rate of protection, I employ the trade openness ratio (total trade to GDP ratio) as a proxy for trade liberalization. Recently, the quality of institutions and governance have received a lot of attention as crucial determinants of growth. Therefore, institutional quality index is included as an explanatory variables.<sup>9</sup> Similarly, inflation is the proxy for the overall macroeconomic situation and the theory points to the detrimental effects of inflation on economic growth. The role of financial development on economic growth is proxied by the broad money to GDP ratio. As remittances affect both inflation and money supply, it is important to control for these macroeconomic variables (Barajas et al. 2009).

## 2.4 Data sources

The data set covers 74 developing countries with five-year period averages from 1976 to 2010— that is a seven period panel data set.<sup>10</sup> The averaging, using 5-year annual data, is done to mitigate the business cycle effects (Barajas et al. 2009; Barro 1991). The choice of the period is dictated by data availability for remittances. Details on variable definitions and data sources for each variable are given in Appendix 2.1.

The data sources are the Penn World Tables Version 7.1 (Heston et al. 2012) for GDP per capita growth and initial GDP per capita. The data for remittances to GDP,

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<sup>9</sup>Similarly, the budget balance may also affect economic growth via employment, output, consumption and investment (Aschauer 1985; Ball & Mankiw 1995; Barajas et al. 2009; Devereux & Love 1995). However, owing to the limited data available, the budget balance is not included as an explanatory variable.

<sup>10</sup> Institution quality index were not available for 24 countries. An extended sample of 98 countries from 1976 to 2010 without including the institutional quality index, is used for robustness checks.

openness, investment to GDP ratio, life expectancy, regional dummies, financial depth, and inflation are taken from the World Development Indicators (2013). The data for the time invariant variable—institutional quality—is taken from Rajan and Subramanian (2008) given in Clemens et al. (2012). The data for years of schooling is taken from Barro and Lee (2013). The data for institutional quality were not available for 24 countries, reducing the sample size to 74 countries. The sample of 74 and 98 countries and the period of data availability are given in Appendix 2.2 and Appendix 2.3 respectively.

The data for remittance gross inflows are taken from the World Development Indicators. There is no single category in the balance of payment statistics which corresponds to remittances data. It is generally calculated as the sum of three components in the current account of the balance of payments: that is, workers' remittances, compensation of employees, and migrants' transfers (International Monetary Fund 1993; The World Bank 2011b).<sup>11</sup> Most of the empirical studies on remittances utilize this definition.

However, there is disagreement as to whether the remittances figure obtained from summing the three components of the Balance of Payments Statistics overestimates or underestimates the actual flows. In particular, there is disagreement as to which category (or categories) best reflects the remittances data (OECD 2005). Due to the difficulties in compiling the data on remittances (including the 'informal remittances'), the official data either overstate or understate the true values (Clemens & McKenzie 2014; International Monetary Fund 1993; Rienke 2007; Shonkwiler et

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<sup>11</sup>'Compensation of employees' comprises wages, salaries, and other benefits earned by individuals—in economies other than those in which they are residents—for work performed for and paid for by residents of those economies. 'Workers' remittances' cover current transfers by migrants who are employed in new economies and considered residents there. 'Migrant transfers' are contra-entries to the flow of goods and changes in financial items that arise from the migration of individuals from one economy to another. The concept of residence for households and individuals is based on their centre of economic interest and not on nationality (International Monetary Fund 1993; Rienke 2007). These data do not include remittance from informal channels such as through 'hundi' or personal carriage (see Shonkwiler et al. (2008) for the compilation issues on remittances and the effects of under-reporting on estimating their impacts). Several studies have shown that a significant amount of remittances is sent through informal channels which are not reported in the balance of payments statistics of each country. The data on remittances thus likely underestimate the true values.



al. 2008; OECD 2005). Moreover, countries adopt slightly different approaches while compiling the data and this affects the comparability across countries (OECD 2005).

The graph in Figure 2.1 shows the remittance and GDP per capita growth based on the sample of countries used in the estimation. A quick inspection of the figure suggests that there is no relationship between remittances and economic growth without controlling for other explanatory variables.

Figure 2.1 Remittance and GDP per capita growth (%)

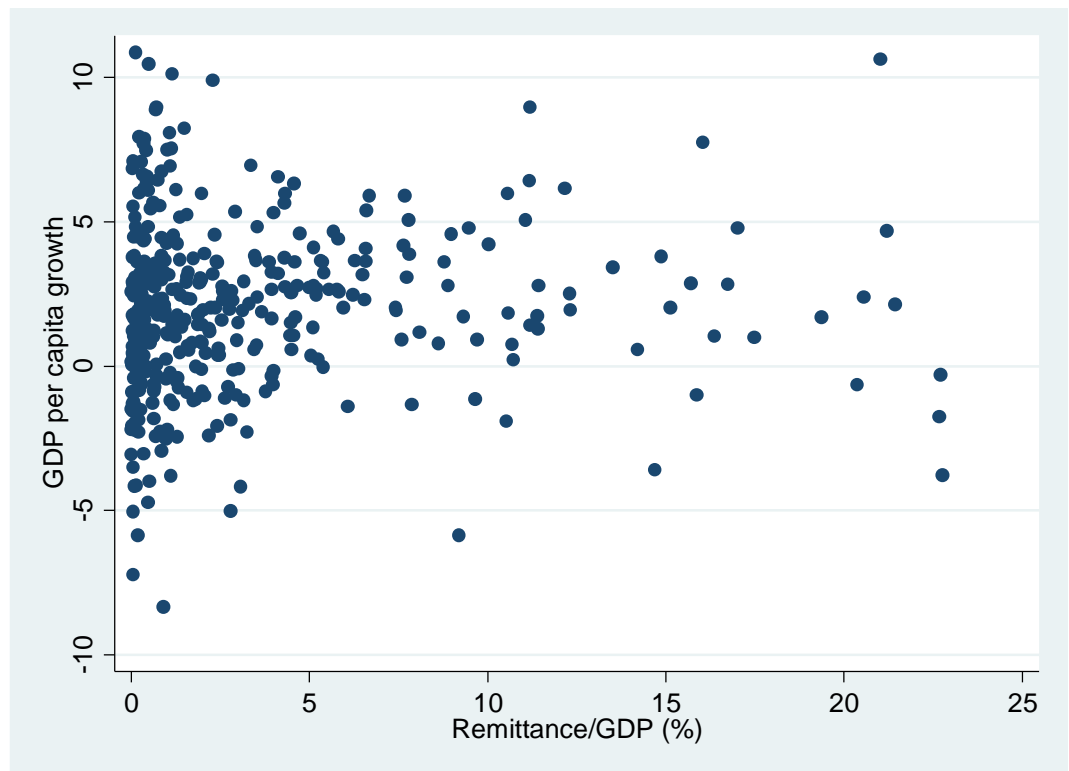


Table 2.2 gives the descriptive statistics of the major variables of interest, based on the sample used in the regression estimations. The maximum value of remittances is around 23 percent. The growth in per capita GDP also shows a minimum per capita growth of negative 8.3 percent and maximum growth of around 10.9 percent. However, I do not adopt the controversial practice of selectively deleting observations based on some ad hoc criterion. Instead, the possible influence of these outliers on the estimation results is discussed in the robustness section (Section 2.7).

Table 2.2 Summary statistics

<b>Variable</b>	<b>Mean</b>	<b>Std.Dev.</b>	<b>Min</b>	<b>Max</b>
Real GDP per capita growth	1.95	2.94	-8.33	10.86
log of initial GDP per capita	8.099	0.973	5.67	10.84
Remittance/GDP (%)	3.219	4.578	0.00175	22.76
Investment/GDP (%)	23.02	9.46	1.53	61.52
Life expectancy at birth	63.46	9.01	37.60	82.38
Years of schooling	5.44	2.48	0.52	11.47
Broad money/GDP (%)	44.74	31.57	8.72	304.30
Inflation rate	34.55	220.1	-4.07	3358
Institution Index	4.52	1.73	1.58	9.60
Trade/GDP (%)	69.23	42.76	9.60	387.10

*Source:* Author's calculation based on the actual sample used in the regressions.

## **2.5 Estimation method**

Of the three standard panel data estimation methods (pooled OLS, random-effects, and fixed-effects estimators), the fixed effect estimator is not appropriate for estimating the model because it contains a number of time-invariant explanatory variables. I therefore started with the pooled OLS estimator and the random-effects estimator (REE). Also, the Breusch and Pagan Lagrange Multiplier test favoured the use of REE over the OLS counterpart (Breusch & Pagan 1980).

REE is a particular case of the generalized least squares estimator, and it assumes that the time invariant fixed effects are uncorrelated with all explanatory variables. It is generally more efficient compared to the pooled OLS estimator (Wooldridge 2009). However, the REE estimator can yield biased and inconsistent coefficient estimates if one or more explanatory variables are endogenous, that is, if they are jointly determined with the dependent variable. There are two such potential sources of endogeneity. The first is the possible reverse causation from economic growth to remittance inflows. Poor growth performance can act as a push factor in

labour migration, resulting in an increase of remittances. Second, there can be some omitted variables in the model which are correlated with both remittance and growth.

To address the potential endogeneity, system generalized method of moments (GMM) method is used (Anderson & Hsiao 1982; Blundell & Bond 1998). Moreover, due to the presence of a lagged dependent variable, the fixed effect coefficients will produce a ‘dynamic panel bias’ or ‘Nickell bias’, as the lagged dependent variable would be correlated with the error term (Arellano & Bond 1991; Baltagi 2005; Nickell 1981). The bias would be small if the time periods in the estimation is large (Roodman 2009a). However, in our estimation, we have only seven non-overlapping five-year periods, and therefore, the bias may be large.

Tackling the potential endogeneity bias is not easy. Several studies use instrumental variables for remittances. The different instrumental variables used for workers’ remittances are: 1) ratio of country’s income to US income; the country’s real interest rate to the US real interest rate, and lagged per capita growth (right hand variable) (Barajas et al. 2009); 2) distance between the migrants’ home country to their major destination country including the dummy variable if the countries shared a common border or not using the cross section data (Faini 2006; International Monetary Fund 2005); 3) inverse of the distance between the migrants’ home country and the destination country multiplied by the GDP per capita; or GDP growth rate or the unemployment rate of the destination country (The World Bank 2006); 4) lagged explanatory variables and system Generalized Method of Moments (GMM) techniques (Catrinescu et al. 2009; Giuliano & Ruiz-Arranz 2009).

Barajas et al. (2009) argue that the endogeneity problem associated with remittances has not been adequately addressed and contend that the robust external instrument for remittances has not been found. Thus, my empirical approach is to (1) employ a five-year panel to mitigate the business cycle effects; (2) examine the quadratic relationship between remittances and growth; (3) include a detailed set of conditioning variables; and (4) use internal instruments to tackle the endogeneity problem. As argued forcefully by Clemens et al. (2012) in their discussion on empirical relationship between foreign aid and economic growth, I use the more transparent method of lagging and differencing as an identification strategy in the absence of valid and strong external instrument for remittances.

It is well known that the quality and magnitude of the coefficients depend on the types of instruments used, and the results are quite sensitive to the choice of instrument. It is difficult to defend the exclusion restriction of the instruments which cannot be tested. In the absence of a strong instrument of remittance, I use the dynamic panel data method which utilizes the internal instruments from the lags of the explanatory variables.

I then estimate Equation 2.1 using the system GMM regression technique developed by Arellano and Bover (1995) and Blundell and Bond (1998). This involves differencing equation the equation by either subtracting the previous observations of the variables, or alternatively subtracting the variables from their means of all future available observations of the variables. The second method of differencing, known as ‘forward orthogonal deviations’ is preferable when dealing with an unbalanced panel (Roodman 2009a). Then the differenced GDP per capita ( $gdppc_{i,t-1}$ ) can be instrumented by  $gdppc_{i,t-2}$  (and previous lags), as these are uncorrelated with the differences error terms. The difference GMM technique only utilizes this set of instruments. However, lagged levels of the variables are weak instruments for the first differences if the variable is persistent (Bond et al. 2001). The system GMM technique derives additional moment conditions by instrumenting  $gdppc_{i,t-1}$  in the original level equation by its contemporaneous and lagged first differences, as these are uncorrelated with the level of the error term.

The system GMM estimation has another important advantage in addition to allowing consistent estimation of an equation that controls for the lagged dependent variable. It allows the explanatory variables to be either endogenous, or weakly exogenous (predetermined), and deals with the problem of likely reverse causality from GDP per capita growth to remittances. In order to estimate the model, I impose the restriction that the remaining explanatory variables are exogenous. Thus, the system GMM technique provides us with the set of internal instruments, rather than the external instruments.

The turning point implied by the remittance-growth equation is estimated and its significance is calculated based on the Wald test for confidence interval for a scalar non-linear combination of the parameters using the delta method (Cameron & Trivedi 2010). Due to the presence of lagged and squared remittances term, the main effect or

the marginal effect of remittances and its significance is also reported in the regression estimations.

To check the robustness of the results, I first re-estimate the model after removing the outliers and influential observations using the leverage ratio method and Cook's distance measure. Second, the data for the time invariant institutional quality was not available for 24 developing countries, resulting in the loss of observations. I estimate the models using the fixed effects estimations including the extended sample of 98 developing countries. Third, some studies have shown that the impact of remittances depend on the level of financial development (Giuliano & Ruiz-Arranz 2009). I also interact the financial development variable with the remittance variable and the years of schooling to test if the impact of remittances depends on the levels of financial deepening and education. Fourth, I use the annual panel and re-estimate the model. Finally, a simple non-parametric graph is used to see if the functional form of remittances in the model impacts the estimation results.

## 2.6 Results

The random effect and system GMM estimates of the growth equation are reported in Tables 2.3 and 2.4, respectively. Alternative pooled OLS and fixed effects estimates are reported in Appendix 2.4 and 2.5 respectively. Column (1) of Table 2.3 presents the random effects estimation of the full model from Equation 2.1. The coefficient of remittances in Column (1) is not significant though its squared term is significant at 10 per cent level. The remittance-growth relationship derived from the two coefficients is significant at the 5% level and it suggest that the turning points occurs at a remittance-GDP ratio of around 7 per cent. Thus, there is some weak evidence of a diminishing effect of remittances on economic growth, but the joint effect of the remittance terms or the marginal effect of remittances (at its mean value) is small—around 0.06—and not significant in this case.

Column (2) of the table excludes the squared term of remittances, and the coefficient of remittance is negative and not statistically significant at 10 per cent level. Moreover, the main effect of remittances is also not significant. Column (3) excludes the investment variable from the regressions. Controlling for investment will estimate the impact of remittances above the fixed capital formation. The turning point

implied by the remittance coefficient occurs around 8.64 per cent, and it is significant at 1 % level. The addition or the exclusion of investment ratio however, does not affect the significance of the remittances variable.<sup>12</sup>

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<sup>12</sup> The inclusion of the additional lags in the regressions does not change the results very much. Moreover, the remittance term is not significant omitting both the lagged and squared remittances terms.

**Table 2.3 Remittances and growth: Random effects estimations**

<b>VARIABLES</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Remittance/GDP (%)	0.032 (0.123)	-0.125 (0.081)	0.047 (0.118)
Remittance/GDP squared	-0.009* (0.005)		-0.010* (0.005)
Remittance lagged	0.093 (0.090)	0.093 (0.088)	0.118 (0.090)
Log (initial per capita GDP)	-1.514*** (0.304)	-1.677*** (0.284)	-1.325*** (0.300)
Investment/GDP (%)	0.070*** (0.023)	0.071*** (0.023)	
Initial life expectancy	0.071 (0.052)	0.089* (0.051)	0.070 (0.046)
Years of schooling	0.224** (0.106)	0.213** (0.106)	0.217** (0.106)
Broad money/GDP (%)	0.004 (0.009)	0.003 (0.010)	0.006 (0.010)
Inflation rate (%)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Institution quality (ICRG index)	0.250** (0.110)	0.246** (0.112)	0.285** (0.114)
Trade openness (%)	-0.008 (0.005)	-0.007 (0.005)	-0.006 (0.006)
East Asian dummy	1.251 (0.827)	1.196 (0.773)	1.826* (0.965)
Sub-Saharan Africa dummy	-0.864 (0.729)	-0.889 (0.751)	-0.809 (0.765)
Constant	4.762 (3.000)	5.236* (3.060)	4.403 (3.110)
Observations	317	317	317
Number of countries	74	74	74
Turning point	7.02**		8.64***
Turning point SE	3.282		2.384
Marginal effect	0.065	-0.032	0.100
Marginal effect SE	0.088	0.053	0.089

Notes. Dependent variable is real GDP per capita growth (in percent). Initial per capita GDP and initial life expectancy refer to per capita GDP and life expectancy at birth of the first non-missing observation of the respective 5-year period. Remittances is lagged by one period. Robust standard errors in parentheses. The regressions contain the time dummies. SE refers to the standard error.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Regarding the other explanatory variables, most of the coefficients are significant and have expected signs. In particular, the coefficient of the log of initial per capita is negative and highly significant in all specifications. This suggests that the countries converges to their respective steady growth also known as the conditional convergence. The estimation in Column (1) of Table 2.3 suggests conditional convergence at a rate of around 1.5 percent per year. This convergence rate is consistent with the estimations from empirical literature on economic growth which finds that the convergence rate is around 2 percent in the long-term panel (Barro 2015).

The results from the random effects, pooled OLS and fixed effects estimations suggest that the null hypothesis of no impact of remittances on economic growth cannot be rejected. However, these estimation techniques do not account for the potential endogeneity of remittances. There are two potential sources of endogeneity in the estimation. The first is the reverse causation from economic growth to remittance inflows. If the growth is poor in a country, that can lead to higher migration and consequently higher remittance inflows. Similarly, a more robust growth is likely to reduce migration and hence remittances. In other words, remittances might be countercyclical in nature. Second, simultaneous causation by the time invariant omitted variable that increase remittance and lower growth might produce a remittance-growth correlation. To the extent remittances are endogenous to growth, the coefficients obtained from the country fixed effects estimation method may be inconsistent and biased (Barro 2015; Nickell 1981).

Column (1) of Table 2.4 presents the results of the system GMM. In this case, the estimations assume that both the initial GDP per capita and the remittances are endogenous. To preserve the number of observations, forward orthogonal deviation instead of differences are used and the instrument set is collapsed as suggested by Roodman (2009a).

The diagnostic tests for the system GMM indicate that the model has been adequately estimated. The number of instruments is only slightly higher than the number of countries in columns (1) and (3). The p-value of the Hansen test for over-identifying restrictions shows that we can not reject the null hypothesis that the instrument set is valid at the ten percent level of significance. Also, the estimation is not likely to suffer from an over-fitting bias caused by over-instrumentation as the



Hansen p-value is above 0.25 and not too high (Jayasuriya & Burke 2013; Roodman 2009a). Thus, it can be argued that there is not over-instrumentation problem. The Arellano-Bond test for second-order correlation in differences, (that is AR(2)), rejects the null hypothesis that there is no second order serial correlation in first differences at the five percent level of significance, which is a necessary condition for consistent estimation using system GMM.

The results from Table 2.5 show that the coefficient of lagged dependent variable (that is, the initial GDP per capita) lies between the coefficients obtained from the pooled OLS and fixed effects estimation in Table 2.3 (Roodman 2009a). This suggests that the system GMM estimation is stable. The term is also close to 2 percent in the long term cross-country panel, supporting the conditional convergence hypothesis (Barro 2015). The turning point of remittance-growth relationship occurs around 6.67 in Column (1) and 9.12 per cent in Column (3) and both are statistically significant. However, consistent with earlier findings, the main effect of remittance is again not significant.

The non-significant impact of remittances on economic growth can be attributed to the various channels through which remittances impact growth. The literature finds multifarious and often contradicting effects of remittances on various macroeconomic variables. Thus, the possible positive effects of remittances on economic growth may be offset by other negative impacts. For example, remittances can have both a positive and negative impact on growth due its effects on labour supply, consumption, investment, human capital formation, institutions and other macroeconomic variables. Appendix 2.6 presents the summary on the possible positive and negative impacts of remittances on various macroeconomic variables.

**Table 2.4 Remittance and growth (Dynamic panel estimations)**

<b>VARIABLES</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Remittance/GDP (%)	0.184 (0.179)	-0.109 (0.078)	0.281 (0.201)
Remittance /GDP squared	-0.014* (0.007)		-0.015* (0.008)
Log (initial per capita GDP)	-2.314*** (0.760)	-2.918*** (1.097)	-1.429 (0.991)
Investment/GDP (%)	0.096*** (0.021)	0.101*** (0.024)	
Initial life expectancy	0.102** (0.047)	0.147** (0.062)	0.063 (0.049)
Years of schooling	0.317** (0.150)	0.333* (0.196)	0.223 (0.167)
Broad money/GDP (%)	0.010 (0.009)	0.010 (0.009)	0.010 (0.010)
Inflation rate	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Trade openness (%)	0.262** (0.113)	0.231* (0.121)	0.289** (0.114)
Institution quality	-0.007* (0.004)	-0.007* (0.004)	-0.003 (0.005)
East Asian dummy	0.606 (0.833)	0.208 (0.858)	1.686 (1.030)
Sub-Saharan Africa dummy	-1.064 (0.732)	-1.170 (0.826)	-1.004 (0.785)
Constant	10.731** (4.425)	13.288** (5.562)	8.109 (5.897)
Observations	395	395	395
Number of countries	74	74	74
Number of instruments	79	58	78
AR(2) p-value	0.29	0.32	0.49
Hansen p-value	0.551	0.301	0.494
Turning point	6.67**		9.129***
Turning point SE	3.158		2.045
Marginal effect	0.095	-0.109	0.182
Marginal effect SE	0.134	0.078	0.148

Estimates regard both initial GDP per capita and remittances as endogeneous and uses the first three lags as instruments using the forward orthogonal deviations. Robust standard errors in parentheses. The regressions contain time dummies. SE refers to the standard error.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Regarding the coefficients of the other explanatory variables, these have broadly expected signs and conform to the earlier studies on growth and remittances (Barro 1991, 2015). The proxies for human capital variable (that is, life expectancy and years of schooling) have a positive impact on growth. Similarly, in agreement with the recent emphasis by Acemoglu et al. (2005) on the importance of institutional quality on economic growth, the coefficients of institutional quality are positively significant and the magnitude is high. Trade openness is mostly positive, indicating that the more open the economy, the higher the economic growth per capita. The coefficient of financial depth (M2/GDP), is ambiguous and not significant in most of the estimations. Inflation on the other hand, has a negative impact on growth. With regard to the time invariant regressors, being a Sub-Saharan African country has a negative impact on growth, whereas being an East Asian country has a positive impact on growth.

The alternative pooled OLS and fixed effects estimates (Appendices 2.4 and 2.5) do not alter the main inferences based on REE and system GMM estimates. The marginal effects of remittances in each of these cases, though positive, are not significant. However, the turning point of remittance-growth relationship appears within the meaningful range of remittance-to-GDP ratio of 7–9 per cent and are statistically significant at 10 per cent level. Thus, there is some weak evidence that after the remittances surpasses the turning point, its impact on growth decreases.

## **2.7 Robustness**

In this section, I discuss estimations undertaken to test whether the results reported in the previous section are sensitive to the outliers, influential observations, selection of the time period, addition of explanatory variables and the specific functional form of the remittance-growth relationships. First, the detection of possible outliers is undertaken using the graphical leverage against residual plot (Belsley et al. 1980). Second, Cook's distance is used to identify the possible influential observations. Based on the graphical analysis, the observations with either high leverage or Cook's distance are deleted and the regressions are re-estimated (Cook 1998).

**Figure 2.2 Detection of outliers using leverage ratio**

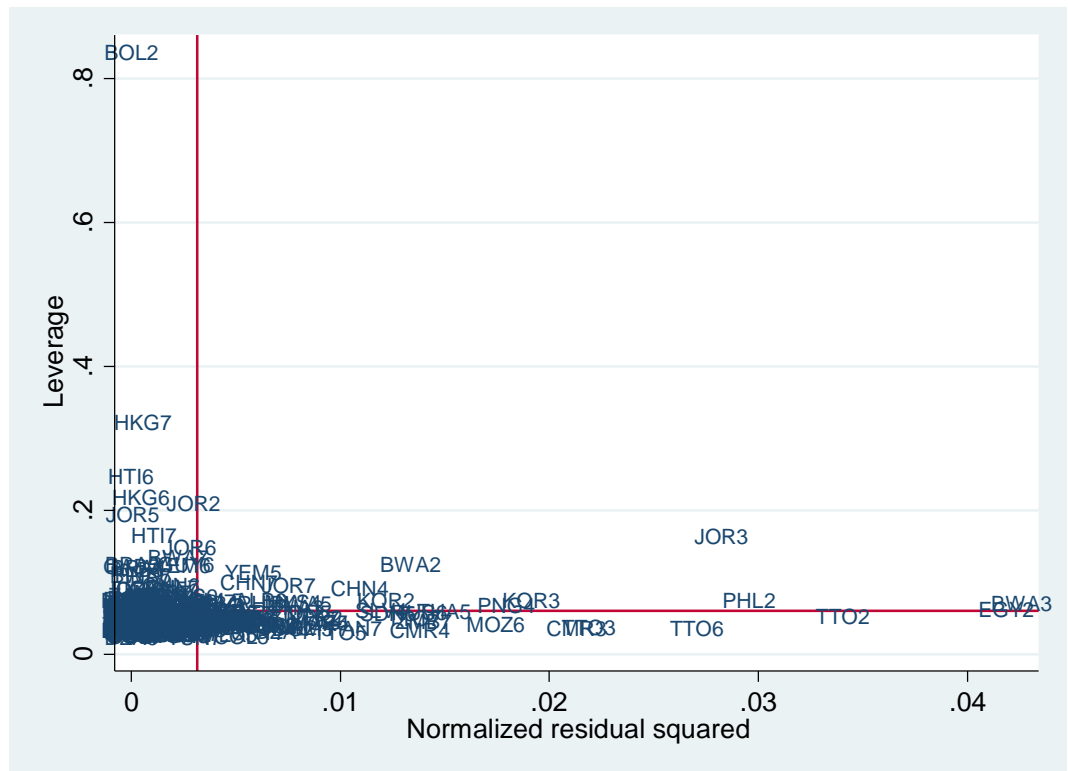


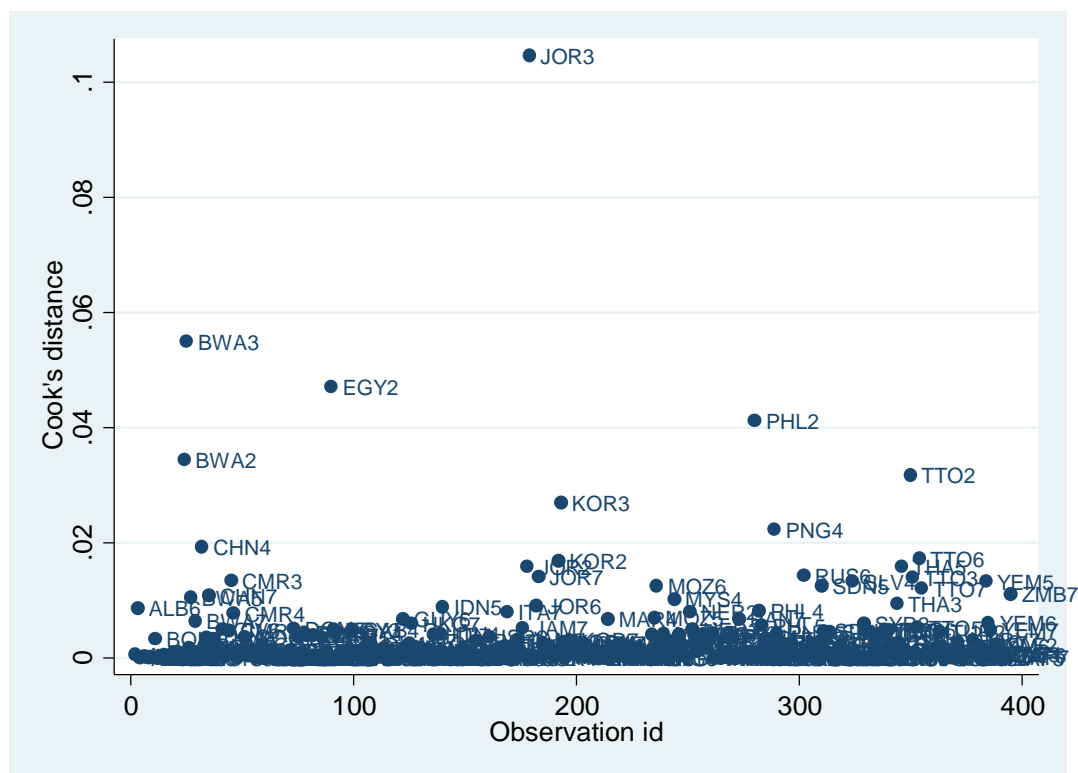
Figure 2.2 shows the plots the leverage against residual plot. The vertical line shows the average value of the normalized squared residuals, and the horizontal line shows the average value of the leverage. A quick inspection of the graph reveals that several observations have high leverage and low residuals.

Few observations with large residuals or high leverage can have affect the parameter estimates. Cook's distance is often used to identify these influential observations. Figure 2.3 depicts the Cook's distance against the observation identifiers.

Based on the leverage value greater than 0.2 (Figure 2.2) or a Cook's distance measure greater than 0.04 (Figure 2.3), I selectively delete 9 observations.<sup>13</sup> The random effects regression is then re-estimated without these observations. The comparison of these estimates, including and excluding the outliers reveal that the results are similar (Appendix 2.7).

<sup>13</sup>The countries and the period deleted are Bolivia (1980–1985), HongKong (2001–2005, 2006–2010), Haiti (2001–2005), Jordan (1986–1990), Botswana(1986–1990), Egypt (1981–1985) and Philippines (1981–1985).

**Figure 2.3 Influential observations using Cook's distance**



One of the possible explanations for the non-significant impact of remittances is that the effect depends on the level of financial deepening and the education level of the recipient households. Several studies have found contradictory findings as to whether remittances act as a complement or are substitutes for financial development (Aggrawal et al. 2011; Chowdhury 2011; Giuliano & Ruiz-Arranz 2009). The level of financial development can affect the allocation and efficiency remittances use, which in turn affect economic growth. Similarly, education level can affect the savings and investment behaviour of households, and this then affects economic growth. To test these propositions, I interact the remittances variable with the proxy for financial deepening (broad money to GDP ratio) and also with the years of schooling.

Appendix 2.8 reports the results by incorporating the interaction terms for remittances and its squared term with financial deepening and years of schooling separately. The marginal effects for remittances for these estimations are not

significant, suggesting that the impact of remittances does not depend on the level of financial deepening or years of schooling.<sup>14</sup>

Several previous studies have used the annual panel data to estimate the impact of remittances on growth (Catrinescu et al. 2009; Ramirez & Sharma 2009; Rao & Hassan 2011). To check the robustness of my results with the annual panel data, the OLS and fixed effects estimations are performed using the annual data from 1976–2010. Specifically, the inclusion of the year dummies to account for the year specific business cycle effect might change the results compared to the 5-year averaged data. The initial GDP per capita is taken as the five-year lagged GDP per capita.<sup>15</sup> The results show that the coefficient of remittances is still not significant (Appendix 2.9).

Similarly, I include other explanatory variables: government consumption; population growth ( $n$ ), along with the growth rate of technical change ( $g$ ) and depreciation of physical and human capital ( $\delta$ ), to conform to the Solow model (Bond et al. 2001).<sup>16</sup> When these variables are included, I find that the coefficient of government consumption is positive and significant, though the logarithm of the term ( $n_{it} + g + \delta$ ) is not significant. However, the inclusion of these terms only slightly alter the magnitude and significance of the main variable of interest.

Another potential concern of the growth empirics is the effect of a few influential observations in the data which drive the estimates. Moreover, the inclusion of the squared remittances term in order to capture the non-linearity may generate a spurious coefficient due to collinearity between the squared and linear terms. One way to address this issue is to estimate the regressions separately in different time intervals so that the influential observation in one estimation does not affect the relationship observed in other intervals. I re-estimate the regressions using the time period from 1980 to 2005. The reason for this is that the 1980s was a period of low growth for many developing countries due to debt and the consequences of the oil crisis.

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<sup>14</sup>One of the major channels through which the levels of financial development and education affect the impact of remittance is through the quality and efficiency of investment. However, excluding the investment from the regression does not alter the broad results very much.

<sup>15</sup> I also used the one year lagged GDP per capita as an explanatory variable. However, the results are not very different.

<sup>16</sup> The inclusion of logarithm of the term ( $n_{it} + g + \delta$ ) where  $n$ =rate of growth of the work force,  $g$ =growth rate of technical change (set at 2%) and  $\delta$ = depreciation rate of physical and human capital (set at 6%) according to Bond et al. (2001).

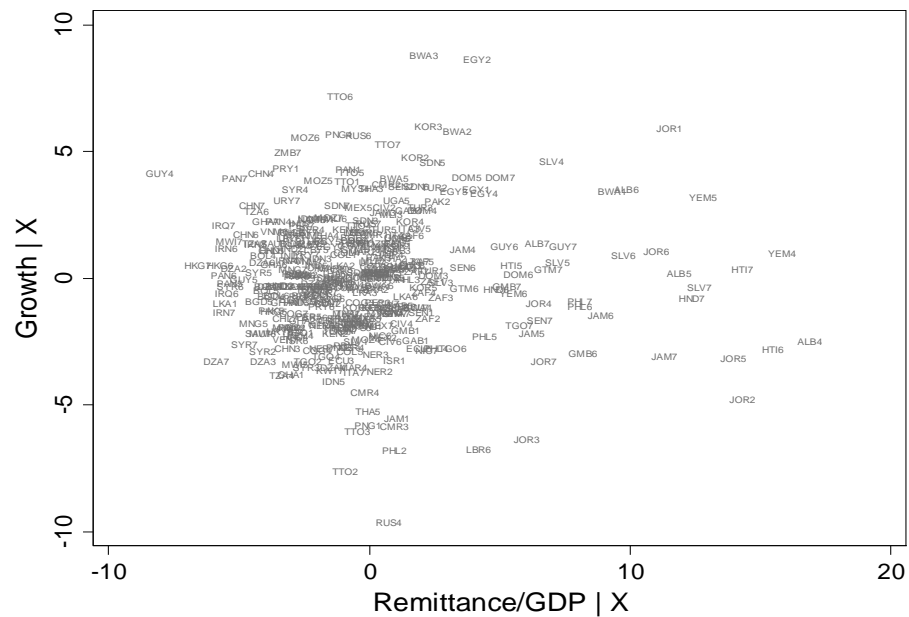
Similarly, growth slowed down in many countries following the global financial crisis in 2007. However, the results broadly conform to earlier results and the coefficient of remittances does not become significant.<sup>17</sup>

Next, I also utilize the semi-parametric plot analysis which makes no assumptions about the functional form of the remittance growth relationship (Clemens et al. 2012). Figure 2.4 produces a graph of this partial relationship using the regression of column (1) from Table 2.3. I plot the residual when growth is regressed on all covariates except Remittance/GDP and (Remittance/GDP) squared against the residual when (Remittance/GDP) is regressed on all other covariates except (Remittance/GDP) squared. Thus, I partial out the non-remittances covariates from growth (vertical axis) and remittances (horizontal axis). The inspection of the semiparametric graph of the partial remittance-growth relationship shows no particular trend. This reinforces the evidence that remittances do not exert significant impact on economic growth.

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<sup>17</sup> The coefficient of the initial GDP per capita (convergence term) is lower in these estimates.

**Figure 2.4 Semiparametric graph of partial remittance-growth relationship**



## 2.8 Conclusion

Though remittances have emerged as a major source of financial flows to many developing countries, the impact on economic growth remains unclear. This study investigates the remittance-growth relationship for 74 developing countries using a five-year averaged panel dataset from 1976 to 2010. The estimations are performed using the random effects and dynamic panel data methods and utilize a detailed set of explanatory variables. The potential non-linear impact and the lagged effect of remittances are also considered. I use System GMM method to address the endogeneity issue rather the instrumental variables approach. All of these estimations suggest that remittances do not exert a systematic impact on economic growth. In particular, the exclusion of the investment variable from the estimation does not affect the main results. The findings in this paper do not depend on the particular functional form of the remittance-growth relationship, and are not affected by several outliers.

The reason that the coefficient of remittance is imprecisely estimated could be several. First, remittances data are noisy and the countries compile the data in different ways. Also, a significant amount of remittances are not recorded properly (or not at all) if they are transferred through informal means. Second, remittances can affect



growth through various macroeconomic variables such as consumption, investment and human capital formation. Often there can be both positive and negative impacts of remittances on these variables. Third, economic growth is a complex phenomenon and the estimations based on a multicountry study simply indicate the average relationship within countries. Individual country experiences could vary from this average due to country specific structural peculiarities not modelled in the estimation. Fourth, due to the unavailability of a strong external instrument it is often hard to make the causal inference of remittances on economic growth.

The findings suggest that there can be a trade-off between the impact of remittances at the household level and economic growth. To the extent that the endogeneity of remittances due to reverse causation is not adequately modelled, the presence of high remittances due to high migration can simply reflect the poor economic growth of recipient economies. Thus, the optimism shared by the governments or policymakers regarding labour export as similar to merchandize exports and the role of remittances may not be warranted. Specifically, the cushion provided by remittance inflows can discourage the policy makers from implementing the longer term reforms regarding exchange rate management and their intention to foster conducive investment environment.

## Appendix 2.1 Data descriptions and sources

**GDP/capita growth.** Average annual growth rate of real GDP/capita from the Penn World Tables 7.1.

**Initial GDP per capita.** Log of per capita (PPP) GDP at the beginning of the relevant time period, taken from Penn World Table Version 7.1.

**Remittance/GDP.** Average annual remittances/GDP from 1976 to 2005, taken from the WDI. It is generally calculated as the sum of three components in the current account of the balance of payments: workers' remittances, compensation of employees, and migrants' transfers (IMF 1993; The World Bank 2011).

**Investment to GDP.** Investment share of PPP converted GDP per capita at current prices (%). Taken from Penn World Table 7.1.

**Years of schooling.** Years of schooling data taken from Barro and Lee (2010).

**Initial life expectancy.** Life expectancy at birth in years at the beginning of the relevant time period. The first non-missing value in each five-year period total life expectancy from WDI 2013.

**Institutional quality.** Period averages of the sum of three components (bureaucratic quality, rule of law and corruption) of the ICRG index. The resultant variable is normalized to one which ranges from 0 to 6. Data are taken from Clemens et al. 2011. The underlying data are obtained from the PRS Group IRIS III dataset.

**Inflation.** The average annual rate of growth of CPI for the first five years of the relevant time period taken from WDI 2013.

**M2/GDP.** The ratio of M2/GDP for the first five years of the relevant period taken from WDI 2013.

**Region dummies.** Sub-Saharan Africa and East Asia dummies obtained from WDI 2013.

**Openness.** Total trade to GDP at current prices (%) obtained from Penn World Version Table 7.1.

**$\ln(n_{it} + g + \delta)$ .** Population growth figure  $n_{it}$  taken from Penn World Table 7.1 and fixing  $g=2\%$  and  $\delta = 6\%$ .

**Government consumption to GDP.** Government consumption share of PPP converted GDP per capita at current prices (%). Taken from Penn World Table Version 7.1.

## Appendix 2.2 Sample of countries and period covered

Country	Period	Country	Period
Albania	1991-2010	Sri Lanka	1971-2010
Bangladesh	1986-2010	Morocco	1971-2010
Bolivia	1976-2010	Mexico	1976-2010
Brazil	1981-2010	Mali	1986-2010
Botswana	1971-2010	Mongolia	1996-2010
Chile	2006-2010	Mozambique	1986-2010
China	1986-2010	Malawi	1991-2010
Cote d'Ivoire	1971-2010	Malaysia	1971-2010
Cameroon	1976-2010	Namibia	2001-2010
Congo, Rep.	1986-2010	Niger	1971-2010
Colombia	1971-2010	Nicaragua	1996-2010
Costa Rica	1976-2010	Pakistan	1976-2010
Dominican Republic	1971-2010	Panama	1976-2010
Algeria	1971-2010	Peru	1986-2010
Ecuador	1976-2010	Philippines	1976-2010
Egypt, Arab Rep.	1976-2010	Papua New Guinea	1976-2010
Gabon	1976-2005	Paraguay	1971-2010
Ghana	1976-2010	Russian Federation	1991-2010
Gambia, The	1976-2010	Saudi Arabia	2001-2010
Guatemala	1976-2010	Sudan	1976-2010
Guyana	1991-2010	Senegal	1971-2010
Hong Kong SAR, China	1996-2010	Sierra Leone	2006-2010
Honduras	1971-2010	El Salvador	1976-2010
Haiti	1996-2010	Syrian Arab Republic	1976-2010
Indonesia	1981-2010	Togo	1971-2010
India	1971-2010	Thailand	1971-2010
Iran, Islamic Rep.	1991-2010	Trinidad and Tobago	1971-2010
Iraq	2001-2010	Tunisia	1981-2010
Israel	1971-2010	Turkey	1971-2010
Italy	1971-2010	Tanzania	1991-2010
Jamaica	1976-2010	Uganda	1996-2010
Jordan	1971-2010	Uruguay	1976-2010
Kenya	1971-2010	Venezuela, RB	2006-2010
Korea, Rep.	1976-2010	Vietnam	1996-2010
Kuwait	2006-2010	Yemen, Rep.	1991-2010
Liberia	2001-2010	South Africa	1971-2010
Libya	1996-2010	Zambia	2001-2010

### Appendix 2.3 Extended sample of countries and period

<b>Country</b>	<b>Period</b>
Afghanistan	2006-2010
Armenia	1991-2010
Burundi	2001-2010
Benin	1991-2010
Belize	1981-2010
Barbados	1971-2010
Central African Republic	1981-1995
Fiji	1976-2010
Croatia	1991-2010
Kazakhstan	1991-2010
Kyrgyz Republic	1996-2010
Cambodia	1991-2010
Lao PDR	1986-2010
Lesotho	1971-2010
Macao SAR, China	2001-2010
Maldives	2006-2010
Mauritania	1986-1995
Mauritius	1991-2010
Nepal	1991-2010
Rwanda	1976-2005
Swaziland	1971-2010
Tajikistan	2001-2010
Tonga	1986-2010
Ukraine	1996-2010

### Appendix 2.4 Remittance and growth: Pooled OLS estimations

VARIABLES	(1)	(2)	(3)
Remittance/GDP (%)	0.036 (0.127)	-0.170** (0.074)	0.033 (0.122)
Remittance/GDP squared	-0.012** (0.005)		-0.012** (0.005)
Remittance lagged	0.126 (0.098)	0.126 (0.100)	0.162 (0.101)
Log (initial per capita GDP)	-1.237*** (0.286)	-1.387*** (0.262)	-1.064*** (0.298)
Investment/GDP (%)	0.068*** (0.022)	0.068*** (0.023)	
Initial life expectancy	0.043 (0.045)	0.063 (0.044)	0.043 (0.042)
Years of schooling	0.221** (0.097)	0.204** (0.094)	0.217** (0.099)
Broad money/GDP (%)	0.010 (0.009)	0.009 (0.010)	0.012 (0.009)
Inflation rate	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Institution quality	0.203* (0.103)	0.184* (0.104)	0.239** (0.108)
Trade openness (%)	-0.011** (0.005)	-0.012** (0.005)	-0.009* (0.005)
East Asian dummy	1.184 (0.813)	1.129 (0.739)	1.750* (0.943)
Sub-Saharan Africa dummy	-0.913 (0.679)	-0.942 (0.692)	-0.854 (0.710)
Constant	4.370 (2.808)	4.857* (2.851)	3.980 (2.965)
Observations	317	317	317
R-squared	0.341	0.329	0.309
Number of countries	74	74	74
Turning point	6.936		8.353
Turning point SE	2.530		2.023
Marginal effect	0.083	-0.044	0.116
Marginal effect SE	0.089	0.056	0.092

*Notes.* Dependent variable is real GDP per capita growth (in percent). Initial per capita GDP and initial life expectancy refer to per capita GDP and life expectancy at birth of the first non-missing observation of the respective 5-year period. Remittances is lagged by one period. Robust standard errors in parentheses. The regressions contain the time dummies. SE refers to the standard error. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Appendix 2.5 Remittance and growth: Fixed effects estimations

VARIABLES	(1)	(2)	(3)
Remittance/GDP (%)	-0.078 (0.149)	-0.049 (0.061)	-0.014 (0.152)
Remittance/GDP squared	0.002 (0.007)		-0.000 (0.007)
Remittance lagged	0.042 (0.063)	0.041 (0.063)	0.036 (0.065)
Log (initial per capita GDP)	-5.839*** (1.197)	-5.792*** (1.110)	-5.342*** (1.133)
Investment/GDP (%)	0.084** (0.042)	0.084** (0.042)	
Initial life expectancy	0.102 (0.073)	0.102 (0.072)	0.089 (0.067)
Years of schooling	0.142 (0.383)	0.148 (0.385)	-0.068 (0.356)
Broad money/GDP (%)	-0.012 (0.015)	-0.013 (0.015)	-0.011 (0.016)
Inflation rate	-0.001* (0.000)	-0.001* (0.000)	-0.001** (0.000)
Trade openness (%)	0.029* (0.016)	0.029* (0.017)	0.029* (0.016)
Constant	37.088*** (9.929)	36.728*** (9.448)	36.538*** (9.971)
Observations	317	317	317
R-squared	0.319	0.319	0.295
Number of countries	74	74	74

*Notes.* Dependent variable is real GDP per capita growth (in percent). Initial per capita GDP and initial life expectancy refer to per capita GDP and life expectancy at birth of the first non-missing observation of the respective 5-year period. Remittances is lagged by one period. Robust standard errors in parentheses. The regressions contain the time dummies.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## Appendix 2.6 Summary of literature review on macroeconomic impact of remittances

Indicators	Positive	Negative
Labour supply	Labour supply may actually increase due to higher demand of skills for people planning to migrate	Leads to decreased labour supply due to moral hazard problems
Consumption	Increase in consumption of domestic goods leads to multiplier effects in the economy	Conspicuous consumption and imports of status oriented goods leading to higher imports and creating inflationary pressures and 'demonstration effects'
Investment	Increase in investment and entrepreneurial activities by increasing income and easing credit constraints	Rarely used for investment purposes and mainly frittered away in consumption
Financial development	Acts as a substitute for low level of financial intermediation in the recipient economy	May act as an disincentive to develop the financial services and creates informal financial market
Foreign exchange	Provides a stable source of foreign exchange and helps to finance the balance of payments deficit	Causes real appreciation of domestic currency, loss of competitiveness and 'Dutch Disease' phenomenon and policy complacency
Poverty	Helps to reduce poverty directly and indirectly	Poor people are unable to migrate internationally due to high cost
Inequality	Helps to reduce inequality by redistributing income in favour of the poor	May exacerbate income equality as the migrants are disproportionately drawn from higher income groups
Human capital formation	Leads to 'brain gain' by encouraging investment in higher education and through network gain	International migration and education are substitutes, leads to 'brain drain'

**Appendix 2.6 Summary of literature review on macroeconomic impact of remittances (contd.)**

<b>Indicators</b>	<b>Positive</b>	<b>Negative</b>
Output volatility	Are compensatory and countercyclical in nature and reduce output volatility	Are procyclical due to moral hazard problems, leads to dispersion of firm earnings and wage income leading to increased output volatility
Government Debt	Support higher future debt levels and government expenditure due to increase in consumption and trade-based tax and stimulation of credit market activities due to increased bank deposits	Government cannot rely on future remittance flows, and dependence on remittances induces business cycle volatility 'imported' from destination countries
Resources	Net addition to resources	Replace other sources of income, increases dependency and erodes good working habits and exacerbates the potential negative effects of return migration
Domestic institutions	May exert favourable impact due to pressure from return migrants and diasporas communities, increase in government revenue from remittance induced greater tax base	Higher ratio of remittances to GDP is associated with deterioration of institutional quality

*Source:* Author's compilation, drawn from Abdih et al. (2012); Barajas et al. (2009); Barajas et al. (2011); Chami et al. (2008); McKenzie and Sasin (2007); Rapoport and Docquier (2005); Russell (1986); Yasser et al. (2008).



## Appendix 2.7 Remittance and growth: sensitivity to outliers

VARIABLES	(1)	(2)
Remittance/GDP (%)	0.032 (0.123)	-0.056 (0.111)
Remittance/GDP squared	-0.009* (0.005)	-0.007* (0.004)
Remittance lagged	0.093 (0.090)	0.157** (0.072)
Log (initial per capita GDP)	-1.514*** (0.304)	-1.437*** (0.293)
Investment/GDP (%)	0.070*** (0.023)	0.079*** (0.022)
Initial life expectancy	0.071 (0.052)	0.052 (0.040)
Years of schooling	0.224** (0.106)	0.260*** (0.097)
Broad money/GDP (%)	0.004 (0.009)	-0.000 (0.010)
Inflation rate	-0.001*** (0.000)	-0.000 (0.001)
Institution quality (ICRG index)	-0.008 (0.005)	-0.010** (0.005)
Trade openness (%)	0.250** (0.110)	0.160* (0.094)
East Asian dummy	1.251 (0.827)	1.666** (0.773)
Sub-Saharan Africa dummy	-0.864 (0.729)	-1.109** (0.564)
Constant	4.762 (3.000)	5.765** (2.303)
Observations	317	308
Number of countries	74	74
Marginal effect	0.065	0.058
Marginal effect SE	0.088	0.079

Notes. Dependent variable is real GDP per capita growth (in percent). Initial per capita GDP and initial life expectancy refer to per capita GDP and life expectancy at birth of the first non-missing observation of the respective 5-year period. Remittances is lagged by one period. Robust standard errors in parentheses. The regressions contain the time dummies. SE refers to the standard error. Column (1) reproduces the result from Table 2.4 for comparison. SE refers to the standard error.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Appendix 2.8 Remittances and growth with interaction terms

VARIABLES	(1)	(2)	(3)	(4)
Remittance/GDP (%)	0.065 (0.250)	-0.082 (0.101)	0.534* (0.320)	0.012 (0.128)
Remittance/GDP	-0.010 (0.012)		-0.032* (0.016)	
Broad money/GDP (%)	0.006 (0.010)	0.004 (0.010)	0.001 (0.010)	0.002 (0.009)
Remittance/GDP*Broad money	-0.001 (0.004)	-0.001 (0.001)		
(Remittance/GDP) <sup>2</sup> *Broad money	0.000 (0.000)			
Lagged remittance	0.098 (0.081)	0.099 (0.080)	0.090 (0.091)	0.102 (0.090)
Log (initial per capita GDP)	-1.530*** (0.317)	-1.706*** (0.293)	-1.694*** (0.315)	-1.787*** (0.295)
Investment/GDP (%)	0.071*** (0.024)	0.073*** (0.024)	0.067*** (0.023)	0.068*** (0.024)
Initial life expectancy	0.070 (0.050)	0.089* (0.051)	0.073 (0.052)	0.092* (0.052)
Years of schooling	0.233** (0.109)	0.230** (0.109)	0.440*** (0.157)	0.330** (0.143)
Inflation rate	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Trade openness (%)	-0.008 (0.006)	-0.007 (0.006)	-0.007 (0.005)	-0.007 (0.006)
Institution quality	0.241** (0.113)	0.236** (0.113)	0.276** (0.110)	0.253** (0.110)
Remittance/GDP*Years of schooling			-0.090** (0.045)	-0.024 (0.019)
(Remittance/GDP) <sup>2</sup> *Years of schooling			0.004* (0.003)	
Observations	317	317	317	317
Number of countries	74	74	74	74
Marginal effects	0.068	-0.019	0.061	-0.019
Marginal effects SE	0.083	0.046	0.083	0.054

Notes. Dependent variable is real GDP per capita growth (in percent). Initial per capita GDP and initial life expectancy refer to per capita GDP and life expectancy at birth of the first non-missing observation of the respective 5-year period. Remittances is lagged by one period. Robust standard errors in parentheses. The regressions contain the time dummies, regional dummies and a constant. SE refers to the standard error. The regressions contain the interaction terms involving both remittance and its squared terms.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Appendix 2.9 Robustness check with the extended sample

<b>Variables</b>	<i>Annual sample</i>		<i>Five-year sample</i>	
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Estimator	FE	FE	FE	FE
Remittance/GDP (%)	-0.033 (0.030)	-0.074 (0.056)	-0.049 (0.047)	-0.051 (0.069)
Remittance/GDPsquared		0.000 (0.000)		-0.002 (0.002)
Log (initial per capita GDP)	-4.263*** (0.964)	-4.785*** (0.898)	-4.730*** (0.821)	-5.118*** (0.771)
Investment/GDP (%)		0.145*** (0.023)		0.136*** (0.022)
Initial life expectancy	0.129*** (0.038)	0.071 (0.045)	0.087 (0.056)	0.032 (0.057)
Years of schooling	0.354 (0.267)	0.392** (0.177)	0.217 (0.289)	0.271 (0.183)
Broad money/GDP (%)	-0.011 (0.013)	-0.014 (0.012)	0.013 (0.013)	0.009 (0.012)
Inflation rate	-0.000* (0.000)	-0.000** (0.000)	-0.002* (0.001)	-0.002* (0.001)
Trade openness (%)	0.014* (0.008)	0.011 (0.008)	0.016* (0.009)	0.014 (0.009)
Constant	25.857*** (6.527)	29.882*** (7.338)	33.108*** (6.066)	35.733*** (6.445)
Observations	2,328	2,328	510	510
R-squared	0.101	0.129	0.230	0.295
Number of countries	98	98	98	98

*Notes.* Dependent variable is real GDP per capita growth (in percent). FE refers to fixed effects estimation technique. Initial per capita GDP and initial life expectancy refer to per capita GDP and life expectancy at birth of the lagged 5-year observations. Robust standard errors in parentheses. The regressions contain the time dummies. Joint p-values for the two remittances variables are 0.18 in column 2, 0.29 in column 3 and 0.59 in column 4. The joint p-values for remittances variables are 0.18 in column (2) and 0.29 in column (4). The sample excludes observations for Lesotho which had remittances/GDP ratio exceeding 50 percent.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Chapter 3

# The differential impact of inward remittances and capital inflows on the real exchange rate

### *Abstract*

*The Dutch disease theory postulates that remittance inflows leads to the appreciation of the real exchange rate, with adverse implications for structural adjustment and growth in the recipient economies. This paper investigates the impact of remittances on the real exchange rate in developing countries using a newly constructed panel dataset. In particular, a new series of theoretically plausible real effective exchange rates are constructed for 115 countries from 1980 to 2011. The analysis pays particular attention to possible difference between remittances and other forms of resource inflows in their impact on the real exchange rate. The results reveal that remittance inflow leads to a significant appreciation of the real exchange rate, and the magnitude of appreciation for a given level of remittance inflow depends on the nature of exchange rate policy regime. There is also evidence that the degree of appreciation associated with remittance inflow is significantly higher compared to that associated with official development assistance and foreign direct investment.*

### **3.1 Introduction**

One of the major channels through which remittances can affect the structure and performance of the recipient economy is through the real exchange rate, that is, the price of domestic goods relative to that of foreign goods. Under several plausible assumptions, the standard Dutch disease model postulates that resource inflows or remittances causes an appreciation of the real exchange rate with adverse impact on the performance of tradable goods production in the economy. Despite this clear theoretical postulate, the empirical evidence on the impact of remittances on real exchange rate is mixed.

The literature finds conflicting findings ranging from real exchange rate appreciation through to no effects on real exchange rate depreciation (Amuedo-

Dorantes & Pozo 2004; Barajas et al. 2011; Lopez et al. 2007; Rajan & Subramanian 2005). All of these studies use the real effective exchange rate (REER) <sup>18</sup>index based on the consumer price indices (CPI), which is the standard index employed by the International Monetary Fund (IMF). Though the CPI is more readily available and understood by people, wholesale prices better capture the prices of tradables (Lane & Milesi-Ferretti 2004). Moreover, the CPI based REER index is often prone to political manipulation by domestic authorities (Athukorala & Rajapatirana 2003). The model formulation in these studies has also generally ignored the role of the exchange rate regime and/or the role of central bank intervention in determining the impact of remittances inflows on the real exchange rate (RER).

This paper examines the debate on the impact of remittances on the real exchange rate. It aims to broaden our understanding of the issue at hand in the following ways. First, an analytical framework is developed and the estimation equation is derived drawing on the Dutch disease model (now become the standard model for analysing the macroeconomic impact of resource inflows). Second, I use a new dataset for 115 countries covering the period 1980-2011. The key feature of the data base is a theoretically consistent real exchange rate index. The newly constructed REER series better reflects the prices of tradables compared to the CPI based REER indices. Third, I estimate the regression using the appropriate transformation of the remittances and other capital inflow variables to take into account the effect of the nominal exchange rate. Fourth, I include several categories of *de facto* exchange rate regimes (as opposed to a binary *de jure* classification of exchange rate) as explanatory variables in the model.

The findings suggest that the use of a theoretically consistent REER index substantially affects the results. There is strong empirical evidence from my analysis that remittance inflows lead to an appreciation of the real exchange rate. However, interestingly, when the IMF's REER index is used, I fail to find any statistically significant impact. This result may also help to explain the 'puzzling' result obtained by Rajan and Subramanian (2005) that remittances do not give rise to adverse competitiveness effects similar to aid inflows (Rajan & Subramanian 2005, p. 20).

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<sup>18</sup> REER is weighted average of the bilateral RER. The definition and computation of REER series are given in Section 4.5.

The remainder of the paper is organized as follows. Section 3.2 provides the analytical framework of the dependent economy model the empirical evidence on the relationship between remittances and REER. Section 3.3 discusses the model, followed by the data sources and variables construction in Sections 3.4. Section 3.5 discusses the estimation method and the results. Section 3.5 discusses the estimation technique and the results and Section 3.6 provides the robustness checks of the results. After a brief discussion about endogeneity in Section 3.7, Section 3.8 concludes.

## **3.2 Remittance inflows and real exchange rate**

Real exchange rate has been defined principally two ways : 1) in *external* terms as the nominal exchange rate adjusted for the price differences between countries in line with the purchasing parity theory; and 2) in *internal* terms as the ratio of domestic prices of tradable to non-tradable goods (Hinkel & Nsengiyumva 1999, p. 41). These two definitions usually give different measures of RER. However, due to various statistical problems in constructing the internal RER, an external RER is often used as a proxy for internal RER (Hinkel & Nsengiyumva 1999, p. 120).

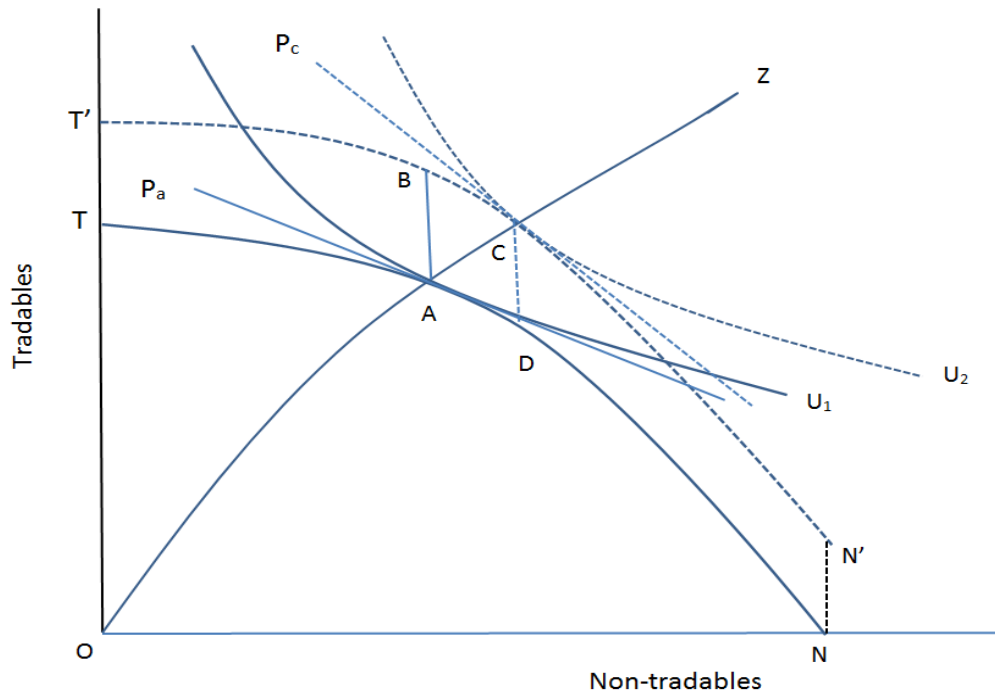
### **3.2.1 Analytical framework**

The Australian model or the ‘dependent economy’ model provides the analytical framework to trace the impact of the real exchange rate arising from a resource boom or capital inflows on the domestic sectors of an economy (Salter 1959; Swan 1960). The model assumes a small, open economy with two sectors: tradables and nontradables. The price of tradables (exports and importables) is determined in the world market. Prices of non-tradable goods (that is, those that are not traded internationally due to high transportation costs or restrictive trade measures) are determined solely by domestic supply and demand. Any excess demand or supply of nontradables is mitigated through adjustment of prices and quantities in the domestic market.<sup>19</sup>

### **Figure 3.1 Capital inflows and real exchange rate**

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<sup>19</sup> The real exchange rate can also be defined as the ratio of price of tradables to nontradables. However, to be consistent with definitions later, I define the RER as the ratio of prices of nontradables to tradables. Figure 3.1 is drawn based on Warr (2006) and Snape (1977)



In Figure 3.1, the NT curve shows the production possibility frontier for the tradable and non-tradable goods. The curve OZ, which is obtained by joining the points on the possibility frontier and the highest attainable social indifference curve, traces out the pattern of demand between tradables and nontradables as expenditure changes. This curve can be interpreted as the demand curve for different levels of expenditure. It is upward sloping as both goods are assumed to be normal. At point A, where  $U_1$  is tangent to NT, the economy is at both internal and external equilibrium. In other words, domestic demand and supply for both goods are equal. The economy is in internal equilibrium as it is producing in its production possibility frontier, and in external equilibrium, due to a zero trade balance. The slope of the price line  $P_a$  which is tangent to NT at A, indicates the domestic relative price of tradables to nontradables, (that is, the RER) which is consistent with the internal and external balance.

The remittance inflow is characterized as an increment in the foreign exchange of the domestic economy. The resultant increase in remittance inflows shifts the production possibility frontier upwards vertically from TN to  $T'N'$ . By construction, the slope of the curve at point B (which lies vertically above point A), is equal to the slope of the curve TN at point A. But point B is not an equilibrium because the slope of the indifference curve passing through B (not shown) would be lower than the slope

of the indifference curve at point C. In other words, the value placed by the consumers on nontradables relative to tradables at point C is higher than at point B.

The real income of the consumer is higher at point B than at point A. At a higher income, the consumer desires to consume more of both tradables and nontradables. However, compared to point A, point B has equal amount of nontradables and higher amount of tradables. Thus, point B is not an equilibrium point, provided the expenditure elasticity of demand for nontradables is not zero. The consumer substitutes nontradables for tradables, moving to the south-east direction from B. The new equilibrium occurs at point C, where the highest attainable indifference curve  $U_2$  intersects the possibility frontier  $T'N'$ . Thus the increase in demand for the nontradables pushes up the relative price of nontradables to tradables, as the slope of the tangent  $P_c$  is higher than that of the tangent  $P_a$ . This, by definition, leads to the increase in real exchange rate.

Remittance inflows can potentially have Dutch disease effects along the similar channels to the natural resource boom or capital inflows such as aid or the FDI (Adenauer & Vagassky 1998; Bourdet & Falck 2006; Rajan & Subramanian 2011; Wijnbergen 1985). The RER appreciation can be more pronounced in the case of a restrictive trade regime, the existence of full employment and a limited ability of consumers to switch between domestic and imported goods (Gupta et al. 2005). The impact on RER appreciation also depends on the exchange rate regime. In a floating exchange rate regime, the central bank sells foreign exchange, thus causing nominal and RER appreciation. In the fixed exchange rate regime, sustained domestic inflation raises the RER, with the higher accommodating government expenditure by the central bank (Gupta et al. 2005).

Remittances can affect the RER mainly through three channels (Lopez et al. 2007). First, the inflow of remittances increases the net foreign asset position of a country, which in turn affects the external equilibrium of the economy. Given that remittances are unrequited transfers to households, the impact of remittances and other capital inflows is likely to be different. For example, in the case of foreign aid there is an associated liability to repay the loan, and this will decrease the net foreign assets. Similarly, in case of foreign direct investment (FDI), the repatriation of the profits will decrease net foreign assets position.



Second, remittances exert an upward pressure on the price of nontradables due to increased demand and also through the potential increase of reservation wage (Lopez et al. 2007, pp. 7-8). If an increase in prices in the non-tradable sectors is passed on to the consumers (but not in case of tradable sector to maintain competitiveness), this can lead to higher productivity in tradable sectors. This Balassa-Samuelson effect can cause real appreciation of the domestic currency (Balassa 1964; Samuelson 1964). The extent of this real appreciation depends on how remittances are spent in the home country. The impact of the RER tends to be higher if the money is spent on consuming goods and services, rather than on investments.

The third channel is the impact on the RER through economic growth. However, the impact in this case is ambiguous, due to the offsetting impact of growth on the net foreign asset to GDP position, and any internal adjustment due to the Balassa-Samuelson effect. Higher growth will lower the net foreign asset to GDP ratio, and this tends to decrease the RER while the higher internal demand will tend to fuel the prices of nontradables, thus causing real appreciation. Therefore, the net impact on the RER can be one that is appreciating, depreciating or has zero impact, depending on the relative strengths of these effects.

The RER appreciation effect of remittances and capital inflows is complicated by the fact that the central banks often pursue an active policy of avoiding the appreciation of domestic currency. Thus, several countries adopt implicit RER targeting as a major objective of their monetary policy framework. Central banks often intervene in the foreign exchange market for several reasons: to stabilize the exchange rate as in exchange rate, e.g. pegs, crawls, or bands; to contain excessive exchange rate volatility; to correct any misalignment of the exchange rate which is considered inconsistent with the macroeconomic fundamentals of the country; and managing foreign exchange reserves (Basu 2014). Thus, the observed real exchange rate movement may not be a sufficient indicator of Dutch Disease effects of remittances.

The theoretical discussion on the Australian model suggests that if the assumptions of the models are valid, then remittances inflows will increase the price of nontradables in response to an increased demand for both tradables and nontradables—that is, RER appreciates in the remittances recipient countries.

### 3.2.2 Empirical evidence

The empirical literature can broadly be classified into two groups: at the individual country level or at the multi-country or cross-country setting. The literature on the individual country studies focuses on the impact of remittance inflow on the real exchange rate using cointegrating equations and vector autoregressive models (Bourdet and Falck (2006) for Cape Verde; Petri and Saadi-Sedik (2006) in case of Jordan; Vargas-Silva (2009) in case of Mexico;Hyder and Mahboob (2006) and Makhoul and Mughal (2013) in case of Pakistan and Edmira et al. (2013 ) in case of Albania).

There are even fewer studies at the multi-country level. These studies often utilize a limited number of countries, including developed countries, in their analysis. They find mixed results, ranging from RER appreciation, to a neutral effect on the exchange rate, or even a depreciation effect. Table 3.1 summarises the existing empirical studies on the impact of remittances and other financial flows to developing countries.

Amuedo-Dorantes and Pozo (2004) test the impact of workers' remittances on the real exchange rate of 13 Latin American countries using the panel data from 1979 to 1998. They find that a doubling of the workers' remittances appreciates the real exchange rate by 22 percent. However, they conclude that foreign aid does not have a significant impact on the RER. The explanatory variables used in the studies include: per capita GDP as a proxy to estimate the Balassa-Samuelson effect; government expenditure to capture the impact on the tradable and nontradable sector; terms of trade; changes in external financial conditions proxied by US interest rate; and foreign aid.

One of the novelties of the Amuedo-Dorantes and Pozo (2004) study is the use of instrumental variables to control for the endogeneity of remittances. Since remittances depend on the migration patterns, which are partly driven by push factors in the home countries (such as low economic growth), this in turn might affect both the RER and remittances. In order to control for the endogeneity, they use instrumental variables, such as the proportion of illiterate male adults age 15 and above; primary

school enrolment rates; the rate of vaccination of children less than one year; crop production; and a livestock index.

Acosta et al. (2009) examine the effects of remittance inflow on the RER using the ratio of tradable-to-nontradable output as dependent variables. They analyse both the spending and the resource movement effects of remittance inflows by using the real effective exchange rate index and the ratio of tradable output (the sum of agriculture and manufacturing output) and nontradable output (services). They find that remittances induce both the spending effects leading to real exchange rate appreciation and resource movement effects that favour the nontradable sector at the expense of tradable goods production. Moreover, they find that the real exchange rate appreciation is more pronounced in countries with a fixed exchange rate regime.

Acosta et al. (2009) use the unbalanced annual panel data set of developing and transition countries from 1990 to 2003. Since the more advanced countries are not included in the sample, and the actual number of countries is not mentioned in the estimation, the generalization of the conclusion may be questioned. The control variables used in the study are FDI (as per cent of GDP), government expenditure growth, broad money supply (as per cent of GDP), trade openness (total trade to GDP) and GDP growth. They also interact the exchange rate dummy (fixed versus flexible) exchange rate regime, and employ the generalized method of moments (GMM) technique to estimate the equation and to address the endogeneity of remittances.

**Table 3.1 Summary of studies on remittances and real effective exchange rate**

<b>Study</b>	<b>Dependent variable</b>	<b>Independent variable</b>	<b>Estimator</b>	<b>Period (country coverage)</b>	<b>Instruments</b>	<b>Findings</b>
Rajan and Subramanian (2005)	Growth rate of value added of industry <i>i</i> in country <i>j</i>	Initial industry share, financial independence interacted with remittance, labour share interacted with remittance and exportability index interacted with remittances	Fixed effects, instrumental variable	1980-2000	External instrument for aid	Remittances do not seem to cause real exchange rate appreciation, whereas aid causes real exchange rate appreciation
Amuedo-Dorantes and Pozo (2004)	Log of real exchange rate	workers' remittances, foreign aid; GDP per capita, terms of trade, government expenditure and US interest rate (all in logs)	Fixed effects, instrumental variable	Panel: 1979-1998. 13 Latin American countries	External	Remittances lead to real exchange rate appreciation
Lopez, Molina and Bussolo (2007)	Change in log of real effective exchange rate	Change in remittances (% of GDP), per capita GDP growth, change in terms of trade, government consumption (% of GDP), US- 6 month interest rate	Fixed effects and Fixed –effects instrumental variable	Panel (1990-2003), 20 mainly Latin American countries	External	Remittances lead to a significant real exchange rate appreciation

**Table 3.1 Summary of studies on remittances and real effective exchange rate (continued.)**

<b>Study</b>	<b>Dependent variable</b>	<b>Independent variable</b>	<b>Estimator</b>	<b>Period ( country coverage)</b>	<b>Instruments</b>	<b>Findings</b>
Lopez, Molina and Bussolo (2007)	Change in log of real effective exchange rate	Change in remittances (% of GDP), per capita GDP growth, change in terms of trade, government consumption (% of GDP), US- six month interest rate	Fixed effects and Fixed –effects instrumental variable	Panel (1990-2003), 20 mainly Latin American countries	External	Remittances lead to a significant real exchange rate appreciation
Lartey et al. (2012)	Real effective exchange rate	Remittance(% of GDP) or remittance (US \$ per capita), FDI (% of GDP), Non-FDI private inflows (% of GDP), government expenditure; GDP per capita; M2 (% of GDP), terms of trade, exports plus imports (% of GDP), growth of GDP	System Generalized Methods of Moments (SGMM)	Panel (1992-2003), 100 developing countries	Internal, external	Remittance lead to real exchange rate appreciation and the effect is stronger under fixed nominal exchange rate regimes

**Table 3.1 Summary of studies on remittances and real effective exchange rate (continued.)**

Study	Dependent variable	Independent variable	Estimator	Period (country coverage)	Instruments	Findings
Barajas et al. 2010	Real effective exchange rate (log)	Net foreign assets, government consumption to GDP, aid to GDP, terms of trade (log), real GDP per capita, Index of capital account liberalization, trade restrictions, administered agricultural prices; natural disaster, fertility.	Fixed effects- Instrumental variables; Dynamic least squares with fixed effects	Panel data (1980- 2007), 79 countries (16 low-income and 31 low-and-lower- middle income)	External	Impact on equilibrium exchange rate is small; the appreciation results can overturn depending degree of openness and other factors

In contrast, several other studies find that remittances are motivated by investment opportunities at home and are procyclical in nature (Lueth & Ruiz-Arranz 2007). Also, remittances might be spent more on goods and services that utilize unemployed unskilled labour, and on imported goods (Rajan & Subramanian 2005, pp. 20-1). Thus, an increase in remittances would not lead to an increase in wages, or the price of nontradables tempering the impact on real exchange rate. The other reason why remittances may not lead to significant RER appreciation is that when the exchange rate is overvalued, migrants might not send remittances or prefer to send goods instead of cash (Rajan and Subramanian 2005). Since the overvalued currency tends to reduce remittances, the Dutch Disease(DD) effect of remittances may not be sustained (Rajan and Subramanian 2005).

The recent comprehensive study by Barajas et al. (2011) analyses the potential “Dutch Disease” effect of inflows of remittances by looking at the effects on the equilibrium exchange rate of remittances. They use a simple, small open economy model to examine the result of an increase in remittance inflows leading to an equilibrium real appreciation and the conditions under which the effect could be reversed. They argue that due to the complicated macroeconomic effects of remittances, a permanent increase in remittances need not lead to an appreciation of the exchange similar to large exogenous capital transfers, as suggested by the “benchmark” of the standard model. The main reasons for this non-robust result, according to the authors are: 1) there is relatively little impact of remittances on highly open economies with flexible labour markets in which the factors of production can move easily between the traded and non-traded sectors; 2) remittances are countercyclical and are partially driven by domestic income. For example, high remittances increase domestic income, which in turn tend to exert an opposite effect on remittance inflow, thus limiting its long run impact on the equilibrium exchange rate; 3) it improved credit worthiness of a country as a result of the remittance inflows can consequently cause the deterioration of the net investment position, thus mitigating the impact on the long-run equilibrium exchange rate; 4) if the remittances are fully spent on traded goods, they would have little effect on the long-run equilibrium exchange rate.

Barajas et al. (2011) use the dynamic ordinary least squares (DOLS) with fixed effects, employing the data of developing and developed countries from 1980 to 2007 for 79 countries. Moreover, they include other explanatory variables such as capital account liberalization deviation, trade restrictions, administered agriculture prices, black market premium and natural disasters. They find that the effects of remittances on RER is not robust, depending on the specific countries being analysed and on the specific set of explanatory variables used in the cointegrating equations. They conclude that even when the coefficients of the remittances variable are statistically significant, they are very small in magnitude. They also find that there is regional differences in the impact, with Middle East/North African countries experiencing the greater appreciation. Thus, they conclude that the Dutch Disease effects may not materialize in countries with high remittance flows.

Based on the panel data estimation, Barajas et al. (2011) find the remittance effects on the equilibrium exchange rate is not robust and the sign and statistical significance depend on the country sample selected, and also on other non-remittance variables included in the cointegrating equation. They argue that the appreciation effects of remittances are dampened by several factors, depending on the degree of openness, flexibility of labour markets, the countercyclical nature of remittance, patterns of expenditures on traded and nontraded goods, and the sensitivity of country's risk premium to remittance inflows. They argue that the determination of the exchange rate is complicated by several factors, and depends on the country-specific situation. They conclude that the Dutch Disease effects seem to have greater effect more in richer remittance-receiving countries than less-developed countries, and in the latter case, the long run growth may not be compromised.

In contrast to the majority of cross-country studies, several studies fail to detect a statistically significant relationship between remittances and REER, or even find a negative relationship between the two. Mongardini and Rayner (2009) estimate the effect of remittance on RER of Sub-Saharan countries and conclude that there is no appreciative effect of remittances in the long-run. They argue that the non-tradable sector in most of the conflict stricken countries in the study possess excess capacity in the non-tradable sector. Consequently, remittances are for 'capacity utilization' and hence there is no upward pressure on the price of nontradables.



Similarly, in a study of six Central American countries for the period (1985-2004), Izquierdo and Montiel (2006) find mixed evidence, depending on individual country. They find that remittances have no influence on RER for Honduras, Jamaica and Nicaragua. In case of El Salvador, remittances have a depreciating effect. They argue that these conflicting results can be attributed to the consumption behaviour of the remittances-recipient country. If the remittances are disproportionately spent on traded goods, then there will be no effect on the real exchange rate.

There is also conflicting literature regarding the size of the impact of remittances on the RER. Some studies find that an increase in remittances leads to a significant appreciation of RER (Amuedo-Dorantes & Pozo 2004; Lopez et al. 2007), while others find a small to moderate impact of remittances (Acosta et al. 2009; Barajas et al. 2011). The difference on the magnitude of the impact found in these studies may be due to the selection of the particular countries and the variables used to estimate the model. For example, Amuedo-Dorantes and Pozo (2004) focus on Latin American countries, and do not include any monetary policy related variable as a control variable.

There are very few studies which look into the differential impact of different types of capital inflows on the real exchange rate. Remittances differ from capital inflows such as aid and foreign direct investment (FDI) in several ways. First, remittances are considered to be a more stable source of foreign exchange. Several studies point out migrant workers are mainly motivated by altruistic motives and send more remittances in times of distress at home. Thus, remittances are countercyclical in nature. Second, as remittances are private transfers and accrue to a large number of dispersed and diverse households, their impact on domestic demand differs from that of large aid financed projects (The World Bank 2006). Thus, the spending patterns of the remittances and other capital are likely to be different, which result in differential impacts on the RER.

In one of the earlier studies, Athukorala and Rajapatirana (2003) examine the impact of capital inflows on RER of several Asian and Latin American countries during the period 1985 to 2000. They emphasize the differential impact of foreign direct investment and other capital inflows on the RER. They argue that the impact of capital inflows depends on whether the countries belong to the Latin American region

or Asia, and on policy response of those countries. They note, for example, that a surge of capital inflows in India and China during the early nineties was accompanied by a series of structural reforms and discrete devaluations (Athukorala & Rajapatirana 2003, p. 620). Thus, despite increases in capital inflows, these countries experienced a depreciation rather than an appreciation of their domestic currencies. Thus, major capital-importing countries in Asia were better able to manage the capital inflows compared to the Latin American countries.

Combes et al. (2011) analyse the impact of portfolio investment, foreign direct investment and private transfers on the real exchange rate. They find that among private capital flows, portfolio investments exert the highest appreciation effect, while the private transfers have the lowest effect. They argue that the magnitude of real appreciation due to FDI and bank loans are less compared to portfolio investment, as FDI and bank loans increase the productive capacity of the economy. They find that remittance have the least appreciation effect due to their countercyclical nature. Using the exchange rate market pressure index as a proxy, the authors find that exchange rate flexibility helps to dampen the appreciation of the domestic currency.

### 3.3 Model

Based on the theoretical and previous empirical evidence, the reduced form of my empirical model is formulated as follows.

The dependent variable in my model is the real effective exchange rate, and the major explanatory variable of interest is the remittance inflows. The model to be estimated is given by:

$$REER_{it} = \alpha + \beta_1 Rem_{it} + X_{it}\beta_2 + \mu_i + \gamma_t + \epsilon_{it} \dots\dots\dots(3.1)$$

where  $i = 1, 2, \dots, N$   $t = 1, 2, \dots, T$  and

$REER_{it}$  = real effective exchange rate index of country  $i$  at time  $t$ ;  $Rem_{it}$  = remittance inflows (as percent of GDP) of country  $i$  at time  $t$ ;  $X_{it}$  is the vector of control variables including capital flows, among others;  $\mu_i$  is the country-specific fixed

effects;  $\gamma_t$  is the year dummy; and  $\epsilon_{it}$  is the idiosyncratic error;  $i = 1, 2, \dots, N$  are the number of countries and  $t = 1, 2, \dots, T$  is the number of years.

The list of control variables in  $X_{it}$  and their expected signs are given below:

<i>ODA/GDP (in %)</i>	Foreign aid to GDP ratio (+/-)
<i>FDI/GDP (in %)</i>	Foreign direct investment to GDP (+/-)
<i>Trade/GDP (in %)</i>	Trade openness (-)
<i>Government consumption (in %)</i>	Government consumption to GDP (+/-)
<i>TOT</i>	Terms of Trade (+/-)
<i>Financial openness</i>	Chinn-Ito Financial openness index (+)
<i>GDP per capita</i>	GDP per capita (+)
<i>ER regimes</i>	Exchange rate regimes (+/-)
<i>Change in reserves</i>	Change in reserves minus gold (-)

The construction and transformation of the REER and remittances to GDP variables are given in Section 3.4.

This section discusses the rationale for the inclusion of other explanatory variables (and their expected signs) in estimating the regressions. The variables definitions and sources of data, summary statistics and the correlation coefficients among these variables are given in the Appendix 3.1, Appendix 3.5 and Appendix 3.6 respectively.

*Foreign aid to GDP ratio (+/-)*: An increase in the inflow of foreign aid leads to increased demand for both tradeables and nontradables. Increased demand for tradeables manifests itself as increased demand for net imports. For a small economy, an increased demand for tradables will have no price impact. However, increased demand for nontradables will be met either from unemployed resources, or from the tradeable sector—that is, either from export producers or import-competing producers. Thus, an inflow of aid will cause both the ‘spending effect’ and ‘resource movement’,

and thus real appreciation. Most empirical studies also find the appreciation impact of aid inflows (Rajan & Subramanian 2005, 2011).

*Foreign direct investment (+/-)*: The impact of foreign direct investment (FDI) on the real exchange rate depends on the sectoral allocation of the FDI. If the FDI is used to favour the tradable sector then it could have depreciative impact on the REER as this increases the productivity of the tradable sector. Generally, FDI is focussed on the tradable sectors and therefore tends to decrease the price of the tradable sector and thus depreciating the domestic currency (Athukorala & Rajapatirana 2003).

*Trade openness (-)*: This is defined as the average ratio of exports and imports to GDP. Openness is often taken as a proxy of trade liberalization, which can potentially increase the demand for tradable goods in the domestic economy, and decrease their price due to increased competition (Phillips et al. 2014). Thus, openness tends to lower the domestic price of tradables leading to a depreciation of the exchange rate. In contrast, protection of domestic industries through restrictions on trade (for example, tariff and non-tariff measures) leads to higher domestic prices and thus real exchange rate appreciation. Consequently, the lifting of trade restrictive measures proxied by an increased openness to trade would cause the real exchange rate to depreciate.

Another interpretation of the impact of trade openness on real exchange rate is provided by Edwards (1989). When a small country liberalizes trade, it acts as a shock to the equilibrium exchange rate. Equilibrium exchange rate, which is consistent with both internal and external balance change in response to this shock. Thus, when a small economy liberalizes its trade, demand for importables increases and demand for nontradables decreases in response to the relative price change (Li 2004). Assuming the Marshall-Lerner condition holds, the real exchange rate depreciation is necessary in order to switch the demand from tradable goods towards nontradables to restore the equilibrium (Edwards 1989). There are some studies which show that a non-credible trade liberalization of uncertain duration could lead to a sharp increase in consumption, including that of nontradables, and cause real appreciation (Calvo & Drazen 1998). However, the theoretical and empirical literature strongly points toward the depreciative effect of trade openness (Li 2004).

*Government consumption (+/-)*: This variable is defined as the total government expenditure as a percentage of GDP. The impact of government consumption on the RER depends on both the sectoral composition of government consumption and inter-temporal budget constraint ((Hyder & Mahboob 2006, p. 245; Montiel 1999). If the government expenditure largely falls on the nontradables, this leads to higher demand for the non-tradable goods. An increased demand for nontradable goods requires an increase in the relative price to maintain an internal equilibrium in the non-traded sector. The private consumption expenditure is crowded out in the long-run equilibrium. However, the reduction in private consumption of non-traded goods is smaller than the increase in government consumption. This is because the real appreciation induces an increase in the production of non-traded goods, allowing the accommodation of an increase in total spending on non-traded goods (Montiel 1999, pp. 279-80). For example, if an increase in public wages is followed by higher demand for nontradables compared to tradables, it will appreciate the domestic currency. Froot and Rogoff (1995) and Froot and Rogoff (1991) find that for Euro Zone countries, government spending is a significant determinant of the real exchange rate. They argue that compared to the private sector, government expenditure falls disproportionately on the non-traded sector. Therefore, an increase in government expenditure leads to an appreciation of the real exchange rate.

However, it is possible that a large share of government expenditure is spent on tradable goods. In that case, this will cause an incipient current account deficit which requires a real depreciation to restore the external balance (Montiel 1999, p. 279). As a consequence, the private consumption of traded goods falls. However, the increase in government spending is higher than the reduction in the private consumption, as real depreciation induces an increase in the production of traded goods. This will allow for the accommodation of an increase in total expenditure on traded goods.

*Terms of trade (+/-)*: Terms of trade is defined as the ratio of export prices to import prices. The impact of terms of trade on the real exchange rate is theoretically ambiguous depending upon the relative income and substitution effects. A rise in the terms of trade increases domestic income. Some portion of this additional income is spent on the nontradables pushing up the price of nontradables, and hence the domestic inflation (Gruen & Dwyer 1995, pp. 6-7). To restore the internal and external balance

following a favourable terms of trade shock, RER has to appreciate in order to switch the demand from nontradables toward tradable goods (Edwards 1989). Thus, the income effect of an increase in terms of trade tends to appreciate the RER. On the other hand, favourable terms of trade, or an increase in the relative price of exportables compared to importables, induces substitution in consumption towards importables. Thus, an improvement in the terms of trade could potentially lead to a RER depreciation. If the substitution effect dominates income effect, then the impact of an increase in terms of trade will be negative, and otherwise it will be positive. However, the majority of the empirical studies find that the income effect dominates the substitution effects (Edwards 1989; Elbadawi 1994).

*Financial openness (+)*: Financial openness can lead to the development of domestic financial sector. A well-developed financial sector produces information *ex ante* about the possible investments and allocates capital; monitors investments and exerts corporate governance after providing finance; facilitate trading; diversification and management of risk; mobilize and pool savings; and eases the exchange of goods and services. Financial development helps to efficiently allocate capital towards the most productive sectors and avoid the flows of capital from being channelled into less productive sectors such as construction or consumption (Saborowski 2009, p. 5). Thus, a less-developed financial sector can shift the resources towards consumption goods or away from more productivity enhancing tradable sectors. Thus, the appreciation effect of capital inflows tend to be mitigated if the financial markets and institutions are well developed (Saborowski 2009).

Financial liberalization, on the other hand, can also induce excessive risk-taking, increase macroeconomic volatility and lead to more frequent crises. Hence, countries adopt various policies to restrict the capital account transactions. Accordingly, there are several measures of financial or capital account openness (Chinn 2008; Edwards 2005; Kose et al. 2003). These measures can be broadly classified into two groups: *de jure* and *de facto*. The *de jure* indices are usually based on the exchange rate classification, and an over 60 different types of control compiled in the Annual Report on Exchange Rate Arrangements and Exchange Restrictions by the IMF. However, these measures do not reflect the actual degree of financial openness, as the countries often depart significantly from their stated objectives or policies.

In contrast, *de facto* measures take into account the actual exchange rate and capital account liberalization policies implemented by the countries. This study utilizes the *de jure* based Chinn-Ito index indicator of financial openness (Chinn & Ito 2006). This is based on the principal component analysis on the four major categories of current and capital account restriction measures from the IMF, namely: 1) restrictions on the current account; 2) presence of multiple rates; 3) policies regarding the surrendering of export proceeds; and 4) restrictions on the capital account transactions. The Chinn-Ito index has several advantages over other indicators. First, it classifies an economy into several categories and avoids the narrow binary indicator of capital account openness such as in (Rodrik 1998). Second, the index is regularly updated and freely available.

*Exchange rate classification:* The impact of remittances and capital inflows depend on the exchange rate regime. This regime is more complex than the simple classification of fixed versus flexible exchange rates as reflected in the *de jure* and *de facto* classification of exchange rate regimes. However, most previous studies do not include this variable as one of the determinants of the RER. The few studies which include this variable do so only as a fixed or flexible dummy variable. This study incorporates the ‘coarse’ classification of exchange rate, based on six categories on exchange rates by (Ilzetki et al. 2008). In contrast to the IMF classification, the Ilzetki et al. (2008) classification is based on the *de facto* classification of exchange rate regimes.

In a fixed exchange rate regime, transfers and capital inflows tend to put upward pressure on the domestic price level. The impact of these flows on the RER depend on whether the flows are driven by autonomous factors or by an increase in domestic money demand (Combes et al. 2012; Singer 2010). A surge in remittances can potentially fuel a credit boom if the authorities do not sterilize these flows. The higher money supply and the consequent demand for goods and services exert an upward pressure on the price of nontradables. However, the effectiveness of the sterilized intervention to combat the inflationary pressure is debatable. It is often costly to sterilize the foreign exchange intervention as it leads to a higher domestic interest rate, further increasing the capital inflows and putting upward pressure on the RER (Calvo

1991). Moreover, the central bank incurs a quasi-fiscal cost as the interest rates on foreign assets are often lower than the domestic interest rates.

In a floating exchange rate regime, remittances and capital inflows affect RER mainly through nominal exchange rate appreciation. The nominal appreciation shifts the consumption away from non-tradable goods to imported goods which now become cheaper (Combes et al. 2011). Due to uncertainty in the nominal exchange rate, a more flexible exchange rate could discourage the short-term speculative flows (Calvo et al. 1996; Lopez-Mejia 1999). Hence, the flexible exchange rate regime tends to decrease those capital flows that generate real appreciation most. However, the long term appreciation of the nominal exchange rate can deteriorate the competitiveness of the economy.

I also interacted the remittance with the dummy for exchange rate regimes. I categorized exchange rate regimes into fixed and flexible exchange rate regimes using the defacto classification (Ilzetzi et al. 2008). As most of the developing countries adopt the hard or *de facto* peg and pre-announced crawling peg, to generate enough variations in the data, I divided Categories 1 and 2 as a fixed exchange rate regime and from categories 3 to 6 as a flexible exchange rate regime (Appendix 3.2). I also interacted remittances with this dummy exchange rate regime in order to examine the effects of the level of remittances and exchange rate regimes on the REER.

*Per capita GDP (+)*: Balassa (1964) and Samuelson (1964) argued that long-run movements in the exchange rates can be explained by the productivity differentials between traded and non-traded goods in economies with freely adjusting wages and prices. They observed that more-developed economies have higher prices of nontradables relative to tradables, when compared to less developed countries. The reason for this pattern is that the productivity growth tends to favour the traded goods sector compared to non-traded sector. The higher productivity growth in the traded sector bids up the wages in that sector, requiring an increase in relative prices of nontraded goods. To the extent that the productivity bias between the traded and nontraded sector is greater in developed countries, compared to less developed countries, this would cause a higher real exchange rate appreciation in more advanced countries.



The empirical evidence for the Balassa-Samuelson hypothesis on developing countries is mixed. Tica and Druzic (2006) provide a comprehensive review of the literature regarding the empirical studies on the Balassa-Samuelson effect. However, the divergences of the results may be attributed to the failure to address the key assumptions of the hypothesis (Dumrongrattikul 2012). These assumptions include: 1) traded goods are homogeneous across countries so that the purchasing power parity (PPP) condition is expected to hold in the long run; 2) there is slower productivity growth in the labour-intensive non-traded sector relative to that in the traded sector; and 3) the labour market clears and labour arbitrage ensures that wages in the traded and nontraded sectors are equal in each country.

To capture the Balassa-Samuelson hypothesis, I include the GDP per capita term as one of the control variables. A more robust indicator would include the productivity differentials across various sectors of the economy. However, the data for the sectoral decomposition of productivities are not available for most of the developing countries for the period under study. I therefore use GDP per capita to capture the effect of anticipated bias in productivity in the relatively high income countries. Thus, a positive coefficient broadly conforms to the hypothesis.

*Change in reserves minus gold (-)*: Under an imperfect capital mobility assumption, foreign exchange intervention should affect the exchange rate. Central banks often intervene in the foreign exchange market to stabilize the exchange rate, as in exchange rate pegs, crawls, or bands. They do this to contain excessive exchange rate volatility; to correct the misalignment of an exchange rate which is inconsistent with the macroeconomic fundamentals of the country; and to manage foreign exchange reserves (Basu 2014). Interventions in the foreign exchange market change the net foreign assets or the foreign reserves of the central bank. Thus, in order to control for this behaviour, change in the international reserves is taken as a proxy for foreign exchange intervention.

### 3.4 Data sources and variable construction

The sample consists of 105 developing countries from 1980 to 2011 according to UN country classification (United Nations 2012).<sup>20</sup> The list of 105 countries used in the main regression, along with the 10 developed countries included in the robustness checks are given in Appendix 3.3 and Appendix 3.4.

The data for remittances is taken from the World Development Indicators which has data for inward remittances from 1970 onwards for a majority of countries. It is generally calculated as the sum of two components of the current account of the balance of payments: workers' remittances and compensation of employees; and migrants' transfers in the capital account according to the Fifth Balance of Payments manual by the IMF (International Monetary Fund 1993). These data do not include remittance from informal channels such as through 'hundi' or personal carriage (see Shonkwiler et al. (2008) for the compilation issues on remittances).

Moreover, in contrast to settlement migration, contract and seasonal migration have been a feature of many developing countries. The seasonal and short term workers who stay less than one year in the destination countries, by definition, would not be counted as 'residents' of the destination countries according to the IMF's Balance of Payments manual (International Monetary Fund 1993; Rienke 2007). Contract migration has been a special feature for the workers working in the Gulf countries, primarily from South Asian countries. Thus, the official figures on remittances might be underestimated.

In contrast, Clemens and McKenzie (2014) argue that the recent surge in remittances in macro data may actually be overstated, rather than underestimated, based on the data on the growth of stocks of migrants and the incomes they earn. Assuming the constant proportion of the migrants who actually remit, they find that 'many countries have remittance growth rates that vastly exceed their migration growth rates, and that there is tremendous heterogeneity across countries in this context. Thus, there is a controversy regarding the true value of remittances.

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<sup>20</sup> I intended to include 129 developing countries in my sample for the period 1976 to 2011. However, owing to the missing data for several variables, I was forced to restrict my sample size and period.

Appendix 3.5 and Appendix 3.6 provide the summary statistics and the correlation among the variables respectively.

### 3.4.1 Calculation of the real effective exchange rate (REER)

Before estimating Equation 3.1, I calculate the REER for all the developing and developed countries. The RER between a given country and its trading partner country  $i$  at time  $t$  is:

$$RER_{i,t} = E_{i,t} \times \frac{P_t}{P_{i,t}^*} \quad (3.2)$$

where  $P_t$  is the price level of the home country,  $P_{i,t}^*$  is the price level in foreign country  $i$ , and  $E_{i,t}$  is the nominal exchange rate between the currencies of foreign country  $i$  and the home country, expressed as the number of foreign currency units per home currency unit. Nominal exchange rate is defined as the price of domestic currency in terms of foreign currency following the IMF's convention. Thus, an increase in RER denotes the real appreciation of domestic currency and a fall in RER denotes the real depreciation.

Taking logarithms of equation (3.2), and dropping the subscript  $i$  for simplicity, we can write (where the lower case letters denote the logarithms of the variables),

$$rer_t = e_t + p_t - p_t^* \quad (3.2a)$$

Suppose the price index is the geometric average of traded and non-traded prices:

$$p_t = \alpha p_t^N + (1 - \alpha) p_t^T$$

$$p_t^* = \alpha^* p_t^{N^*} + (1 - \alpha^*) p_t^{T^*}$$

Thus,

$$rer_t = e_t + p_t^T - p_t^{T^*} + [\alpha (p_t^N - p_t^T) - \alpha^* (p_t^{N^*} - p_t^{T^*})] \quad (3.3)$$

$$\text{or, } rer_t = q_t^T + [\omega_t] \quad (3.3')$$

Equations (3.3) and (3.3') indicate that the real exchange rate can be expressed as the sum of two components: i) the relative price of tradables  $q_t^T$ , and ii) the relative price of nontradables in terms of tradables in both domestic and foreign countries—that is, the intercountry relative price of nontradables in terms of tradables in the home

country  $\omega$ . If we assume that the price of tradables is the same around the world, then RER can be interpreted as the ratio of *relative price* indices of tradable goods to non-tradable goods. Thus, the numerator of the right hand side of Equation 3.2 denotes the foreign currency index of tradables, and the denominator denotes the domestic currency index of non tradables (Kipici & Kesriyeli 1997; Perkins et al. 2006).

But, in the real world a country trades with not only a single but also multiple countries, and thus in multiple currencies. Therefore, every country is affected by the movements of more than one bilateral exchange rate (Ellis 2001; Maciejewski 1983). Thus, the multilateral RER is calculated based on weights assigned to each bilateral exchange rate:

$$REER_t = \frac{NEER_t \times PI_t}{PI_t^{(foreign)}} , \quad (3.4)$$

where  $REER_t$  is the real effective exchange rate index of the given country estimated against the basket of N number of major trading partners, and  $PI_t$  is the domestic price index of the country, while

$NEER_t = \prod_{i=1}^N S(i)_t^{w_i}$  is the nominal effective exchange rate of the country under study; it is the geometrically weighted average of  $S(i)$ , the nominal bilateral exchange rate between the country under study and the trading partner  $i$ .<sup>21</sup> Similarly,  $PI_t^{(foreign)} = \prod_{i=1}^N PI(i)_t^{w_i}$  is the geometrically weighted average foreign price indices of N number of trading partners,  $PI(i)_t$  is the price index of trading partner  $i$ , while  $w^{(i)}$  is the weight of trading partner  $i$ , and N is the number of trading partner considered (Zsolt 2012). Thus, REER is the weighted average of the bilateral RER of major trading partners, that is,

$$REER_t = \prod_{i=1}^I rer_{i,t}^{w_i} , \quad (3.5)$$

where, the weights,  $w_i$  (which are applied to each bilateral real exchange rate,  $rer$ ) sum to one. The RER calculated as mentioned above, reflects in essence, a broad summary measure of the prices of one country's goods and services relative to those of another, or of a group of countries (Ellis 2001). A rise in the RER index, as defined by Equations

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<sup>21</sup> Exchange rate is measured as the foreign currency price of one unit of domestic currency so that an increase in the exchange rate implies appreciation and decrease in the exchange rate implies depreciation.

3.4 and 3.5, means a real appreciation, or increase in domestic non-traded good prices relative to that of traded goods.<sup>22</sup>

While calculating the REER a number of choices have to be made. These include: the choice of currencies in the basket; selection of the base period; price measures; and foreign currencies for computing bilateral real exchange rates. In addition, there are different methods for computing weights and aggregating different bilateral RERs. REER indices computed with different choices of the above factors may give different measures that will move in different paths.

The different price indices used to calculate the RER are the consumer price indices, producer prices, export prices, GDP deflator, the prices of tradable goods or output prices, the price of an economy compared to the price of its imports, and relative unit labour costs (Chinn 2006; Driver & Westaway 2004; Ellis 2001; Jongwanich & Kohpaiboon 2013). These different price indices do not move together in the short run, or even necessarily in the longer run; there is no unique measure of the real exchange rate (Driver & Westaway 2004). As a result, the REER indices computed based on different price indices give different results.

This study constructs a new REER index using the GDP deflator as the domestic price and the wholesale price indices (WPI) of the trading partners as the foreign price. The foreign price index is obtained by total trade weighted geometric mean of the trading partners. All previous studies have used the consumer price indices for both the domestic price and foreign prices. However, the CPI basket contains a significant portion of nontraded components, which makes it less than ideal to represent trading partners' price levels (Ellis 2001). At the same time, it has two main limitations as an indicator of the price level in remittance-receiving developing countries. First, being a politically sensitive variable, it is often prone to manipulation by the authorities, Second, in most developing countries, its coverage is limited only to the capital or major cities (Athukorala & Rajapatirana 2003, p. 3).

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<sup>22</sup> RER is often taken as an indicator of competitiveness as a nominal depreciation matched by a positive inflation differential with trading partners leaves relative prices of domestic and foreign goods, expressed in a common currency, unchanged. Similarly, a nominal depreciation matched by a rising cost differential gives exporters no additional edge over foreign competitors (Chinn 2008; Rajan & Subramanian 2011).

Mindful of these limitations, in this study I use the wholesale price index to measure the price levels of trading partner countries (foreign price index) and the GDP deflator to measure the price level of the given country (domestic price). In case of the foreign price index, by construction, wholesale price index is dominated by the tradable component and thus serves as a better proxy for the price of tradables. As regards the measurement of domestic price, the GDP deflator, has a wider coverage of domestic prices compared to the CPI, as it is derived from national accounts. Also, presumably, GDP deflator is less susceptible to manipulation by the authorities.

Similarly, the weight attached to each of the bilateral exchange rates also affects the REER indices. The choice of the currency for the bilateral exchange rate and the weight attached to it is usually based on the importance of the foreign country to the domestic country's international trade. Different weights that can be used to calculate the REER are import or export, total trade, country shares of GDP, and capital account weights (Ellis 2001).

I use the fixed bilateral trade shares as the weight. This weight is widely used in the computation of REER indices and allows us to compare with the indices published by the IMF.<sup>23</sup> The constant trade weight is used instead of the time varying weight, as it better captures the dynamics of movements in the nominal exchange rates or relative prices.<sup>24</sup> I use all the bilateral exports and imports data available from 1976 to 2011 to construct the fixed bilateral trade weight using the World Integrated Trade Solution (WITS) database. To maximise the sample, the bilateral export and import data were replaced by the mirror data for missing values if the corresponding values were available. I then sum the bilateral export and import data for the whole period to obtain the total bilateral trade for each country. The trade shares of the bilateral trade are then taken as basis for the weights for the country pair. It should be noted that owing to the

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<sup>23</sup> Recently, the weights have been calculated to reflect the countries with the potential to be the domestic country's competitor in the third country markets and countries that are important in regional trade (Bayoumi et al. 2006).

<sup>24</sup>One major problem with the time varying weight is that the REER changes can occur due to changes in either bilateral trade with one country, nominal exchange rates or the price differential. For example, suppose that the bilateral nominal exchange rate between A and B changes temporarily, but the exchange rate between A and C remains fixed for few years. Further, suppose that the bilateral exchange rate between A and B returns to the previous level after a few years. If the weights applied in calculating the REER changes with time, the REER will not return to the previous level, though the bilateral nominal exchange rate has returned to the previous level due to the possible changes in the weights. However, if we use a fixed weight such a problem is mitigated (Zsolt 2012).

availability of the data and the trading partners, the actual number of trading partners varies country to country. These weights are used to calculate both the nominal effective exchange rate (NEER) and the foreign price index.

The bilateral exchange rate data are taken from Penn World Table (PWT) and the World Development Indicators. The former reports the adjusted bilateral exchange rate data for the Euro Zone countries after the countries adopted the common currency. The bilateral exchange rate is calculated as an annual average, based on monthly averages in terms of local currency units relative to the US dollar. To maximise the number of observations, I use the bilateral exchange rates data from the World Development Indicators when the data is not available in the PWT. I then use the geometric means of the trade weighted bilateral nominal exchange rates converted into the base year 2007.

The data on the wholesale prices were not available for all countries. For those countries, for which the WPI was missing for some periods, I use the corresponding GDP deflator to increase the sample size for estimation. The WPIs, which are used to construct the weighted foreign price index, are available for several countries which are the major trading partners for most of the countries. To test the total actual total trade weight covered by these countries, I estimate the trade shares of the countries in the sample and the average total was more than 85 percent. Thus, we can be confident that the major trading partners have not been dropped due to missing variables, and the computation of the REER index would not differ very much had all the WPI data been available.

### **3.4.2 Construction of the remittances variable**

Before estimating Model 3.1, I perform several operations using the data. Specifically, unlike in previous studies, I use the remittances and other capital inflow variables (foreign direct investment and official development assistance) into ‘constant dollar’ terms. This adjustment is necessary as the magnitude of remittance is affected both by the volume of remittance and changes in the nominal exchange rate. I first convert the remittance series into current local currency, and then convert it into the constant dollar by using the exchange rate of the base year (2007). To construct the remittance-to-GDP ratio, I then use the real GDP of 2007, so that both the numerator and

denominator variables are in real terms. This transformation of remittance and other capital inflows variables is a significant departure from the existing literature. However, I also use the conventional current remittance-to-GDP variable to check for the robustness of the results.

Figure 3.2 presents the computed REER and the IMF's REER indices (available from International Financial Statistics, and also reported by the World Bank in World Development Indicators). The REER thus calculated differs markedly from the REER calculated by the IMF.



**Figure 3.2 Computed REER vs IMF REER and remittances by country**



Figure 3.2 Computed REER Vs IMF REER and remittances by country (contd.)

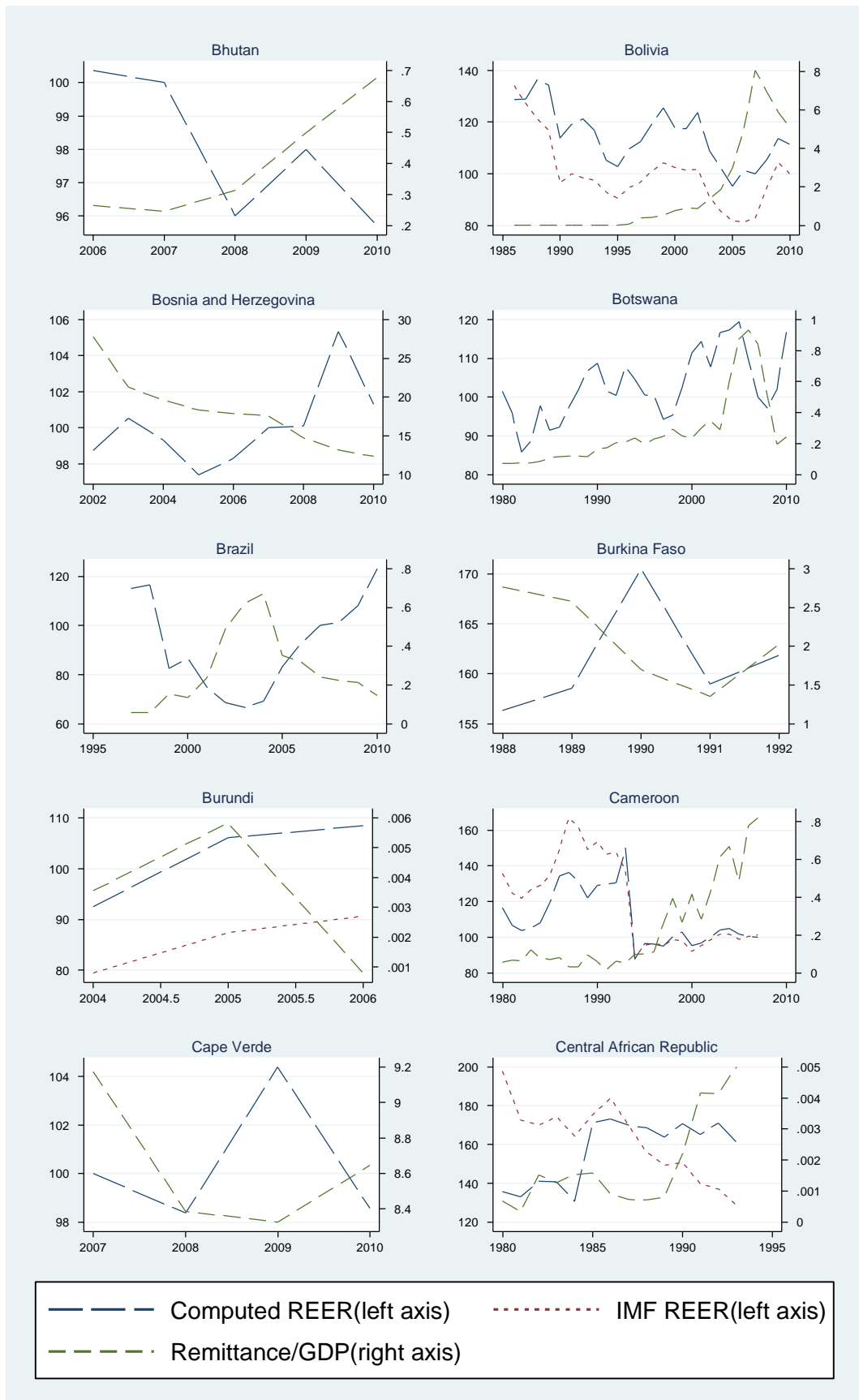


Figure 3.2 Computed REER vs IMF REER and remittances by country (contd.)

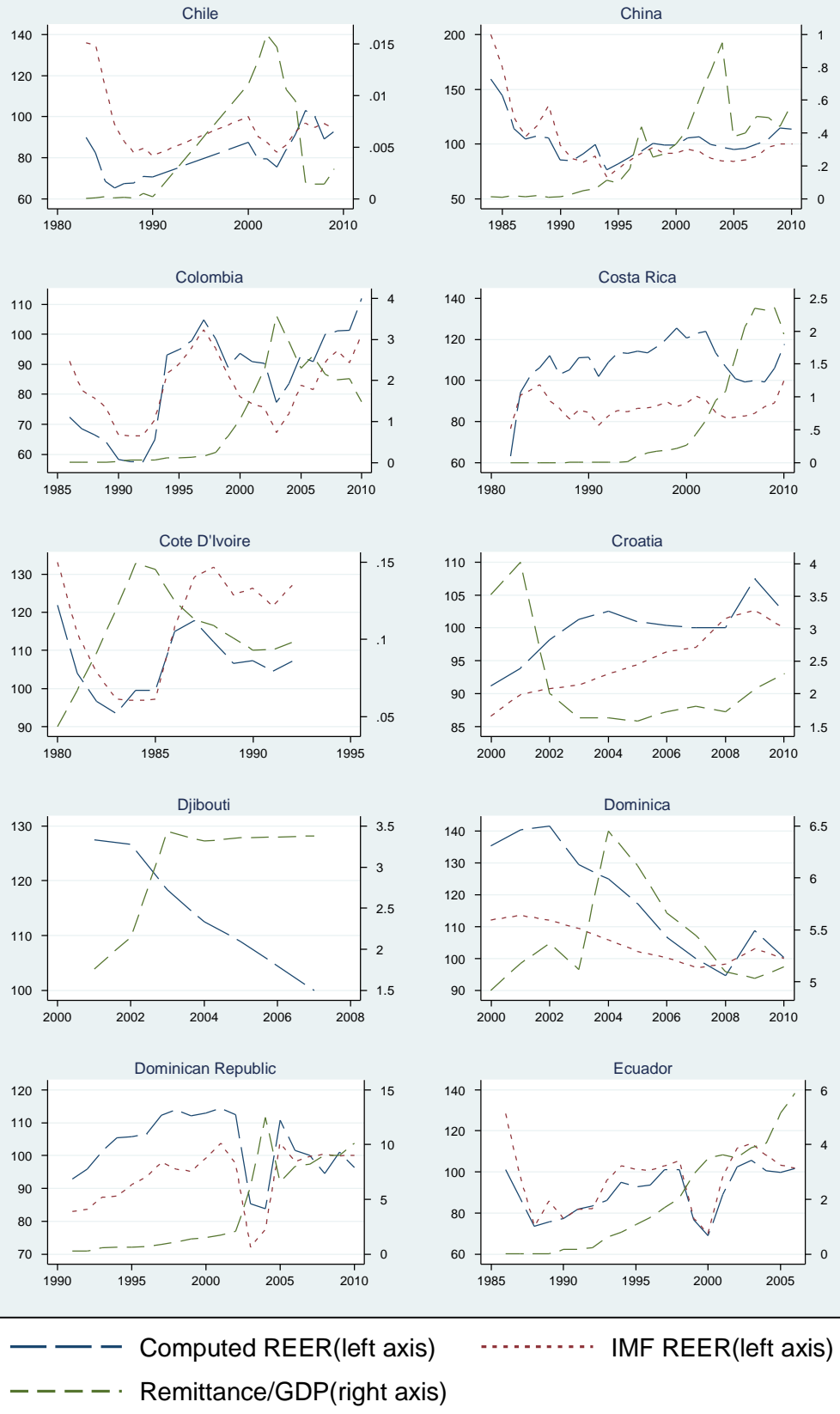


Figure 3.2 Computed REER vs IMF REER and remittances by country (contd.)

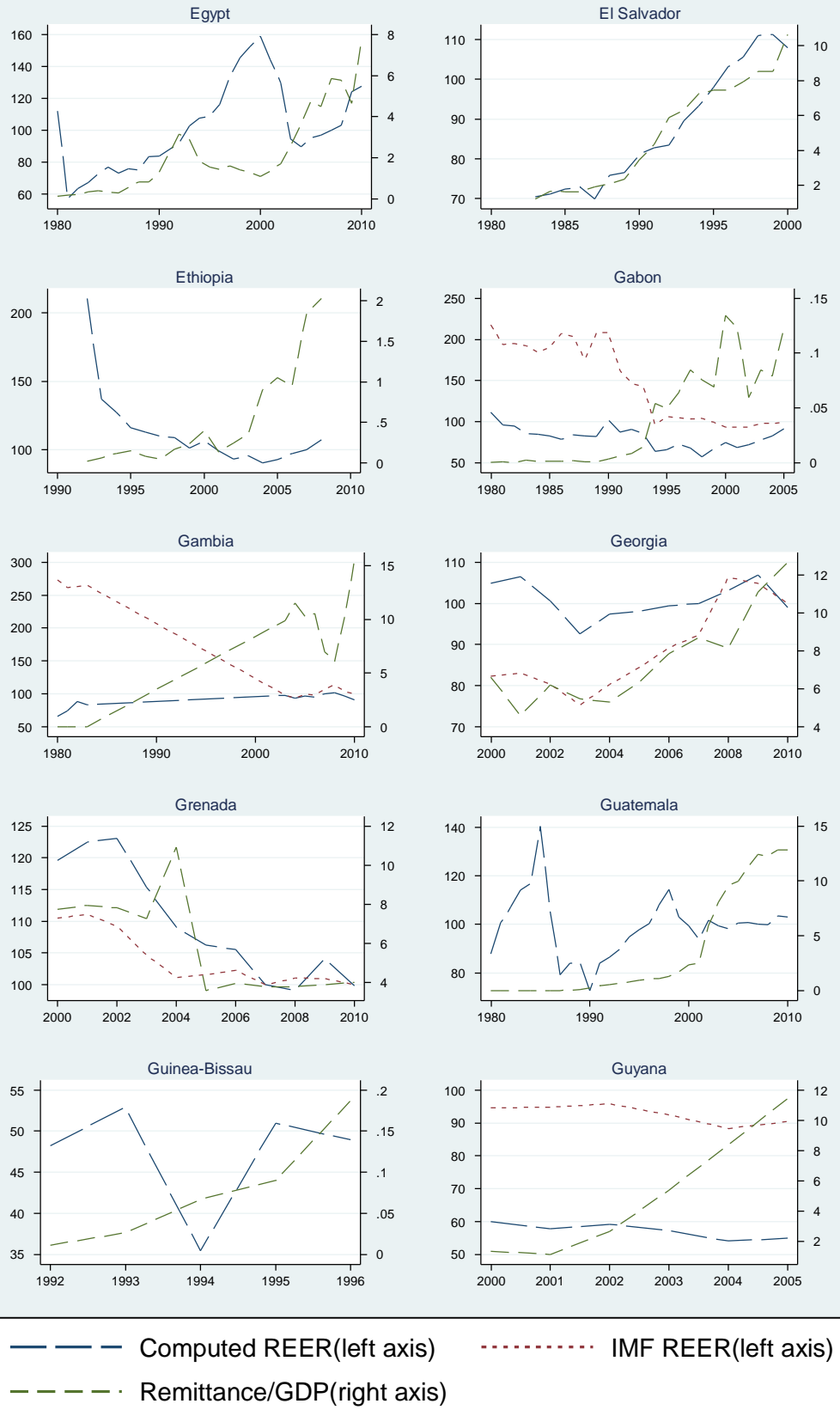


Figure 3.2 Computed REER vs IMF REER and remittances by country (contd.)



Figure 3.2 Computed REER vs IMF REER and remittances by country (contd.)

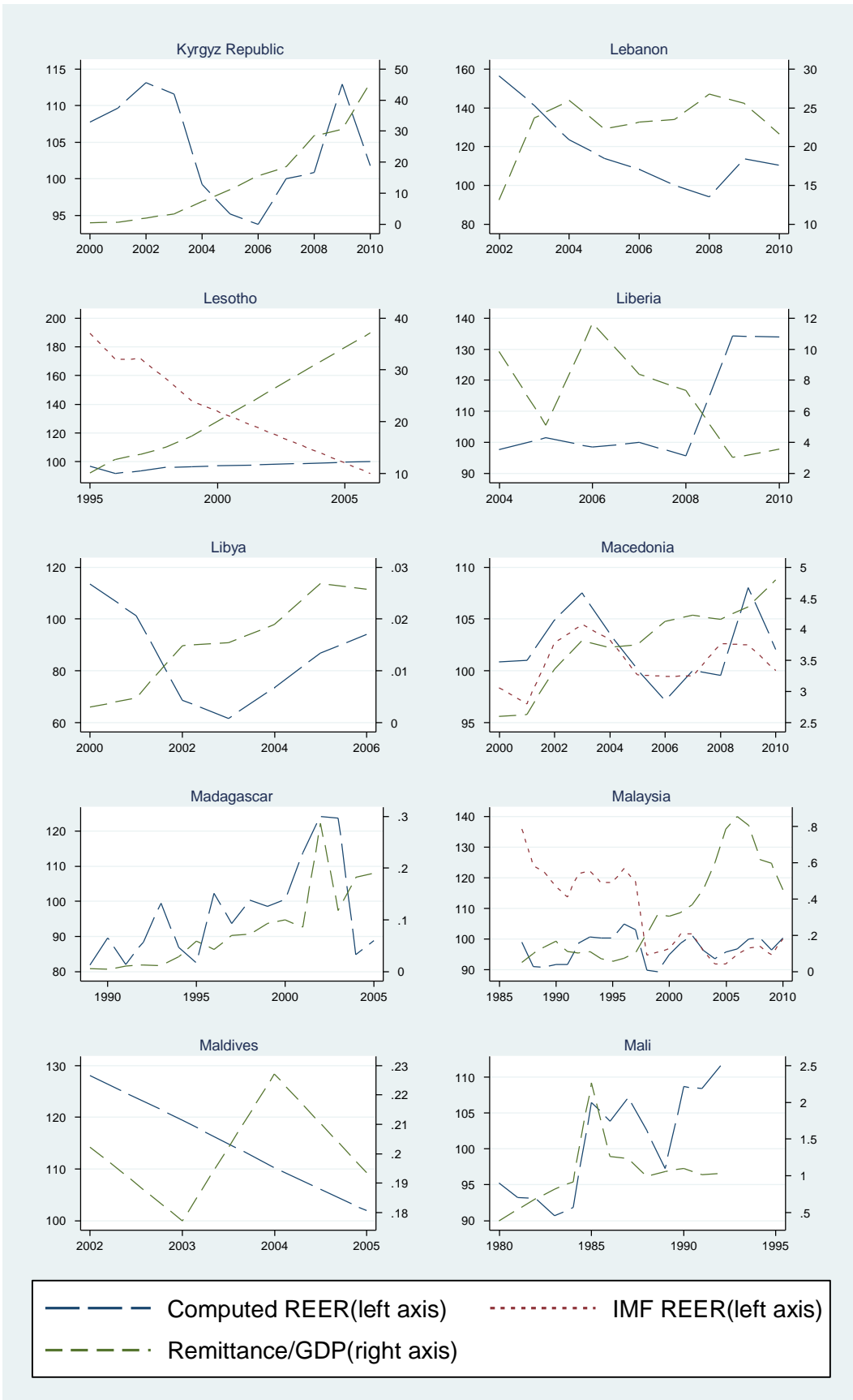


Figure 3.2 Computed REER Vs IMF REER and remittances by country (contd.)

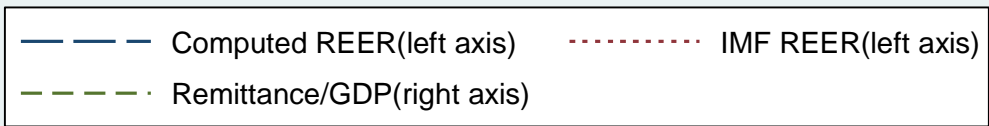


Figure 3.2 Computed REER vs IMF REER and remittances by country (contd.)

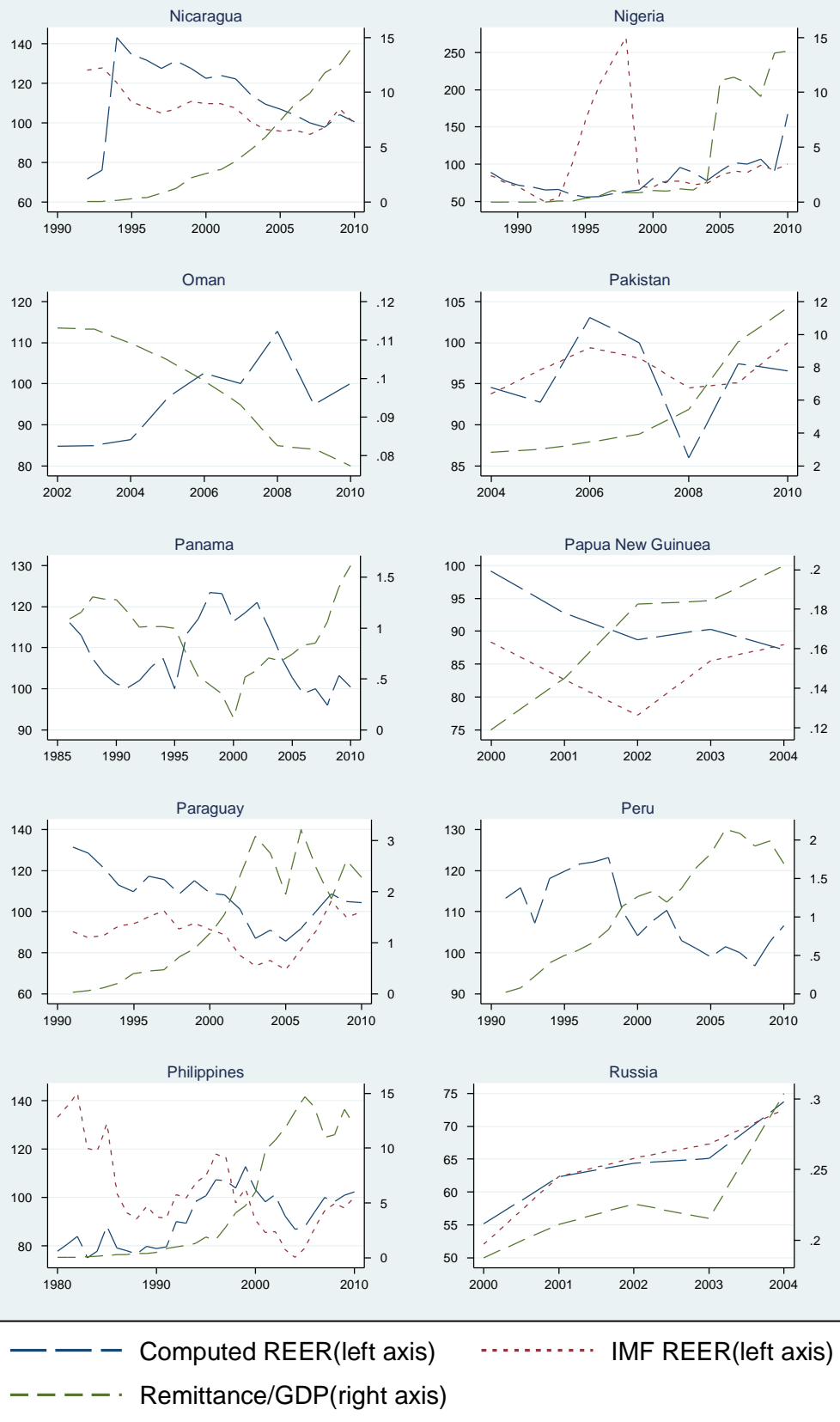




Figure 3.2 Computed REER vs IMF REER and remittances by country (contd.)

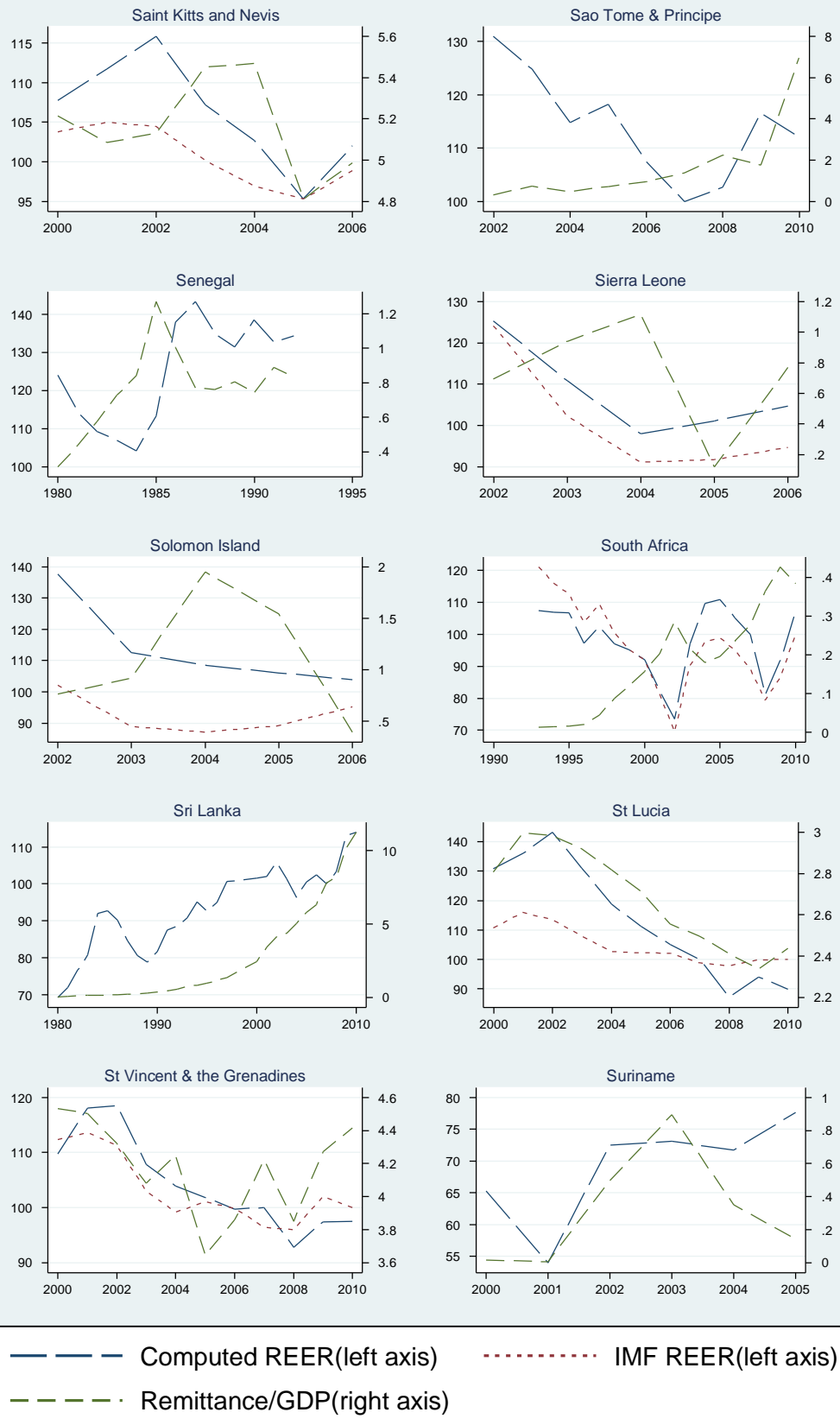


Figure 3.2 Computed REER vs IMF REER and remittances by country (contd.)

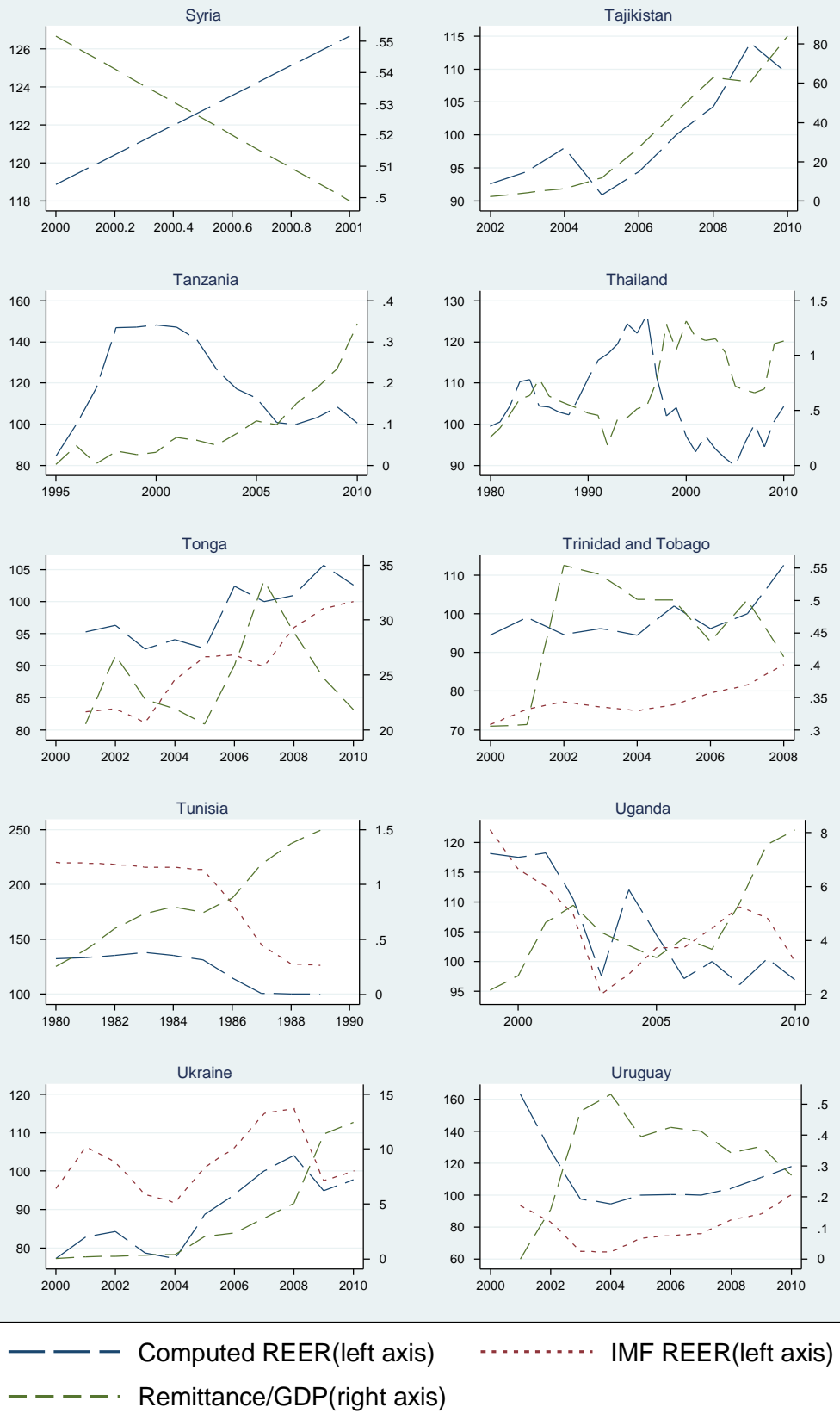
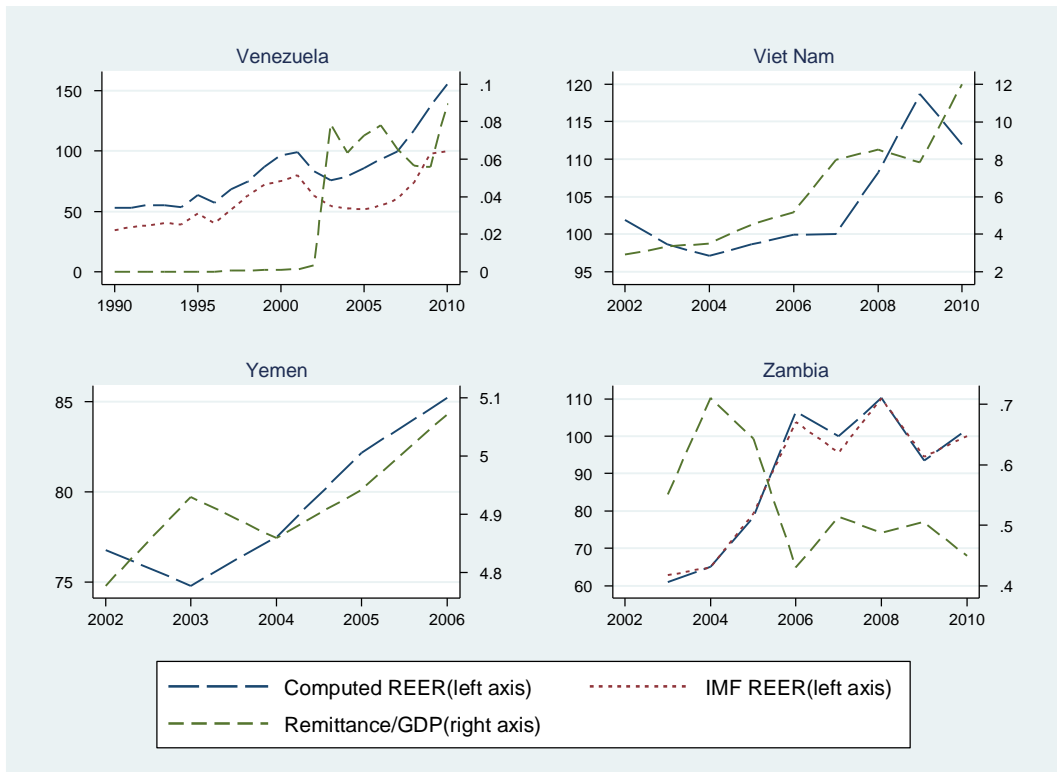


Figure 3.2 Computed REER vs IMF REER and remittances by country (contd.)



### 3.5 Estimation and results

This study utilizes the fixed effects and system generalized method of moments (SGMM) methods to estimate the model. The empirical model is based on the fixed effects model. The specification starts with a linear model,

$$y_{it} = \alpha + \mathbf{X}_{it}\beta_1 + \mu_i + \gamma_t + \epsilon_{it} , \quad i = 1, 2, \dots, N \quad t = 1, 2, \dots, T \quad (3.6)$$

where  $y_{it}$  is the dependent variable;  $\mathbf{X}_{it}$  is a  $(1 \times K_1)$  vector of time varying covariates;  $\alpha$ ,  $\beta_1$  are  $1+K_1$  parameters;  $\mu_i$  is the country-specific fixed effects;  $\gamma_t$  are the time or year dummies; and  $\epsilon_{it}$  is the idiosyncratic error. If the  $\mu_i$ s are correlated with the  $\mathbf{X}_{it}$ , the coefficients on the time-varying covariates  $\mathbf{X}_{it}$  can be consistently estimated by a regression on the first-differenced data or within-transformed data— which is popularly known as the fixed effects model. If the  $\mu_i$ s are uncorrelated with the  $\mathbf{X}_{it}$ , the coefficients on the time-varying covariates can be consistently and efficiently estimated using the feasible generalized least squares method— known as random-effects regression.

All of these estimators assume that  $E[\epsilon_{it}\epsilon_{is}] = 0$  for all  $s \neq t$ . That is, there is no serial correlation in the idiosyncratic errors, which would otherwise cause the standard errors to be biased and the estimates to be less efficient.

Table 3.2 presents the results of estimating Equation 3.6 using the full set of control variables and using the computed REER index as the dependent variable. The results show a positive sign of remittance-to-GDP ratio at a 10 percent level of significance. Thus, an increase of one percentage point in the remittance-to-GDP ratio will increase the REER index by 0.424 points with respect to the base year. In other words, an increase in remittance to GDP ratio by one percentage point, keeping all other variables constant, appreciates the real exchange rate index from 100 to 100.424. Thus, remittances lead to significant moderate increase in the real exchange rate of the recipient countries.

Regarding capital inflow variables, it is interesting to note that the coefficient of foreign direct investment variable is negative and significant at 5 percent level. The depreciating impact of FDI may be attributed to its more favourable impact on the tradable goods sector. Thus, an increase in the FDI will enhance the productivity of

the tradable sector and hence the price of tradables falls relative to the nontradables, which means real depreciation of the domestic currency. This result conforms with the earlier findings in case of several Asian and Latin American countries by Athukorala and Rajapatirana (2003).

The impact of official development assistance on the real exchange rate is not conclusive. This might be due to the fact that the different components of foreign aid might have different impacts on the tradable and non-tradable sectors. Similarly, the coefficient of per capita GDP is positive and significant, broadly lending the support to the Balassa-Samuelson hypothesis. Thus, an increase in the per capita GDP by US \$ 1000, for example, would increase the real effective exchange rate index by about 4.5 points. However, as remarked earlier, GDP per capita is a crude indicator of tradable sector productivity relative to the non-tradable sector across the developing and developing countries. The coefficient of trade openness has an expected and significant sign. Trade openness is taken as a proxy for trade liberalization, which tends to lower the cost of traded goods. Thus an increased openness will lead to the depreciation of the real exchange rate. The estimation results show that an increase of one percentage point in the total trade to GDP ratio will lead to a decline in the REER index by 0.272 points.

The impact of government expenditure is positive, though the coefficient is not significant. Thus, the coefficient tends to support weakly the hypothesis that government expenditure largely falls on the non-traded sector in developing countries. This increase in expenditure leads to an increase in price in the non-tradable sector, and therefore tends to appreciate the domestic currency. The terms of trade coefficient is positive and significant, indicating that the income effects dominates the substitution effect. An improvement in the terms of trade index by 1 unit increases the real effective exchange rate index by 0.158.

Regarding the policy variable, the ratio of reserve change to GDP has the perverse (positive) sign. This might be due to the possible endogeneity of the variable. For example, countries are more likely to accumulate reserves at a time when currency is already strong, and to lose reserves to defend the weakening currency (Phillips et al. 2014). Thus, countries adopt the 'leaning against the wind' policy to prevent the possible depreciation of the currency and this renders the variable endogenous.

Initially, I used the two instruments, 1) broad money supply to GDP to capture the crisis prevention motive, and 2) the U.S. real interest rate to capture the exchange rate stabilization motive as well as return on the reserves. However, these did not pass the weak instrument tests. So instead, I use these variables as control variables to capture the different motives for reserve accumulation. The coefficient on reserve accumulation becomes significant at the 11 percent level of significance.

With regard to the capital account openness index, the sign is positive and significant at the 10 per cent level. Thus, an increase in the capital account index by one unit increases the REER index by 2.40. Regarding the impact of exchange rate regime, those countries adopting fixed exchange rate regimes tend to have a more appreciated domestic currency. For example, from the estimation, we can interpret that countries adopting a fixed exchange rate regime tend to have a ten units higher REER, compared to a managed float, or wider exchange rate arrangement. The degree of exchange rate impact decreases as the countries move towards greater flexibility of exchange rate, as shown by the lower coefficient of 5.89.

I also interact remittance variable with a flexible exchange rate dummy. The coefficient for the exchange rate dummy is again negative and significant, confirming the patterns in Column 2. However, the coefficient of the interaction term is small compared to the exchange rate dummy, and not significant (though it has the anticipated sign).

The marginal effect of remittances reveals that a one percent increase in the remittances to GDP ratio in fixed effects exchange rate regime increases the REER index by about 0.47 and the effect is significant at the 5 percent level of significance. Similarly, a one percent increase in the remittance to GDP ratio leads to an increase in REER index by about 1.08, for countries with flexible exchange rate regimes, and the effect is significant at the 5 percent level of significance. Thus, in the case of the flexible exchange rate regime countries, since both nominal exchange rate and domestic price levels are free to adjust following an increase of remittances, the point estimates suggest that REER appreciates more than for those countries with a fixed exchange rate regime.

### **Table 3.2 Remittances and REER**

	(1)	(2)	(3)
Estimation method	Simple FE	FE with full controls	FE with interaction
Remittance /GDP (in %)	0.669*** (0.248)	0.464* (0.235)	0.467** (0.235)
ODA/GDP (in %)	-0.0124 (0.189)	0.0245 (0.157)	0.0214 (0.164)
FDI/GDP (in %)	-0.157 (0.149)	-0.183* (0.108)	-0.161* (0.100)
GDP per capita (current '000 USD)	5.71*** (1.09)	4.61*** (1.02)	4.83*** (1.07)
Trade openness (in %)		-0.277*** (0.0645)	-0.277*** (0.064)
Govt. expenditure/GDP (in %)		0.123 (0.282)	0.164 (0.250)
Terms of trade	0.093 (0.062)	0.144** (0.057)	0.139** (0.0589)
Real interest rate differential		-0.0345 (0.063)	-0.0374 (0.056)
Reserve change/GDP		0.019 (0.089)	0.0188 (0.089)
Exchange rate (category 2)		-4.745 (4.952)	
Exchange rate (category 3)		-10.55** (4.658)	
Exchange rate (category 4)		-10.20 (6.456)	
Exchange rate (category 5)		-14.97*** (4.217)	
Exchange rate (category 6)		-3.990 (6.268)	
Capital account openness (Chinn-Ito index)		2.301* (1.045)	2.078* (1.050)
Flexible exchange rate dummy (FER)			-9.413*** (2.766)
Remittance and FER interaction			0.619 (0.443)
Observations	2,117	1,478	1,478
R-squared	0.198	0.370	0.365
Number of countries	117	105	105
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

REER (computed) is the dependent variable. The regression include time dummies and a constant. Robust standard errors in parentheses. FE refers to the fixed effects.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The significant appreciation result of remittances on REER disappears if the REER indices computed by the IMF are used. To compare the results with the computed REER and the IMF indices, I re-estimate the regressions with fixed effects and full controls. Since the REER indices are available for fewer countries or years compared to the computed REER, I use the same sample for the regression with the computed REER to ensure the comparability of the results (Table 3.3).

The first column of the Table 3.3 shows that the impact of remittances on the REER computed by the IMF is not significant. The number of countries and observations dropped substantially compared to Table 3.3 as the REER data were available for fewer countries compared to the computed REER. To ensure the comparability of the results, Column 2 of the Table 3.3 shows the coefficients using the same sample as the first column. The result, becomes significant and positive if the computed REER is used as a dependent variable. The coefficient of remittances to GDP is higher than in the estimates using the full sample, which might be due to the smaller selected sample. Thus, the results demonstrate the critical importance of the method used to compute REER in driving the result for the impact of remittances on the REER.



**Table 3.3 Remittances and REER comparison**

VARIABLES	(1) FE with full controls (REER_IMF)	(2) FE with full controls (REER computed)
Remittance /GDP (in %)	0.0889 (0.493)	0.955*** (0.303)
ODA/GDP (in %)	-1.205*** (0.296)	-0.383 (0.386)
FDI/GDP (in %)	0.108 (0.284)	-0.422** (0.209)
GDP per capita (current USD)	4.93*** (0.00142)	4.70*** (0.00128)
Trade openness (in %)	-0.201* (0.101)	-0.296*** (0.0910)
Govt. expenditure/GDP (in %)	3.363*** (0.692)	0.0477 (0.440)
Terms of trade	0.0190 (0.100)	0.223*** (0.0609)
Real interest rate differential	-0.0481 (0.0764)	-0.0753 (0.0544)
Reserve change/GDP	0.355 (0.340)	-0.0625 (0.177)
Exchange rate (category 2)	-2.909 (4.323)	4.024 (4.195)
Exchange rate (category 3)	1.293 (5.581)	-0.614 (3.931)
Exchange rate (category 4)	-15.80 (15.36)	3.599 (5.107)
Exchange rate (category 5)	-20.50*** (5.911)	-10.35*** (3.854)
Exchange rate (category 6)	-0.348 (18.54)	2.894 (10.70)
Capital account openness (Chinn-Ito index)	8.039 (7.975)	-0.0489 (5.266)
Observations	725	725
R-squared	0.540	0.403
Number of countries	53	53
Country FE	Yes	Yes
Year FE	Yes	Yes

Robust standard errors in parentheses. REER\_IMF refers to the REER published by the IMF. Exchange rate categories (2-6) refer to the Itzetki et al. (2008) defacto classification of exchange rates (*see Appendix 3.3*). The regression include time dummies a constant. FE refers to fixed effects.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 3.5.1 A simple decomposition of REER effect

The impact of remittance inflows on the REER can be decomposed into two components: the change in nominal effective exchange rate (NEER); and the change in the relative prices of domestic goods to foreign goods ( $P_w/P_D$ ). The relative contribution of the REER appreciation can be obtained by separately running the regressions, with the logarithms of NEER and the domestic and foreign price indices as the dependent variables.

Table 3.4 presents the simple decomposition of the remittances impact on REER. It shows that one percentage point increase in the remittance to GDP ratio is associated with an appreciation of the REER by 0.43 percent.<sup>25</sup> A rise in the REER is accompanied by an increase in the domestic price level by 0.99 percent. It is interesting to note that the source of REER appreciation mainly comes from an increase in the domestic price level, in contrast to the depreciation of the nominal exchange rate. This increase more than offsets the decrease in the decrease in the NEER. The contribution of the foreign price in the REER appreciation is negligible as expected.

This result is consistent with the Dutch disease model—that is, an increase in remittance inflows increases the price of nontradables which in turn increases the domestic price level. However, it is interesting to note that an increase of one percentage point in the remittance to GDP ratio leads to a decline in the NEER by about 0.62 percent. Thus, this result shows that countries may adopt policies to prevent the possible appreciation of the REER by devaluing the currency (also known as the ‘leaning against the wind’ policy).

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<sup>25</sup> The actual coefficient is  $100 * (\exp(\text{coefficient}) - 1) \%$ .

**Table 3.4 Simple decomposition of the remittance on REER**

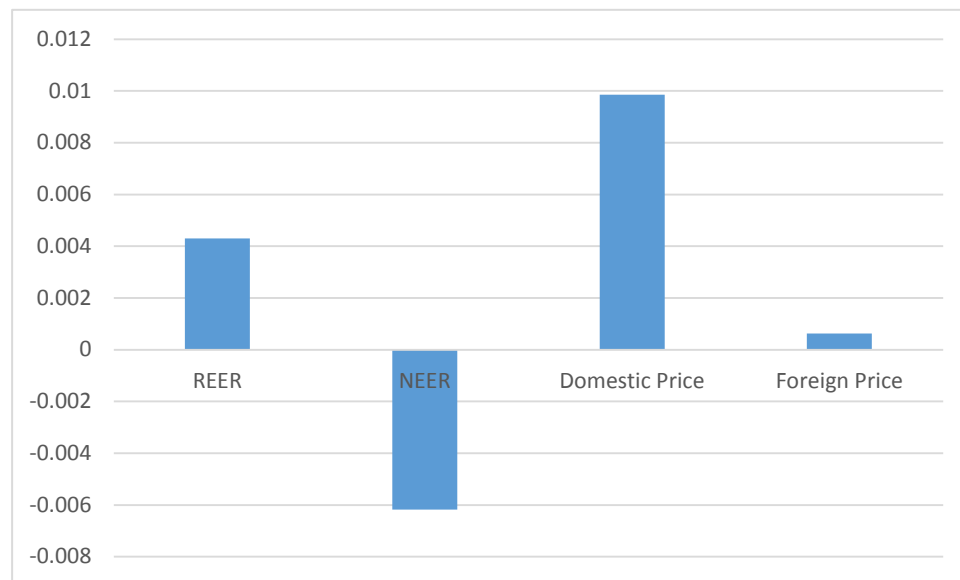
VARIABLES	(1) log(REER)	(2) log(NEER)	(3) log(domestic price)	(4) log(foreign price)
Remittance to GDP	0.00430* (0.00223)	-0.00618 (0.00482)	0.00985** (0.00390)	-0.000625 (0.00367)
Observations	1,478	1,478	1,478	1,478
R-squared	0.388	0.131	0.807	0.720
Number of country	105	105	105	105
Country Fixed effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

Robust standard errors in parentheses. Regressions include all control variables, time dummies and a constant (not reported).

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The results of this decomposition are depicted graphically in Figure 3.4. From the definition of the REER (Equation 3.2a) it follows that the sum of coefficients of the NEER and domestic price, and the negative coefficient of the foreign price should be equal to the REER.

**Figure 3.3 Decomposition of impact of remittances on REER**



Source: Author based on Table 3.4 in this study

### 3.6 Robustness check

This section presents the sensitivity of the results using 1) unit root tests, 2) sample containing the developed countries, 2) alternative definition of the RER and, 3) the results from the system GMM. First, to check for the stationarity, the pooled data for all the remittances and capital inflows variables are tested for the presence of a unit root, based on the assumption of trend and also without a trend in the variables. The augmented Dickey Fuller and Phillips-Peron unit root tests of all the variables reject the null hypothesis that all the panels contain unit roots. I also test for the presence of autocorrelation in the transformed variables, using the Wooldridge test (Wooldridge 2002). This confirms that there is no autocorrelation in the actual data used for the estimation.<sup>26</sup>

Second, I included the ten developed countries in the sample (see Appendix 3.4 for the list of developed countries).<sup>27</sup> The remittance to GDP ratio for the developed countries is much lower than for the developing countries. The estimation results show that remittance-to-GDP ratio is positive and significant.). The magnitude of remittance-to-GDP variable almost remains same at 0.464 compared to the restricted sample consisting of developing countries only. Other relevant variables also broadly conform with the sample consisting of developing countries only.

Third, I employ a different definition of REER, that is, the ratio of tradable to nontradable prices. Since the data for these prices are not available, a proxy for the ratio of tradable and nontradable output is taken. The tradable output is defined as the sum of the manufacturing and agricultural output as a share of GDP, while the share of services to GDP is defined as the nontradable output (Lartey et al. 2012). The rationale for this choice is that manufacturing and agricultural output may contain a sizeable portion of traded goods, whereas services is generally dominated by the nontradable component.

Tables 3.5 presents the regression results including nontradable-to-tradable output ratio as the dependent variable. The coefficient of remittance to GDP is

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<sup>26</sup> The time series nature of the panel data is less of a concern, as the number of years in the actual sample of estimation decreased substantially due to missing observations for several variables.

<sup>27</sup> Though I intended to include all the 32 developed countries in the sample, owing to missing data, only 10 developed countries could be added.

significant at one per cent level of significance, though it is higher than the earlier estimates. Official development assistance also has a positive impact on the nontradable-to-tradable output; however, the coefficient of FDI to GDP is not significant. All other explanatory variables have the correct signs (not shown).

**Table 3.5 Remittances and nontradables-to-tradables ratio**

VARIABLES	
Remittance /GDP (in %)	0.780*** (0.227)
ODA/GDP (in %)	0.391** (0.178)
FDI/GDP (in %)	0.112 (0.217)
GDP per capita (current USD)	1.93** (0.940)
Observations	1,338
Number of countries	96
R-squared	0.416
Country fixed effects	Yes
Year fixed effects	Yes

Robust standard errors in parentheses. The regression includes the full set of controls, time dummies and a constant (not reported).

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

### 3.6.1 Tackling endogeneity

The fixed effects estimation results may be biased due to the potential endogeneity problems. There can be several sources of bias. The first is the reverse causality running from real exchange rate change to remittance inflows. If the remittance senders are motivated by altruistic behaviour or investment incentive, then they might send more remittances when the exchange rate of the domestic currency depreciates. Thus, the remittance receiver will receive a greater amount of local currency. Also, the remittance receiver may also convert the foreign currency in anticipation of a possible future appreciation of the remittance recipients countries' currency. Moreover, if we assume that remittance is a decreasing function of domestic real income, measured in units of traded goods—in this case, a real exchange rate

depreciation reduces domestic real income (by reducing the traded-good value of non-traded goods production), and increases the level of remittances (Barajas et al. 2011). In both of these cases, the reverse causality would cause a downward bias in the estimated coefficient of remittance to GDP.

Moreover, central banks often intervene in the exchange rate market to maintain the peg, or to avoid excessive fluctuations in the exchange rate in response to REER changes. The change in reserves (included as an explanatory variable) is an imperfect measure of central bank intervention as the central banks have different motives (Mohanty & Berger 2013).

Tackling the potential endogeneity bias is not easy. Several studies have used instrumental variables for remittances. It is well known that the quality and magnitude of the coefficients depend on the types of instruments used, and the results are quite sensitive to the choice of the instruments. It is hard to defend the exclusion restriction of instruments which cannot be tested. In the absence of a strong and ‘patented’ instrument of remittances, I use the system GMM method (Table 3.6). This method utilizes the ‘internal’ instruments from the lags of the explanatory variables.

I assume that only the remittance variable is endogenous, and use all the available lags in the estimation. The coefficient of remittance is positive and significant, though lower than the fixed effects estimation method. The diagnostic tests for the system GMM shows that the model is adequately estimated. The number of instruments is lower than the number of groups or the number of countries in our case. Similarly, the Hansen test of over-identifying restriction shows that the results are robust, as the associated p-value is not too high. The Arellano-Bond test for AR(2) in the first differences test rejects the null hypothesis that there is no second order serial correlation in first differences at the 10 per cent level of significance. The coefficients of all other explanatory variables have expected signs and are significant. Thus, utilizing the system GMM method does not alter the signs and significance of the remittance variables.

**Table 3.6 Robustness check including full sample and System GMM**

VARIABLES	(1) Full sample	(2) SGMM
Remittance /GDP (in %)	0.464* (0.234)	0.228* (0.137)
ODA/GDP (in %)	0.0198 (0.157)	0.220*** (0.0778)
FDI/GDP (in %)	-0.175* (0.103)	-0.131 (0.102)
GDP per capita (current '000 USD)	4.53*** (-0.945)	1.67*** (-0.602)
Trade openness (in %)	-0.279*** (0.0637)	-0.136*** (0.0429)
Govt. expenditure/GDP (in %)	0.123 (0.281)	0.0327 (0.215)
Terms of trade	0.145** (0.0570)	0.185*** (0.0563)
Real interest rate differential	-0.0331 (0.0625)	0.00800 (0.0645)
Reserve change/GDP	0.0313 (0.0884)	-0.0543 (0.0995)
Exchange rate (category 2)	-4.691 (4.880)	-6.001 (3.649)
Exchange rate (category 3)	-10.24** (4.539)	-13.77*** (3.642)
Exchange rate (category 4)	-10.04* (6.208)	-11.58*** (4.076)
Exchange rate (category 5)	-14.89*** (4.153)	-20.89*** (4.301)
Exchange rate (category 6)	-3.831 (6.261)	-23.65** (10.61)
Capital account openness (Chinn-Ito index)	2.283* (1.406)	1.592* (0.892)
Observations	1,527	1,478
R-squared	0.370	
Number of countries	115	105
Country Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Number of instruments		85
Number of groups		105
Hansen test of over-identification restrictions, p-value		0.578
AR(2) in first difference p-value		0.126

Robust standard errors in parentheses. Regressions include a constant and time dummies.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 3.7 Conclusion

This chapter has undertaken an empirical analysis of the impact of remittances on the real exchange rate using the Dutch disease model to derive the estimation equation. The empirical analysis is based on a new REER index, which is more theoretically consistent compared to the standard IMF index widely used in the previous studies.

The empirical evidence shows that remittance inflows can lead to significant RER appreciation compared to official development assistance whereas foreign direct investment leads to depreciation of the RER. However, I do not find an evidence of positive impact of remittances on the IMF's REER series. The estimations suggests that a one percentage point increase in remittance to GDP ratio leads to an increase of about 0.5 and 1.08 increase in the REER indices for countries adopting the fixed and flexible exchange rate respectively. There is some evidence that as countries move towards more flexible exchange rate regimes, the magnitude of the impact of remittances on REER increases. A further decomposition of the results shows that the REER appreciation occurs mainly through nominal exchange rate appreciation for countries with flexible exchange rate regimes. However, for countries adopting the fixed exchange rate regime, the impact is mainly felt through the increase in domestic price.



### Appendix 3.1 Variables: definitions and sources

Variables	Definition	Source
Remittances	Sum of workers' remittance, compensation of employees and migrants' transfers in the balance of payments account	World Development Indicators (2014)
Bilateral exports and imports	Bilateral merchandise exports and imports	World Integrated Trade Solution (WITS) database
Nominal exchange rate	Annual average based on monthly averages in terms of local currency units relative to the US dollar	Penn World Table, Version 8 and World Development Indicators (2014)
GDP deflator	The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.	Author's calculation based on the World Development Indicators
Wholesale price index	Wholesale price index refers to a mix of agricultural and industrial goods at various stages of production and distribution	World Development Indicators
Net official development assistance	Disbursements of loans made on concessional terms (net of repayments of principal) and grants	World Development Indicators
Net foreign direct investment	Net inflows of investment to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor. This series shows net inflows (new investment inflows less disinvestment).	World Development Indicators
International reserves minus gold	Foreign reserves minus gold holdings	Lane-Milesi Ferretti database
GDP per capita	Real GDP divided by population	World Development Indicators

### Appendix 3.1 Variables: definitions and source (continued)

Variables	Definition	Source
Government expenditure to GDP	General government final consumption expenditure includes all government current expenditures for purchases of goods and services	World Development Indicators
Exchange rate regimes	IMF coarse classification of exchange rate regime	Exchange rate regime Ilzetzi et al. (2008) classification database
Trade openness	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Development Indicators
Capital account openness index	Chinn-Ito Index	Chinn-Ito database
Real interest rate differential	Difference of real interest rate between the country and the US.	Author's calculation based on the World Development Indicator
Manufacturing output	Share of manufacturing output in GDP (%)	World Development Indicators
Agricultural output	Share of agricultural output in GDP (%)	World Development Indicators
Services output	Share of services output in GDP (%)	World Development Indicators
Terms of trade	Percentage ratio of the export unit value indexes to the import unit value indexes.	World Development Indicators

### **Appendix 3.2: Ilzetzi, Riehart and Rogoff (2008) exchange rate regime classification**

The 'coarse' classification codes are

Codes

- 1 No separate legal tender
- 1 Pre announced peg or currency board arrangement
- 1 Pre announced horizontal band that is narrower than or equal to +/-2%
- 1 De facto peg
- 2 Pre announced crawling peg
- 2 Pre announced crawling band that is narrower than or equal to +/-2%
- 2 De facto crawling peg
- 2 De facto crawling band that is narrower than or equal to +/-2%
- 3 Pre announced crawling band that is wider than or equal to +/-2%
- 3 De facto crawling band that is narrower than or equal to +/-5%
- 3 Moving band that is narrower than or equal to +/-2% (i.e., allows for both appreciation and depreciation over time)
- 3 Managed floating
- 4 Freely floating
- 5 Freely falling
- 6 Dual market in which parallel market data is missing.

### Appendix 3.3 Coverage of remittance data

Country	Year coverage	Country	Year coverage
Afghanistan	2008-2010	Lao PDR	1986-2010
Albania	1992-2010	Lebanon	2002-2010
Algeria	1970-2010	Liberia	2004-2010
Angola	2008-2010	Libya	2000-2006
Antigua and Barbuda	1986-2010	Macedonia, FYR	1996-2010
Argentina	1990-2010	Madagascar	1974-2005
Armenia	1995-2010	Malaysia	1975-2010
Azerbaijan	1995-2010	Maldives	1983-2006
Bangladesh	1976-2010	Mali	1975-2010
Belarus	1993-2010	Malta	1971-2010
Belize	1984-2010	Mauritania	1975-1998
Bhutan	2006-2010	Mauritius	1994-2010
Bolivia	1985-2010	Mexico	1985-2010
Bosnia and Herzegovina	1998-2010	Moldova	1995-2010
Botswana	1975-2010	Mongolia	1998-2010
Brazil	1993-2010	Morocco	1975-2010
Burkina Faso	1974-2010	Mozambique	1987-2010
Burundi	2004-2006	Namibia	1990-2010
Cabo Verde	1977-2010	Nepal	1993-2010
Cambodia	1992-2010	Nicaragua	1992-2010
Cameroon	1979-2010	Nigeria	1987-2010
Central African Republic	1980-1993	Oman	1980-2010
Chile	1983-2009	Pakistan	1976-2010
China	1982-2010	Panama	1977-2010
Colombia	1976-2010	Papua New Guinea	1976-2010
Comoros	1980-1995	Paraguay	1975-2010
Costa Rica	1977-2010	Peru	1990-2010
Cote d'Ivoire	1975-2010	Philippines	1977-2010
Croatia	1993-2010	Russian Federation	1994-2010
Djibouti	1991-2010	Samoa	1977-2010
Dominica	1976-2010	Sao Tome and Principe	1997-2010
Dominican Republic	1970-2010	Saudi Arabia	2005-2010
Ecuador	1976-2010	Senegal	1974-2010
Egypt, Arab Rep.	1977-2010	Seychelles	1989-2010
El Salvador	1976-2010	Sierra Leone	1987-2006
Eritrea	1998-2000	Solomon Islands	1999-2010
Ethiopia	1977-2010	South Africa	1970-2010
Gabon	1978-2005	Sri Lanka	1975-2010

### Appendix 3.3 Coverage of remittances data (continued)

Country	Year coverage	Country	Year coverage
Gambia, The	1978-2010	St. Kitts and Nevis	1980-2006
Georgia	1997-2010	St. Lucia	1983-2010
Grenada	1986-2010	Sudan	1985-2010
Guatemala	1977-2010	Suriname	1994-2010
Guinea-Bissau	1991-2006	Syrian Arab Republic	1977-2010
Guyana	1982-2010	Tajikistan	2002-2010
Honduras	1974-2010	Tanzania	1978-2010
Hong Kong SAR, China	1998-2010	Thailand	1975-2010
Iceland	1976-2010	Tonga	1975-2010
India	1975-2010	Trinidad and Tobago	1975-2010
Indonesia	1983-2010	Tunisia	1976-2010
Iran, Islamic Rep.	1993-2010	Turkey	1992-2010
Iraq	2005-2010	Turkmenistan	1996-1996
Israel	1983-2010	Uganda	1999-2010
Jamaica	1976-2010	Ukraine	1996-2010
Jordan	1972-2010	Uruguay	2001-2010
Kazakhstan	1995-2010	Vanuatu	1982-2006
Kenya	1970-2010	Venezuela, RB	1989-2010
Korea, Rep.	1976-2010	Vietnam	2000-2010
Kuwait	2010-2010	Yemen, Rep.	1990-2010
Kyrgyz Republic	1993-2010	Zambia	2003-2010
Lesotho	1994-2006		

### Appendix 3.4 List of countries in the regression sample

Developing countries		Developed countries	
Albania	Guyana	Russia	Bulgaria
Algeria	Honduras	Saint Kitts and Nevis	Cyprus
Angola	Hong Kong	Saint Lucia	Czech Republic
		Saint Vincent and the Grenadines	Estonia
Antigua and Barbuda	India	Sao Tome and Principe	Hungary
Argentina	Indonesia	Senegal	Latvia
Armenia	Iran	Sierra Leone	Lithuania
Azerbaijan	Israel	Solomon Islands	Poland
Bangladesh	Jamaica	South Africa	Slovakia
Belarus	Jordan	Sri Lanka	Slovenia
Belize	Kenya	Suriname	
Bhutan	Korea, South	Syria	
Bolivia	Kyrgyzstan	Tajikistan	
Bosnia and Herzegovina	Lebanon	Tanzania	
Botswana	Lesotho	Thailand	
Brazil	Liberia	Tonga	
Burkina Faso	Libya	Trinidad and Tobago	
Burundi	Macedonia	Tunisia	
Cameroon	Madagascar	Uganda	
Cape Verde	Malaysia	Ukraine	
Central African Republic	Maldives	Uruguay	
Chile	Mali		
China, People's Republic of	Malta	Venezuela	
Colombia	Mauritania	Vietnam	
Costa Rica	Mauritius	Yemen	
Cote d'Ivoire (Ivory Coast)	Mexico	Zambia	
Croatia	Moldova		
Djibouti	Mongolia		
Dominica	Morocco		
Dominican Republic	Mozambique		
Ecuador	Namibia		
Egypt	Nepal		
El Salvador	Nicaragua		
Ethiopia	Nigeria		
Gabon	Oman		
Gambia, The	Pakistan		
Georgia	Panama		
	Papua New Guinea		
Ghana	Paraguay		
Grenada	Peru		
Guatemala	Philippines		
Guinea-Bissau			

### Appendix 3.5 Summary statistics of variables

Variable		Mean	Std. Dev.	Min	Max
Real effective exchange rate	overall	101.90	20.92	35.43	219.10
	between		17.17	47.30	161.25
	within		14.73	46.86	200.09
Net remittance/GDP	overall	3.93	6.54	0.00	51.99
	between		6.79	0.00	30.29
	within		3.08	-20.41	26.41
Net ODA/GDP	overall	3.14	8.17	-2.10	160.17
	between		9.54	0.00	83.53
	within		4.32	-44.77	79.78
Net FDI/GDP	overall	3.04	5.29	-12.19	59.27
	between		4.66	-1.37	23.15
	within		3.59	-17.48	41.46
GDP per capita	overall	2771	3462	110	25809
	between		3973	141	25065
	within		1369	-3343	12635
Trade openness	overall	76.47	39.17	10.95	364.59
	between		40.22	23.70	289.13
	within		13.86	9.72	151.94
Government expenditure/ GDP	overall	14.08	5.46	3.22	45.96
	between		5.36	4.90	34.60
	within		2.67	2.46	42.02
Terms of trade index	overall	102.34	31.27	24.98	323.31
	between		26.65	54.44	287.60
	within		15.70	44.71	206.97

### Appendix 3.5 Summary statistics of variables (actual sample), continued

Variable		Mean	Std. Dev.	Min	Max
Real interest rate differential	overall	3.47	11.32	-55.97	90.82
	between		7.40	-14.95	43.20
	within		8.76	-66.63	75.66
Change in reserves/GDP	overall	2.00	4.31	-17.11	43.33
	between		2.59	-0.45	18.24
	within		3.70	-18.72	37.88
Capital account openness Index (normalized)	overall	0.43	0.33	0.00	1.00
	between		0.30	0.00	1.00
	within		0.19	-0.31	1.11
Capital account openness Index	overall	-0.02	1.40	-1.88	2.42
	between		1.31	-1.88	2.42
	within		0.80	-3.19	2.90



### Appendix 3.6 Correlation coefficients among major explanatory variables

	<i>REER</i>	<i>Remittance /GDP (in %)</i>	<i>ODA/GDP (in %)</i>	<i>FDI/GDP (in %)</i>	<i>GDP per capita (current USD)</i>	<i>Trade openness (in %)</i>	<i>Govt. expenditure/GDP (in %)</i>	<i>Terms of trade</i>	<i>Real interest rate differential</i>	<i>Reserve change/GDP</i>	<i>Capital account openness index</i>
REER	1.00										
Remittance /GDP (in %)	0.01	1.00									
ODA/GDP (in %)	0.05*	0.20***	1.00								
FDI/GDP (in %)	0.06*	0.25***	0.45***	1.00							
GDP per capita (current USD)	0.15***	-0.07**	-0.18***	0.21***	1.00						
Trade openness (in %)	-0.08***	0.16***	0.07**	0.31***	0.31***	1.00					
Govt. expenditure/GDP (in %)	-0.02	0.05*	0.09***	0.05*	0.10***	0.28***	1.00				
Terms of trade	0.34***	0.01	0.04	0.00	-0.02	-0.03	-0.04	1.00			
Real interest rate differential	0.05*	0.03	0.07**	0.03	-0.02	-0.09***	0.02	-0.08**	1.00		
Reserve change/GDP	-0.07**	0.09***	0.05*	0.12***	0.07**	0.16***	0.06*	-0.05*	-0.12	1.00	
Capital account openness index	0.08***	0.12***	0.12***	0.21***	0.26***	0.24***	-0.03	-0.08**	0.19***	0.03	1.00

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

## Chapter 4

# Are expenditure patterns different for households receiving international remittances? Evidence from Nepal

### Abstract

*This paper examines differences in patterns of consumption expenditure between households who receive remittances and those who do not. The analysis is based on a panel dataset culled from three rounds of nationally representative household surveys of Nepal. The estimations take into account the possible endogeneity of remittances using an instrumental variable approach. The findings suggest that remittances reshape household demand in ways that are independent of total consumption, and remittances-receiving households devote a higher share of total consumption on education and health compared to non-remittances-receiving households.*

## 4.1 Introduction

Nepal is one of the top five remittance-receiving countries in the world, measured as a percentage of GDP (World Bank 2014). The ratio of remittances to GDP has been more than 10 percent of GDP since 2001 and exceeded more than 20 percent in recent years and are a major source of income for many households. The Nepal Living Standard Survey (NLSS) 2011 estimates that around 56 percent of households receive either internal or external remittances. Among the remittances-receiving households, around 80 percent of the remittance inflows come from abroad (Central Bureau of Statistics 2011). Apart from the macroeconomic impact of the remittances, they have contributed to a substantial decrease in poverty (Acharya & Leon-Gonzalez 2012; Lokshin et al. 2007).

Despite the importance of remittances in Nepalese economy, the literature on the microeconomic impact of remittances is scant. The role in reducing poverty and increasing welfare crucially depends on how remittances affect the consumption behaviour of households. Though the role of remittances in reducing poverty has been

recognized, there is also a general perception that remittances are being frittered away in unproductive consumption such as luxury imported items. Moreover, theory suggests that remittances might induce behavioural changes in households, and this may impact consumption. This study attempts to analyse the impact of international remittances on the expenditure patterns of households in Nepal, utilizing the country's most comprehensive household survey data.

The contribution of this study is threefold. It presents the first causal evidence of the impact of remittances on consumption patterns in Nepal. I use the instrumental variable approach to address the possible endogeneity between remittances and consumption patterns. Second, the study attempts to construct a panel dataset of all three rounds of the Nepal Living Standard Surveys (NLSS) conducted in 1995, 2003 and 2010.<sup>28</sup> Third, I construct the consumption aggregates of major expenditure items in each survey round.

Three key findings emerge from the study. First, international remittances exert a multifarious impact on household consumption patterns and induce behavioural change in the households. Thus, remittances reshape consumption pattern which is independent of the total household consumption. Second, the study finds some evidence that remittances-receiving households spend a higher share of total consumption on education, durable goods and health. This finding suggests that remittances are not used, on average, on ostentatious goods as previously perceived. This also supports the view that remittances play an important role in human capital formation at the household levels. Third, remittances are often an outcome of joint decisions of a household to send its members as a migrant, and therefore, it is an endogenous choice. I use the instrumental variable approach to identify the effects of remittances from unobservable households' decisions which can both impact consumption and remittances behaviour.

The remainder of the chapter is structured as follows. Section 4.2 provides a brief background of international labour migration and remittances in Nepal. Section 4.3 reviews the theoretical and empirical literature on the impact of remittances on household consumption and expenditure. Section 4.4 discusses the empirical model

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<sup>28</sup> However, panel components are only available for the two consecutive rounds in the survey.

followed by the data sources in Section 4.5. Section 4.4.56 presents the estimation method for the empirical model. Section 4.7 discusses the empirical results, followed by several robustness checks in Section 4.8. Finally, Section 4.9 concludes.

## **4.2 Background**

The history of labour migration in Nepal dates back more than two centuries when Nepalese went to Lahore to join the army of the Sikh ruler Ranjeet Singh (Seddon et al. 2002). However, the first recruitment of the Nepalese Gurkhas in the British Army in 1815-1816 marks the formal beginning of regular migration (Seddon et al. 2002). Due to the geographical proximity, and economic and cultural ties, large numbers of Nepalese go to India for seasonal as well as long-term employment. However, with the advent of globalization more Nepalese are going to other destinations primarily the Gulf countries, Malaysia and other developed countries.

While Nepal has a long tradition of overseas employment, other factors have contributed to an increase in labour migration in recent years. Starting in the early 19th century, Nepalese have served in various armies in pre-colonial and colonial India. This tradition continues and Nepalese continue to be employed in the Indian and British armed forces. Earnings and pensions from these soldiers form a sizeable portion of remittances.

Despite the long history of migration, the data on the number of Nepalese working abroad are patchy. The number is harder to estimate in the case of Nepalese going to India due to the open and porous border. Seddon et al. (2002), citing several other studies and based on their own research, argue that official statistics grossly underestimate the number of migrants and remittances received by the country, mainly due to illegal migration and remittances sent through informal channels. Moreover, the population censuses of Nepal have also underestimated the number of migrants due to an inaccuracy in accounting for the seasonal migration (The World Bank 2011a, p. 3).

Table 4.1 shows the migrant (the absentee population<sup>29</sup>) according to various population censuses.

**Table 4.1 Foreign migrant workers (absentee population) in Nepal (1942-2001)**

<b>Year</b>	<b>Total population</b>	<b>Migrants</b>	<b>Migrants (% of total)</b>	<b>Male</b>	<b>Female</b>
1942	628,3649	87,722	1.4		
1952/54	847,3478	198,120	2.3	173,619	24,501
1961	974,1466	328,470	3.4		
1981	15,425,816	402,977	2.6	328,448	74,529
1991	19,149,387	658,290	3.4	548,002	118,288
2001	23,499,115	762,181	3.2	679,489	82,712

*Source: World Bank (2011)*

The migration received a further impetus after the 1990s when a large number of Nepalese started going to the Middle East and Malaysia, following the high labour demand in these countries. This was also prompted by the Nepalese Maoist insurgency, sluggish economic growth and reduced opportunities for employment domestically. Consequently, the amount of remittance inflows to Nepal has increased steadily over the last two decades. These remittances provided a cushion and help maintain the macroeconomic stability (The World Bank 2011a).

As a result of rapid population and labour force expansion along with inadequate growth, the absorptive capacity of the domestic economy has been stretched. With limited arable land, landlessness is pervasive and the number of landless households has steadily increased in the agricultural sector. In the non-agricultural sector, the slowdown in growth (especially since 2000/01) due to the insurgency and exogenous shocks has further retarded the pace of employment creation. The armed conflict has also created difficult living and security conditions, especially in the rural areas (Adhikari 2011; Pant 2008).

<sup>29</sup> An absentee person is defined as an individual who stayed away more than six months during the previous year of the respective surveys.

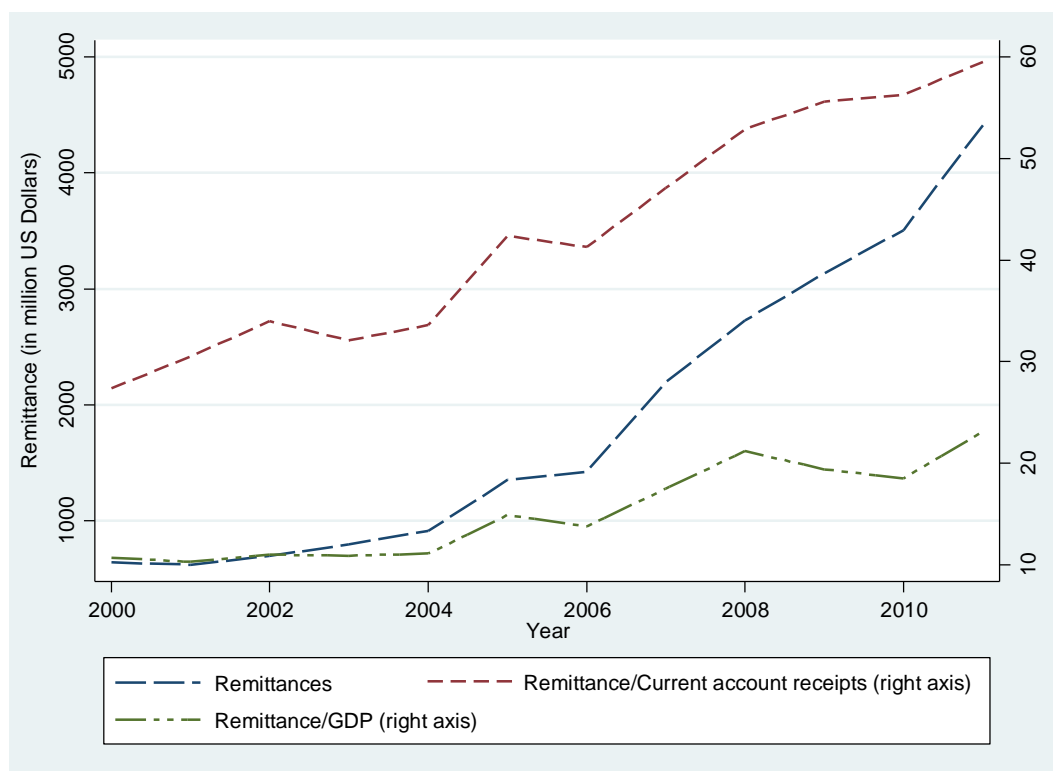
An increasingly larger share of remittances now comes from countries other than India, reflecting changing migration patterns and accompanied by the higher wages in these countries. Moreover, the composition of skills of the labour flows is different for each destination. While migrants to the Middle East are employed mostly as security personnel, chauffeurs, and construction workers, the demand from South East Asian countries is in industrial enterprises. Monthly earnings for these workers are higher than those of Nepalese workers in India(Pant 2008).

The inflow of foreign remittances (or international remittances)— that is, remittances sent home by Nepalese working abroad— has been a major contributor to maintaining the positive current account balance, as well as the overall balance of payments position (Figure 4.1).<sup>30</sup> The ratio of foreign remittances to GDP reached around 23 percent, making Nepal one of the top five countries in the world.

Figure 4.1 Remittance inflows in Nepal

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<sup>30</sup> The comparable series for remittances in Nepal are available only from the year 2000 and onwards. The inward remittances figures in Nepal is taken from the balance of payment (BOP) statistics published by Nepal Rastra Bank (NRB) which compiles data based on the balance of payments fifth manual by the IMF. The compilation of the BOP statistics is based on the concept of ‘residents’ defined as people who come to an economy and stay there, or are expected to stay, for a year or more. This poses problems when accounting for the seasonal and short-term migrants from Nepal who go to India and elsewhere and would not be defined as migrants. Moreover, due to the open and porous border with India, a significant number of Nepalese who go to India bring back remittances informally (NRB 2008). While the NRB makes some adjustment for the remittances that potentially are sent through informal channels (such as personal carriage and ‘hundi’) the remittances figure may well understate the true remittance figure.



International remittances are a major source of income for many households in Nepal. (Table 4.2). International remittances are increasing much faster than the domestic remittances or the remittances sent by the family members working inside Nepal (domestic remittances). Among the remittances-receiving households, the share of remittances from international or foreign sources contributed more than 80 percent of total remittances. For comparison purposes, Table 4.2 also presents the summary statistics for domestic remittances and remittances from India, which is the destination for the largest number of migrants from Nepal.

Among the remittances-receiving households, these are a major source of non-farm income. About 12 percent of the poorest quintile households receive remittances, whereas for the richest quintile, the figure is around 31 per cent. The share of remittance income among the bottom and top quintile is around 29 percent and 35 percent respectively (Central Bureau of Statistics 2011, p. 84).

**Table 4.2 Summary statistics of external and internal remittances in Nepal**

Description	Nepal Living Standards Surveys		
	1995/96	2003/04	2010/11
Total remittance received (million NRs)	12,957.8	46,365.5	259,088.5
Percent of all households receiving remittances	23.4	31.9	55.8
Average remittances per recipient household (NRs)	15,160	34,698	80,436
Share of remittances in total household income	26.6	35.4	30.9
Source-country composition of remittances			
India	32.9	23.2	11.3
within Nepal	44.7	23.5	19.6
Other countries	22.4	53.3	69.1

*Notes:* Values in Nepalese rupees (NRs). *Source:* Compiled from Nepal Central Bureau of Statistics (CBS),

*Nepal Standard Living Survey 2010/11, Statistical volume II, p.80*

### **4.3 The impact of remittances on household consumption and expenditure: Theory and empirical evidence**

The impact of the remittances on the domestic economy crucially depends on the use of remittances by the households. The New Economics of Labour Migration (NELM) emphasizes the role of joint household decisions in migration and consequently the decision to send remittances (Stark & Blackwell 1991; Stark & Bloom 1985). There is a conflicting view regarding how the remittances are spent. It is sometimes argued that remittances are frittered away in conspicuous consumption and ostentatious imported goods in the economy. However, some researchers show that remittances are used for human capital formation. Thus, the use of remittances by migrant households is an empirical issue.

There are generally three strands of thought regarding the use of remittances by the households (Adams & Cuecuecha 2010). The first and the most prevalent view based on the behavioural assumption of microeconomic theory is that remittances are fungible (Christiaensen & Pan 2012). Thus, households do not distinguish between different sources of income. In other words, a household pools together all the sources of income and makes decisions on expenditure based on the total income, rather than



different sources of income. Thus, the marginal propensity to consume (MPC) is independent of the sources of income.

The second and more recent view, based on cognitive psychology, holds that the receipt of remittances causes behavioural changes at the household level (Adams & Cuecuecha 2010; Christiaensen & Pan 2012). This view contends that individuals and households compartmentalize different sources of income and use mental accounting when spending their income. The mental accounting approach also helps to clarify the seemingly irrational spending behaviour of household consumption. A review of literature by (Christiaensen & Pan 2012) reports various reasons for the use of mental accounting such as the 'flypaper' or 'labelling' effect, assignment of different MPCs as a self-control device and the level of effort exerted in obtaining the income. In particular they study the effect of earned and unearned income on consumption patterns in China and Tanzania. They find that people tend to spend the unearned income on less basic consumption items such as tobacco, non-staple items and other expenses, in contrast to spending earned income on more basic consumption items and education. Similarly, using the mental accounting approach to study the impact of remittances on household consumption behaviour in Malawi, Davies et al. (2009) find that remittance income exhibits a lower MPC than other income sources, and remittances are used more to fund education.

The differential impact of remittances and other sources of income on household behaviours can arise due to the moral hazard problem between the remittance senders and recipients (Barham & Boucher 1998; Chami et al. 2003). First, recipient households might lower their work effort due to the transfers sent by the migrant household member. Second, recipient members substitute remittances for other sources of income.

The third and more recent view is based on permanent income hypothesis which postulates that as remittances represent a transitory type of income, households tend to spend the remittance income more at the margin on human and physical capital investment (Adams & Cuecuecha 2010; Friedman 1957; Modigliani & Brumberg 1954). Citing several studies, these authors argue that spending behaviour of remittances depends on the complex interplay between households' socio-economic

characteristics and the emotional feelings invoked due to the level of efforts, as a self-controlling device and demonstration effects.

Remittances can also affect household expenditure through several channels, such as information from migration, uncertainty, and risk aversion and preferences. If the households receive information from migrants sending remittances, this might affect expenditure behaviour. For example, households might expand their consumption basket, which in turn generates demand for new goods, or through the adoption of better technologies of producing goods or services at home. Remittances received may also relax credit constraints on household production and influence investment and reallocate expenditure.

Chami et al. (2003), citing several other studies, argue that there are three stylized facts to be gleaned from the literature. First, a significant amount (or majority) of the remittance is spent on consumption. Second, a significant, though smaller, amount of the remittance is saved or invested. Finally, the household savings and investment may not be productive to the economy. Therefore, he argues, remittances are used to finance a family's consumption and increase their stock of wealth, but not necessarily that of the overall economy. Similarly, De Haas (2007) reviews several studies which conclude that a significant share of remittance income is spent on consumption only and, therefore, has a detrimental effect on the economic growth of the recipient countries.

Barajas et al. (2009) argue that, in their impact on household expenditure patterns remittances are different from other private capital flows. They note that even though remittances might ease the credit constraints and provide macroeconomic stability for capital accumulation, these effects may not materialize, and even if they do it need not be a positive effect. The paper contends that since remittances are compensatory in nature, households with a higher marginal propensity to consume are more likely to receive remittances, and hence they may not invest significantly. Second, if the households perceive remittances as a permanent source of income, they tend to increase consumption rather than investment, despite the presence of credit constraints. Third, if the recipient country's financial markets are developed and well integrated with the world financial markets, this might obviate the role of remittances in easing credit constraints and may not stimulate investment. Moreover, remittances

are spent in ways similar to other sources of income, based on the hierarchy of needs and mainly used for consumption (OECD 2005). Thus, Lowell and de la Garza (2000) argue that households spend their income based on the hierarchy of needs whatever the sources of income, and until the households reach a certain threshold of income, they exhibit similar expenditure pattern.

In contrast, Adams and Cuecuecha (2010) and Edwards and Ureta (2003) argue that remittances can increase human and physical capital in the recipient households. Adams and Cuecuecha (2010) find that households receiving remittances in Guatemala spend less at the margin on key consumption goods such as food, compared to households who do not receive remittances. They also conclude that the remittance-receiving households spend more on 'investment' goods such as education and housing. Similarly, Edwards and Ureta (2003) find that remittances receiving households in El Salvador spend their income differently from other sources of income and it has positive impact on school attendance and retention rates.

To support this view, Yang (2008) utilizes a novel natural experiment using the East Asian financial crisis of 1997 to discern the impact of remittances on household expenditure behaviour. He finds that the favourable exchange rate shock stimulates spending on education significantly, and increases the likelihood of enrolment in schools. Several other studies based on household surveys of individual countries also find that remittances are saved and invested on productive assets (Adams Jr 1998; Mollini 2007; Osili 2007). Rapoport and Docquier (2005) cite several studies which show that remittances are crucial to achieving consumption smoothing, easing liquidity constraints and acting as mutual insurance.

Any comparative analysis of expenditure shares of households with and without remittances needs to take into account the selection of migrants. Households receiving remittances might be different from households without, due to unobserved and hard-to-measure characteristics: e.g. the former might have more motivated or more skilled members. Surveying the literature in the case of Mexican migrants to the US, McKenzie and Rapoport (2010) report that there are conflicting results regarding the selectivity of migrants in terms of education skills.

There is a very scant empirical literature related to remittances in Nepal—to my knowledge, there is no study on the impact of remittances on different categories of household expenditures in Nepal. There are a few studies which focus on the impact of remittances on particular aspects, such as poverty and inequality (Acharya & Leon-Gonzalez 2012; Bohra-Mishra 2011; Lokshin et al. 2007), and on gender and school enrolment (Pivovarovova 2011). These studies all utilize only the first two rounds of the Nepal Living Standard Surveys (NLSS) data. Bansak et al. (2015) examine the effects of household expenditures on human capital investment in Nepal using the third round of the Nepal Living Standard Survey (2010). They find that internal remittances contribute more to human capital investment compared to external remittances. Similarly, Vogel and Korinek (2012) using the second round of the Nepal Living Standard Survey (2003-04) find that remittances are spent disproportionately on boys education than girls’.

#### 4.4 The model

Most household expenditure models are based on the assumption that a household allocates its budget across various expenditure categories in order to maximize the utility derived from the consumption of goods or services. In the standard consumer model, the total budget is generally assumed to be fixed, or it may be determined endogenously according to the labour allocation and/or production choices found in the agricultural household model (Singh et al. 1986).

The first set of regressions estimates the impact of remittances on consumption. Since those household receiving foreign remittances are expected to have more per capita consumption after controlling for household characteristics and other relevant variables impacting on per capita consumption, the impact of remittances-recipient households on per capita expenditure is estimated using the following equation:

$$\log \frac{x_{ht}}{n_{ht}} = \alpha_0 + \beta_h + \phi_i H_{ht} + \varphi_i R_{ht} + \delta_i \tau_t + \varepsilon_{iht} , \quad (4.1)$$

where,  $\log \frac{x_{ht}}{n_{ht}}$  = logarithm of per capita expenditure  $x$  of household  $h$  at time  $t$ , while  $\alpha_0$  = constant intercept,  $\beta_h$  = unobserved individual household fixed effect,  $H_{ht}$  = household characteristics and regional dummy variables,  $R_{ht}$  = dummy

variable for remittance (that is, whether or not the household receives remittances),  $\tau_t$ = period dummies and  $\varepsilon_{iht}$  = idiosyncratic error terms.

The main model consists of the modified version of the Engel's curve, known as the Working-Leser model. Prais and Houthakkar (1971) wrote a comprehensive review and performed estimations of the following forms: linear, hyperbolic, semi-logarithmic, double logarithmic, and logarithmic reciprocal. All these forms have been shown to have some advantages over the alternative forms for some of the goods or for part of the range of the relationship. Prais and Houthakkar (1971) conclude that the widely used double logarithmic and the semi-logarithmic forms perform better than the others in terms of goodness of fit. The choice of the functional form should not only be based on the practical criteria of goodness of fit, but also on the principles of demand theory. The functional form that satisfies adding-up condition, and that is able to represent closely consumer behaviour, was originally proposed by Working (1943), elaborated on by Leser (1963), and widely used following the seminal work of Deaton and Muelbauer (1980). This form is known as the Working-Leser model, and relates the commodity budget shares to the logarithm of per capita expenditure:

$$w_i = a_i + b_i \ln y \quad (4.1a)$$

This form satisfies the adding-up condition provided that the sum of the parameters  $a_i$  estimated over all commodities in the household budget is equal to one, and that the sum of the parameters  $b_i$  is equal to zero. It allows for luxuries, necessities and inferior goods, and for elasticities to vary with income. Finally, the form is linear in the logarithm of expenditure, and is easily estimated by ordinary least square (OLS), with the adding-up restrictions being automatically satisfied.

The Working-Leser model can be extended to include the binary variable  $R_h$  to capture whether or not the household receives remittances.

$$w_{iht} = \alpha_i + \varphi_i R_{ht} + \beta_i \log \frac{x_{ht}}{n_{ht}} + \phi_i H_{ht} + \varepsilon_{iht} , \quad (4.2)$$

where,  $w_{iht}$ =share of expenditure of item  $i$  for household  $h$ (which ranges from 0 to 1) in round  $t$  of the survey (where  $t$  ranges from 1 to 3) while  $x_{ht}$  = total expenditure for household  $h$  in round  $t$ , and  $n_{ht}$ = number of people in the household  $h$  in round  $t$ . In

other words,  $\frac{x_{ht}}{n_{ht}}$  = per capita expenditure of household  $h$  in round  $t$ , and  $H_{ht}$  = vector of household characteristics and other variables that might affect the expenditure behaviour of the household,  $R_{ht}$  = dummy variable representing whether the household receives remittances or not and  $\varepsilon_{iht}$  = idiosyncratic error term.<sup>31</sup>

I use the actual per capita consumption rather than the income used in earlier studies, as consumption is more reliable than households' self-reported income. The control variables which affect the expenditure patterns include individual and household characteristics, as well as socioeconomic and geographic location. These variables can be grouped into household demographic characteristics, human capital variables and a proxy for wealth.

The household demographic variables include the household size, age of the household head, average age of the household members, number of children of different ages and working-age adults. Accordingly, the age composition of the household members also influence their needs and the expenditure amount and needs. For example, a household with more small children needs to allocate less for consumption items such as food, and more for health expenditure. Similarly, the age of the household head indicates the composition of household members. For example, household which has an older head age tends to have a higher number of children who are born with a greater age difference between them, compared to other household with similar characteristics.

Education of household head, measured as the number of years of schooling, is included as the human capital variable. The rationale for including this is twofold. First, the education level of the household head affects the earning potential of the members. A household with a higher per capita income allows the members more flexibility when spending their income. Consequently, households with higher per capita income tend to allocate their expenditure more on capital goods or other investments, as their basic consumption needs are met. Second, the education level

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<sup>31</sup> I also use the actual value of remittances instead of the dummy in robustness check, since the related coefficients for remittances variables are very small and impacts are similar across different regressions, I focus mainly on the impact of the remittances dummy.

might be positively correlated with age, and this influences earning potential (as described above).

Finally, the level of wealth needs to be included as a regressor. Even though an asset might be held in an illiquid form, it can indicate a prior high level of savings or social networks that confers gifts or income transfers. As an indicator of level of wealth, I include the per capita consumption and agricultural land possession and whether the household has a loan or not. This is due to the fact in developing countries like Nepal, poverty is highly correlated with landlessness and indebtedness.

I also include the five regional dummies and a rural-urban dummy as the locational factors also affect the consumption behaviour.<sup>32</sup> These dummies are also expected to pick up some of the spatial price differences of the consumption items. In addition, I have included the destination dummy for migrants in India. Due to geographical proximity, open border, economic and cultural ties a large number of Nepalese go to India for seasonal as well as long term employment. Therefore, migrants going to India are likely to differ from migrants elsewhere (Acharya & Leon-Gonzalez 2012).

## **4.5 Data**

The data come from three rounds of living standard surveys undertaken by the Central Bureau of Statistics of Nepal with the technical assistance from the World Bank. These surveys are based on a multistage sampling design and are nationally representative surveys which cover broad areas of demographic composition, housing, consumption expenditure, income by source, and employment. The first, second and third rounds of the survey were taken during the years 1995-1996, 2003-2004 and 2010-2011. The surveys consist of a cross-section of households and a small proportion of those are panel households. The number of cross section and panel households are given in Table 4.3.

**Table 4.3 Sample size of the Nepal Living Standard Surveys**

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<sup>32</sup>The ecological region is divided into five major 'development regions' in Nepal.

<b>Survey rounds</b>	<b>Sample size</b>	<b>Cross-section</b>	<b>Panel</b>
First round (1995-96)	3370		
Second round (2003-04)	3912	2950	962 (first and second round)
Third round (2010-11)	6961	5988	973 (second and third round)
All three rounds			446 (first, second and third rounds)

Source: Author based on (Central Bureau of Statistics 1996, 2004, 2011).

The first comprehensive part of the exercise consists of estimating the consumption aggregates of the households in three rounds of the survey. The consumption items are grouped together into eight major items: food, tobacco and other non-food, consumption of durables, education, fuel, utilities, rental and health expenses. The consumption of food items are also broken down into four major categories (Table 4.4). The detailed estimation of the consumption aggregate and the relevant sections in the NLSS data are given in Appendix 4.1 and Appendix 4.2.

Remittances in the NLSSs are defined as transfer in cash or kind received by a household over the period of last twelve months of the respective surveys. The amount of foreign (or international) remittances are the transfers received by a household from sender working or living abroad, while domestic remittances refer to transfers received within Nepal. Table 4.5 shows the summary statistics of the variables categorized under three types of household and according to the three rounds of the survey: those which receive 1) no remittances, 2) domestic remittances and, 3) foreign remittances. There was a small proportion of household (less than 4 percent of the remittance-receiving households) which received both domestic and foreign remittances. These households have been assigned to the foreign remittances category.



**Table 4.4 Components of major consumption categories**

<b>Major items</b>	<b>Components</b>	<b>Detailed breakdown</b>
Food items	Staple foods	Grains and cereals, pulses and lentils
	Vegetables	Eggs and milk products, vegetables, fruits and nuts
	Meat	Fish and meat
	Other foods	Cooking oils, spices and condiments, sweets and confectionary, non-alcoholic and alcoholic beverages, miscellaneous food products including meals taken from outside
Non-food	Tobacco	Tobacco and tobacco related items
	Consumption of durables	Inventory of durable items
	Education	Education and related costs
	Fuel	Fuel for cooking
	Utilities	Electricity, telephone, garbage collection
	Health	Health and related expenditure
Housing	Rental value	Rent or imputed rent if owner- occupied

Table 4.5 shows that the proportion of households receiving foreign remittances increased substantially from around 11 per cent to about 30 per cent from round 1 to round 3 of the survey. Although size of foreign remittances-receiving households looks smaller than that of households not receiving remittances, they might be bigger as the absentees are not counted as the household members in the surveys.

The value of average remittances has also increased significantly in the rounds 2 and 3. Interestingly though, the per capita consumption of household receiving foreign remittances is lower compared to the households with no remittances or

domestic remittances. Similarly, the average education of the household receiving foreign remittances is lower than that of the non-remittance-receiving households. This suggests that the households which receive foreign remittances might be negatively selected or on average poorer.

Regarding the demographic characteristics, the average age of the household head's age, and the average age of the households receiving remittances, are lower than the household with no remittances; this conforms New Economics of Labour Migration (NELM) theory's prediction. The number of children below six years of age, and between 6–12 years, seems to be higher, suggesting that there are more dependent age children in the foreign remittance receiving households. The number of adults above 15 years of age is higher in the first two rounds of the survey, but lower the third round.

The proportion of households with loans is higher for remittance-receiving households except in the first round of the survey. Similarly, the proportion of households owning agricultural land is higher among those households. The proportion of households engaging in nonfarm activities is smaller among the foreign remittances households.

For household consumption composition, the major portion of expenditure incurred is for food items, followed by non-food and tobacco items. Though the share of expenditure on food is declining in subsequent rounds, it still accounts for more than 55 percent of household consumption. However, there does not seem to appear a significant difference between the consumption share of food items among different categories of households. The share of non-food and tobacco items on total consumption is marginally higher in the first two rounds, though the difference is not significant. Households receiving foreign remittances seem to spend a marginally higher proportion of their consumption on education in the last two rounds of the survey, though the difference, again, is not statistically significant. Similarly, the share of durables consumption is marginally higher in foreign remittances-receiving households. With regard to the health expenditure share, this is higher compared to non-remittance receiving households except in the first round.

**Table 4.5 Summary statistics**

Description	Round 1			Round 2			Round 3		
	<i>No remittance</i>	<i>Domestic remittance</i>	Foreign remittance	<i>No remittance</i>	<i>Domestic remittance</i>	Foreign remittance	<i>No remittance</i>	<i>Domestic remittance</i>	Foreign remittance
Sample size (in %)	76.59	12.69	10.71	68.08	14.06	17.85	44.24	25.72	30.04
Per capita nominal consumption (Rupees)	7018	7717	6726	15444	15700	14476	41422	41960	40790
Remittance (Rupees)	0	12326	18842	0	16800	48796	0	63063	124827
Household size	5.815	5.364	5.282	5.449	4.507	5.213	5.014	4.544	4.876
Household head education (number of years of schooling)	6.266	6.548	6.042	6.818	6.752	6.654	6.967	7.157	6.573
Household head's age	44.23	46.22	45.71	44.82	48.73	46.08	46	46.68	46.61
Average age of household	25.06	27.08	25.33	26.36	30.55	25.4	29.16	30.61	27.71
Average number of children (below 6 yrs)	1.018	1.018	1.1	0.847	0.69	1.019	0.602	0.554	0.728
Average number of children (6-12 yrs)	1.193	1.1	1.21	0.736	0.642	0.708	0.663	0.535	0.68
Average number of adults (above 15 yrs)	3.388	3.752	3.758	3.307	3.197	3.465	3.102	2.875	2.843
Household with loan (in %)	62.1	60.5	55.7	69.3	62.1	72.1	62.8	63.4	69.7
Household with agricultural land (in %)	81.8	83	82.4	75.5	76.1	82.3	74	77.9	81
Household engaged in nonfarm activities (in %)	22.5	21.3	14.5	30.2	21	13.4	38.1	32	26.5

**Table 4.5 Summary statistics (continued)**

Description	Round 1			Round 2			Round 3		
	<i>No remittance</i>	<i>Domestic remittance</i>	Foreign remittance	<i>No remittance</i>	<i>Domestic remittance</i>	Foreign remittance	<i>No remittance</i>	<i>Domestic remittance</i>	Foreign remittance
Share of food in total consumption (wf1)	0.6943	0.6928	0.6992	0.605	0.6072	0.6093	0.5786	0.5695	0.5671
Share of staple food	0.405	0.387	0.407	0.289	0.28	0.291	0.241	0.227	0.233
Share of meat	0.0536	0.0558	0.0462	0.063	0.0662	0.0643	0.0833	0.0895	0.0861
Share of vegetables	0.0897	0.106	0.099	0.106	0.117	0.11	0.0983	0.104	0.105
Share of other food	0.146	0.144	0.147	0.147	0.144	0.144	0.156	0.149	0.143
Share of non-food and tobacco (wf2)	0.148	0.137	0.147	0.173	0.164	0.171	0.145	0.147	0.148
Share of rental income (wf3)	0.0891	0.1	0.0942	0.105	0.111	0.0947	0.101	0.103	0.091
Share of education (wf4)	0.0416	0.0449	0.03	0.0567	0.0571	0.0607	0.0555	0.0569	0.0581
Share of durables (wf5)	0.00692	0.00835	0.00622	0.0115	0.0088	0.011	0.0311	0.0289	0.0357
Share of fuel (wf6)	0.014	0.0134	0.0149	0.019	0.02	0.0171	0.0159	0.0144	0.0127
Share of utilities (wf7)	0.00337	0.00379	0.00121	0.0108	0.0103	0.00907	0.0242	0.0228	0.0267
Share of health (wf8)	0.0356	0.0339	0.0342	0.0391	0.0443	0.0461	0.0496	0.0574	0.0608

*Source:* Author's calculation based on NLSS data. Figures are the weighted average at the household levels.

## 4.6 Estimation method

The estimation method used are: 1) pooled OLS, 2) seemingly unrelated regression (SUR) in the context of unbalanced panel data and, 3) pooled OLS with the instrumental variables approach. Due to the highly unbalanced nature of the panel data and the very low number of households in the panel component, pooled OLS can provide a reasonable estimation. The coefficients from the pooled OLS and SUR models are used to compare the estimates from the instrumental variable regression method. The instrumental variable approach employs the data from only the second and third round of the survey, as the proposed instrument was available only for these rounds.

The SUR estimation method is used because the error terms in the separate regressions can be correlated. The correlations among the error terms arise as the expenditure shares are related to each other and hence the coefficients from the separate regressions must sum to zero. In particular, an increase in the expenditure share of one group of expenditure category must be accompanied by fall in the expenditure share of one or more remaining categories. Thus the standard errors of the pooled OLS need to be adjusted to account for the correlations among the separate regressions.

The SUR method is used to adjust the standard errors if there are correlations among the regressions (Cameron and Trivedi 2010, pp.165-166). I re-estimate the regressions using the panel SUR method, using random effect estimators based on Biørn (2004). This method uses a multi-step algorithm using generalized least squares and the maximum likelihood procedures in the context of unbalanced panel data (Nguyen 2010).<sup>33</sup>

Generally, the fixed effects model is preferred rather than random effects, as the former takes into account the correlation between the unobserved fixed effects and the explanatory variables. However, there are two reasons why I employ the random effects model instead of fixed effects. First, decomposition of all the variables used in the estimations show that most of the variability in the data comes from ‘between variation’ and not ‘within variation’ (Appendix 4.3). In many cases, there is no

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<sup>33</sup> The method is implemented using the Stata routine ‘XTSUR’ developed by Nguyen (2010).

temporal variation in the explanatory variables in the sample. As a result, it is difficult to identify the effect of remittances on expenditure patterns using the fixed effects approach. Thus, due to the very low within-variability of variables, the standard errors from fixed effects models may be too large to tolerate (Allison 2009). Second, due to very low number of observations in the panel component of the data, the fixed effects estimation results in the substantial loss of observations. Thus, due to substantial panel attrition, fixed effects may not produce reliable estimates.<sup>34</sup>

#### **4.6.1 Tackling endogeneity**

The pooled OLS estimations assume that remittances are exogenous to expenditure shares. However, decision to send family member to migration and hence remittances can be endogenous to this process. Migrants are selective group of individuals who might differ from other households in both the observed and unobserved characteristics. For example, household with highly motivated household age may prefer to send family member for migration and simultaneously cut their expenditure on food or other items to finance the migration process. This suggests that migration and consequently remittances, are not predetermined. Rather it is an endogenous process shaped by some observed or unobserved characteristics which might influence the expenditure behaviours of households.

Moreover, there can be other sources of endogeneity arising mainly from omitted variable bias. For example, decision to migrate and allocation of expenditure may be made simultaneously. The final objective is to identify how the migration decision affects the expenditure shares, the outcome variable of interest in this paper. But migration and remittance may also potentially react to the increase in expenditure shares of essential items may be due to a rise in prices. Thus, the household may decide to send a member abroad for work in order to finance higher expenses on food. The second reason endogeneity can arise is due to unobserved characteristics of migrant such as the risk averse nature, or motivation, of an individual which affects decision to migrate and also the expenditure patterns. The third source of endogeneity can arise due to consumer preference bias, which is defined as a household's tendency to prefer

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<sup>34</sup>I estimated the model using fixed effects estimation. The coefficients have similar signs and magnitude but the standard errors are large, rendering most the coefficients insignificant.

certain types of commodities. This change in preference is distinct from the associated change in proportions spent on different goods due to the increase in total expenditure.

Most of the studies in the literature use the instrumental variable method to identify the causal relationship between the remittances and expenditure behaviour of the recipient households. There have been various instruments used in the literature of migration and remittances. The choice of these instruments depends on the outcome of interest and on data availability. For example, the instruments which are valid to analyse the impact of migrants living abroad may not be a valid instrument when used to analyse the impact on households left behind. The instruments that have been used in the literature can be grouped into four categories: 1) economic shock, 2) cultural, historical, community and political factors, 3) distance, 4) natural shocks (McKenzie & Rapoport 2007). The cleanest strategy is to use a natural experiment or the external shock which impacts on migration or remittances, but not an outcome of interest.

Yang (2008) uses the financial crisis of 1997 to construct the IV which affected the remittances flow but not the outcome variables. However, such natural experiments are hard to find in practice. Other researchers have used historical migration rates for current migration pattern and its effects on child health (Hilderbrandt & McKenzie 2005). Several other researchers have used historical migration networks at the village or household levels to identify the impact of migration, arguing that it affects the current migration and remittance patterns but do not affect education and food expenditure (Acosta 2006; Hanson & Woodruff 2002; Mansuri 2006; Woodruff & Zenteno 2007; Calero et al. 2009). Specifically, due to paucity of information in the rural areas about the job prospects abroad, the decision to migrate for work may be partly driven by the number of past migrants from the area and their experiences. In other words, the assumption is historical migration rates are exogenous, and it affects current migration and hence remittances, but does not affect current consumption pattern. This is justified because historical migration networks promote future migration (Calero et al. 2009; Munshi 2003). Specifically, as rural areas often lack information about job opportunities outside the area, the decision to migrate for work may be partly driven by the success stories of returning migrant workers that have benefitted from the higher salaries offered in cities. However,

historical migration rates are exogenous; they are in the past and, therefore, should not affect current expenditure.

To address the endogeneity of remittances and expenditure shares, I use the instrumental variable approach. The instrumental variable used is the migrant network at the district level. The proportion of absentee population (defined as people who stayed more than six months outside of their usual residence during the previous year of the survey) in each district was extracted from the population censuses of 2001 and 2010, conducted just before the NLSS rounds two and three respectively. The data on the absentee population were available only for the second and third rounds of the survey. The identifying assumption is that a past migration networks affect remittances through migration only, but it is uncorrelated with the expenditure behaviour of the households.

A valid instrumental variable should be correlated with the endogenous variable (remittances) and should affect the dependent variable only through its impact on the endogenous variable. However, it is a well-established fact that the estimation results from the instrumental variable approach crucially rely on both the validity and strength of the instruments. A potential threat to the validity of this instrument is that not all the migrants send remittances, especially if they have migrated in the same year as the survey was conducted. When they arrive at the new place, it takes time and money to settle before they are able to send money back home. Moreover, the particular district might possess the characteristics which might affect both the remittances behaviour and the expenditure habits of the people living there. The unobservable household characteristics also can affect the expenditure patterns. To account for the regional differences in the consumption patterns, I have included both the regional and urban or rural area dummies in the estimation. The standard errors are clustered at the district level to account for validity of the instrumental variable at the district level only.

With the above caveats and the chosen instrument, it is difficult to measure precisely the magnitude of the regression coefficients. Nevertheless, the district level instrumental variable can provide the broad direction of the impact of remittances on expenditure patterns.



## 4.7 Results

This section first presents the empirical results relating to the impact of foreign remittances on per capita household consumption, controlling for other household characteristics. Then I present the results for the main model relating to the remittances and consumption shares using the pooled OLS, seemingly unrelated regressions and the instrumental variable method.

Table 4.6 shows the pooled ordinary least squares (OLS) and the second column shows the random effects estimations of the impact of foreign remittances on total household consumption. The first two columns use the foreign remittance dummy variable, whereas Columns 3 and 4 use foreign remittance amount (in Rupees ten thousand) as an explanatory variable.

Table 4.6 shows that households receiving foreign remittances spend about 15.3 percent more on consumption compared to households without remittances (Table 4.6, Column 1).<sup>35</sup> In terms of amount, an increase in remittances by ten thousand Rupees increases per capita consumption by about 0.4 per cent. Since the regressions do not control for the income variable, the effects of remittances on consumption could actually be much smaller.

The size of the household has a negative relationship with per capita consumption. This can be due to a greater economy of scale in food preparation, minimising wastage and higher food price elasticity (Deaton & Paxson 1998). The education level of the household head exerts positive impact on per capita consumption in the pooled OLS estimation, but the coefficient is not significant in the fixed effects estimation. *A priori*, it is not clear whether the level of education of the household's head encourages more consumption or saving.

Similarly, the age of the household head and the number of children below 12 years seem to be negatively associated with per capita consumption. The number of adults aged 15 years and above has positive association with per capita consumption. A household which has incurred loan has less per capita consumption. However, the

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<sup>35</sup> The dependent variable is in natural logarithms, therefore the actual coefficient would be  $e^{0.143} - 1 = 0.154$ , I ignore the difference.

households with agricultural land seem to consume less, which is counter intuitive. One possible explanation is that the households which own agricultural lands might have under-reported their actual consumption of food items compared to households which do not own land, and hence the need to purchase food items. Households which engage in nonfarm activities seem to have a higher per capita consumption than those which do not engage in nonfarm activities.

**Table 4.6 The impact of remittance on per capita consumption**

VARIABLES	(1)	(2)	(3)	(4)
Estimator	OLS	RE	OLS	RE
Remittance dummy	0.149*** (0.016)	0.139*** (0.016)		
Remittances (in Rupees ten thousand)			0.004*** (0.001)	0.004*** (0.001)
Household size	-0.091*** (0.006)	-0.090*** (0.006)	-0.093*** (0.006)	-0.091*** (0.006)
Household head education	0.067*** (0.002)	0.065*** (0.002)	0.067*** (0.002)	0.064*** (0.002)
Household head's age	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)	-0.001** (0.001)
Average age of household	0.011*** (0.001)	0.010*** (0.001)	0.011*** (0.001)	0.010*** (0.001)
Number of children < 6 years	-0.070*** (0.009)	-0.067*** (0.009)	-0.066*** (0.009)	-0.063*** (0.008)
Number of children age 6-12 years	-0.002 (0.009)	-0.003 (0.009)	-0.000 (0.009)	-0.001 (0.009)
Number of children > 15 years	0.063*** (0.007)	0.061*** (0.007)	0.064*** (0.007)	0.062*** (0.007)
Household has a loan?	-0.110*** (0.012)	-0.104*** (0.012)	-0.105*** (0.012)	-0.099*** (0.012)
Household owns agricultural land?	-0.253*** (0.015)	-0.244*** (0.015)	-0.252*** (0.015)	-0.243*** (0.015)
Household has nonfarm activities?	0.167*** (0.012)	0.159*** (0.013)	0.163*** (0.012)	0.156*** (0.012)
Destination India?	-0.189*** (0.022)	-0.174*** (0.021)	-0.098*** (0.018)	-0.089*** (0.018)
Constant	9.264*** (0.037)	10.078*** (0.040)	9.266*** (0.037)	10.089*** (0.040)
Observations	8,541	8,541	8,541	8,541
R-squared	0.722		0.724	
Number of households		7,774		7,774

*Notes.* Dependent variable is log of per capita consumption. Robust standard errors in parentheses. OLS refers to 'ordinary least squares' and RE refers to 'random effects'. The regressions contains the dummies for three rounds of the survey, and regional dummies for five 'Development Regions'.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The second sets of results present the disaggregated effects of foreign remittances on the expenditure patterns of households, using the model from Equation 4.2. Table 4.7 shows the pooled OLS estimation of the effect of the remittance dummy

and other household characteristics on the consumption shares of eight major consumption categories (Table 4.4). As the total consumption shares of the different categories sum to one, the sum of the coefficients of the remittances dummy across the estimations would be equal to zero.

The results in Table 4.7 show that remittances receiving households spend more of their consumption shares on education, durables, utilities and on health expenses compared to their non-remittances-receiving counterparts. In particular, remittances-receiving households allocate 0.4 percent more of their total consumption on education and about 0.5 percent share more on durable goods. Also, these households spend greater share on utilities and health expenditures though the latter is not statistically significant. Similarly, these households spend a smaller share of consumption on food, fuel and rental, though the last is not statistically significant. This suggests that international remittances help to improve the education and health condition, both crucial determinants of human capital formation.

With regard to other explanatory variables, they are in broad confirmation with the expected signs of the coefficients. For example, an increase in total per capita consumption by one percent will lead a decrease in food consumption share by about 0.0015 percentage point. This conforms to Engel's Law, which states that the share of food expenditure declines as income increases.

Table 4.7 shows that the households that have loans spend more of their consumption share on non-food items and health. This suggests that households borrow money for the consumption of these items. Similarly, households which own agricultural land consume a higher proportion of consumption shares on food, non-food and on health. These households allocate less of their consumption shares on rental consumption, educational expenses, fuel and utilities. Finally, households which engage in non-farm activities spend less of their expenditure shares on food and health, and increase their expenditure shares of the remaining items.

There is a negative correlation between the household size and the share of consumption on food items. Several other studies have also found a negative relationship between household size and calorie intake per capita, suggesting that larger households tend to consume less calories per capita compared to smaller

households (Abdulai & Aubert 2004; Gibson & Rozelle 2002; Mollini 2007). Deaton and Paxson (1998) also found that in many countries, per capita demand for food decreases with household size.

**Table 4.7 Determinants of household consumption shares: Pooled OLS estimates**

<b>VARIABLES</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>	<b>(8)</b>
	<b>Food</b>	<b>Non-food and tobacco</b>	<b>Rental</b>	<b>Education</b>	<b>Durables</b>	<b>Fuel</b>	<b>Utilities</b>	<b>Health</b>
Remittance dummy	-0.013*** (0.003)	-0.001 (0.002)	-0.001 (0.003)	0.004** (0.002)	0.005*** (0.001)	-0.001** (0.000)	0.004*** (0.001)	0.003 (0.002)
Per capita consumption (logs)	-0.139*** (0.003)	0.018*** (0.002)	0.042*** (0.003)	0.022*** (0.002)	0.028*** (0.001)	-0.003*** (0.000)	0.011*** (0.001)	0.021*** (0.002)
Household size	-0.011*** (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.010*** (0.001)	0.002*** (0.000)	-0.002*** (0.000)	-0.000 (0.000)	0.002** (0.001)
Household head education	-0.004*** (0.000)	-0.001** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.000** (0.000)	0.001*** (0.000)	-0.001*** (0.000)
Household head's age	-0.000** (0.000)	-0.000** (0.000)	0.000** (0.000)	0.000*** (0.000)	0.000 (0.000)	-0.000** (0.000)	0.000** (0.000)	0.000 (0.000)
Average age of household	0.001*** (0.000)	-0.001*** (0.000)	0.001*** (0.000)	-0.002*** (0.000)	-0.000*** (0.000)	0.000** (0.000)	0.000** (0.000)	0.001*** (0.000)
Number of children < 6 years	0.011*** (0.002)	0.001 (0.001)	0.005*** (0.001)	-0.027*** (0.001)	0.001 (0.001)	0.001*** (0.000)	0.001*** (0.000)	0.006*** (0.001)
Number of children aged 6-12 years	0.006*** (0.002)	-0.001 (0.001)	-0.001 (0.002)	-0.003*** (0.001)	-0.002*** (0.001)	0.001** (0.000)	0.000 (0.000)	0.000 (0.001)
Number of children > 15 years	0.001 (0.002)	0.003*** (0.001)	-0.001 (0.001)	-0.003*** (0.001)	0.001 (0.001)	0.001** (0.000)	0.001* (0.000)	-0.003*** (0.001)
Household has a loan?	0.003 (0.003)	0.004** (0.002)	-0.015*** (0.002)	0.002 (0.001)	-0.002** (0.001)	-0.002*** (0.000)	-0.001** (0.001)	0.012*** (0.002)

**Table 4.7 Determinants of household consumption shares: Pooled OLS estimates***(continued)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>VARIABLES</b>	<b>Food</b>	<b>Non-food and tobacco</b>	<b>Rental</b>	<b>Education</b>	<b>Durables</b>	<b>Fuel</b>	<b>Utilities</b>	<b>Health</b>
Household own agricultural land?	0.029*** (0.003)	0.005** (0.002)	-0.017*** (0.003)	-0.003* (0.002)	-0.000 (0.001)	-0.010*** (0.001)	-0.008*** (0.001)	0.004* (0.002)
Household has nonfarm activities?	-0.012*** (0.003)	0.002 (0.002)	0.007*** (0.002)	-0.003** (0.001)	0.005*** (0.001)	0.002*** (0.000)	0.002*** (0.001)	-0.003* (0.002)
Destination India?	0.007 (0.005)	-0.001 (0.003)	-0.003 (0.004)	0.002 (0.003)	-0.005*** (0.002)	-0.000 (0.001)	-0.003*** (0.001)	0.004 (0.003)
Observations	8,541	8,541	8,500	8,541	8,541	8,538	8,541	8,541
R-squared	0.624	0.058	0.391	0.296	0.31	0.263	0.391	0.052

Robust standard errors in parentheses. The regressions include the regional, urban and round dummies and a constant.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Food items constitute a major proportion of expenditure shares of households with average shares of around 70 percent, 61 percent and 57 percent of total consumption for remittances receiving households in the three rounds of survey respectively (Table 4.5). Hence, a further disaggregation of food items is performed in terms of four major categories of food items: staples, vegetables, meat and other foods. Table 4.8 presents the impact of foreign remittances on the consumption of major categories of food items. The results show that the consumption shares of staples and other foods decline for remittance-receiving households. As many households in Nepal depend on subsistence farming, the absence of a male member might reduce the agricultural production and the remaining household members are forced to consume a smaller proportion of food items (Adhikari 2011). Though the total consumption of food shares is lower for remittance-receiving households, the shares of ‘superior’ food items such as meat and vegetables tend to increase. Thus, there might be some substitution of food items occurring from the staple and other items into more rich foods.

**Table 4.8 Determinants of household consumption: Decomposition of food consumption shares**

	(1)	(2)	(3)	(4)
<b>VARIABLES</b>	<b>Share of staple</b>	<b>Share of vegetables</b>	<b>Share of meat</b>	<b>Share of other food</b>
Remittances dummy	0.0068*** (0.002)	0.0021 (0.002)	0.0037*** (0.001)	0.0121*** (0.002)
Observations	8,541	8,541	8,541	8,541
R-squared	0.67066	0.07990	0.12646	0.10138

*Notes.* Robust standard errors in parentheses. The regressions contain all the explanatory variables, round dummies and a constant.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4.9 shows that the regression coefficients using the random effect SUR method. Compared to the pooled OLS, the signs of the coefficients are similar, though the impact of foreign remittances is now higher. Specifically, the coefficients for food,



education and durables are higher than the pooled estimates. Also, the impact of remittances on health expenditure share is also now positive and significant. Thus, the estimations confirms the findings that remittances-receiving households devote a higher proportion of their consumption to education, durable goods and health, and reduce the consumption share of food items. Regarding the coefficients of other explanatory variables, they are broadly in confirmation with the estimates from the pooled OLS.

**Table 4.9 Determinants of household consumption shares: SUR estimates**

<b>VARIABLES</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>	<b>(8)</b>
	<b>Food</b>	<b>Non-food and tobacco</b>	<b>Rental</b>	<b>Education</b>	<b>Durables</b>	<b>Fuel</b>	<b>Utilities</b>	<b>Health</b>
Remittance dummy	-0.0412*** (0.001)	0.0010 (0.003)	0.0011 (0.010)	0.0087* (0.005)	0.0061* (0.003)	-0.0015 (0.003)	0.0051 (0.003)	0.0074*** (0.001)
Per capita consumption (logs)	0.0657*** (0.000)	0.0190*** (0.001)	0.0082** (0.003)	0.0056*** (0.002)	0.0021 (0.002)	0.0023* (0.001)	0.0002 (0.001)	0.0010*** (0.000)
Household size	0.0142*** (0.001)	-0.0017 (0.002)	-0.0057 (0.006)	0.0097*** (0.003)	-0.0013 (0.004)	-0.0010 (0.002)	-0.0016 (0.002)	0.0007 (0.001)
Household head education	-0.0118*** (0.000)	0.0002 (0.000)	0.0022** (0.001)	0.0025*** (0.001)	0.0026*** (0.001)	-0.0003 (0.000)	0.0012*** (0.000)	-0.0011*** (0.000)
Household head's age	-0.0006*** (0.000)	-0.0003** (0.000)	0.0004 (0.000)	0.0002 (0.000)	-0.0001 (0.000)	-0.0000 (0.000)	0.0001 (0.000)	0.0005*** (0.000)
Average age of household	0.0003*** (0.000)	-0.0005*** (0.000)	0.0014** (0.001)	-0.0023*** (0.000)	-0.0001 (0.000)	0.0001 (0.000)	0.0002 (0.000)	0.0006*** (0.000)
Number of children < 6 years	0.0350*** (0.001)	0.0034 (0.002)	0.0015 (0.008)	-0.0333*** (0.005)	-0.0023 (0.006)	0.0018 (0.003)	-0.0001 (0.003)	0.0043*** (0.001)
Number of children aged 6-12 years	0.0087*** (0.001)	-0.0002 (0.002)	0.0024 (0.009)	-0.0033 (0.005)	-0.0032 (0.006)	0.0007 (0.003)	0.0002 (0.003)	-0.0026*** (0.001)

**Table 4.9 Determinants of household consumption shares: SUR estimates (contd.)**

<b>VARIABLES</b>	<b>(1) Food</b>	<b>(2) Non-food and tobacco</b>	<b>(3) Rental</b>	<b>(4) Education</b>	<b>(5) Durables</b>	<b>(6) Fuel</b>	<b>(7) Utilities</b>	<b>(8) Health</b>
Number of children > 15 years	-0.0162*** (0.001)	0.0015 (0.002)	(0.007) -0.0108	(0.004) 0.0021	(0.005) -0.0031	(0.002) -0.0010	(0.002) -0.0018	(0.001) 0.0106***
Household has a loan?	0.0046*** (0.001)	0.0075*** (0.002)	(0.008) -0.0122	(0.004) -0.0026	(0.006) -0.0037	(0.003) -0.0087***	(0.003) -0.0072**	(0.001) 0.0034***
Household own agricultural land?	0.0356*** (0.001)	0.0073*** (0.002)	(0.009) 0.0045	(0.005) -0.0036	(0.006) 0.0067	(0.003) 0.0006	(0.003) 0.0016	(0.001) 0.0002
Household has nonfarm activities?	-0.0242*** (0.001)	0.0048** (0.002)	(0.008) 0.0850**	(0.004) 0.0343*	(0.005) 0.0187	(0.003) 0.0092	(0.003) 0.0195	(0.001) 0.0013
Urban dummy	-0.1951*** (0.005)	-0.0221* (0.012)	(0.037) -0.0055	(0.018) 0.0002	(0.025) -0.0079	(0.013) 0.0002	(0.012) -0.0042	(0.004) -0.0013
Destination India?	0.0250*** (0.003)	0.0057 (0.006)	(0.021)	(0.012)	(0.015)	(0.008)	(0.007)	(0.002)
Observations	8,497	8,497	8,497	8,497	8,497	8,497	8,497	8,497

*Notes.* Standard errors in parentheses. The regressions contain regional and round dummies.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The results in Tables 4.7 and 4.8 show that the coefficients, though statistically significant, are modest in magnitudes. I also estimate a separate system of regressions using the actual remittances amount (in ten thousand Nepalese rupees) instead of the remittances dummy as an explanatory variable (Appendix 4.4). The coefficients of remittances amount are similar in signs and significance compared with the remittances dummy as an explanatory variable, except for the coefficient on the consumption of fuel. A comparison of the results indicates that the impact of an increment of foreign remittances on expenditure patterns is less pronounced than the estimations using the remittance dummy. The coefficients are very small when using the actual amount of remittances. Thus, though the coefficients are statistically significant, they do not have much economic significance. In other words, given the households receiving foreign remittances, an increase in the amount transferred does not affect the expenditure patterns.

Table 4.10 shows that the impact of remittances on expenditure shares using the instrumental variable. The instrumental variables are available for only the second and third rounds of the survey, and therefore the estimation is performed only for these rounds. For the instrumental variable regressions to be estimable, it must be identified. The necessary and sufficient condition for identification is that the ‘order condition’ and the ‘rank condition’ both should be satisfied (Baum 2006). The first stage regressions show that the instrumental variable has the correct sign and is significant. Moreover, for the coefficients to be unbiased, the instrumental variable should be strong, that is, it should not be correlated with other explanatory variables. Since the standard errors are clustered at the district level, the Kleibergen-Paap rk F-statistic is the appropriate statistic to detect the weak instrument (Baum 2006). The resultant statistic is 21.56, which is much higher than the rule of thumb of 10, which indicates to indicate that the instrument is not weak (Stock & Watson 2006, p. 441).

Table 4.10 shows that the coefficients of the remittances dummy are similar in sign to the pooled OLS.<sup>36</sup> The coefficients and the standard errors are now higher than the pooled OLS, which is expected as the variations in remittances come from the instrumental variable at the district level. The IV estimation shows that remittances

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<sup>36</sup> Since the instrumental variable estimation is performed using only the second and third rounds of the survey, to make the results comparable, Appendix 4.5 reports the results of the random effects estimation using only the second and third rounds of the survey.

receiving households spend higher proportion of their consumption on education and durables compared to the non-remittances receiving counterparts. This result suggests remittances play an important role in increasing human capital formation. Similarly, the impact of other explanatory variables on expenditure shares are in line with OLS results though the magnitude of the coefficients are higher.

These results conform to the earlier findings that households with remittances spent more at the margin on education in case of Guatemala and Ecuador respectively (Adams 2005; Calero et al. 2009). Edwards and Ureta (2003) also found that remittances lower school dropout rates in El Salvador. Similarly, consistent with earlier findings by Adams(2005) study on Guatemala, Taylor et al. (1996), Zarate-Hoyos (2004) and Amuedo-Dorantes and Pozo (2009) studies for Mexico, I find evidence that remittances receiving household devote higher proportion of total consumption on health expenses. However, the impact on housing was not found to be significant. The latter might be due to the fact that housing represents the fixed costs and it may not increase proportionately with the increase in income.

**Table 4.10 Determinants of consumption shares using an instrumental variable**

<b>VARIABLES</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>	<b>(8)</b>
	<b>Food</b>	<b>Non-food and tobacco</b>	<b>Rental</b>	<b>Education</b>	<b>Durables</b>	<b>Fuel</b>	<b>Utilities</b>	<b>Health</b>
Remittance dummy	-0.089** (0.040)	-0.014 (0.015)	-0.043** (0.020)	0.049*** (0.019)	0.043*** (0.012)	-0.020** (0.008)	0.048*** (0.014)	0.027 (0.026)
Per capita consumption (logs)	-0.133*** (0.007)	0.021*** (0.004)	0.049*** (0.005)	0.016*** (0.004)	0.022*** (0.003)	-0.001 (0.001)	0.007*** (0.002)	0.019*** (0.005)
Household size	-0.012*** (0.002)	-0.001 (0.001)	-0.003** (0.001)	0.012*** (0.001)	0.003*** (0.001)	-0.002*** (0.000)	0.001 (0.001)	0.003** (0.001)
Household head education	-0.004*** (0.001)	-0.001** (0.000)	0.001* (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.000 (0.000)	0.001*** (0.000)	-0.001*** (0.000)
Household head's age	0.000 (0.000)	-0.000 (0.000)	0.000*** (0.000)	-0.000 (0.000)	-0.000** (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Average age of household	0.001*** (0.000)	-0.001*** (0.000)	0.001*** (0.000)	-0.002*** (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000** (0.000)	0.001*** (0.000)
Number of children < 6 years	0.017*** (0.004)	0.003 (0.002)	0.012*** (0.003)	-0.034*** (0.002)	-0.003** (0.002)	0.002*** (0.001)	-0.002* (0.001)	0.005** (0.003)
Number of children aged 6-12 years	0.006** (0.003)	-0.002 (0.002)	0.004* (0.002)	-0.005*** (0.002)	-0.003** (0.001)	0.000 (0.000)	-0.001 (0.001)	0.001 (0.002)
Number of children > 15 years	0.001 (0.002)	0.004** (0.001)	0.002 (0.002)	-0.004*** (0.001)	0.001 (0.001)	0.001** (0.000)	0.000 (0.001)	-0.003** (0.001)
Household has a loan ?	0.002 (0.003)	0.005** (0.002)	-0.012*** (0.003)	0.002 (0.002)	-0.004*** (0.002)	-0.002*** (0.001)	-0.003*** (0.001)	0.013*** (0.002)

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**Table 4.10 Determinants of consumption shares using an instrumental variable(continued)**

<b>VARIABLES</b>	<b>(1)</b> <b>Food</b>	<b>(2)</b> <b>Non-food and tobacco</b>	<b>(3)</b> <b>Rental</b>	<b>(4)</b> <b>Education</b>	<b>(5)</b> <b>Durables</b>	<b>(6)</b> <b>Fuel</b>	<b>(7)</b> <b>Utilities</b>	<b>(8)</b> <b>Health</b>
Household owns agricultural land?	0.030*** (0.004)	0.005* (0.003)	-0.012*** (0.003)	-0.005** (0.002)	-0.001 (0.002)	-0.010*** (0.001)	-0.009*** (0.001)	0.003 (0.003)
Household has nonfarm activities?	-0.017*** (0.005)	-0.001 (0.003)	0.001 (0.004)	0.003 (0.003)	0.010*** (0.002)	0.000 (0.001)	0.006*** (0.001)	-0.001 (0.004)
Urban dummy	-0.076*** (0.005)	-0.022*** (0.003)	0.055*** (0.004)	0.025*** (0.003)	0.007*** (0.002)	0.009*** (0.001)	0.015*** (0.001)	-0.014*** (0.004)
Destination India?	0.077** (0.037)	0.021 (0.021)	0.049* (0.025)	-0.047** (0.020)	-0.056*** (0.016)	0.011** (0.005)	-0.034*** (0.010)	-0.021 (0.026)
Observations	6,857	6,857	6,857	6,857	6,857	6,857	6,857	6,857
R-squared	0.554	0.037	0.277	0.094	-0.131	0.147	-0.020	0.011
F-statistics	21.56	21.56	21.56	21.56	21.56	21.56	21.56	21.56

Robust standard errors in parentheses and clustered at district levels. Standard errors in parentheses. The regressions contain the regional dummies, round dummies and a constant.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 4.8 Robustness check

This section discusses several robustness checks relating to the different sample size, possible outliers and the effect of domestic remittances on expenditure patterns.

In particular, separate sets of estimations are performed using rounds two and three for the pooled OLS. The results show that the coefficients of variables have similar signs and magnitudes compared with the full sample. However, due to the panel attrition and small number of observations, the panel component is not fully representative of the whole pooled cross-sections (Central Bureau of Statistics 2006). The number of households with at least two observations is 483, and with observations in all three rounds only 142.<sup>37</sup>

Similarly, the pooled OLS regressions are re-estimated using the domestic instead of international remittances ( Table 4.11). However, the coefficients of the domestic remittances dummy are different from the international remittances dummy, and are not significant in most cases. Specifically, the coefficients of food share are not significant, whereas the share on durables have a negative sign. However, the share on the health expenditure is positive and significant. It might be speculated that due to the close proximity of the domestic migrants, they are able to take better care of the health of their families. The impact of domestic remittances on the education share is similar to international remittances though the coefficient is slightly smaller. It might be then be argued that international remittances induces behavioural changes at the household expenditure patterns which might be absent in the case of domestic remittances recipient households.

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<sup>37</sup> Nevertheless, I re-estimated the results using the panel sample only; however the coefficients have similar signs, but are not statistically significant.



**Table 4.11 Determinants of consumption shares and domestic remittances: pooled OLS estimates**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Food	Non-food and tobacco	Rental	Education	Durables	Fuel	Utilities	Health
Domestic remittance dummy	-0.001 (0.003)	0.001 (0.002)	-0.003 (0.002)	0.003* (0.002)	-0.004*** (0.001)	-0.001** (0.000)	-0.000 (0.001)	0.006*** (0.002)
Per capita consumption (logs)	-0.139*** (0.003)	0.017*** (0.002)	0.044*** (0.003)	0.021*** (0.002)	0.026*** (0.001)	-0.003*** (0.000)	0.011*** (0.001)	0.022*** (0.003)
Household size	-0.010*** (0.001)	-0.001 (0.001)	-0.000 (0.001)	0.010*** (0.001)	0.002*** (0.000)	-0.002*** (0.000)	-0.000 (0.000)	0.001 (0.001)
Household head education	-0.003*** (0.000)	-0.001** (0.000)	0.001** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.000** (0.000)	0.001*** (0.000)	-0.001*** (0.000)
Household head's age	-0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)	0.000 (0.000)
Average age of household	0.001*** (0.000)	-0.001*** (0.000)	0.001*** (0.000)	-0.002*** (0.000)	-0.000*** (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)
Number of children < 6 years	0.011*** (0.002)	0.001 (0.001)	0.003** (0.001)	-0.026*** (0.001)	0.001* (0.001)	0.001*** (0.000)	0.001*** (0.000)	0.007*** (0.001)
Number of children aged 6-12 years	0.005** (0.002)	-0.000 (0.001)	-0.001 (0.002)	-0.003*** (0.001)	-0.001* (0.001)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.002)
Number of children > 15 years	0.000 (0.002)	0.002** (0.001)	-0.001 (0.001)	-0.003*** (0.001)	0.001 (0.001)	0.000 (0.000)	0.001 (0.000)	-0.001 (0.001)
Household has a loan?	0.003 (0.003)	0.005*** (0.002)	-0.014*** (0.002)	-0.001 (0.001)	-0.002** (0.001)	-0.002*** (0.000)	-0.001** (0.001)	0.011*** (0.002)
Household own agricultural land?	0.026*** (0.003)	0.006*** (0.002)	-0.016*** (0.003)	-0.003* (0.002)	-0.000 (0.001)	-0.010*** (0.001)	-0.008*** (0.001)	0.005** (0.002)

**Table 4.11 Determinants of consumption shares and domestic remittances: pooled OLS estimates(continued)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>VARIABLES</b>	<b>Food</b>	<b>Non-food and tobacco</b>	<b>Rental</b>	<b>Education</b>	<b>Durables</b>	<b>Fuel</b>	<b>Utilities</b>	<b>Health</b>
Household has nonfarm activities?	-0.017*** (0.003)	0.004** (0.002)	0.008*** (0.002)	-0.002 (0.001)	0.006*** (0.001)	0.002*** (0.000)	0.002*** (0.001)	-0.003* (0.002)
Urban dummy	-0.073*** (0.004)	-0.020*** (0.003)	0.061*** (0.003)	0.019*** (0.002)	0.004*** (0.001)	0.010*** (0.001)	0.014*** (0.001)	-0.015*** (0.002)
Observations	8,412	8,412	8,366	8,412	8,412	8,408	8,412	8,412
R-squared	0.613	0.057	0.377	0.285	0.302	0.255	0.368	0.048

Robust standard errors in parentheses. The regressions contain regional dummies, round dummies and a constant.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 4.9 Conclusion

Remittances play an important role in the Nepalese economy and also in shaping the expenditure patterns of Nepalese households. I constructed data on consumption expenditure disaggregated into eight categories from the three rounds of the Nepal Living Standard Surveys. An empirical model is estimated to quantify the differences in the expenditure demands between the households who receive international remittances and those who do not. The modelling approach addresses the possible endogeneity of remittances using an instrumental variable approach. The findings suggest that remittances reshape household demand in ways that are independent of total consumption. Three main findings emerge from the study.

First, remittances lead to higher consumption after controlling for household characteristics. Remittances have complex effects on household expenditures. Apart from augmenting the household income, remittances link households with international markets and cultures which might induce behavioural changes in consumption patterns including the substitution of purchased goods for own-produced goods. They might also change the households' information set and the perceptions which alter the preferences, and hence the marginal utilities of consumption and investment.

Second, remittances induce changes in the expenditure patterns. The results suggest remittances-receiving households devote a lower share of their total consumption of food items, holding total consumption and other household characteristics constant. Further decomposition of the impact of remittances on shares of food items shows that remittances-receiving households allocate a higher share of consumption on meat and other food (which includes meals consumed in restaurants), thus decreasing the share of staple food items.

Third, an important inference of the study is that the argument—often made in Nepalese context—that remittances is frittered away on imported goods and unproductive consumption may not be true. While remittances-receiving households consume more than non-remittances-receiving ones, this study finds weak evidence that remittances-receiving households devote a higher share of remittances to investment goods, such as education, and to durable goods when compared to those

which are non-remittances receiving. Moreover, the results suggest that the households spend a greater expenditure share on meat and vegetables, which are more important sources of nutrition compared to staples and other foods. Moreover, the paper also finds some evidence to suggest that households receiving international remittances have different expenditure patterns compared to domestic remittances- receiving households.

This study also finds that remittances significantly reshape expenditure patterns, but in different ways than the past studies have suggested. In particular, the propensity to invest more on education and health seems to be considerably higher. In practice, it is difficult to disentangle the effects of remittances on expenditure patterns of households due to intra-household bargaining power, the preference of households for different consumption goods and prices prevailing in the market. No attempt is made to incorporate these in this study in the absence of the information about remittance senders in the surveys. Remittances might also induce several other behavioural changes at the household level including the labour supply and change in the expenditure allocation, due to changes in the household head gender, which all affects the expenditure shares of the households. A further analysis of these issues is an important avenue for future research.

## Appendix 4.1 Computation of consumption aggregates

The computation of consumption aggregates is based on the methodology described in the Nepal Living Standard Surveys reports (Central Bureau of Statistics 1996, 2004, 2011). The consumption aggregates for all three rounds of surveys are computed by adding the consumption of goods and services by a household over a period of 12 months. The consumption items are broadly classified into three groups: food, non-food and housing. The detailed breakdown of the consumption aggregates used to calculate the shares of each of these categories is given in Table 4.4 and the computation of each of the broad items is briefly described below.

### *Consumption of food items*

Consumption of food items is the major component of expenditure for households, and is calculated based on the consumption of food items of around 70 items grouped under 12 categories. It is calculated as the sum of three components: food purchases, home production and receipt in-kind.<sup>38</sup> The food items are broadly classified into four sub-groups: staples, vegetables, meat and other food items. Staples mainly consist of rice and cereals and pulses, the major staple food items in Nepal. Consumption of meat and fish items are considered to be ‘superior’ food items in Nepal. Similarly, the vegetables sub-groups consist of the vegetables, eggs and dairy products. The remaining food items are categorized under ‘other food’ items, including meals taken outside home. Consumption of tobacco and tobacco related items is excluded from the food items and categorized under non-food items.

### *Consumption of non-food items*

Non-food items are broadly classified into expenditure on frequent and non-frequent items. The frequent items are categorized into fuels, apparels, personal care items and other frequent expenses. Non-frequent items are categorized into infrequent expenses, miscellaneous expenses and durable goods. According to the methodology developed

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<sup>38</sup>The annual consumption of food items is computed based on the consumption of each item using a ‘typical month’ criterion which could induce a potential recall bias in the responses. All the three rounds of the survey have similar questions in the food categories, though under the “Miscellaneous food products” in category 13, there are more sub-items in the third round of the survey.

by the Nepal Living Standard Survey Reports, the following items of non-food expenditure are excluded when computing the total non-food expenditure:

- 1) 'Firewood', due to difficulty in imputation and non-standard metrics.
- 2) 'Education', the expenditure in this category is calculated separately comparing with the separate module on education.
- 3) 'Repair and maintenance and home construction and improvements' are excluded as they represent an investment and also pose the risk of double counting
- 4) Expenditure on 'taxes and fines' are excluded
- 5) 'Marriages, dowries, funerals, charity and other religious functions' due to the lumpiness and short time horizon reflecting the household welfare
- 6) 'Durable goods', due to lumpiness of the investment and separately calculated as the consumption of durables reflecting the flow of services from durable goods.

Consumption of non-food items consists both 'frequent' expenditure (such as apparel and personal care items, transportation and fuel) and 'infrequent' expenses. The depreciation rate is calculated for each durable item using the purchase cost in current prices, and year of purchase, in order to impute the annual flow of services provided by the items owned by the households.

#### *Expenditure on frequent non-food items*

The questionnaires on the consumption of non-food items ask both the monthly and annual consumption of these items. The annual expenditure on these items is first categorized into 'regular' and 'non-regular' groups. For the regular items, the annual expenses are computed by multiplying the monthly expenses by 12, whereas for the 'non-regular' items the reported annual consumption is used.

#### *Expenditure on durable goods*

The expenditure on durable goods is calculated based on the flow of services provided by these goods, and on the year of purchase, the price of purchase and the household's estimate of the current value of the item. The current price of the item is estimated based on the annual rate of consumer price inflation over the past 30 years. A rate of depreciation for each item is obtained using the formula,

$$\delta_i = \left( 1 - \left( \frac{v_{in}}{v_{i0}} \right)^{\frac{1}{A_i}} \right),$$

where  $v_{in}$  = current value per item,  $v_{i0}$  = purchase value per item and  $A_i$  = age of the item.

The median depreciation is then computed for each item and converted to the current value, scaled back to the previous year to obtain the imputed flow of services provided by the durable goods.

#### *Consumption of utilities*

The annual expenditure of households on electricity, telephone and garbage collection were added to get the consumption of utilities. Expenditure on water is excluded from consumption aggregate.

#### *Consumption on education*

The consumption on education is calculated using the expenditure on tuition fees, uniforms, textbooks and supplies, transportation for each of the members of households attending schools. The value of scholarship received, if any, was also added.

#### *Consumption of housing*

The annual consumption of housing is calculated based on the monthly rents paid by the households; then this is multiplied by 12 to get the annual rent expenses. For the owner-occupied houses, or when the rent is free, the questionnaire asks the estimated cost of the dwelling. Despite this question, several observations on the rental values were missing for each of the three rounds of the survey. Moreover, some of the reported values were not reliable due to the very small or very large reported rent. The minimum cut-off points for all the rounds are kept at rupees 100 per month and the maximum permissible rent for the three rounds is Rupees 25,000 for first two rounds and Rupees 30,000 for the third round. In order to maximise the number of observations for further analysis, I estimate the rent for these households using the hedonic pricing model (Table 4.12).

**Table 4.12 Hedonic pricing coefficients**

<b>VARIABLES</b>	<b>Round I</b>	<b>Round II</b>	<b>Round III</b>
Log of area	0.111*** (0.026)	0.205*** (0.022)	0.158*** (0.019)
Number of rooms	0.108*** (0.011)	0.103*** (0.007)	0.114*** (0.006)
Has Kitchen	0.294*** (0.035)	0.222*** (0.025)	0.206*** (0.024)
Cement wall	0.023 (0.058)	0.281*** (0.043)	0.272*** (0.040)
Cement foundation	-0.481*** (0.071)	-0.367*** (0.048)	0.213*** (0.039)
Roof material	0.179*** (0.051)	0.238*** (0.031)	0.180*** (0.026)
Windows	0.152*** (0.040)	0.166*** (0.028)	0.224*** (0.026)
Has piped water	0.007 (0.041)	0.089*** (0.028)	-0.088*** (0.030)
Piped inside	0.172*** (0.062)	-0.021 (0.040)	0.187*** (0.033)
Garbage	0.295*** (0.079)	0.234*** (0.054)	0.157*** (0.044)
Municipal sewage	0.164** (0.080)	0.355*** (0.057)	0.178*** (0.054)
Electricity	0.492*** (0.059)	0.219*** (0.031)	0.174*** (0.027)
Telephone	0.176* (0.096)	0.471*** (0.052)	0.270*** (0.034)
Road next to household	0.130* (0.066)	0.217*** (0.043)	0.397*** (0.034)
Log of assets	0.149*** (0.015)	0.061*** (0.010)	0.060*** (0.009)
Constant	3.350*** (0.197)	3.499*** (0.144)	3.886*** (0.126)
Observations	2,075	3,547	5,913
R-squared	0.672	0.701	0.622
Adjusted R-squared	0.669	0.700	0.620

*Notes.* Dependent variable is log of rent. Standard errors in parentheses. Round I, II and III refer to the three NLSS rounds respectively.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Appendix 4.2 Computation of consumption aggregate (relevant sections of the questionnaires)**

<b>Major items</b>	<b>Components</b>	<b>Detailed breakdown</b>	<b>NLSS I</b>	<b>NLSS II</b>	<b>NLSS III</b>
Food items	Staple food	Grains and cereals, pulses and lentils	Section 5 (1 and 2)	Section 5 (1 and 2)	Section 5 (010, 020)
	Vegetables	Eggs and milk products, vegetables	Section 5 (3 and 5)	Section 3 and 5)	Section 5 (030, 050)
	Meat	Fish and meat, fruits and nuts	Section 5 (6 and 7)	Section 5 (6 and 7)	Section 5 (060, 070)
	Other foods	Cooking oils, spices and condiments, sweets and confectionary, non-alcoholic and alcoholic beverages, miscellaneous food products including meals taken outside the home	Section 5 (4, 8, 9, 10, 11, 13)	Section 5 (4, 8, 9, 10, 11, 13)	Section 5 (040, 080, 090, 100, 110, 130)
Non-food	Tobacco	Tobacco and tobacco related items	Section 5 (12)	Section 5 (12)	Section 5 (120)
	Consumption of durables	Inventory of durable items	Section 6 (c)	Section 6 (c)	Section 6 (c)
	Education	Education and related costs	Section 7 (c), section 6 (A)	Section 7 (c), section 6(A)	Section 7, Section 6 (a)

**Appendix 4.2 Computation of consumption aggregate (relevant sections of the questionnaires),*continued***

<b>Major items</b>	<b>Components</b>	<b>Detail breakdown</b>	<b>NLSS I</b>	<b>NLSS II</b>	<b>NLSS III</b>
	Fuel	Fuels for cooking	Section 6 (A)		Section 6 (a)
	Utilities	Electricity, telephone, garbage collection	Section 2 (C),	Section 2 (C),	Section 2
Housing	Rental value	Rents or imputed rent if owner occupied	Section 3, section 6 (c), sections 2 (A and B)	Section 3, section 6 (c), sections 2 (A and B)	Section 3, Section 6 (c), section 2

Source: Central Bureau of Statistics (1996, 2004, 2011). NLSS I, NLSS II and NLSS III refer to the first, second and third rounds of the NLSS respectively.

### Appendix 4.3 Summary statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
Share of food (wf1) in total consumption	overall	0.532	0.176	0.037	0.955	N =6857
	between		0.175	0.037	0.955	n = 6472
	within		0.024	0.220	0.844	T-bar = 1.06
Share of non-food and tobacco (wf2)	overall	0.159	0.078	0.013	0.875	N = 6857
	between		0.077	0.013	0.767	n = 6472
	within		0.018	-0.228	0.546	T-bar = 1.06
Share of rental income (wf3)	overall	0.126	0.110	0.003	0.836	N = 6857
	between		0.108	0.003	0.836	n = 6472
	within		0.021	-0.170	0.422	T-bar = 1.06
Share of education (wf4)	overall	0.057	0.070	0.000	0.819	N = 6857
	between		0.070	0.000	0.819	n = 6472
	within		0.013	-0.112	0.226	T-bar = 1.06
Share of durables (wf5)	overall	0.034	0.051	0.000	0.610	N = 6857
	between		0.051	0.000	0.610	n = 6472
	within		0.011	-0.146	0.213	T-bar = 1.06
Share of fuel (wf6)	overall	0.019	0.019	0.000	0.228	N = 6857
	between		0.019	0.000	0.228	n = 6472
	within		0.003	-0.031	0.070	T-bar = 1.06
Share of utilities (wf7)	overall	0.027	0.032	0.000	0.401	N = 6857
	between		0.032	0.000	0.401	n = 6472
	within		0.006	-0.114	0.168	T-bar = 1.06

### Appendix 4.3 Summary statistics (continued)

Variable		Mean	Std. Dev.	Min	Max	Observations
Share of health (wf8)	overall	0.046	0.078	0.000	0.873	N = 6857
	between		0.077	0.000	0.873	n = 6472
	within		0.018	-0.244	0.336	T-bar = 1.06
Foreign remittances (Rs)	overall	32764	137043	0.000	3600500	N = 6857
	between		138590	0.000	3600500	n = 6472
	within		18894	-449736	515264	T-bar = 1.06
Log of per capita consumption	overall	10.168	0.882	7.479	13.502	N = 6857
	between		0.873	7.479	13.502	n = 6472
	within		0.178	9.010	11.327	T-bar = 1.06
Household size	overall	5.387	2.485	1.000	32.000	N = 6857
	between		2.453	1.000	32.000	n = 6472
	within		0.412	-1.613	12.387	T-bar = 1.06
Household head education (number of years of schooling)	overall	7.204	3.741	0.000	16.000	N = 6857
	between		3.725	0.000	16.000	n = 6472
	within		0.464	1.704	12.704	T-bar = 1.06
Household head's age	overall	46.013	13.371	16.000	93.000	N = 6857
	between		13.286	16.000	93.000	n = 6472
	within		2.177	17.513	74.513	T-bar = 1.06
Average age of household	overall	27.646	9.907	8.667	85.000	N = 6857
	between		9.851	8.667	85.000	n = 6472
	within		1.611	7.146	48.146	T-bar = 1.06

**Appendix 4.3 Summary statistics (continued)**

<b>Variable</b>		<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>	<b>Observations</b>
Average number of children<6 years	overall	0.704	0.935	0.000	10.000	N = 6857
	between		0.922	0.000	10.000	n = 6472
	within		0.200	-1.796	3.204	T-bar = 1.06
Average number of children aged 6–12 years	overall	0.634	0.831	0.000	6.000	N = 6857
	between		0.819	0.000	6.000	n = 6472
	within		0.188	-0.866	2.134	T-bar = 1.06
Average number of children>15 years	overall	3.493	1.682	1.000	21.000	N = 6857
	between		1.667	1.000	21.000	n = 6472
	within		0.281	-0.007	6.993	T-bar = 1.06
Household has a loan (in %)	overall	0.631	0.483	0.000	1.000	N = 6857
	between		0.477	0.000	1.000	n = 6472
	within		0.100	0.131	1.131	T-bar = 1.06
Household has agricultural land (in %)	overall	0.706	0.455	0.000	1.000	N = 6857
	between		0.454	0.000	1.000	n = 6472
	within		0.061	0.206	1.206	T-bar = 1.06
Household has nonfarm activities (in %)	overall	0.370	0.483	0.000	1.000	N = 6857
	between		0.479	0.000	1.000	n = 6472
	within		0.083	-0.130	0.870	T-bar = 1.06

**Appendix 4.4 Determinants of consumption shares using remittance values: SUR estimates**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>VARIABLES</b>	<b>Food</b>	<b>Non-food and tobacco</b>	<b>Rental</b>	<b>Education</b>	<b>Durables</b>	<b>Fuel</b>	<b>Utilities</b>	<b>Health</b>
Remittance dummy	0.0008*** (0.000)	0.0000 (0.000)	0.0001 (0.000)	0.0002** (0.000)	0.0002 (0.000)	0.0000 (0.000)	0.0001* (0.000)	-0.0000*** (0.000)
Per capita consumption (logs)	0.0654*** (0.000)	0.0190*** (0.001)	0.0081** (0.003)	0.0056*** (0.002)	0.0021 (0.002)	0.0023* (0.001)	0.0002 (0.001)	0.0012*** (0.000)
Household size	0.0158*** (0.001)	-0.0018 (0.002)	-0.0059 (0.006)	0.0094*** (0.003)	-0.0015 (0.004)	-0.0009 (0.002)	-0.0018 (0.002)	0.0005 (0.001)
Household head education	0.0120*** (0.000)	0.0002 (0.000)	0.0023** (0.001)	0.0026*** (0.001)	0.0027*** (0.001)	-0.0003 (0.000)	0.0012*** (0.000)	-0.0012*** (0.000)
Household head's age	0.0007*** (0.000)	-0.0003** (0.000)	0.0004 (0.000)	0.0002 (0.000)	-0.0001 (0.000)	-0.0000 (0.000)	0.0001 (0.000)	0.0005*** (0.000)
Average age of household	0.0003*** (0.000)	-0.0005*** (0.000)	0.0014** (0.001)	-0.0023*** (0.000)	-0.0001 (0.000)	0.0001 (0.000)	0.0002 (0.000)	0.0006*** (0.000)
Number of children < 6 years	0.0325*** (0.001)	0.0037 (0.002)	0.0015 (0.008)	-0.0330*** (0.005)	-0.0021 (0.006)	0.0018 (0.003)	0.0001 (0.003)	0.0050*** (0.001)
Number of children aged 6-12 years	0.0077*** (0.001)	-0.0001 (0.002)	0.0026 (0.009)	-0.0030 (0.005)	-0.0031 (0.006)	0.0007 (0.003)	0.0003 (0.003)	-0.0027*** (0.001)

**Appendix 4.4 Determinants of consumption shares using remittance values: SUR estimates(continued)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>VARIABLES</b>	<b>Food</b>	<b>Non-food and tobacco</b>	<b>Rental</b>	<b>Education</b>	<b>Durables</b>	<b>Fuel</b>	<b>Utilities</b>	<b>Health</b>
Number of children > 15 years	0.0167*** (0.001)	0.0015 (0.002)	0.0042 (0.007)	-0.0022 (0.004)	0.0037 (0.005)	0.0001 (0.002)	0.0017 (0.002)	-0.0018** (0.001)
Household has a loan?	0.0066*** (0.001)	0.0076*** (0.002)	-0.0118 (0.008)	0.0019 (0.004)	-0.0033 (0.006)	-0.0010 (0.003)	-0.0018 (0.003)	0.0104*** (0.001)
Household own agricultural land?	0.0357*** (0.001)	0.0070*** (0.002)	-0.0118 (0.009)	-0.0025 (0.005)	-0.0036 (0.006)	-0.0087*** (0.003)	-0.0071** (0.003)	0.0029*** (0.001)
Household has nonfarm activities?	0.0221*** (0.001)	0.0049** (0.002)	0.0043 (0.008)	-0.0040 (0.004)	0.0065 (0.005)	0.0007 (0.003)	0.0014 (0.003)	-0.0006 (0.001)
Urban dummy	0.1906*** (0.005)	-0.0222* (0.012)	0.0839** (0.036)	0.0336* (0.018)	0.0182 (0.025)	0.0092 (0.013)	0.0192 (0.012)	0.0007 (0.004)
Destination India?	0.0170*** (0.003)	0.0061 (0.006)	-0.0093 (0.021)	0.0033 (0.012)	-0.0060 (0.015)	-0.0006 (0.008)	-0.0021 (0.007)	0.0002 (0.002)
Observations	8,497	8,497	8,497	8,497	8,497	8,497	8,497	8,497

Standard errors in parentheses. The regressions contain regional and round dummies.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Appendix 4.5 Determinants of consumption shares on Rounds 2 and 3: Pooled OLS

VARIABLES	(1) Food	(2) Non-food and tobacco	(3) Rental	(4) Education	(5) Durables	(6) Fuel	(7) Utilities	(8) Health
Remittance dummy	-0.0183** (0.009)	-0.0042 (0.006)	0.0059 (0.007)	0.0022 (0.004)	0.0059* (0.003)	-0.0023* (0.001)	0.0060*** (0.002)	0.0060 (0.006)
Per capita consumption (logs)	-0.1424*** (0.007)	0.0121*** (0.005)	0.0452*** (0.005)	0.0205*** (0.003)	0.0256*** (0.002)	-0.0024** (0.001)	0.0106*** (0.001)	0.0331*** (0.005)
Household size	-0.0107*** (0.004)	0.0002 (0.003)	0.0025 (0.003)	0.0091*** (0.002)	-0.0010 (0.001)	-0.0010* (0.001)	0.0001 (0.001)	0.0012 (0.003)
Household head education	-0.0030*** (0.001)	-0.0031*** (0.001)	0.0032*** (0.001)	0.0021*** (0.000)	0.0022*** (0.000)	0.0004*** (0.000)	0.0010*** (0.000)	-0.0026*** (0.001)
Household head's age	0.0004 (0.000)	-0.0004* (0.000)	-0.0003 (0.000)	0.0002 (0.000)	0.0001 (0.000)	-0.0000 (0.000)	0.0001* (0.000)	0.0001 (0.000)
Average age of household	0.0003 (0.001)	-0.0006 (0.000)	0.0018*** (0.000)	-0.0021*** (0.000)	-0.0003 (0.000)	0.0000 (0.000)	0.0002 (0.000)	0.0006* (0.000)
Number of children < 6	0.0080 (0.005)	-0.0013 (0.004)	0.0035 (0.004)	-0.0272*** (0.003)	0.0039* (0.002)	-0.0002 (0.001)	0.0011 (0.001)	0.0107*** (0.004)
Number of children age 6-12	0.0082 (0.006)	-0.0042 (0.004)	-0.0062 (0.005)	-0.0035 (0.003)	0.0031 (0.002)	0.0004 (0.001)	-0.0005 (0.001)	0.0023 (0.004)
Number of children > 15	-0.0010 (0.004)	0.0045 (0.003)	-0.0069* (0.004)	-0.0013 (0.002)	0.0030* (0.002)	-0.0001 (0.001)	-0.0001 (0.001)	0.0012 (0.003)



**Appendix 4.5 Determinants of consumption shares on Rounds 2 and 3: Pooled OLS (continued)**

<b>VARIABLES</b>	<b>(1)</b> <b>Food</b>	<b>(2)</b> <b>Non-food and tobacco</b>	<b>(3)</b> <b>Rental</b>	<b>(4)</b> <b>Education</b>	<b>(5)</b> <b>Durables</b>	<b>(6)</b> <b>Fuel</b>	<b>(7)</b> <b>Utilities</b>	<b>(8)</b> <b>Health</b>
Household has a loan?	0.0005 (0.007)	0.0010 (0.005)	-0.0143** (0.006)	0.0028 (0.003)	-0.0039 (0.003)	0.0003 (0.001)	-0.0014 (0.002)	0.0112** (0.005)
Household own agricultural land?	0.0213** (0.009)	0.0081 (0.006)	-0.0093 (0.008)	0.0003 (0.004)	0.0003 (0.003)	-0.0066*** (0.001)	-0.0082*** (0.002)	-0.0049 (0.006)
Household has nonfarm activities?	-0.0204*** (0.007)	-0.0018 (0.005)	0.0125** (0.006)	0.0031 (0.003)	0.0094*** (0.003)	0.0025** (0.001)	0.0031* (0.002)	-0.0044 (0.005)
Urban dummy	-0.1014*** (0.010)	-0.0210*** (0.007)	0.0907*** (0.008)	0.0243*** (0.005)	-0.0000 (0.004)	0.0115*** (0.002)	0.0189*** (0.002)	-0.0259*** (0.007)
Destination India?	0.0184 (0.013)	-0.0002 (0.009)	-0.0123 (0.011)	0.0030 (0.006)	-0.0046 (0.005)	0.0009 (0.002)	-0.0021 (0.003)	-0.0013 (0.009)
Observations	1,098	1,098	1,098	1,098	1,098	1,098	1,098	1,098
Number of households	713	713	713	713	713	713	713	713

Standard errors in parentheses. The regressions contain regional and round dummies and a constant.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Chapter 5

### Conclusion

In this concluding chapter, the key findings of the three studies are summarized and some suggestions for further research are offered.

The thesis consists of three core chapters dealing with the impact of workers' remittances inflows on economic growth; the implications on real exchange rate of domestic currency; and the consumption patterns of households in Nepal. The three chapters are based on the application of modern econometric techniques, with appropriate sensitivity testing, to newly-constructed multi-country and household panel data sets.

The empirical analysis of Chapter 2 suggests that the overall effect of remittances on growth is not statistically significant. However, there is some, albeit weak, evidence that there is a diminishing impact of remittances on growth after remittances surpass a threshold of about 7–9 percent. The results are robust to alternative specifications and different sample periods. In particular, the impact of remittances is not affected by the past level of remittances, nor the current level of financial deepening and education levels.

The findings of Chapter 3 demonstrate that, when controlled for the other relevant factors, remittance inflows results in an appreciation of the exchange rate as predicted by the Dutch disease theory. In contrast to the real exchange rate indices constructed by the International Monetary Fund, I construct a new real effective exchange rate series based on wholesale price index and GDP deflator and long-run trade weights, compared to the CPI-based index of earlier studies. I find that the estimated REER indices differ substantially for many countries compared to the CPI-based measure. The outcome is that the magnitude and significance of the impact of remittances on the real exchange rate depends crucially on the choice of an appropriate REER index.

The findings of Chapter 3 also suggest that remittances lead to a higher degree of RER appreciation compared to official development assistance, whereas foreign direct investment leads to a depreciation of the RER. There is some weak evidence to suggest that magnitude of the impact, depends on the exchange rate regimes. In particular, the impact of remittances on the REER on the countries adopting a flexible exchange rate regime tend to be higher than fixed exchange rate regime countries.

According to the findings of the Nepalese case study in Chapter 4, foreign remittances enables remittance-receiving household maintain higher levels of consumption compared to non-remittance receiving households, after controlling for household characteristics. There is also evidence that that remittance-receiving household have modestly different expenditure patterns compared to non-remittances receiving households. The findings of this chapter suggest that these households spend higher proportion of their incomes on education, durable goods and health and lower proportion on food items. However, within food categories they allocate higher shares of consumption on meat and other foods (which includes meal consumed in restaurants). However, there is no evidence to suggest that domestic remittance-receiving households have different expenditure patterns compared to non-remittance receiving households.

These findings are contrary to the popular perception that remittances are mostly frittered away in conspicuous consumption. This chapter provides the first empirical evidence that remittances contributes positively to education and health outcomes in the context of Nepal. This finding also helps to reinforce the results of the earlier chapters that remittances are mixed blessings.

### **Limitations and Directions for Further Research**

Chapters 2 and 3 of the thesis are based on cross-country panel regressions. The empirical literature on economic growth is vast compared to the remittance growth literature. The very nature of panel data analysis is that it estimates the ‘average’ effects of a particular variable of interest across all countries covered. Individual country experiences can vary from this average, due to country specific structural peculiarities not modelled in the estimation. As argued by (Rodrik 2007), it is

necessary to undertake country-specific case-studies to supplement the cross-country analysis in order to ensure informed policy making in the individual country context.

A recurring theme of all the empirical studies is the tackling of the endogeneity issue. So far the search for to find a strong and uncontroversial external instrument has remained elusive. It is hard to find a valid instrument: it should be highly correlated with remittances but should affect growth or real exchange rate only via remittances. The search for the valid instrument for remittances is now focussed on the microeconomic variable, such as the cost of sending remittance (Barajas et al. 2009). However, due to data unavailability for many countries, an empirical analysis could not be conducted using the external instrument.

A caveat is in order about using the dynamic panel data method using the system GMM technique. System GMM is sensitive to choice of lag length and also to the options of how one chooses different types of instruments (Roodman 2009b). Moreover, there is no test available within the System GMM framework to test for the internally generated instruments (Bazzi & Clemens 2013).

Chapter 4 examines whether the remittance-receiving households have different consumption patterns compared to households which do not receive remittances. Apart from augmenting the household income through remittances, international labour migration also link households with international markets and cultures, which might induce behavioural changes in consumption patterns, including the substitution of purchased goods for own-produced goods. It is, therefore, necessary to conduct in-depth surveys of migrant households focussing on characteristics of migrant workers such as their education and skill levels, overseas employment status, and destination countries in the surveys. Moreover, the panel data analysis of the study suffers from the shorter time period and the presence of gaps in the data series. There is also room to improve the analysis using better instrumental variables depending on data availability.

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