

6-30-2016

# Essays On The Economics Of International Remittances And Migration

Marian Manic

*University of South Carolina*

Follow this and additional works at: <https://scholarcommons.sc.edu/etd>

 Part of the [Business Commons](#), and the [Economics Commons](#)

---

## Recommended Citation

Manic, M.(2016). *Essays On The Economics Of International Remittances And Migration*. (Doctoral dissertation). Retrieved from <https://scholarcommons.sc.edu/etd/3408>

This Open Access Dissertation is brought to you by Scholar Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact [dillarda@mailbox.sc.edu](mailto:dillarda@mailbox.sc.edu).

ESSAYS ON THE ECONOMICS OF INTERNATIONAL REMITTANCES AND  
MIGRATION

by

Marian Manic

Diploma of Licentiate  
Academy of Economic Studies of Moldova 2004

International Master of Business Administration  
University of South Carolina 2007

---

Submitted in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy in  
Economics

The Darla Moore School of Business  
University of South Carolina

2016

Accepted by:

Douglas Woodward, Major Professor

John McDermott, Committee Member

William Hauk, Committee Member

Paulo Guimarães, Committee Member

Chuck Kwok, Committee Member

Lacy Ford, Senior Vice Provost and Dean of Graduate Studies

© Copyright by Marian Manic, 2016  
All Rights Reserved.

## DEDICATION

To my wife, Mariana, and my parents, Afanasie and Elena, for their indispensable support during my Ph.D. studies.

## ACKNOWLEDGMENTS

If there is one person without whose help this dissertation would not have been possibly, it is Professor Douglas Woodward. I thank him from the bottom of my heart for his mentorship, help securing funding for my Ph.D. research, efforts to improve the text of the essays, constant encouragement, and, most importantly, for his life lessons that I will cherish throughout my academic career! I also thank Professor Paulo Guimarães for his tremendous help with the empirical models in this research and Professor William Hauk for his support in getting funding as well as ideas about improving the text of the essays. Finally, I thank Professor John McDermott for his support during my Ph.D. studies.

This dissertation research is funded in part by The Darla Moore School of Business Research Grant Program, CIBER Research Grant, the University of South Carolina Division of Research funds, and the University of South Carolina Economics Department grant.

## ABSTRACT

Existing literature on international remittances recognizes the increasing importance of these transfers on economic development as well as their effect on the reduction of poverty in developing countries. However, the studies on this topic are still divided over the long-term effects of remittances, identifying instances when remittances have either positive or negative results. Probably the most important oversight of the literature on international remittances and migration is the lack of the regional dimension in the analysis, which is the focus of this dissertation.

In the first chapter I propose a novel spatial dataset of remittances and spending from a nationally representative survey that I carried out in the Republic of Moldova in the first half of 2013. Based on these data, I build an empirical model that estimates average budget shares at the household level using the two-stage linear regression approach. The impact of remittances is evaluated by comparing marginal spending for households receiving remittances with their counterfactuals. In this essay, I perform the analysis at the national level and control effectively for the selection bias using a two-stage multinomial logit regression approach. The results at the national level are mixed and mostly appear to have negative implications on economic development of the country.

The second chapter continues the analysis in the first essay. In this chapter, I analyze remittance flows with a model that estimates regional (urban and rural) budget shares of consumption and investment expenditure categories for rural and urban households. This model is an innovation in the literature on remittances because it provides a technique for estimating regional spending and evaluating the impact of

remittances based on the location of spending, rather than the location of the household. The fundamental finding of the essay is that remittances influence the flight of productive capital out of rural areas into urban regions (a pattern similar to the crowding-out effect of the “Dutch Disease”). Thus, although rural regions have the highest frequency of households receiving international remittances, these transfers change the regional spending propensities of rural households, leading them to spend more on investment categories located in urban centers.

The third chapter builds upon the results of the second essay. This study offers a new approach of analyzing the effect of international migration (and remittances, implicitly) on regional economic development by investigating their impact on the dynamics of local human capital concentration. It is a departure from the classic analysis of the effect of remittances/migration on educational attainment (school enrollment) or the links between international migration and brain drain. Instead, it uses probit and conditional logit estimation techniques to evaluate the effect of money flowing from international migration on the likelihood that left-behind household members with tertiary education migrate domestically, attracted by employment opportunities in urban areas. The regional choice model is grounded in random utility maximization theory, which also adds more clarity about the urban job choice alternatives in Moldova. The main findings of the paper support the hypothesis that international migration/remittances lead to an increase in the preference for urban jobs of the “left-behind” tertiary-educated household members, especially for individuals with rural origins located outside the “primate city” region.

## TABLE OF CONTENTS

DEDICATION . . . . .	iii
ACKNOWLEDGMENTS . . . . .	iv
ABSTRACT . . . . .	v
LIST OF TABLES . . . . .	ix
LIST OF FIGURES . . . . .	xi
CHAPTER 1 INTERNATIONAL REMITTANCES, HOUSEHOLD SPENDING, AND INVESTMENT: A CASE STUDY OF MOLDOVA . . . . .	1
1.1 Introduction . . . . .	1
1.2 Country Overview . . . . .	3
1.3 Literature Review . . . . .	8
1.4 Empirical Approach . . . . .	13
1.5 Data . . . . .	22
1.6 Regression Results . . . . .	35
1.7 Conclusion . . . . .	43
CHAPTER 2 THE IMPACT OF REMITTANCES ON REGIONAL CONSUMP- TION AND INVESTMENT . . . . .	45
2.1 Introduction . . . . .	45

2.2	Additional Country Overview Details . . . . .	49
2.3	Literature Review at the Regional Level . . . . .	50
2.4	Empirical Approach at the Regional Level . . . . .	54
2.5	Expenditures at the Regional Level . . . . .	62
2.6	Regression Results . . . . .	65
2.7	Conclusion . . . . .	80
CHAPTER 3	THE REGIONAL EFFECTS OF INTERNATIONAL MIGRATION ON DOMESTIC ACCUMULATION OF HUMAN CAPITAL . . . . .	84
3.1	Introduction . . . . .	84
3.2	Human Capital Potential of the Republic of Moldova . . . . .	89
3.3	Literature Review . . . . .	90
3.4	Empirical Approach . . . . .	97
3.5	Data . . . . .	108
3.6	Results . . . . .	116
3.7	Conclusion . . . . .	124
BIBLIOGRAPHY	. . . . .	128
APPENDIX A	COPYRIGHT PERMISSION . . . . .	138

## LIST OF TABLES

Table 1.1	Wu-Hausman Test Results . . . . .	17
Table 1.2	Sargan Test Results . . . . .	19
Table 1.3	Specification of Household Socio-demographic Characteristics . . . . .	19
Table 1.4	Household Descriptive Statistics . . . . .	26
Table 1.5	Description of Expenditure Categories . . . . .	31
Table 1.6	Descriptive Statistics of Households' Expenditure Shares and Values . . . . .	34
Table 1.7	First-Stage Multinomial Logit Regression Results . . . . .	36
Table 1.8	Selected Second-Stage OLS Regression Results . . . . .	38
Table 1.9	Impact of Remittances on Marginal Spending at the Country Level . . . . .	39
Table 2.1	Regional Sargan Test Results . . . . .	60
Table 2.2	Regional Wu-Hausman Test Results . . . . .	60
Table 2.3	Descriptive Statistics of Households' Regional Expenditure Shares and Values . . . . .	63
Table 2.4	Selected Second-Stage OLS Regression Results for Urban Expenditures . . . . .	66
Table 2.5	Selected Second-Stage OLS Regression Results for Rural Expenditures . . . . .	67
Table 2.6	Impact of Remittances on Marginal Spending at the Regional Level . . . . .	70
Table 2.7	Impact of Remittances on Regional Spending Propensity of Urban Households . . . . .	75
Table 2.8	Impact of Remittances on Regional Spending Propensity of Rural Households . . . . .	78

Table 3.1	Description of the covariates used in the Probit regression . . . . .	101
Table 3.2	Description of variables used in the CLM regression . . . . .	106
Table 3.3a	Cross tabulation of the regional job choice by type of household . .	109
Table 3.3b	Cross tabulation of households by primate city region and type of household . . . . .	109
Table 3.3c	Cross tabulation of exposure to international migration by type of household . . . . .	112
Table 3.3d	Cross tabulation of exposure to international migration by region of first job . . . . .	114
Table 3.3e	Cross tabulation of exposure to international migration by pri- mate city region . . . . .	114
Table 3.4	Descriptive statistics of variables used in Probit regression . . . . .	115
Table 3.5	Probit Regression Results . . . . .	118
Table 3.6	Marginal Effects . . . . .	120
Table 3.7	CLM Regression Results . . . . .	122
Table 3.8	Marginal Effects after CLM . . . . .	123

## LIST OF FIGURES

Figure 1.1	Dynamics of Remittances vs Economics Sectors in Moldova During 1995-2014. . . . .	5
Figure 1.2	Evolution of Remittances in Moldova During 1995-2014. . . . .	8
Figure 1.3	The 12 Regions Used in the Analysis. . . . .	24
Figure 1.4	Frequency of Households Receiving Remittances in Moldova. . . . .	27
Figure 1.5	Weight of Remittances in Total Budget of Households in Moldova. . . . .	28
Figure 1.6	Mean Household Expenditure Level in Moldova. . . . .	33
Figure 1.7	Distribution of Marginal Budget Shares Across 12 Regions in Moldova. . . . .	41
Figure 2.1	Traditional approach: Analyzing the impact of remittances using consumer theory models. . . . .	57
Figure 2.2	The impact of remittances using consumer theory models in a regional framework. . . . .	58
Figure 2.3	Distribution of Urban Marginal Budget Shares Across 12 Regions in Moldova. . . . .	72
Figure 2.4	Distribution of Rural Marginal Budget Shares Across 12 Regions in Moldova. . . . .	73
Figure 3.1	Number of Educational Institutions Across Cities in Moldova. . . . .	90
Figure 3.2	Urban Job Choices Used in the Conditional Logit Model. . . . .	107
Figure 3.3	Frequency of Jobs by District of Moldovan College Graduates. . . . .	110
Figure 3.4	Frequency of Urban Jobs Taken by Moldovan College Graduates. . . . .	111

Figure 3.5 Frequency of Households Exposed to International Migration. . . 113

# CHAPTER 1

## INTERNATIONAL REMITTANCES, HOUSEHOLD SPENDING, AND INVESTMENT: A CASE STUDY OF MOLDOVA\*

### 1.1 INTRODUCTION

In many developing countries international remittances are an important catalyst in economic development and the reduction of poverty. The United Nations defines international remittances as “transfers in cash or in kind made, or received, by resident households to or from other non-resident households” (United Nations (2005), page 3). According to the World Bank, in 2015 worldwide remittances were estimated to reach approximately \$590 billion, of which the majority of funds, \$435 billion, were sent to developing countries. The World Bank forecasts that worldwide remittances will reach the \$610 billion level in 2016. In many developing countries remittances have significantly surpassed official development programs as well as the level of Foreign Direct Investments (World Bank (2015b)). As a result, starting with approximately the 2000’s, this economic factor became a fundamental element in the development and implementation of intervention policies (De Haas (2007a), page 4).

---

\*Manic, Marian. 2016. “The Impact of Remittances on Regional Consumption and Investment,” *Journal of Regional Science*, Accepted on 04/05/2016. Reproduced here with permission of the publisher.

The increasing importance of international remittances has stimulated research about their impact on economic development. Currently, the debate about the effect of remittances is unsettled (De Haas (2007a)). Researchers argue on one side that remittances have a negative impact because they lead to an increase in consumption at the expense of investment in productive assets (Reichert (1981), Chami et al. (2003), Clément (2011)). On the other side, economists maintain that due to their transitory characteristic remittances are used primarily in investment activities that generate additional income and spending (Taylor et al. (1996), Adams (2005), Taylor and Mora (2006)). In other words, remittances lead to higher spending propensities on productive investments in human and physical capital that create economic growth and development opportunities.

This study uses extensive survey data from the Republic of Moldova, a developing country in Eastern Europe, and employs a regression model that analyzes the impact of international remittances within a household's system of demand functions (similar to Clément (2011), Adams and Cuecuecha (2010), Taylor and Mora (2006), and several others). This model makes use of variables identifying the effect of remittances, distance from household location to the expenditure location, regional dummies, and other control variables for household characteristics in order to reveal remittances' effect on households' marginal propensities to spend on different types of goods. The dependent variables are expressed as budget shares of particular categories in the household's total expenditure.

The data on household expenditures come from a novel survey that I carried out during the first half of 2013 in the Republic of Moldova with the help of the professional surveying firm IMAS-INC. IMAS selected a random and representative sample (both at the national as well as regional levels) of 1,813 households. Although similar surveys have been conducted in Moldova before by the International Organization for Migration (IOM) and the International Labor Organization (ILO), the current

survey provides the most accurate estimates of household spending and introduces the spatial elements required for the regional analysis described in Chapters 2 and 3 of the dissertation. The spatial elements of spending and human capital investigated in the current survey are unique and have not been used in any prior literature.

The findings in this study complement those of the limited negative strand of the literature. Interestingly, the study finds that international remittances lead to a decrease in marginal spending on human capital categories (contrary to the studies finding positive results of these transfers). In addition, most consumption categories appear to be increasing as a result of the inflow of remittances. The only positive findings are observed in the cases of marginal spending on savings and business development. However, due to the small shares of savings and business development in the households' overall budget, these benefits are overshadowed by the negative results in the case of consumption and human capital categories.

The remainder of this chapter is organized in six major sections. In Section (1.2), the essay provides a brief overview of the Republic of Moldova. Section (1.3) presents a review of the relevant literature in this field. Section (1.4) explains the empirical approach. Section (1.5) describes the data, while section (1.6) covers the results of regressions. Finally, section (1.7) contains the main conclusions of the study.

## 1.2 COUNTRY OVERVIEW

The Republic of Moldova is a developing country in Eastern Europe with a population of approximately 3.6 million people. The capital city is Chişinău, which, together with its suburbs (forming the municipality of Chişinău), has a population of approximately 800,000 people. The capital is situated in the central region of the country. Other major cities in this region are: Ungheni (approximately 38,000 people), Orhei (approximately 34,000 people), Hânceşti (approximately 17,000 people), and Ialoveni (approximately 16,000 people). In the northern region, the major urban

centers include the municipality of Bălți (approximately 150,000 people), the city of Soroca (approximately 38,000 people), the city of Drochia (approximately 20,000 people), and the city of Edineț (approximately 18,000 people). The major urban centers in the southern region of Moldova include the city of Cahul (approximately 40,000 people), the municipality of Comrat (approximately 26,000 people), and the city of Căușeni (approximately 20,000 people).

The central region is the most populous (approximately 1.9 million people, out of which approximately 50% is urban and most of it resides in the capital); the northern region is the second most populous with almost 1 million people (out of which almost 36% is urban); finally the southern region is the least populated region of the country with approximately 700,000 people (out of which approximately 29% is urban).<sup>1</sup>

In 1991, Moldova obtained its independence from the Soviet Union and started a slow process of transitioning towards the capitalist models of Western Europe. This process was also affected by a continuous de-industrialization as Moldova lost the Soviet-era industrial subsidies and had to privatize most of the state enterprises. Today, Moldova is considered the poorest country in Europe. It does not have any major natural resources except for highly fertile lands and favorable temperate weather conditions. Approximately 75% of Moldovan soils are chernozem (black soil), the most fertile in the world. During the Soviet era, Moldova represented only 0.15% of the Soviet Union's total land area; however, it produced approximately 40% of the USSR's tobacco, 10% of the fruits, and 5% of the vegetables (United Nations (1997)). Moldova's economy currently relies mostly on agriculture and light-food processing industries with the biggest exports including fruits and vegetables as well as wines (United Nations (2011)).

The shares of Moldova's three major economic sectors (agriculture, manufacturing, and services) had been approximately evenly distributed after gaining independence

---

<sup>1</sup>2013 population data from Moldova's National Bureau of Statistics.

from the Soviet Union (World Bank Data by Country in 2015). However, starting with the second half of the 1990's, the weights of agricultural and manufacturing sectors in the country's GDP diminished significantly (Figure 1.1). During this period, a big portion of the agro-industrial equipment and facilities from the large Soviet agricultural collective organizations (the so-called "Kolkhoz" and "Sovhoz") was stolen, damaged or sold as a result of inefficient privatizations, while new investments in this sector were low.<sup>2</sup>

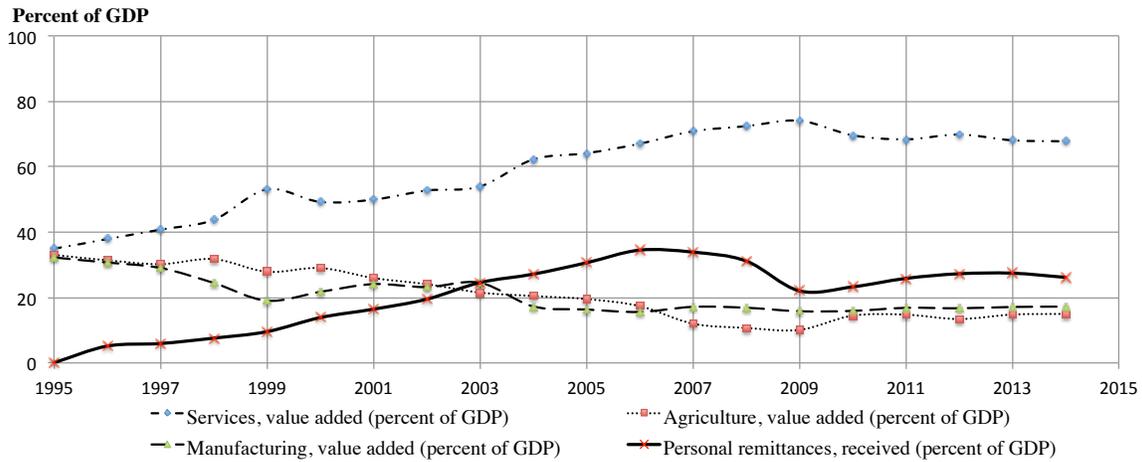


Figure 1.1: Dynamics of Remittances vs Economic Sectors in Moldova During 1995-2014.  
(Source: World Bank Data)

During the same period, the land was allotted back (privatized), mostly to the people who were members of the above-mentioned Kolkhoz and Sovhoz organizations.<sup>3</sup> However, due to a series of factors (lack of tools and equipment, high cost of scant fuel, and damaged and physically depreciated infrastructure) the farmers could not administer these lands efficiently. For similar reasons, agricultural processing in-

<sup>2</sup>The process of privatization was highly criticized due to multiple cases of corruption and fraud.

<sup>3</sup>The restitution of land in Moldova, as opposed to other Eastern European countries like Romania or Hungary, was not done based on historical ownership of land prior to collectivization (Gorton (2001)).

dustries reduced operations and many skilled workers were left without jobs and had to seek alternative employment opportunities.

The desperate situation of Moldovan farmers, the onset of the 1998 financial crisis in Russia that adversely affected many Moldovan enterprises, and the ensuing political instability led to two distinct waves of emigration. Lücke et al. (2007) provide an overview of these two waves: the migrants who left the country during the first wave were medium-skilled and higher educated workers mainly from urban areas, while the migrants of the second wave were low-skilled and less educated workers primarily from rural areas.

Gudim (2004) provides a more detailed view of the migrants in the second wave based on a study conducted by the International Labor Organization (ILO). According to this study, one third of Moldovan households had at least one member working abroad, 70% of migrants were male, 80% of the migrants were between the ages of 25 and 40, and 69% of the migrants came from rural areas. The main destinations of these migrants were: Russia (55%), Italy (18%), Greece, Portugal and Turkey (each with approximately 4%), Ukraine (2.8%), and Israel (2.8%). Importantly, data from the current survey indicate similar trends in the migration preferences: Russia (56.2%), Italy (21.4%), Romania (3.5%), France and Spain (each with 2.2%), Israel (1.9%), USA (1.8%), Turkey (1.7%), Ukraine (1.5%), Greece and Canada (each with 1.4%), Portugal and Germany (each with 1.3%).

The destinations and their weights in total migration may change soon due to the recent geo-political tremors in Eastern Europe, which have already started to reshape the migration and remittance flow patterns. In addition, the EU parliament has signed visa-free travel for Moldovans in the EU starting in the spring of 2014. This may lead to easier access of Moldovan migrants to the European labor markets. On the other hand, the rising issues with refugees from belligerent Middle East regions will most probably affect labor migration from Eastern Europe as well. Finally, recent

Russian regulation on migration that makes it more difficult for foreign workers to stay in the country may force many Moldovan migrants to choose other destinations in the EU and other developed countries.

Surveys conducted by IOM identify that a big portion of the migrants are seasonal, a characteristic that introduces further challenges in finding a good estimate for the total stock of emigrants. Data from the current survey reveal that approximately 45% of Moldovan households have migrant members and 40% receive international remittances. Within the households with international migrants, approximately 59% are located in rural regions (a similar statistic is observed in the case of households receiving remittances).

Following the second massive wave of emigration, the stock of Moldovan emigrants increased to approximately 770,000 (World Bank (2011)) and the country experienced a dramatic growth in the volume of remittances. Pursuant to the World Bank, remittances increased from \$179 million in 2000 to approximately \$1.9 billion in 2008 (Figure 1.2). During the financial crisis that started in 2009 the receipt of remittances decreased to approximately \$1.2 billion; however it has picked up momentum again in the last several years and reached a new record of approximately \$2.08 billion.<sup>4</sup>

An important reason why Moldova is relevant to the study of remittances is that these funds have taken a considerable share of the country's GDP. According to the World Bank, in 1996 remittances represented approximately 5% of Moldova's GDP, while in 2006 they rose to 35%. From 2009 until 2014 the weight of remittances in Moldova's GDP fluctuated between approximately 22% and 26%. These findings

---

<sup>4</sup>The data on remittances is based only on official transfers recorded by the central bank. Since these statistics don't account for the transfers made through money transfer firms (Western Union, MoneyGram, and others) as well as the cash or in-kind remittances that are transmitted through bus drivers, the actual amount of remittances transferred to Moldova during this period might have been much higher. The Economist (2012) summarizes that "In 2011 remittances to poor countries totaled \$372 billion, according to the World Bank (total remittances, including to the rich world, came to \$501 billion). That is not far off the total amount of foreign direct investment that flowed to poor countries. *Given that cash is ferried home stuffed into socks as well as by wire transfer, the real total could be 50% higher.*"

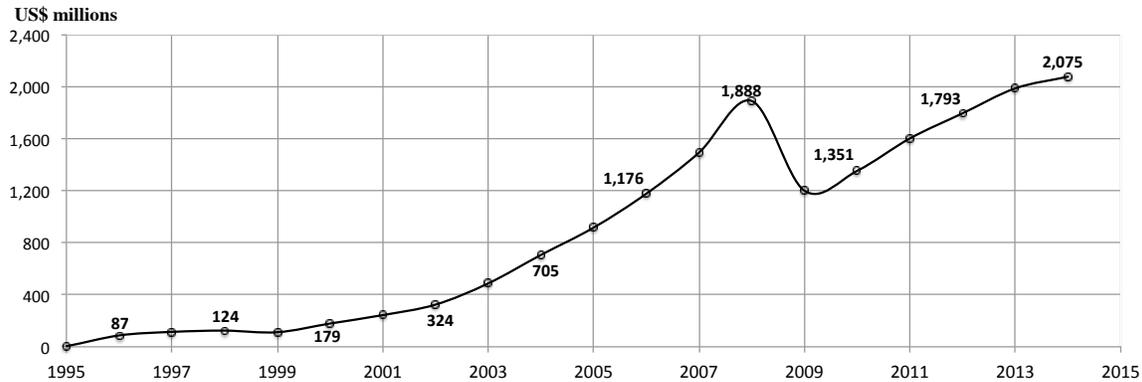


Figure 1.2: Evolution of Remittances in Moldova During 1995-2014.  
*(Source: World Bank Data)*

place Moldova among the top five countries in the world in terms of remittances as a share of GDP. Furthermore, a comparison of the remittances' weight in GDP with those of Moldova's economic sectors reveals that during 2006-2008 remittances surpassed the share of GDP of agriculture and manufacturing taken together (Figure 1.1). Another interesting observation revealed by Figure 1.1 is that there seems to be a positive correlation between the weight of remittances in GDP and that of the services sector. This may indicate that remittances lead to a boom in the services sector based on the crowding-out of productive factors from the lagging productive sectors (Corden and Neary (1982); Acosta et al. (2009)).

Data presented above support the observation that Moldova's economic growth and development has a strong dependence on the inflow of remittances and their eventual use. Moreover, if remittances are used primarily on consumption then the long term sustainable development of Moldova might be jeopardized.

### 1.3 LITERATURE REVIEW

The literature covering the impact of remittances on economic development falls into two camps. On one hand, we have papers that find remittances to reduce poverty

and income inequality (Alderman (1996), Taylor (1999), Adams (2005), Taylor and Mora (2006), Adams and Cuecuecha (2010)). These papers argue that such funds help accelerate economic development through accumulation of physical and human capital as well as increasing income multipliers. On the other hand, there are researchers who contend that remittances do not lead to improved development and growth in the remittance-receiving countries because they are spent primarily on consumption and crowd out capital and labor factors from the productive sectors of the economy (Reichert (1981), Durand and Massey (1992), Chami et al. (2003), Clément (2011)).

The modern literature on remittances uses rigorous empirical models that analyze the impact of remittances on economic growth and development. These papers address the complications of fungibility as well as endogeneity (or self-selection of migrant households). Much of this literature builds on consumer demand theory. In a panel study of Pakistan, Alderman (1996) constructs a system of expenditure equations assuming saving and consumption to be a function of the returns to assets and human capital wealth as well as transitory shocks to income. The study finds positive effects of international remittances on economic development in the form of increasing marginal propensities to save on physical and human capital categories. Adams (2005), Taylor and Mora (2006), Tabuga (2007), Valero-Gil (2009), and Adams and Cuecuecha (2010) build their analyses upon a similar approach.

These later papers use household survey data from various countries, mostly from Latin America, to estimate budget shares for specific consumption or productive investment categories. Moreover, the models in these papers employ linear regressions of the average budget shares for the specific categories on a series of household socio-demographic characteristics along with the variable that captures the effect of remittances. They conclude that, at the margin, remittances decrease the households' marginal spending propensities for consumption categories and increase their propensities to invest in human capital represented by education and healthcare as well as

in physical capital represented by housing. Adams (2005) and Adams and Cuecuecha (2010) recognize that although expenditures on housing are consumption-based when considered at the macroeconomic level, yet they are productive in the sense that they have “second-” and “third-round effects” on wages, employment, and business development. This reasoning, however, could be extended to other consumption categories as well, which complicates the interpretation of investment categories and their separation from consumption. Chami et al. (2003) also casts doubt on labeling housing expenditures productive.

Taylor et al. (1996) describe several positive effects stemming from international migration and ensuing remittance flows. First, the authors argue that remittances reduce the financial and risk constraints that households have in the absence of this additional income source. Second, income and employment multipliers in the communities with migrants eventually benefit other households without migrants.

Another important paper in the set of studies finding positive effects of remittances is Taylor (1999). It claims that the decisions to migrate are taken at the household level rather than at the individual level. According to the author, the primary motivation for migration includes raising additional income, getting access to funds to be invested in “new activities,” as well as to insure against income and production risks. Thus, the paper suggests that the additional consumption generated by remittance receiving households may stimulate production indirectly. Such consumption may allow other households and economic agents to use the resulting funds in productive investments that might not have been possible otherwise due to high capital and risk constraints. The paper also points out a result of Adelman and Taylor (1990) that shows that remittances coming into Mexico intensify income multipliers especially in rural households, while transfers going into urban households lead to higher consumption of imports, which results in a drain of funds outside the country.

Clément (2011) is a recent study that also employs consumer theory in the analysis of the economic impact of remittances. The paper gathers household data from Tajikistan and uses a propensity score matching model based on a system of demand functions for consumption and investment categories. In contrast to the other studies, this paper questions the efficacy of remittances on economic development. The results show that international remittances are used predominately for consumption and are considered as a short-term resource used to cope with financial vulnerabilities of receiving households. In addition, Tabuga (2007), using household data from the Philippines, constructs a similar system of demand functions and finds mixed results for some consumption categories. This study agrees in its conclusion that remittances may lead to higher spending on consumer goods and leisure.

A couple of other papers that do not find positive effects of remittances are Reichert (1981) and Chami et al. (2003). Reichert (1981) uses household data from Mexico and finds that although international migration can lead to rapid growth of rural communities, it may simultaneously create a wide gap among the social classes based on wealth and migrant status, which can also spur social friction. The author concludes that the rapid growth of the rural community is not sustainable because it is not based on productive investments and this elevated status of the migrant households can only be maintained with recurring migration.

Chami et al. (2003) use panel data on multiple countries to construct a model that analyzes remittances arising from altruistic motivations and show that these transfers may actually lead to moral hazard issues, which can be serious enough to affect the economic activity negatively. The paper finds that future use of remittance income in productive activities is difficult and this depends on the existence of appropriate policies that can transform the nature of remittances from compensatory transfers into investments. Also, the authors question the effectiveness of previous studies about remittances' impact on economic development and raise important issues related to

how productive investments are defined. For example, the authors explain on page 9 of the paper that expenditures on housing, land or jewelry should not be defined as productive investments in cases when these assets simply change hands. This paper also raises serious concerns related to using spending multipliers as evidence of positive effects of remittances, arguing that in most cases the spending multipliers have a consumerist nature.

The literature that identifies the consumption-oriented effects of remittances parallels the main thesis of the “Dutch Disease.” This concept has been advanced by Corden and Neary (1982), who present a model with a booming and lagging sector. The booming sector has a crowding-out effect on the productive factors of the lagging sector, which explains the occurrence of de-industrialization. In a similar way, remittances may lead to a destabilization of economic sectors, which results in a booming sector (usually represented by services) and a lagging sector (agriculture and/or manufacturing). This is mainly because remittances drive productive factors from the agriculture and manufacturing sectors into the booming service sector, which is primarily located in urban regions. Acosta et al. (2009) is a more recent study that investigates the relationship between international remittances and the Dutch disease phenomenon based on the study of the effects on relative prices of non-tradable goods in El Salvador. This later study confirms that remittances have an effect on the reallocation of productive factors, which causes the contraction of the tradable sector.

Remittance studies in Eastern Europe are limited and, to the best of my knowledge, lack accuracy and the spatial dimensions introduced in the current dissertation research. Mîsliuțaia and Vakhitova (2009) is a recent study that analyzes the effect of remittances in Moldova along the same lines of consumer demand theory as Adams (2005). The main results of the paper are that remittances do not increase the households’ marginal propensity to invest, although these transfers do increase

the households' marginal budget share for savings (a finding that is observed by the current study as well). A curious aspect related to Mîslițcaia and Vakhitova (2009) is that they report very low expenditure levels (significantly lower than the levels observed in the current study). Another drawback of the paper is that it does not address the endogeneity bias of remittances.

## 1.4 EMPIRICAL APPROACH

### 1.4.1 MODEL SPECIFICATION

I start building the model by looking at whether remittances, a transitory income shock, alter the spending behavior of households. The approach is based on consumer demand models in which remittances are used as an explanatory variable. Essentially, I have a system of expenditure equations for different categories of goods and services, which I then group by type of households ((1) do not receive remittances and (2) receive remittances).<sup>5</sup> This setup allows the comparison of the propensities to spend the extra unit of income (marginal budget share) on the specific categories across the two types of households.

In order to carry out such an analysis, one needs to start by identifying an appropriate functional form of the demand equations, which must comply with the following requirements:

- 1) The model allows for variations in expenditure patterns when total level of expenditure changes.
- 2) Marginal budget shares must vary among different expenditure categories.

---

<sup>5</sup>Generally, there is a third group of households that report the receipt of local/internal remittances. However this group of households is too small in the current study (39 observations) and is consequently cumulated into the first type.

- 3) The model must ensure additivity of marginal budget shares (the sum of all marginal budget shares must add up to unity).<sup>6</sup>

The modified version of the Working-Leser model complies with all of the above conditions and is widely used in the literature. In order to allow for more variability among expenditure categories, one may adjust this model with the inclusion of households' socio-demographic characteristics and their interactions with the total expenditure. In addition, I am assuming that the average distance between the household location and the locations of all expenditures that the household incurs is also an important factor that affects the intercept and the slope of the demand function. Thus, equation (1.1) represents the Engel function upon which I build the analysis model.

$$e_i = \alpha_i + \theta_{1i} \ln \bar{d} + \theta_{2i} \ln \bar{d}E + \beta_{1i}E + \beta_{2i}E \ln E + \sum_j (\gamma_{ij}H_j + \delta_{ij}H_jE), \quad (1.1)$$

where  $e_i$  is the household's expenditure on category  $i$ ,  $E$  is the total household expenditure,  $\bar{d}$  is the average distance described above,  $H_j$  represents the set of socio-demographic characteristics, and  $\gamma_{ij}$  and  $\delta_{ij}$  are constants.

According to Leser (1963), this specification of the budget share works well with high levels of income. In addition, there are several factors that motivate the use of the total expenditure instead of the income level to obtain budget shares: first, the expenditure data is more appropriate for the analysis of the effects of remittances on marginal spending characteristics; second, it is more difficult to correctly estimate income of rural households in developing countries that derive a considerable part of their income from agricultural activities (Adams and Cuecuecha (2010)).

Expressed as a budget share, the model looks as follows:

$$w_i = \frac{\alpha_i}{E} + \frac{\theta_{1i} \ln \bar{d}}{E} + \theta_{2i} \ln \bar{d} + \beta_{1i} + \beta_{2i} \ln E + \sum_j \left( \frac{\gamma_{ij}H_j}{E} + \delta_{ij}H_j \right), \quad (1.2)$$

<sup>6</sup>Also, the model must allow one to disaggregate the marginal budget shares at the country level into their respective urban and rural components. This is a fundamental characteristic that will be discussed in more detail in Chapter 2 of the dissertation research.

where  $w_i = \frac{e_i}{E}$  is the budget share of category  $i$  in the households total expenditure (the additivity condition must ensure that  $\sum_{i=1}^n w_i = 1$ ).

In order to better control for the regional heterogeneity of households in urban and rural regions of the country, the set of socio-demographic characteristics,  $H_j$ , is interacted by the regional dummy that indicates the region of the households' location. I show this in general form as  $H_{jb}$  ( $b=1$  identifies households residing in urban localities and  $b=2$  identifies households residing in rural localities). Thus, the final model can be represented as follows:

$$e_i = \alpha_i + \theta_{1i} \ln \bar{d} + \theta_{2i} \ln \bar{d}E + \beta_{1i}E + \beta_{2i}E \ln E + \sum_j (\gamma_{ij,b}H_{jb} + \delta_{ij,b}H_{jb}E) \quad (1.3)$$

From equation (1.3), one can obtain the Budget Shares,  $w_i$ , and the Marginal Budget Shares,  $MBS_i$ , in the following way:

$$w_i = \frac{e_i}{E} = \frac{\alpha_i}{E} + \frac{\theta_{1i} \ln \bar{d}}{E} + \theta_{2i} \ln \bar{d} + \beta_{1i} + \beta_{2i} \ln E + \sum_j \left( \frac{\gamma_{ij,b}H_{jb}}{E} + \delta_{ij,b}H_{jb} \right) \quad (1.4)$$

$$MBS_i = \frac{\partial e_i}{\partial E} = \beta_{1i} + \theta_{2i} \ln \bar{d} + \beta_{2i}(1 + \ln E) + \sum_j \delta_{ij,b}H_{jb} \quad (1.5)$$

#### 1.4.2 ENDOGENEITY OF REMITTANCES

Endogeneity (or selection) bias represents a major issue in the analysis of the impact of remittances (or migration). Remittances/migration may influence the spending levels of households just as the spending levels may influence the decision to migrate and receive remittances. In addition, other household characteristics (income level, education level, household size, etc.) that explain the household's expenditure patterns may also explain the decision to migrate and receive remittances. Starting with the mid 1980's (Lucas and Stark (1985), Borjas (1989)), researchers have recognized that there may be unobserved characteristics that simultaneously affect the decision to migrate (and thus receive remittances) and the decision related to some productive activities (spending, educational attainment, savings, etc.) In other words, there

may be fundamental unobserved factors that affect the respective activity patterns of households with international migrants differently from those that do not have migrants, which means that the migration or remittance variable may be correlated with the error term of the regression equations. It thus becomes crucial to correct for this selection bias in observed and unobserved characteristics.

Depending on the type of data and the scope of the study, economists highlight various forms of dealing with selection bias, mainly: difference-in-difference (with panel data), instrumental variables (IV), or a matching technique. Stark and Taylor (1991) propose the use of instrumental variables to obtain estimates of household income in the absence of migration to correct for sample selection bias. Alderman (1996) uses panel data techniques to evaluate the sensitivity of results stemming from endogeneity bias. Chami et al. (2003) also take advantage of panel data techniques to reduce the endogeneity bias. Taylor and Mora (2006) describe a two-stage, Heckman-type, least squares estimation process based on probit regressions on household characteristics and instrumental variables to control for endogeneity. Adams and Cuecuecha (2010) use a similar Heckman-type two-stage least squares estimation process based on multinomial logit regressions of the remittance variable on a set of household characteristics along with instrumental variables in order to correct for the selection bias. Clément (2011) argues that the propensity score matching technique used to match treated and non-treated households for the purpose of testing for differences in spending patterns takes care of the selection bias in unobservable characteristics. Göbel (2013) also explains eloquently the economic motivation of controlling for selection in observable and unobservable factors as well as the advantages and pitfalls of using appropriate instrumental variables when doing so.

Table 1.1 presents the results of a Wu-Hausman test for endogeneity across the demand functions in the current study. These results reveal that the remittances variable is correlated with the error terms in the main regressions, which necessitates

Table 1.1: Wu-Hausman Test Results

Expenditure Category	Residual t-statistic	p-value
Personal expenses	-1.69	0.091
Durable goods	-1.13	0.258
Other services	1.40	0.163
Housing	-0.20	0.845
Education	0.64	0.519
Healthcare	1.70	0.089
Debt payment	1.08	0.279
Business Development	-0.38	0.705

N=1,188 observations.

a control for selection. Specifically, endogeneity is significant (10% level) in the case of personal expenditures and healthcare expenditures.<sup>7</sup>

Adams and Cuecuecha (2010) argue that a two-stage least squares estimation process using a multinomial logit model based on Dubin and McFadden (1984) method is an effective way to control for the selection bias. In the first stage the model runs a multinomial logit regression of the remittance variable on a set of household characteristics and instrumental variables in order to estimate selection-correction variables, which are then used in the second stage OLS regressions of the demand functions in order to control for the endogeneity bias. Similarly, the current study uses the two-stage multinomial logit model approach to correct for the selectivity of households that receive and do not receive remittances. Thus, I adjust the second stage equation shown in expression (1.4) in the following way:

$$w_{ci} = \frac{\alpha_{ci}}{E} + \frac{\theta_{1ci} \ln \bar{d}}{E} + \theta_{2ci} \ln \bar{d} + \beta_{1ci} + \beta_{2ci} \ln E + \sum_j \left( \frac{\gamma_{cij,b} H_{jb}}{E} + \delta_{cij,b} H_{jb} \right) + \mu_{bci,k} \hat{\lambda}_{bi,k} + \varepsilon_{ci}, \quad (1.6)$$

where  $c \neq k$  represents the chosen state (treatment) of the households ( $c = 1$  if the household is in the no remittance state and  $c = 2$  if the household is in the remittance state),  $\hat{\lambda}_{bi,k}$  represents the selection correction variable estimated in the first-stage multinomial logit regression and associated with households' choice alternatives  $k$

<sup>7</sup>See subsection (1.6.1) for further details related to endogeneity.

( $k = 1$  if households choose not to receive remittances and  $k = 2$  if households choose to receive remittances),  $\mu_{bc_i,k}$  is a coefficient to be estimated, while  $\varepsilon_{ci}$  is the error term, which is assumed to be normally distributed with a mean of zero and variance of  $\sigma^2$ . Equation (1.6) thus becomes an example of Heckman's two-stage estimation approach.

The selection correction variable is determined in the following way:

$$\hat{\lambda}_{i,k} = \frac{P_{i,k} \times \ln P_{i,k}}{(1 - P_{i,k})} + \ln P_{i,c} \quad (1.7)$$

where  $P_{i,k}$  stands for the probability that the household selects alternative  $k$  and  $P_{i,c}$  is the probability of selecting the base alternative. The probability of receiving remittances is estimated in the first-stage based on similar covariates that are used in the second stage OLS regression with minor variations as well as the inclusion of instrumental variables. The instruments have been chosen so that they are strongly correlated with the endogenous variable for remittances (an F-test of joint significance equal to 246.98 confirms this) and are not correlated with the error term of the second stage equations. The instrumental variables used in the multinomial regression include: (a) LFPR\_AVG\_U: average labor force participation rate one year prior to migration in the foreign countries where household members migrated interacted by the URBAN dummy; (b) LFPR\_AVG\_R: average labor force participation rate one year prior to migration in the foreign countries where household members migrated interacted by the RURAL dummy.

The value of LFPR for households without international migrants comes from the 2012 labor force participation statistics in four regions of Moldova (municipality of Chişinău, northern region, central region, and southern region). Similar instruments are used in earlier literature that also employs the two-stage IV endogeneity control approach. Table 1.2 presents the Sargan tests of overidentification for each expenditure category at the country level with the  $\chi^2$  statistics that have p-values for which the null hypothesis that all instruments are uncorrelated cannot be rejected.

Table 1.2: Sargan Test Results

Expenditure Category	$\chi^2(2)$	p-value
Personal expenses	2.442	0.2950
Durable goods	4.454	0.1079
Other services	1.598	0.4498
Housing	0.349	0.8401
Education	2.793	0.2475
Healthcare	1.977	0.3721
Debt payment	0.486	0.7841
Business Development	0.003	0.9985

N=474 observations.

The specification of the second-stage model in equation (1.6) is completed by identifying the socio-demographic characteristics ( $H_j$ ) described in Table 1.3:

Table 1.3: Specification of Household Socio-demographic Characteristics

Variable Name	Description
SIZE	Household size based on the number of household members
AGE	Age of the household head (in years)
CHILD12	Number of children below 12 in the household
EMPL	Indicator that is equal to 1 if the household head is employed
UNEMPL	Indicator that is equal to 1 if the household head is unemployed
SELFEMPL	Indicator that is equal to 1 if the household head is self employed
RETIRED	Indicator that is equal to 1 if the household head is retired
EDUSEC	Number of household members with secondary education (9 years)
EDUPROF	Number of household members with professional school (specialized) education (11 years)
EDULYC	Number of household members with lyceum/baccalauréat education (12 years)
EDUUNIV	Number of household members with university education (15 years)
PC	Indicator that is equal to 1 if the household owns a Personal Computer
INTERNET	Indicator that is equal to 1 if the household has access to the Internet
SREG1- SREG12	12 regional indicators that identify the region where the household is located (these are the 12 sampling regions in which the survey was carried out)

Thus, the complete model to be estimated can be represented as follows:

$$\begin{aligned}
\frac{e_{ci}}{E} = & \frac{\alpha_{ci}}{E} + \frac{\theta_{1ci} \ln \bar{d}}{E} + \theta_{2ci} \ln \bar{d} + \beta_{1ci} + \beta_{2ci} \ln E + \text{URBAN} \times \left( \frac{\gamma_{ci1} \text{SIZE}}{E} + \delta_{ci1} \text{SIZE} + \frac{\gamma_{ci2} \text{AGE}}{E} + \right. \\
& + \delta_{ci2} \text{AGE} + \frac{\gamma_{ci3} \text{CHILD12}}{E} + \delta_{ci3} \text{CHILD12} + \sum_l \frac{\gamma_{ci4,l} \text{OCC}_l}{E} + \sum_l \delta_{ci4,l} \text{OCC}_l + \\
& + \sum_m \frac{\gamma_{ci5,m} \text{EDU}_m}{E} + \sum_m \delta_{ci5,m} \text{EDU}_m + \frac{\gamma_{ci6} \text{PC}}{E} + \delta_{ci6} \text{PC} + \frac{\gamma_{ci7} \text{INTERNET}}{E} + \\
& + \delta_{ci7} \text{INTERNET} + \sum_p \delta_{ci8,p} \text{SREG}_p + \mu_{ci,k} \hat{\lambda}_{i,k} \left. \right) + \text{RURAL} \times \left( \frac{\gamma_{ci8} \text{SIZE}}{E} + \delta_{ci9} \text{SIZE} + \right. \\
& + \frac{\gamma_{ci9} \text{AGE}}{E} + \delta_{ci10} \text{AGE} + \frac{\gamma_{ci10} \text{CHILD12}}{E} + \delta_{ci11} \text{CHILD12} + \sum_q \frac{\gamma_{ci11,q} \text{OCC}_q}{E} + \\
& + \sum_q \delta_{ci12,q} \text{OCC}_q + \sum_r \frac{\gamma_{ci12,r} \text{EDU}_r}{E} + \sum_r \delta_{ci13,r} \text{EDU}_r + \frac{\gamma_{ci13} \text{PC}}{E} + \delta_{ci14} \text{PC} + \\
& + \left. \frac{\gamma_{ci14} \text{INTERNET}}{E} + \delta_{ci15} \text{INTERNET} + \sum_s \delta_{ci16,s} \text{SREG}_s + \mu_{ci,k} \hat{\lambda}_{i,k} \right) + u_{ci}, \tag{1.8}
\end{aligned}$$

where OCC stands for the household head's occupational status (1=EMPL, 2=UNEMPL, 3=SELFEMPL, 4=RETIRED) and EDU represents the household's education level (1=EDUSEC, 2=EDUPROF, 3=EDULYC, 4=EDUUNIV).

### 1.4.3 REMITTANCE EFFECTS

After estimating the budget shares based on the above mentioned model, the next step is to calculate the effect of remittances. In order to do this, one may use the Average Treatment Effect on the Treated (ATE|T or ATT) approach. It is used to calculate the effects of the treatment (in this case, receipt of remittances) on a particular outcome (in this case, marginal spending propensity) based on a pairwise comparison of the outcomes for households that are treated and those that are not treated, conditioning on the fact that both groups of households choose the treatment.

Since in survey studies the former of the outcomes is observable while the latter is not, the fundamental part of this technique is to connect/match the two groups. Accordingly, the pairwise comparison can be done using the equation for the treated households, conditional on the socio-demographic characteristics of households that choose the treatment, and the equation for the non-treated households, conditional

on the socio-demographic characteristics of households that choose the treatment (the counterfactual). To understand how this works, assume that  $Y_i$  is household's  $i$  outcome variable that must be evaluated and  $D_i$  is the treatment dummy that takes values  $t$  or  $s$ . Thus, one can calculate the average treatment effect of treatment  $t$  on the treated ( $ATT_{ts}$ ) as follows:

$$ATT_{ts} \equiv E(Y_{ti} - Y_{si} | D_i = t) = E(Y_{ti} | D_i = t) - E(Y_{si} | D_i = t) \quad (1.9)$$

Equation (1.9) thus provides a comparison between the observed outcome (the first term on the R-H-S of equation (1.9)) and the unobserved outcome (the second term on the R-H-S), which can be estimated given the existence of socio-demographic characteristics that connect the two groups. In this study, the pairwise comparison is done on the marginal spending propensities for households receiving remittances and those that do not, conditioning on the socio-demographic characteristics of households that choose to receive remittances. Examples of remittance studies that have implemented a similar technique successfully include Adams and Cuecuecha (2010), Clément (2011), and Göbel (2013).

Positive ATT values mean that receipt of remittances increases the spending propensity for the respective categories, while negative ATT values have the opposite meaning. As in previous studies employing consumer theory, the impact of remittances is finally evaluated by comparing the ATT's for consumption categories to the ATT's for investment categories. Increasing spending propensities in consumption categories while productive categories experience decreasing spending propensities have negative effects on economic development because these consumption categories do not lead to sustainable long-term development. On the other hand, increasing propensities to spend on investment categories while consumption categories experience decreasing propensities implies a positive effect of remittances since these expenditures are associated with productive activities.

Taking into account all of the above points, to evaluate the impact of remittances on marginal spending, one must first calculate the MBS for each of the two states ( $c = 1$  and  $c = 2$ ) and then the counterfactual for state  $c = 1$  (counterfactual MBS for households not receiving remittances conditioning on the characteristics of households that choose to receive remittances). I start by estimating the pair of budget shares as follows:

$$E\left(\frac{e_{2i}}{E} \middle| c = 2\right) = \frac{\alpha_{2i}}{E} + \frac{\theta_{12i} \ln \bar{d}}{E} + \theta_{22i} \ln \bar{d} + \beta_{12i} + \beta_{22i} \ln E + \sum_j \left( \frac{\gamma_{2ij,b} H_{jb}}{E} + \delta_{2ij,b} H_{jb} \right) + \mu_{b2i,1} \hat{\lambda}_{bi,1} \quad (1.10)$$

$$E\left(\frac{e_{1i}}{E} \middle| c = 2\right) = \frac{\alpha_{1i}}{E} + \frac{\theta_{11i} \ln \bar{d}}{E} + \theta_{21i} \ln \bar{d} + \beta_{11i} + \beta_{21i} \ln E + \sum_j \left( \frac{\gamma_{1ij,b} H_{jb}}{E} + \delta_{1ij,b} H_{jb} \right) + \mu_{b1i,2|c=2} \hat{\lambda}_{bi,2|c=2} \quad (1.11)$$

Based on equations (1.10) and (1.11), one can calculate the MBS for the treated and the counterfactual groups in a similar way as in equation (1.5). The effect of remittances on the marginal propensity to spend by households receiving remittances is then obtained from the difference of the two MBS and can be represented in the following way:

$$ATT_{21i} = \beta_{12i} - \beta_{11i} + (\theta_{22i} - \theta_{21i}) \ln \bar{d} + (\beta_{22i} - \beta_{21i})(1 + \ln E) + \sum_j (\delta_{2ij,b} - \delta_{1ij,b}) H_{jb} + \mu_{b2i,1} \hat{\lambda}_{bi,1} - \mu_{b1i,2|c=2} \hat{\lambda}_{bi,2|c=2} \quad (1.12)$$

## 1.5 DATA

### 1.5.1 MOLDOVA SURVEY

Data used in this study come from an original survey that I implemented in the Republic of Moldova during the first half of 2013. The sampling and data gathering processes were contracted with a professional surveying company, IMAS-INC. The

survey was designed to be statistically representative of all regions and localities in Moldova and gathered information related to several key elements: (1) socio-demographics; (2) human capital; (3) remittances and migration; (4) expenditure categories, amounts and locations.

The interviews were conducted only with household heads (18+ years of age). The interviewer gave the respondent a control ticket at the end of the interview. This ticket contained the name and code of the interviewer, date of the interview, the coordinates of IMAS-INC and some information about the goal of the survey as well as the confidentiality of the collected data (a statement about the purpose of the survey, confidentiality of gathered information, and the right to terminate the interview at any time was also read to the respondent at the beginning of the interview). The questionnaire was programmed in Romanian and Russian languages using Computer Assisted Personal Interviewing (CAPI) software. The Russian translation was based on the Romanian version.<sup>8</sup>

The sampling procedure starts by dividing the country in 12 sampling regions (based on the country's 32 administrative districts, also called "raions", three municipalities, and one administrative-territorial unit, see Figure 1.3). The total sample includes 1,188 households.<sup>9</sup> The sampling in each region was determined according to the population living in the following categories of localities: municipalities, towns, and villages/communes. The only restriction was to limit the number of interviews to three in one sampling point (represented by a street). In addition, the households were selected based on a "random walk" procedure. Keeping the number of interviews per sampling point limited to three, the survey also employed a "skip interval" procedure between households.

---

<sup>8</sup>Moldova was historically a part of Romania and the majority of the population speaks Romanian. Due to the Russian and subsequent Soviet annexation (1812-1918, 1940, and 1944-1991), the Russian language became a second spoken language in the country (especially in urban centers).

<sup>9</sup>The original sample size is 1,813 households; however, due to missing locations for expenditures, I drop 625 observations. Nevertheless, this does not affect the representativeness of the data.

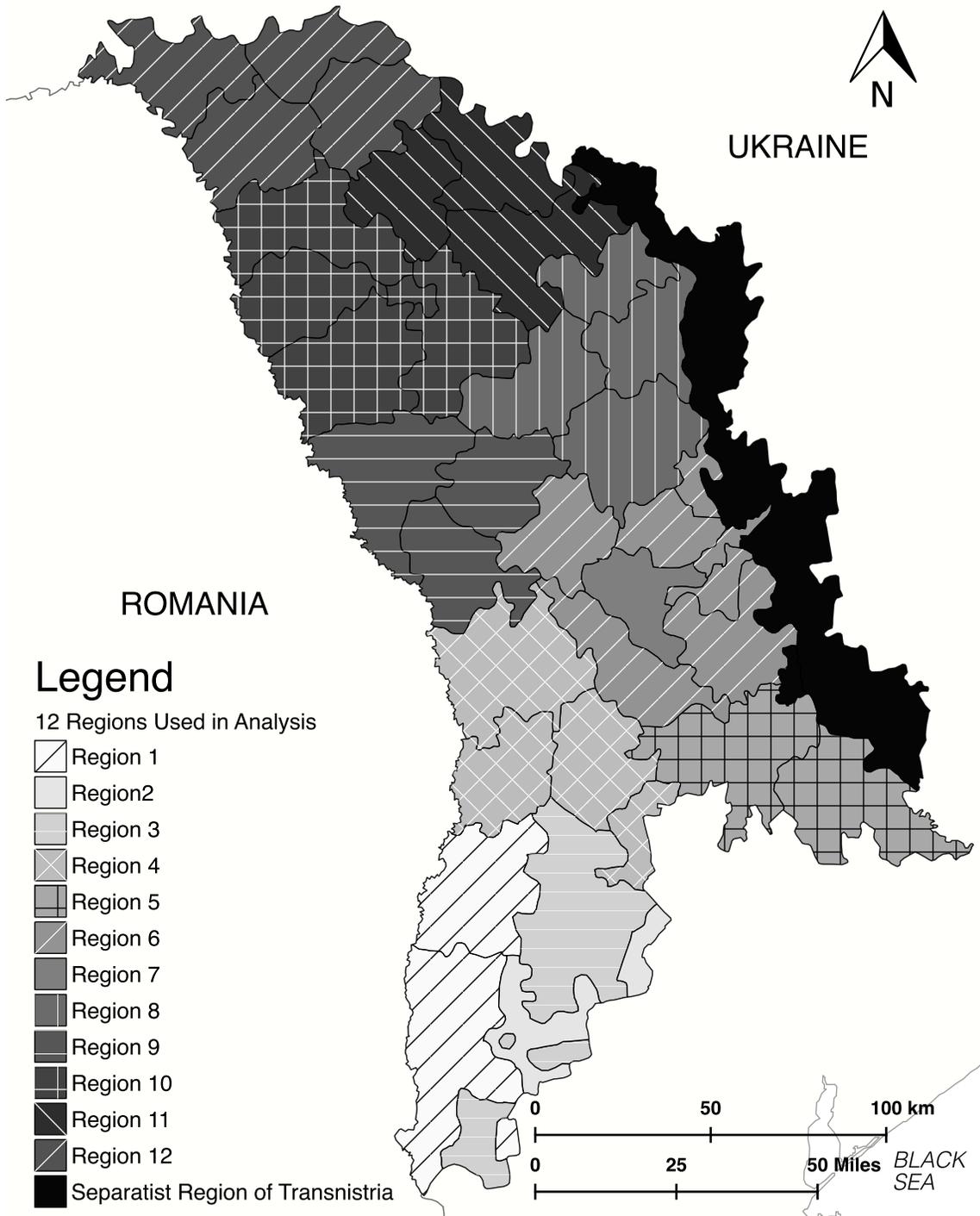


Figure 1.3: The 12 Regions Used in the Analysis.

(Source: Created using IMAS-INC survey data with QGIS and Google Earth software)

### 1.5.2 DESCRIPTIVE STATISTICS

Table 1.4 provides descriptive statistics for the main socio-demographic characteristics of the households. In addition, the table contrasts the socio-demographic characteristics for all the households in the two states (without remittances and with remittances), as well as for urban and rural households within each state. Most of these variables show significant differences when compared across the two states. Out of the 1,188 households, 474 households receive remittances (or approximately 40%). The frequency of households receiving remittances across the administrative units (raions) of Moldova has been mapped out in Figure 1.4. The proportion of households receiving remittances appears to be highest in the northern regions of the country (several northern raions have frequencies of households with remittances between 80-100%).

Another important statistic is the weight of remittances in the total budget of households; according to Table 1.4 it is approximately 51% for all households, 49.6% for urban households, and 52.3% for rural households. In addition, I have mapped the weight of remittances in the total budget of households across all raions of Moldova in Figure 1.5. This figure contrasts with Figure 1.4 by showing that although the percentage of households receiving remittances in the central regions of the country is lower than in the rest of the country, the weight of remittances in the total budget of households living in the central regions is much higher.

Table 1.4 also shows that the majority of households receiving international remittances are located in rural regions (weight of rural households receiving remittances, 0.22, is higher than that of urban households receiving remittances, 0.18). Out of 474 households receiving international remittances, 263 households reside in rural regions, which is approximately 22% of the total sample or 55% of the total number of households receiving remittances. In the set of households that do not receive remittances (714 out of 1,188), there are 400 households residing in the rural region,

Table 1.4: Household Descriptive Statistics

Variable	(1) Do not receive remittances			(2) Receive remittances			t-test (1) vs (2)		
	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural
<b>General Characteristics:</b>									
Mean Distance to all Expenditure Locations (in Km)	1.47 (2.71)	0.77 (2.13)	2.02 (2.97)	1.99 (2.62)	0.91 (1.83)	2.86 (2.84)	2.70**	0.72	3.09***
Mean age of household head	51.47 (15.92)	50.47 (17.41)	52.26 (14.62)	43.86 (15.50)	41.36 (15.90)	45.86 (14.91)	-8.24***	-13.82***	-5.09***
Household size	3.12 (1.53)	2.89 (1.25)	3.30 (1.69)	3.77 (1.47)	3.44 (1.25)	4.03 (1.57)	4.07***	3.53***	3.91***
No. of children with age below 12	0.37 (0.75)	0.29 (0.61)	0.43 (0.84)	0.52 (0.83)	0.40 (0.71)	0.62 (0.90)	2.41**	1.86*	2.33**
<b>Human Capital:</b>									
No. of people with Secondary education (9 years)	0.49 (0.83)	0.33 (0.62)	0.63 (0.95)	0.54 (0.87)	0.33 (0.65)	0.71 (0.98)	0.61	0.12	0.78
No. of people with Professional School education (11 years)	0.54 (0.75)	0.44 (0.67)	0.62 (0.80)	0.82 (0.87)	0.71 (0.76)	0.91 (0.94)	4.49***	2.58**	4.42***
No. of people with Lyceum education (12 years)	0.12 (0.37)	0.14 (0.37)	0.09 (0.37)	0.21 (0.52)	0.22 (0.53)	0.19 (0.52)	3.65***	1.20	3.39***
No. of people with University education (15 years)	0.43 (0.81)	0.68 (0.92)	0.24 (0.65)	0.45 (0.78)	0.54 (0.78)	0.37 (0.78)	0.34	-1.59	1.84*
<b>Occupational Status:</b>									
Household head is a salaried employee (1=Yes)	0.32 (0.47)	0.39 (0.49)	0.27 (0.44)	0.32 (0.47)	0.37 (0.48)	0.29 (0.45)	0.07	-0.57	0.47
Household head is unemployed (1=Yes)	0.09 (0.29)	0.08 (0.27)	0.10 (0.30)	0.09 (0.29)	0.09 (0.28)	0.10 (0.30)	0.15	0.34	-0.04
Household head is self-employed (1=Yes)	0.06 (0.25)	0.05 (0.21)	0.08 (0.27)	0.03 (0.17)	0.03 (0.18)	0.03 (0.16)	-1.73	-0.63	-2.07*
Household head is retired (1=Yes)	0.37 (0.48)	0.36 (0.48)	0.38 (0.49)	0.21 (0.41)	0.19 (0.40)	0.22 (0.41)	-6.68***	-8.79***	-3.95***
<b>Access to Technology:</b>									
Household owns a personal computer (1=Yes)	0.34 (0.47)	0.44 (0.50)	0.25 (0.44)	0.57 (0.50)	0.64 (0.48)	0.51 (0.50)	4.03***	2.73**	4.72***
Household has access to the internet (1=Yes)	0.39 (0.49)	0.56 (0.50)	0.26 (0.44)	0.66 (0.48)	0.78 (0.42)	0.56 (0.50)	5.12***	5.29***	4.25***
<b>Instruments:</b>									
Mean LFPR one year prior to migration	43.71 (12.56)	47.26 (11.38)	40.92 (12.76)	61.00 (14.17)	60.54 (13.67)	61.37 (14.59)	6.39***	4.32***	17.38***
<b>Other Statistics:</b>									
Mean household income range <sup>a</sup>	2.87 (2.20)	3.61 (2.69)	2.35 (1.60)	4.07 (2.52)	4.52 (2.88)	3.73 (2.17)	10.97***	2.58**	8.31***
Remittances share of total budget				51.13 (32.67)	49.58 (33.36)	52.32 (32.14)	-	-	-
Region (1=Urban)	0.44 (0.50)			0.45 (0.50)			0.18	-	-
Weight in total sample	0.60	0.26	0.34	0.40	0.18	0.22			

N = 1,188 households, standard deviations shown in parentheses.

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

a: Income ranges start from less than or equal to 10,000 MDL/year and proceed in increments of 9,999 MDL (i.e., income range 3 is between 20,001 - 30,000 MDL; income Range 4 is between 30,001 - 40,000 MDL).

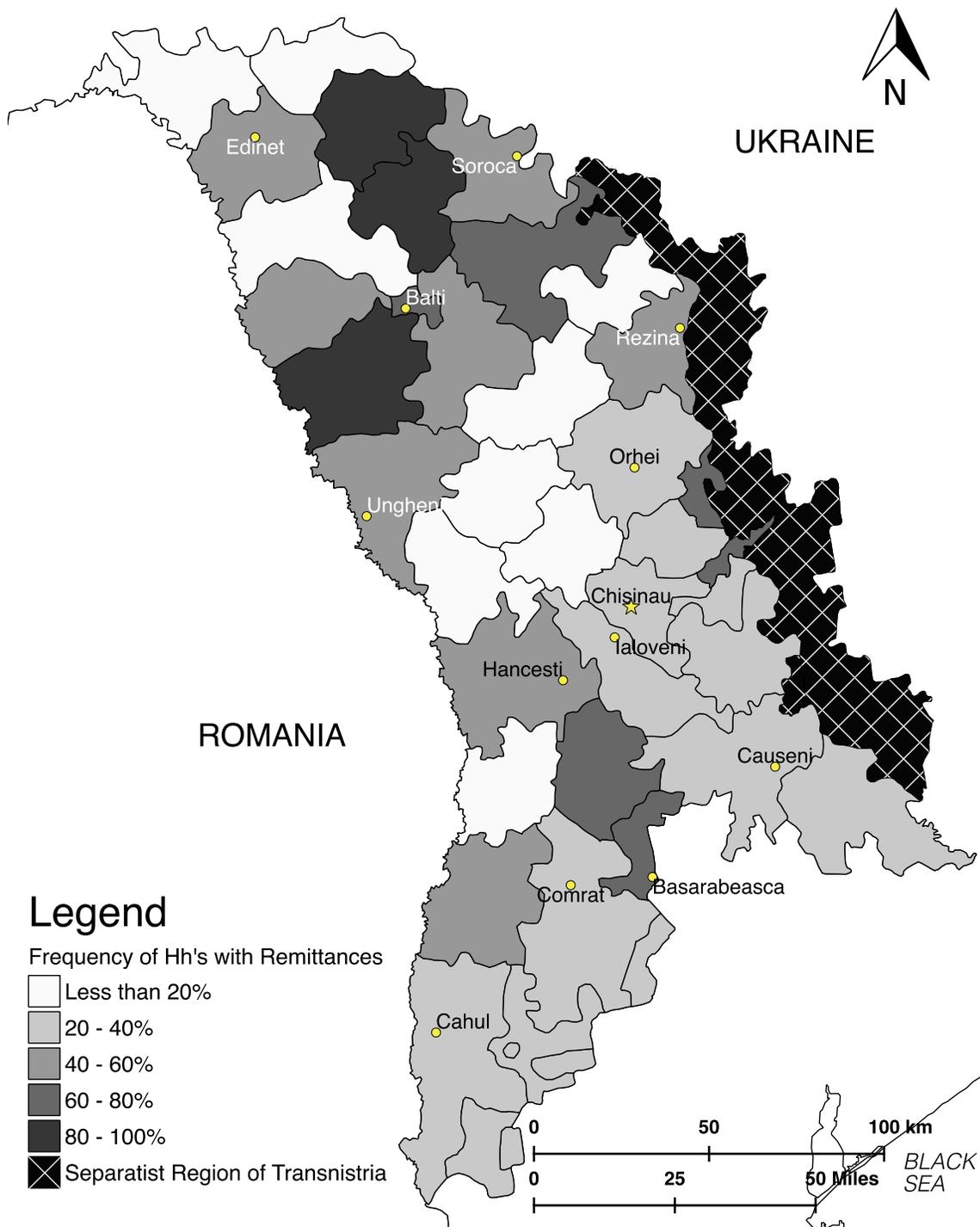


Figure 1.4: Frequency of Households Receiving Remittances in Moldova.  
 (Source: Created using IMAS-INC survey data with QGIS and Google Earth software)

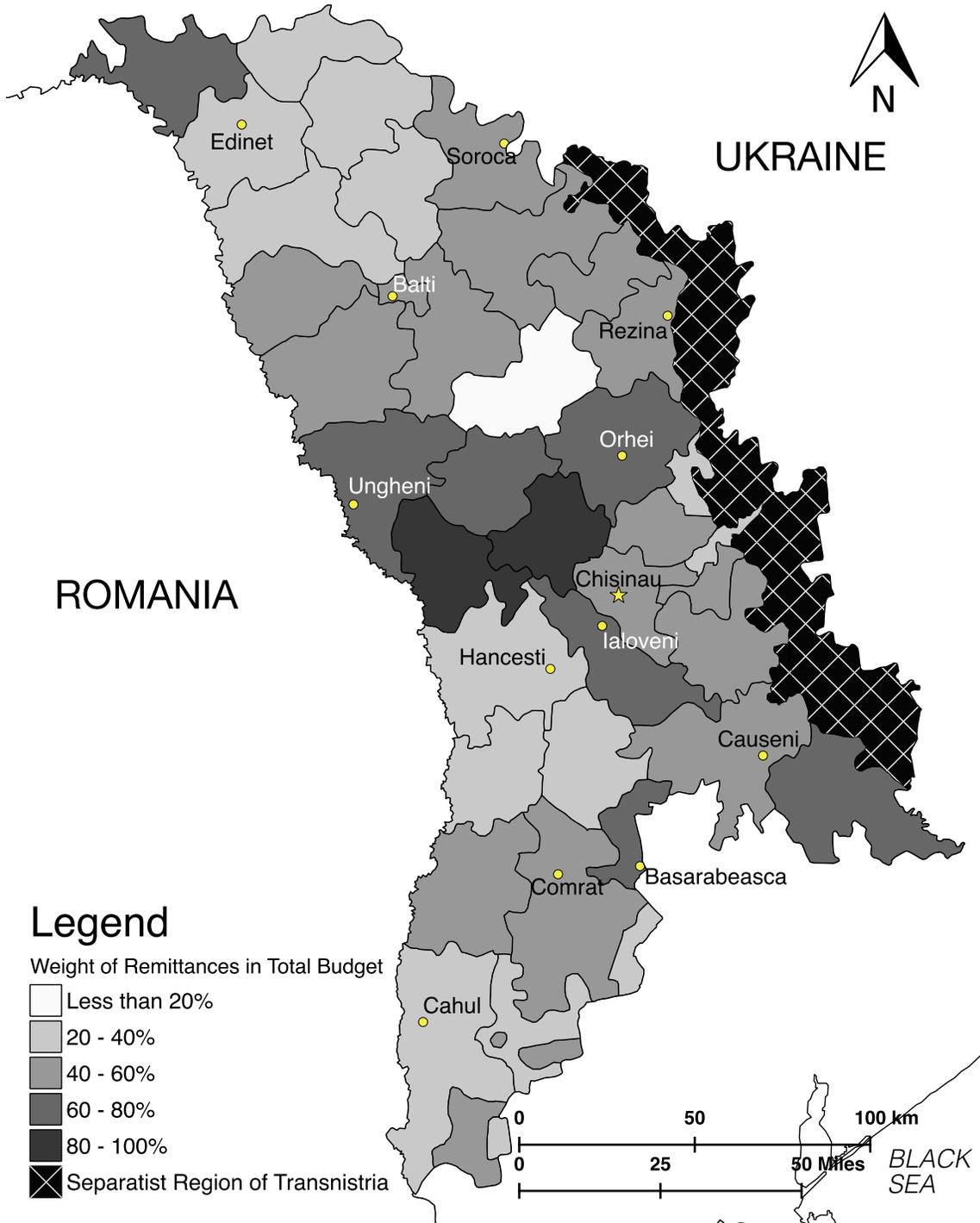


Figure 1.5: Weight of Remittances in Total Budget of Households in Moldova.  
 (Source: Created using IMAS-INC survey data with QGIS and Google Earth software)

which is approximately 34% of the total sample or 56% of the total number of households that do not receive remittances. In addition, this table provides information about the instrumental variables that are used to control endogeneity of remittances. Not surprising, the Labor Force Participation Rate (LFPR) levels associated with all types of households that receive remittances are significantly higher than for households without remittances; the biggest difference in LFPR is for the rural case, where the t statistic is 17.38.

The average distance from the household location to all expenditure locations is also significantly higher for households receiving remittances (on average these households face distances of approximately 2 Km, while households without remittances have shorter trips of approximately 1.5 Km). Rural households receiving remittances have the longest trips of approximately 2.9 Km (while rural households without remittances face trips of approximately 2 Km). These statistics reveal that rural households that receive remittances are situated in more remote locations (although for Moldova the average distances are relatively short).<sup>10</sup>

Table 1.4 reveals that the mean income range of households with no remittances is 2.87 and that of households receiving remittances is 4.07.<sup>11</sup> An interesting observation here is that the reported mean income level for rural households that receive remittances is slightly higher (3.73) than that reported by urban households that do not receive remittances (3.61). Moreover, when looking at the weight of remittances across the two regions, one can notice that rural households report higher dependence on remittances (52.32% of the total budget) than urban households (49.58% of the

---

<sup>10</sup>While these distances may seem short, in poor developing countries many rural localities are, at best, connected by country roads that may become impassable during adverse weather conditions, which makes the travel time even for relatively short distances much bigger than under normal conditions. In addition, many developing countries that rely heavily on remittances are much bigger in area size and, as a result, the distance factor may become more significant in such cases. I discuss the significance of the distance variable in more detail in subsection (1.6.1).

<sup>11</sup>Income ranges start from less than 10,000 MDL (income range 1) and proceed in increments of 9,999 MDL to more than 120,000 MDL per year.

total budget). As mentioned above, Figure 1.5 depicts the weight of remittances in the total budget of households across all the regions in Moldova.

The technology variables also present interesting patterns. There is a clear increase in usage of information and communication technologies by households receiving remittances compared with those that do not. The average incidence of owning a computer in the case of households receiving international remittances is 0.57 while for households without remittances it is 0.34; when it comes to access to the Internet then the contrast is even larger, with an average incidence of 0.66 for those that receive remittances and 0.39 for those without remittances. Even the rural households that receive remittances report a high incidence of using information and communication technologies (0.51 for a PC and 0.56 for Internet) compared with urban households that do not report any remittances (0.44 for a PC and 0.56 for Internet).

### 1.5.3 EXPENDITURE CATEGORIES

The survey identifies 20 individual categories of expenditures used to build eight general categories (see Table 1.5). General categories (1), (2), (3) and (4) that are shown in this table represent *consumption* categories, categories (5) and (6) are considered investments in *human capital*, category (7) is considered a proxy for *savings* (higher debt payment is assumed to represent lower savings and vice versa), and finally category (8) is considered the true investment category in *physical and natural capital* that have a productive character. The total expenditure of the household is calculated by summing up all the eight general categories. The response rate for each individual category varies from more than 90% to less than 50% in some cases. After creating the general categories, however, most expenditures did not have issues with missing values. In a few cases, I used an imputing process based on poisson regressions to predict the missing values (the personal expenditures category has approximately

Table 1.5: Description of Expenditure Categories

Category	Description	Examples
(1) Personal expenditures	Food, clothing and shoes	Bread, milk, shirts, pants, sneakers, etc.
(2) Durables expenditures	Durable goods [cumulates individual categories (2) and (15)]	Electronics, appliances, furniture, cars, etc.
(3) Other services	Cumulates individual categories (9), (10) and (12): Entertainment, transportation, and immigration fees	Attending a wedding, transportation cost to and from work, application fees to regain Romanian citizenship
(4) Housing expenditures	Cumulates individual categories (13), (14), (3), (4), (5), and (6): House, apartment, rent, property taxes, repairs & maintenance, utilities, gardening near the house	Construction or purchase of a house, purchase of an apartment, payment of utilities, repairs, payment of property taxes, planting flowers in the yard, etc.
(5) Education expenditures	Expenses on all levels of education	Tuition fees, student fees, school supplies, etc.
(6) Healthcare expenditures	Expenses on healthcare	Hospitalization, drugs, gym membership, etc.
(7) Debt payment expenditure	Repayment of debts	Repayment of a loan from relatives, friends, or a financial institution
(8) Business development expenditures	Cumulates individual categories (16), (17), (18), and (19): Land, agricultural equipment, agricultural materials, investments in a small business	Purchase of a land parcel, tractor, plough, seeds, fertilizer, renting office space, etc.

Note: The 20 **individual categories** include: (1) Personal expenditures (includes food, clothing and shoes); (2) Household durable goods (examples include furniture, electronics, appliances, etc.); (3) Rent and property tax payments; (4) Repairs and maintenance; (5) Utilities (payment of bills for electricity, water, cable, etc.); (6) Gardening expenditures; (7) Education expenditures; (8) Healthcare expenditures; (9) Entertainment expenditures; (10) Transportation expenditures; (11) Debt payment expenditures; (12) Immigration fees; (13) Construction or purchase of a house; (14) Purchase of an apartment; (15) Purchase of a car; (16) Purchase of land; (17) Purchase of agricultural machinery (for example, tractor, plough, etc.); (18) Purchase of agricultural materials (for example, seeds, fertilizer, etc.); (19) Investment in small business (for example, leasing office space); (20) Investments in other commercial facilities and equipment.

Individual categories (1) through (6) and (8) through (12) show monthly values for the months of January 2013 and July 2012 in order to differentiate between the cold and warm seasons. The annual values for these categories were calculated by multiplying the cold and warm monthly values by 6 and then adding up the two results within each category. The remaining individual categories identify annual data and do not need any further transformations. Category (20) has been dropped from the calculations because there are no observations for the previous 12 months.

5.6% of total observations missing, healthcare expenditure has approximately 11% missing, and debt payment category has approximately 3% missing).

Moreover, several households reported a value for the education expenditure but did not provide a location; in these cases locations were obtained based on the answers that these households provided to other human capital questions (a separate list of questions in this survey gather information related to the characteristics of household

members that are/were students at a university). Finally, a few respondents indicated the location of some expenditures in a foreign country, so I treat these locations as if they were urban regions in Moldova.

Figure 1.6 shows the average total household expenditure across all the raions of Moldova. Expenditure levels appear to be highest across the central raions (between 60,000 and 120,000 MDL), although there are two northern regions that exhibit total expenditures of more than 180,000 MDL (approximately USD \$15,000).<sup>12</sup> Household expenditures and budget shares are summarized in Table 1.6. It is worth noting that consumption categories make up approximately 83% of the total household budget for households without remittances and approximately 84% for households receiving remittances.

Moreover, personal and housing expenditures make up the biggest portion of the total household's budget. Households that do not receive remittances report average budget shares (ABS) for personal expenses and housing equal to approximately 38% and 34% (16,768 MDL and 24,160 MDL), respectively; households receiving international remittances report weights of 37% and 32% (22,860 MDL and 34,481 MDL), respectively. Four categories present significant differences in means of their ABS when comparing the case that does not receive remittances with the one that receives international remittances. Durable goods and other services consumption categories present significant increases in ABS; education also presents a significant increase in the ABS, however this increase is partially counteracted by the significant decrease in the healthcare ABS.

The estimated mean total expenditure of households with no remittances is 62,589 MDL, while the mean total expenditure of households receiving remittances is 87,231 MDL. Compared with the reported mean of income ranges, the estimated mean of

---

<sup>12</sup>The average exchange rate during the period January 2012 - May 2013 was approximately 0.084 USD per 1 MDL.

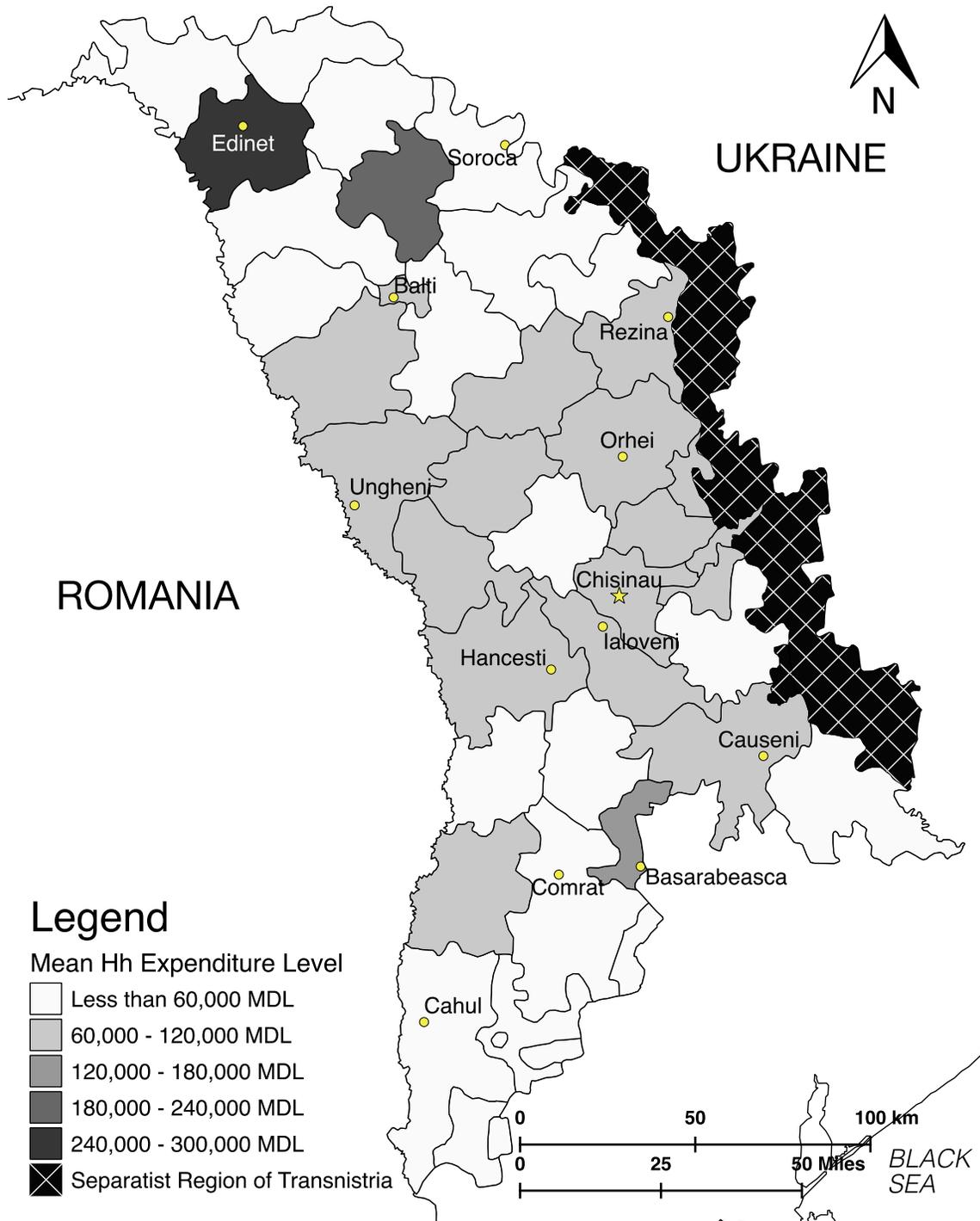


Figure 1.6: Mean Household Expenditure Level in Moldova.

(Source: Created using IMAS-INC survey data with QGIS and Google Earth software)

Table 1.6: Descriptive Statistics of Households' Expenditure Shares and Values

Expenditure category	(1)	(2)	t-test (1) vs (2)
	Do not receive remittances	Receive remittances	
<i>Average Budget Shares (ABS):</i>			
Personal expenses	0.3788 (0.20)	0.3724 (0.23)	-0.41
Durable goods	0.0311 (0.10)	0.0503 (0.13)	2.76**
Other services	0.0843 (0.11)	0.1018 (0.13)	2.67**
Housing	0.3360 (0.19)	0.3169 (0.22)	-1.24
Education	0.0275 (0.07)	0.0371 (0.08)	3.91***
Healthcare	0.1286 (0.15)	0.1083 (0.14)	-2.00*
Debt payment	0.0130 (0.05)	0.0116 (0.05)	-0.50
Business Development	0.0008 (0.01)	0.0016 (0.03)	0.68
<b>Total</b>	<b>1.00</b>	<b>1.00</b>	
<i>Expenditure Values (MDL):</i>			
Personal expenses	16,767.94 (14,791.39)	22,860.35 (19,883.76)	4.08***
Durable goods	3,822.79 (15,530.86)	8,097.50 (36,349.53)	3.91***
Other services	8,313.42 (51,258.93)	9,673.65 (18,226.44)	0.53
Housing	24,160.18 (98,851.20)	34,481.03 (91,367.80)	1.56
Education	1,872.17 (4,990.59)	2,900.72 (8,342.42)	2.42**
Healthcare	6,330.66 (16,334.56)	7,776.75 (28,810.14)	0.93
Debt payment	1,268.81 (6,582.31)	1,002.81 (4,727.12)	-0.67
Business Development	53.22 (733.37)	438.06 (8,827.80)	1.04
<b>Total</b>	<b>62,589.20 (169,765.30)</b>	<b>87,230.86 (121,305.70)</b>	<b>2.14**</b>

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

total household expenditure is approximately between two and three times higher. This large discrepancy might be explained by several factors: (1) the shadow economy; (2) a reluctance to disclose actual income levels (people are highly skeptical towards foreigners asking questions about income and other personal information, especially given the Soviet past of Moldova, so they may provide erroneous income information); (3) the difficulty of accurately determining income levels in rural communities where most of the respondents derive a significant portion of their income from seasonal agricultural activities; (4) miscommunication, as the household heads may have provided income ranges based only on their own incomes, ignoring the incomes of the other household members.

## 1.6 REGRESSION RESULTS

### 1.6.1 TWO-STAGE REGRESSION RESULTS

As discussed in the Empirical Approach section, I employ a two-stage estimation process to calculate the coefficients used in constructing the marginal budget shares for the analysis of remittances. In the first stage, I execute a multinomial logit model based on the Dubin and McFadden (1984) method to estimate the selection correction variable ( $\lambda_{i,k}$ ), which is then used in the second stage OLS regression to control for the selection bias. The results of the multinomial logit regression show that both instruments used to estimate  $\lambda_{i,k}$  are significant (see Table 1.7).<sup>13</sup>

The OLS regressions for households that do not receive remittances are based on a sample size of 714 households, while those for households that receive remittances are based on a sample size of 474 households. To control for regional heterogeneity of socio-demographic characteristics I include 11 regions out of a total of 12 possible, separately identified for urban and rural households. I calculate the standard errors by clustering the data in these sampling regions (see Figure 1.3 for details about the sampling regions). Also, I use a bootstrapping approach with 500 replications which decreases the standard errors inflated by the two-stage estimation process and makes the analysis results more robust.

Table 1.8 reports selected second-stage OLS regression results for households that do not receive remittances and for those that receive remittances, respectively.<sup>14</sup> The coefficients presented in these tables are used to calculate the *MBS* in each category, which are in turn used to determine the effect of remittances with the help of the *ATT* approach. The results of the OLS regressions also report the coefficient of the selection correction variable  $\lambda_k$ . The coefficient of this variable is not significant at

---

<sup>13</sup>I use STATA command `selmlog` developed by Marc Gurgand and Martin Fournier based on the methods discussed in Bourguignon et al. (2007).

<sup>14</sup>The full OLS regression results are available upon request.

Table 1.7: First-Stage Multinomial Logit Regression Results

Variable	Coefficient	Robust Std. Err
Urban household size	0.0779	0.11
Rural household size	-0.1628	0.11
Urban household head age	-0.0181	0.01
Rural household head age	-0.011	0.01
Number of children below 12 in urban household	-0.0668	0.20
Number of children below 12 in rural household	0.1767	0.13
Number of children between 12 and 18 years in urban household	-0.0969	0.17
Number of children between 12 and 18 years in rural household	-0.0931	0.19
Head of urban household is salaried employee	-0.8016**	0.36
Head of rural household is salaried employee	-0.7964***	0.21
Head of urban household is unemployed	-0.8587	0.66
Head of rural household is unemployed	-0.4774**	0.24
Head of urban household is self-employed	-0.573	0.80
Head of rural household is self-employed	-1.8274**	0.85
Head of urban household is retired	-0.2211	0.50
Head of rural household is retired	-0.5355	0.45
Number of members in urban household with secondary education	-0.1352	0.32
Number of members in rural household with secondary education	0.081	0.10
Number of members in urban household with professional school education	0.3809	0.25
Number of members in rural household with professional school education	0.2206**	0.11
Urban Household in Region 1	-1.0231	0.83
Urban Household in Region 3	-0.6882	0.90
Urban Household in Region 4	1.0329	0.80
Urban Household in Region 5	0.3398	0.79
Urban Household in Region 6	-0.8804	0.96
Urban Household in Region 7	-1.1026	0.98
Urban Household in Region 8	0.54	0.84
Urban Household in Region 9	0.4783	0.79
Urban Household in Region 10	-0.0173	0.97
Urban Household in Region 11	1.6405**	0.81
Urban Household in Region 12	-1.0133	0.86
Rural Household in Region 1	0.5104***	0.16
Rural Household in Region 3	-1.6151***	0.30
Rural Household in Region 4	-0.0264	0.10
Rural Household in Region 5	-0.5271**	0.27
Rural Household in Region 6	-0.805***	0.22
Rural Household in Region 7	-2.151***	0.30
Rural Household in Region 8	-0.9235***	0.24
Rural Household in Region 9	-0.4928**	0.20
Rural Household in Region 10	-1.314***	0.37
Rural Household in Region 11	0.0633	0.20
Rural Household in Region 12	0.3169*	0.17
Urban household uses Skype	1.0651***	0.25
Rural household uses Skype	1.4968***	0.34
Average LFPR one year prior to migration from urban household	0.078***	0.02
Average LFPR one year prior to migration from rural household	0.0949***	0.01
Constant	-3.7722***	0.73

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

N=1,188 observations; Pseudo  $R^2 = 0.35$

the national level, however it becomes significant at the regional level (discussed in more detail in Chapter 2).

The complexity of the model (high number of covariates) may reduce the significance of the selection correction coefficients. As a result, I also ran a simplified version of the model (with only a few socio-demographic characteristics) and with 100 bootstrap replications in order to check the validity of the selection correction variables. In this simplified form of the model, the selection correction variable becomes significant, specifically: for education expenditures in the do not receive remittances state at the 10% level, for personal expenditures in the receive remittances state at the 5% level, and for the education expenditures in the receive remittances state at the 10% level. Importantly, the results in the simplified version of the model are generally robust and do not change much from the fully specified model.

The average distance and total household expenditure variables have significant coefficients in a number of expenditure categories. Thus, in the case of households that do not receive remittances (top section of Table 1.8), the coefficient for the average distance is significant at the 5% level for personal expenditure as well as the other services expenditure. Also in this case, the coefficient on the inverse of total household expenditure ( $1/E$ ) as well as the log of the total expenditure have significant coefficients for the personal expenditure ( $\ln E$  is significant at the 1% level), durables ( $\ln E$  is significant at the 5% level), housing ( $\ln E$  is significant at the 1% level), and debt payment expenditure ( $1/E$  is significant at the 5%). Similar results are observed in the case of the households that receive remittances (bottom section of Table 1.8): distance interacted by  $1/E$  is significant for the personal expenditure (5% level), housing expenditure (5% level), and healthcare (10% level), while the total expenditure variables are significant for personal expenditure ( $\ln E$  at the 1% level), durables ( $\ln E$  at the 10% level), housing expenditure ( $\ln E$  at the 1% level), and education expenditure ( $\ln E$  at the 10% level).

Table 1.8: Selected Second-Stage OLS Regression Results

Second-Stage OLS Regression of Average Budget Shares for Households that Do Not Receive Remittances								
Variable	Personal	Durables	Other Services	Housing	Education	Healthcare	Debt Payment	Business Development
Average Distance	-0.0370** (0.0146)	0.0101 (0.0103)	0.0232** (0.0101)	-0.0192 (0.0157)	0.0051 (0.0085)	0.0142 (0.0135)	0.0027 (0.0053)	0.0009 (0.0011)
Average Distance ×1/E	493.8912 (393.4748)	-91.1086 (166.1000)	-21.1442 (181.3428)	23.0419 (333.0694)	-40.3067 (135.6226)	-250.2235 (344.1913)	-107.9417 (82.6106)	-6.2085 (14.9551)
1/E	424.1524 (1,479.5660)	273.0686 (670.5380)	-253.8890 (622.0021)	1,147.9179 (1,317.5159)	341.7144 (453.7536)	-1,103.4342 (1,343.5933)	-740.6909** (329.5041)	-88.8394 (76.2203)
ln E	-0.1157*** (0.0190)	0.0267** (0.0121)	0.0112 (0.0158)	0.1025*** (0.0246)	-0.0107 (0.0070)	-0.0153 (0.0223)	0.0014 (0.0049)	-0.0001 (0.0016)
λ <sub>2</sub>	-0.0046 (0.0166)	-0.0038 (0.0105)	-0.0026 (0.0082)	0.0127 (0.0133)	-0.0027 (0.0072)	0.0047 (0.0118)	-0.0042 (0.0035)	0.0004 (0.0007)
Constant	1.5706*** (0.2441)	-0.2697* (0.1442)	-0.1071 (0.1720)	-0.7242** (0.2868)	0.1124 (0.0908)	0.3480 (0.2608)	0.0584 (0.0644)	0.0117 (0.0169)
R <sup>2</sup>	0.36	0.27	0.29	0.26	0.28	0.26	0.17	0.12

N=714, standard errors in parentheses obtained by clustering at the sampling region and bootstrapping with 500 repetitions.  
 \*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

Second-Stage OLS Regression of Average Budget Shares for Households that Receive Remittances								
Variable	Personal	Durables	Other Services	Housing	Education	Healthcare	Debt Payment	Business Development
Average Distance	0.0129 (0.0213)	0.0241 (0.0152)	0.0130 (0.0132)	-0.0361 (0.0249)	0.0041 (0.0088)	-0.0136 (0.0166)	0.0004 (0.0046)	-0.0048 (0.0049)
Average Distance ×1/E	-2,394.7048** (947.7676)	-403.7387 (414.5959)	19.7177 (424.3001)	1,676.6773** (843.4727)	-52.1423 (305.4696)	1,057.0026* (588.8883)	-77.8623 (132.9821)	175.0506 (185.0277)
1/E	1,848.3990 (3,693.3015)	1,683.1146 (2,624.4080)	-2,353.3938 (1,790.2137)	336.1016 (3,942.1161)	-1,596.2813 (1,244.3824)	921.5076 (2,537.4280)	-401.0842 (921.5697)	-438.3633 (528.0833)
ln E	-0.1645*** (0.0313)	0.0570* (0.0299)	-0.0260 (0.0168)	0.1443*** (0.0387)	-0.0200* (0.0108)	0.0061 (0.0268)	-0.0050 (0.0064)	0.0080 (0.0072)
λ <sub>1</sub>	0.0175 (0.0142)	0.0090 (0.0081)	-0.0012 (0.0082)	-0.0043 (0.0133)	-0.0068 (0.0060)	-0.0114 (0.0101)	-0.0005 (0.0031)	-0.0022 (0.0022)
Constant	1.9810*** (0.4021)	-0.6666* (0.3700)	0.3712 (0.2301)	-1.1737** (0.5085)	0.2397* (0.1339)	0.0721 (0.3573)	0.2522* (0.1430)	-0.0760 (0.0747)
R <sup>2</sup>	0.39	0.24	0.26	0.29	0.20	0.29	0.17	0.14

N=474, standard errors in parentheses obtained by clustering at the sampling region and bootstrapping with 500 repetitions.  
 \*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

Finally, the two sections of Table 1.8 also present information about the  $R^2$ . This statistic varies between 0.12 and 0.36 for regressions in the case of households that do not receive remittances and between 0.14 and 0.39 for households that receive remittances. These levels of fit are in line with those reported in other studies (Adams and Cuecuecha (2010), Adams (2005)).

## 1.6.2 THE IMPACT OF REMITTANCES

Table 1.9 presents the main empirical results. The second column of the table shows the marginal budget share (MBS) of households that do not receive remittances, the third column shows the counterfactual MBS (the MBS of households that do not receive international remittances conditional on characteristics of households that receive remittances), the fourth column shows the MBS of households that receive international remittances and the fifth column shows the average treatment effect (ATT) of remittances on each of the eight expenditure categories.

Table 1.9: Impact of Remittances on Marginal Spending at the Country Level

Expenditure Category	(1)		(2)		ATT <sub>21</sub>	% Δ
	No Remit. MBS	No Remit. Counterfactual MBS	Receive Remit. MBS			
Personal expenses	0.2763	0.2458	0.2712	0.0254 (2.42)**	10.33%	
Durable goods	0.0652	0.0982	0.0890	-0.0092 (-1.27)	-9.35%	
Other services	0.1064	0.1169	0.1242	0.0073 (1.12)	6.22%	
Housing	0.3878	0.3658	0.3785	0.0127 (0.85)	3.46%	
Education	0.0307	0.0565	0.0341	-0.0224 (-2.79)**	-39.60%	
Healthcare	0.1126	0.0846	0.0828	-0.0018 (-0.23)	-2.11%	
Debt payment	0.0203	0.0318	0.0166	-0.0152 (-2.20)**	-47.80%	
Business Development	0.0009	0.0004	0.0036	0.0032 (2.12)*	855.53%	
Total	1.00	1.00	1.00			

two-tailed t statistics in parentheses obtained by robust clustering at the sampling region.

% Δ is obtained by dividing ATT<sub>21</sub> (column 5) by the counterfactual (column 3).

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

Households that do not receive remittances allocate the marginal unit of income mainly for consumption (approximately 84%). On average, human capital categories receive approximately 14% of the extra unit of income, while savings and business

development categories receive the rest (most of it going towards savings). For households that receive international remittances the allocation of the marginal unit of income coming from remittances follows a similar pattern (consumption categories get approximately 86%, human capital categories get approximately 12%, and finally savings and business development get the rest).

The effect of remittances, shown in the fifth and sixth columns of Table 1.9, is most significant for personal expenses (+10%), education (-40%), debt payment (-48%), and business development (+856%). Remittances also lead to an increase in the marginal propensity to spend on housing and other services, however they are not statistically significant. Thus, at the country level the results reveal that remittances increase the marginal spending propensity in most consumption categories and reduce the human capital investments (especially on education). At the same time, remittances may have positive effects in the form of increased marginal savings as well as the significant increase in marginal propensity to invest in business development activities (these categories, however, have the smallest magnitude in the total budget; the shares are around 1% for savings and less than 0.1% for business development expenditures at the country and regional levels). Since consumption categories make up the big majority of the households' budget (over 80%), these results may point to overall negative effects of remittances because these categories experience increases, while the main productive categories (human capital) show decreases in marginal spending propensity.

It is also important to emphasize the significance of the heterogeneity in the effects of remittances across the regions of a country (here the term "region" refers to the administrative region level).<sup>15</sup> Figure 1.7 presents boxplot graphs that compare the

---

<sup>15</sup>Due to the limited data available from the survey, a proper control for spatial autocorrelation (as in Valdivia López and Lozano Ascencio (2010)) was not possible; however, I try to control for the regional heterogeneity using regional dummies and estimating clustered standard errors, as discussed in subsection (1.6.1).

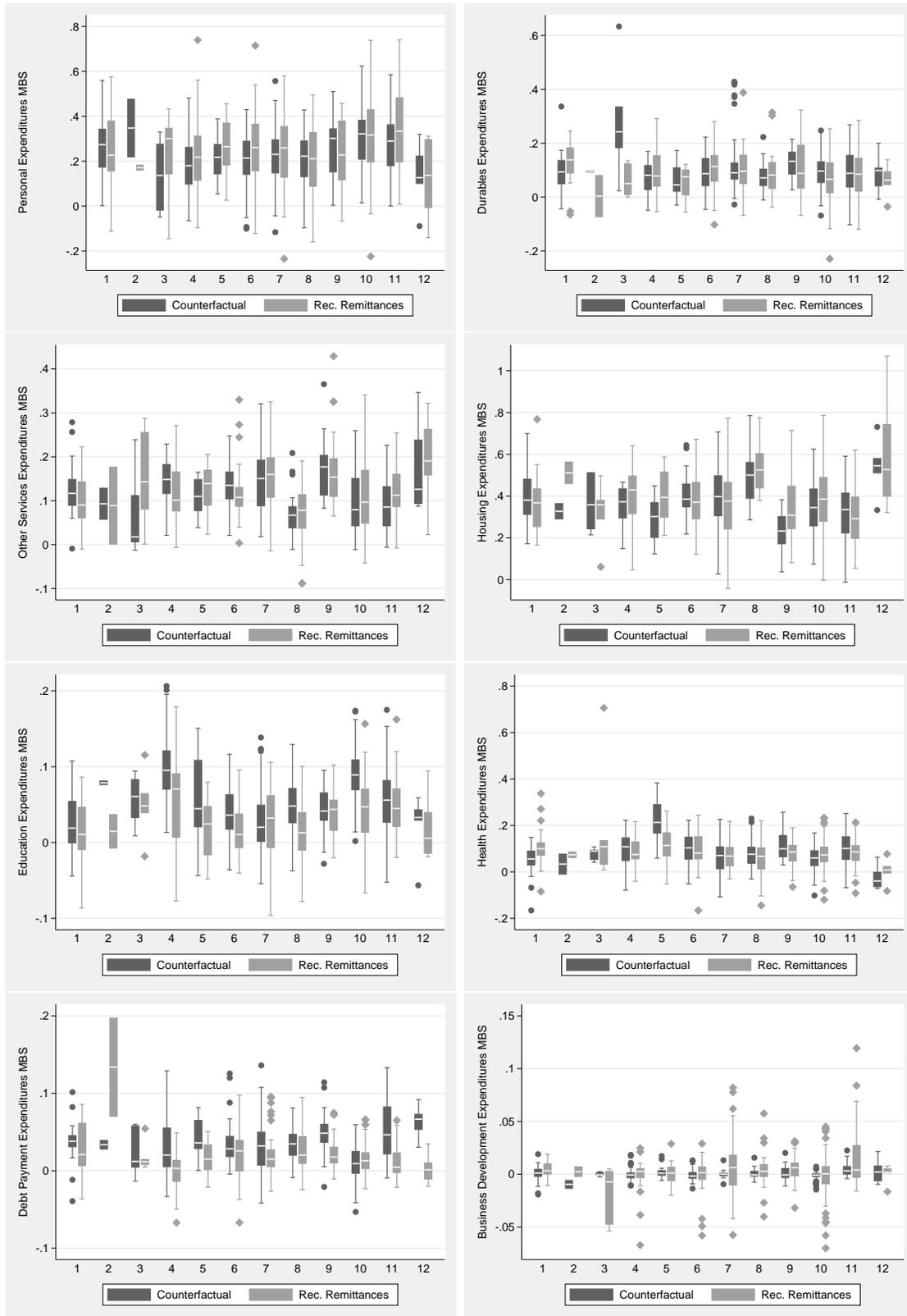


Figure 1.7: Distribution of Marginal Budget Shares Across 12 Regions in Moldova.

counterfactual MBS with the MBS of households receiving remittances for the eight expenditure categories across the 12 regions of Moldova used in this analysis (please note that each of these survey regions covers between one and four raions, see Figure 1.3 for details). Essentially, Figure 1.7 provides a graphical representation of the results presented in Table 1.9 around the country.

Thus, Figure 1.7 helps in understanding how the effects of remittances at the country level vary in different administrative regions. Comparing the right-hand lighter shaded boxes (MBS for households receiving remittances) with the left-hand darker shaded boxes (counterfactual MBS) one can observe that in many categories there is fluctuation in the differences between these two states (for example, in the case of the Durables category regions 2, 3, and 12 exhibit a different pattern of the ATT's than in the other regions - lighter shaded boxes are lower than darker shaded boxes, while in the other regions lighter shaded boxes are above darker shaded boxes; similar observations can be made for other expenditure categories as well).

This corresponds to the results discussed in Valdivia López and Lozano Ascencio (2010) that describe mixed effects of remittances (in some regions there may be observed some effects, while in others there may be no effects or the effects could be opposite). However, looking at Figure 1.7 it is also evident that in most regions the effects have the same trend. In other words, the lighter shaded and darker shaded boxes have a similar pattern; for example, in the case of the general Education MBS, in all regions, except region 7, most observations have lower MBS in the receive remittances state than in the counterfactual, which is equivalent to a negative ATT for this category; recall that region 7 represents the municipality of Chişinău, the capital of Moldova, where the best schools and universities of the country are concentrated.

## 1.7 CONCLUSION

This essay is part of a series of studies on the impact of international remittances and migration on economic development. It provides the foundation for deeper layers of analysis that follow in Chapters 2 and 3. In particular, the essay focuses on the analysis of the effect of international remittances on households' marginal spending on consumption and investment activities. Based on a 2013 survey conducted in Moldova, I employ a modified version of the Working-Leser model to build a system of demand equations, which are used to predict the respective marginal spending propensities.

Unlike many previous papers, the current study addresses the endogeneity bias of remittances that arises from households' migration selection. To achieve this, I employ a type of "Heckman" two-stage estimation process by running a multinomial logit on a set of exogenous variables along with instrumental variables for the receipt of remittances in the first stage in order to estimate a selection correction variable, which is used as an explanatory variable in the second stage OLS regression of the expenditure budget shares. This procedure also allows the creation of counterfactual marginal budget shares that are used to calculate the average treatment effect on the treated (ATT) of remittances.

The results of this study are in line with the findings in the strand of the literature that raises questions about remittances' effects on economic development. At the country level, remittances have mixed results. The marginal spending propensities in most consumption categories increase and the marginal propensities to invest in human capital appear to decrease due to remittances. There are positive results in the form of increasing marginal propensities to save as well as to invest in business development, however these categories have the lowest weights in households' budgets (less than 2%). These generally negative results contrast those in earlier studies that primarily find increases in productive investment categories.

Previous research has shown that the direction and magnitude of the remittances' effects will vary in accordance with the economic, social, cultural, and geopolitical factors present in a particular country at a particular moment in time (De Haas (2007a,b)). The current study shares this viewpoint and, as a result, emphasizes the importance of analyzing the effect of remittances on the development of rural and urban regions within a country. Remittances' regional economic impact may be more comparable across countries (especially in countries that share geographic, cultural, geopolitical, and social similarities). Thus, the analysis presented in this essay is continued at the deeper regional level in the following two chapters of this dissertation.

## CHAPTER 2

# THE IMPACT OF REMITTANCES ON REGIONAL CONSUMPTION AND INVESTMENT\*

### 2.1 INTRODUCTION

Probably the most important oversight of the literature on remittances is the lack of the regional dimension in this analysis. Accordingly, De Haas (2007a) observes that the importance of the study of remittances does not lie in finding whether these flows have positive or negative effects, but rather in answering why remittances lead to higher development in some communities, while other communities have less or even negative development. In addition, De Haas (2007a) expands on this observation by pointing out that future spatial and inter-temporal research needs to establish whether remittances create a so-called *extra-regional leakage* from peripheral (rural) regions to central (urban) regions, which could lead to increasing regional inequalities.

The second key observation regarding the gaps in the literature is that previous studies analyze the impact of remittances within the communities that receive remittances, while ignoring where these households ultimately spend this income. Thus, the true impact of remittances must be studied in the regions where these funds are spent. In this sense, both De Haas (2007a,b) explain that although the leakage may

---

\*Manic, Marian. 2016. "The Impact of Remittances on Regional Consumption and Investment," *Journal of Regional Science*, Accepted on 04/05/2016. Reproduced here with permission of the publisher.

occur between peripheral and central regions, it usually stays within the same greater region (district/county), which leads to micro-urbanization.

Jones (1995, 1998) and Valdivia López and Lozano Ascencio (2010) are among the few papers that try to estimate the regional effects of remittances on the development of communities. However, the studies from the 1990's are based on descriptive statistics and ignore the fungibility of remittances, while Valdivia López and Lozano Ascencio (2010) employ a more rigorous econometric model that predicts the spatial effects of remittances.

The extra-regional spending leakage between rural and urban regions discussed in De Haas (2007a,b) is similar to the regional spending spillovers that were formalized in Rose and Stevens (1991). The authors observe that only a portion of the income generated within a region is paid to the same region's residents and on commodities that are produced within the same region. At the same time, a portion of the income of households in a region is received from outside the region, while some of the consumption taking place in the region may be originated by nonresidents. Wakabayashi and Hewings (2007) also emphasize the importance of adopting a framework as in Rose and Stevens (1991) in regional and interregional analysis models (particularly for education expenditures). Following this line of thinking, as remittances alter income levels, many rural households may choose to send their children to better schools in urban centers, which then changes where education expenditures take place, and thus the level of the human capital that is developed.

The first contribution of the current essay is to offer a framework that analyzes the impact of remittances in the regions where expenditures occur (generally identified as urban or rural regions), rather than the regions where households reside. This allows for the estimation of marginal propensities to spend in urban regions separately from the marginal propensities to spend in rural regions. The second, and most important, contribution is related to the analysis of the extra-regional leakage

(or the so called “crowding-out”) effect of remittances on spending. Thus, the study identifies four possible cases: 1) urban expenditures by urban households; 2) rural expenditures by urban households; 3) urban expenditures by rural households; and 4) rural expenditures by rural households. The differences in urban and rural spending propensities for each type of household offer a unique view into whether remittances alter the accumulation of funds (specifically investment funds) in the two regions. In other words, this fundamental part of the study goes beyond the analysis of remittance effects on marginal spending in the urban and rural regions of the country; importantly, it evaluates the effect of remittances on the preference of choosing urban and rural regions when spending on specific categories. These results are essential in explaining why some regions in the migrant-sending (and remittance-receiving) country are negatively affected by remittances, while others benefit as a result of these funds.

As explained in Chapter 1 of this dissertation, the research is based on extensive, original survey data from the Republic of Moldova. These data are analyzed with a regression model that estimates the impact of international remittances within a household’s system of demand functions, similar to Clément (2011), Adams and Cuecuecha (2010), and Taylor and Mora (2006). The analytical framework builds upon the foundation introduced in Chapter 1. Specifically, it uses information that identifies the effect of remittances, distance from the location of the household to the expenditure location, eleven regional dummies, and other control variables for household socio-demographic characteristics in order to evaluate whether international remittances have an impact on the household’s marginal propensities to spend on consumption and/or investment goods and services that are located either in rural or urban regions. The analysis concentrates on two cases: (1) the regional case, which takes into account the region where expenditures occur; and (2) the regional dynamics case, which looks at the movement of marginal spending between the two regions

(difference between urban and rural marginal spending propensities separately for urban households and for rural households).

The most important finding of this study is related to the effect of remittances on regional spending dynamics (the crowding-out effect). Remittances lead to a change in the region where both urban and rural households spend the extra income coming from migrants. Specifically, all marginal spending that has a productive nature (human capital, savings, and business development) accumulates in urban centers. However, when a large portion of the extra income coming from remittances is spent on productive investments located mainly in urban areas this may hinder the economic development potential of rural areas because of a “Dutch Disease”-like crowding-out effect: the dislocation of the productive factors out of rural regions.

The results help advance the discussion about regional policy intervention within the context of 21st century globalization, as reviewed by Barca et al. (2012). While there is no clear-cut prescription for either a place-neutral or place-based policy intervention in developing countries facing rapid changes as a result of globalization, it is obvious that regional and local characteristics matter in a significant way. For example, Barca et al. (2012) describe place-based policy interventions that encompass coordination of infrastructure investments with schooling, business development, and technology advancement in order to improve local economic development as well as aggregate growth. Even so, the effectiveness of such intervention could be seriously affected by remittances, a major funding source, which may destabilize productive factors by altering regional spending preferences of households. This is particularly true in the many developing countries where international remittances are much larger than the official foreign assistance programs.<sup>1</sup> Therefore, it is crucial that regional

---

<sup>1</sup>For instance, based on the Association Agreement signed with the EU in 2014, Moldova is set to receive approximately €750 million for various infrastructure development projects and institutional reforms during the entire period of 2014-2020 (European Commission (2014)), while the official level of international remittances in this country has been approximately \$2 billion *per year* for the last several years.

policy makers understand the impact of remittances on interregional spending patterns.

The remainder of this chapter is organized in six sections. In Section (2.2), the essay complements the overview of Moldova introduced in Chapter 1 with some additional regional details. Section (2.3) presents a review of the relevant literature at the regional level. Section (2.4) expands the empirical approach explained in Chapter 1 to the regional level. Section (2.5) provides details about the average budget shares and expenditure levels in urban and rural regions. Section (2.6) explains the analytical results. Finally, section (2.7) provides the conclusions of the study and a brief discussion of policy implications.

## 2.2 ADDITIONAL COUNTRY OVERVIEW DETAILS

Chapter 1 of this dissertation provides a detailed overview of the Republic of Moldova. Since the current chapter goes into the deeper levels of analysis at the regional level, it is helpful to add a few extra details that explain the regional dimensions in Moldova. Thus, according to the official Classifier of Territorial Administrative Units of Moldova<sup>2</sup>, the country is organized in three types of administrative units: villages (communes), towns/cities, and raions (districts).

Based on this official document, a village (rural locality) is defined as a territorial administrative unit that embodies the rural population that shares the same geographic conditions, economic relationships, as well as social and cultural traditions (two or more villages may form a commune, which is also considered a rural locality). In the same time, the city (urban locality) is defined as a geographic unit that is significantly more advanced from an economic, infrastructure, and socio-cultural point of view than a village. The city may have households located in high-rise apartment

---

<sup>2</sup>Abbreviated as CUATM and developed by the Department of Statistics and Sociology, within the National Bureau of Statistics. Available at the following [link](#), [Accessed on March 2, 2015].

blocks and the population that resides in this type of localities is usually engaged in industrial activities, general services as well as other human capital, cultural, and political services. Finally, the municipality, also defined as an urban region, has a fundamental role in the economic, political, administrative, socio-cultural, academic, commercial, and other human capital activities of the country.<sup>3</sup>

At the time of this analysis, Moldova had the following administrative units: 32 raions (districts), three municipalities (Chişinău, Bălţi, and Comrat), one autonomous territorial unit called “Găgăuzia” (with the capital Comrat), 61 cities, and 916 villages. Each raion is represented by approximately 25 villages (on average) and between one to three towns or cities (in most cases the raion has only one city, which is also considered the central locality of the raion with all the administrative, financial, commercial, socio-cultural, academic, and healthcare institutions). Another important aspect of Moldovan localities is that their names always include the type of locality for ease of administrative differentiation (for example: both the “*city of Drochia*” and the “*village of Drochia*” are located inside the “*raion of Drochia*”; one can thus differentiate between these two urban and rural localities that are situated inside the bigger administrative unit, raion).<sup>4</sup>

### 2.3 LITERATURE REVIEW AT THE REGIONAL LEVEL

Most studies covering the impact of remittances on economic development from the earlier periods reveal a consumer-orientation of remittances and lack of investment (Durand and Massey (1992)). From a regional perspective, Durand and Massey (1992) raise the important question concerning why productive investments tend

---

<sup>3</sup>Although the municipality is considered an urban region, it may also include rural localities. For example, the municipality of Chişinău is composed of seven towns/cities and 28 villages.

<sup>4</sup>The only distinction between urban or rural geographic units is made at the level of villages or cities. From the perspective of population numbers, all raions in Moldova are rural. Thus, the geographic units considered in this paper refer to specific localities (villages or cities) within raions.

to occur in some communities and not in others. They conclude that the lack of investment in some regions is not surprising since most of the communities involved in such studies are usually isolated, lacking basic infrastructure and ready access to a suitable labor force, which make these communities highly unattractive for productive investments. However, the authors recognize that the limited investments in these rural regions may also be due to the “poor quality land, lack of water, a fragmented land tenure system, and highly unequal property distribution”.<sup>5</sup> Other researchers also emphasize the importance of explaining why remittances lead to an increase in regional inequality and lack of development (De Haas (2007a,b)), although these studies are built upon survey data that only provides observational information.<sup>6</sup>

Surprisingly, there is little rigorous research about the impact of remittances at the regional level. One of the earliest regional studies of remittances is Jones (1995, 1998). This research uses inter-temporal and spatial household survey data collected from regions of Mexico to study the impact of remittances on regional income inequality. The findings suggest that remittances help rural households preserve their livelihood and without such funds these households would move to urban regions in search of better paying work. However, it is based on descriptive statistics rather than formal econometric estimations and may not be reliable due to the fungibility issues

---

<sup>5</sup>In general, it is difficult to carry the generalizations from this paper to other developing countries; for example, Moldova, as mentioned in section (1.2), has the most fertile soils on 75% of its land area, it has favorable temperate weather conditions, and is among the most densely populated countries in Europe (124 people per Km<sup>2</sup>, according to World Bank Population Density data). So, there are few barriers for Moldovan rural communities to invest in productive activities in these regions.

<sup>6</sup>One drawback of the Durand and Massey (1992), De Haas (2007a,b), and many other papers from the 1980's, 1990's, and 2000's, is that they are built mostly upon observational data from a few different surveys limited to a number of small localities within a country; the authors ignore the fungibility of remittances and quote statistics of how households/workers spend the specific funds from remittances, although later studies (Taylor and Mora (2006)) point out that this analysis method does not provide reliable results. In addition, Taylor and Mora (2006) explains that asking households how they spend the income from remittances/migration tells us little about their impact on household's expenditures. Since the income from remittances becomes part of the total household budget, these funds may simultaneously affect the entire system of expenditure categories that the household incurs.

discussed earlier. An important observation that Jones (1998) makes is that above-average income households have a propensity to spend more on goods and services located outside the town of origin, especially on imports, which leads to a movement of funds from rural to urban centers.<sup>7</sup>

Valdivia López and Lozano Ascencio (2010) is a recent example of research related to the impact of remittances in a regional framework. The paper uses a spatial econometrics model based on a non-parametric approach that examines the spatial and inter-temporal effect of remittances on GDP growth rates across several regions (states) in Mexico. Based on the mixed results of remittances' impact on regional growth, the authors explain that remittances may have spatial heterogeneity in their effects (remittances may have effects in some regions, while in other regions there may not be any effect or the effect may be diametrically opposed). This paper, calls for more research on remittances in a regional framework, which may provide more accurate estimates of the regional effects of remittances within developing countries.<sup>8</sup>

As discussed in the introduction, no other paper using consumer theory models has analyzed the impact of remittances on the regions where expenditures actually take place. Instead, all these papers make the so-called “no cross-payments” assumption indirectly, which implies that the funds that enter a region are spent in the same region. In this sense, they ignore an essential feature of regional economics: the transboundary nature of income and expenditure flows (Rose and Stevens (1991)). Only a part of the income generated within a region is paid to the same region's residents and on commodities that are produced within the same region. At the

---

<sup>7</sup>This observation parallels those made in De Haas (2007a,b), that also make reference to the study of Berriane (1997) pointing out that migrant households in Moroccan villages do not invest their money in houses and business development in the village of origin, but rather in small- to medium-sized towns within their region.

<sup>8</sup>Note that the scope of this paper is different from others discussed above in the sense that it looks at the heterogeneity of remittance effects across different regions (states/districts) in the country, rather than focusing on the heterogeneity of the impact of remittances on the development potential of migrant sending communities within these regions.

same time, a part of the income received by households in a region is generated outside the region, while some of the consumption taking place in the region may be originated by nonresidents.

Since the economic growth of a particular region is driven in part by the spending taking place in the respective region (which may be different from the location of the households generating the spending), then ignoring this fact may lead to inaccurate estimates of the effects of income sources on marginal spending. It follows that previous studies (Adams and Cuecuecha (2010), Taylor and Mora (2006), Adams (2005)) may have arrived at overly positive conclusions about the effect of remittances, while ignoring the regional heterogeneity of these effects. A proper analysis of the effect of remittances at the regional level must take into account the spatial dynamics of the expenditure flows.

Another paper that investigates regional economic development through consumer theory is Wakabayashi and Hewings (2007). The focus of the paper is the impact of aging on consumption patterns of Japanese households. The paper emphasizes the importance of regional factors in the decision to spend on particular goods and services in urban or rural regions. For example, when analyzing education expenditure, the authors recognize that urban and rural regions have differences in terms of access to various types of schools, income levels of parents, as well as overall number of school-aged children. As a result, the level of expenditures on education in urban regions are different from rural regions. One pertinent conclusion that the authors make is that since more consumption is initiated electronically then it becomes more difficult to match regional income and consumption by location.

Although Wakabayashi and Hewings (2007) is not directly related to the research on remittances, it provides several observations that are relevant. Following this analysis, one can reach the conclusion that a transitory income-shock, such as the receipt of remittances, may alter the regional expenditure preferences of households

(particularly rural households with lower income-levels). This is especially true for education and other human capital categories because the schools from urban regions provide more qualitative and advanced education opportunities than those in rural regions (all tertiary education institutions from Moldova are primarily located in urban regions). Thus, since the extra funds from remittances raise the rural households' budget constraints, they may have a better access to higher quality education in urban centers and as a result seek higher returns from their human capital investments (either in the form of higher paying urban jobs, or from emigration).<sup>9</sup> Another important conclusion is that it is becoming increasingly difficult to match regional spending patterns with income sources, which is particularly true in the case of remittances. Hence the earlier studies (Jones (1995, 1998), Berriane (1997), De Haas (2007a,b)) may not provide reliable results and require a more structured approach to the study of the crowding-out (leakage) effect of remittances on spending from rural to urban regions.

## 2.4 EMPIRICAL APPROACH AT THE REGIONAL LEVEL

### 2.4.1 MODEL SELECTION

In this study of the impact of remittances on spending I consider two general regions: core, or urban regions, and peripheral, or rural regions (as in De Haas (2007a,b)). It is fundamental to understand the meaning of the urban and rural regions in the scope of the current paper. As section 2.2 explains, the geographic units used in this study are the urban and rural localities where spending takes place; however, this spending is originated by households that in turn reside in either urban or rural localities. In other words, households can reside in either an urban or rural locality and may have either urban, or rural, or both types of expenditures. Consequently,

---

<sup>9</sup>This issue will be at the center of the research in Chapter 3 of this dissertation.

this definition of the urban/rural regions applies to both the region of residence as well as the region of spending. However, the major contribution of the paper is that it evaluates the impact of remittances in the regions where spending takes place, which is not necessarily the same as the region where the households reside.

Thus, the set of all urban locations is defined as the urban region, while the set of all rural locations is defined as the rural region. Moreover, since the data are representative at the country level, then these urban and rural regions refer to the entire country (not just a few urban or rural regions in the country). Also, the current study assumes that the urban/rural spending may occur within the same general region/district or across regions.

So, a proper analysis of the impact of remittances on regional spending requires one to distinguish between the location of the expenditures and the location of the households. In this sense, the empirical approach of the current study is to develop a model that estimates marginal spending propensities (marginal budget shares, or MBS) in urban and rural regions separately. Moreover, the so-called “crowding-out” or “extra-regional leakage” between urban and rural regions can be estimated by controlling for socio-demographic characteristics of urban and rural households separately. In this paper, the “crowding-out” effect measures how remittances affect households’ preference for a region where to spend on various categories. This allows to identify four possible cases for the marginal spending propensities:

- 1) Urban MBS of Urban Households.
- 2) Rural MBS of Urban Households.
- 3) Urban MBS of Rural Households.
- 4) Rural MBS of Rural Households.

In cases (1) and (4), the region of the expenditure coincides with the region of the household.<sup>10</sup> In cases (2) and (3) the region of the expenditure is different from the region of the household. Thus, one can calculate the crowding-out effect by estimating the difference between urban and rural MBS for urban households separately and then for rural households separately (in other words, the crowding-out effect represents the difference between cases (1) and (2) separately and the difference between cases (3) and (4) separately).

By changing the demand functions described in Chapter 1 in two fundamental ways, this modeling approach offers a significant improvement over the methodology employed in Adams (2005), Taylor and Mora (2006), Adams and Cuecuecha (2010), and several others. First the current model constructs regional (urban and rural) demand functions based on novel spatial data of expenditures. Secondly, the model controls for the socio-demographic characteristics of urban and rural households separately, along with additional spatial characteristics like the average distance between the household location and all the locations where the expenditures occur as well as regional dummies. See Figure 1.3 for more details about the regions used to control for the regional heterogeneity across the country.<sup>11</sup>

Figure 2.1 shows the graphical representation of the approach used in previous literature. The earlier models (Adams (2005), Taylor and Mora (2006), Adams and Cuecuecha (2010), and others) simply estimate the MBS based on a single system of demand equations for two groups of households: 1) households that do not receive remittances and 2) households that receive remittances (some papers limit the anal-

---

<sup>10</sup>This does not mean that the spending takes place in the same raion/district of the country. Since the scope of the current research is to focus on the effect of remittances on the urban and rural development potential of the country in general, the spatial spillovers that may occur across several different raions/districts are not taken into account in the current study. However this would definitely be an important extension of the research in this field once more data becomes available; unfortunately, the data used in this research is too limited to include the analysis of spatial spillover effects of remittances across regions.

<sup>11</sup>These are also the sampling regions in which the survey was carried out.

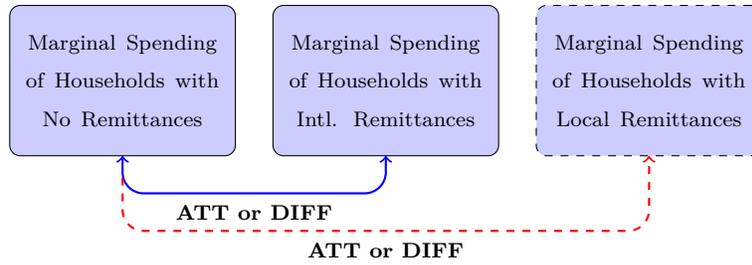


Figure 2.1: Traditional approach: Analyzing the impact of remittances using consumer theory models.

ysis only to international remittances, while others also include local remittances in the analysis). The impact of the remittances is then estimated by calculating the differences between the MBS for households receiving remittances and the households without remittances (modern studies use the ATT approach instead; a detailed discussion about this method was introduced in subsection (1.4.3)).

The current study's approach is thus significantly different from the one used in earlier studies (see the graphical representation of the current model in Figure 2.2). Note that I separate expenditures into urban and rural cases (upper pair and lower pair of blocks, respectively) for the two groups (states) of households (without and with remittances). I then estimate the set of Average Treatment Effects on the Treated (ATT's) for urban expenditures (*Average Treatment Effect<sub>i1</sub>*, where  $i$  indexes the different categories of expenditures) and the set of ATT's for rural expenditures (*Average Treatment Effect<sub>i2</sub>*) separately. Finally, the crowding-out effect (extra-regional leakage) can be obtained by taking the difference between urban and rural marginal spending within each state of households (*Difference<sub>i1</sub>* and *Difference<sub>i2</sub>*, respectively), and then estimating the set of ATT's on these two differences (*Average Treatment Effect<sub>i3</sub>*). Also, note that this is done for the households that reside in urban localities (left-hand-side dashed block) and then the process is identically repeated for the households that reside in rural localities separately (right-hand-side dashed block). The net crowding-out effect for both regions could finally be ob-

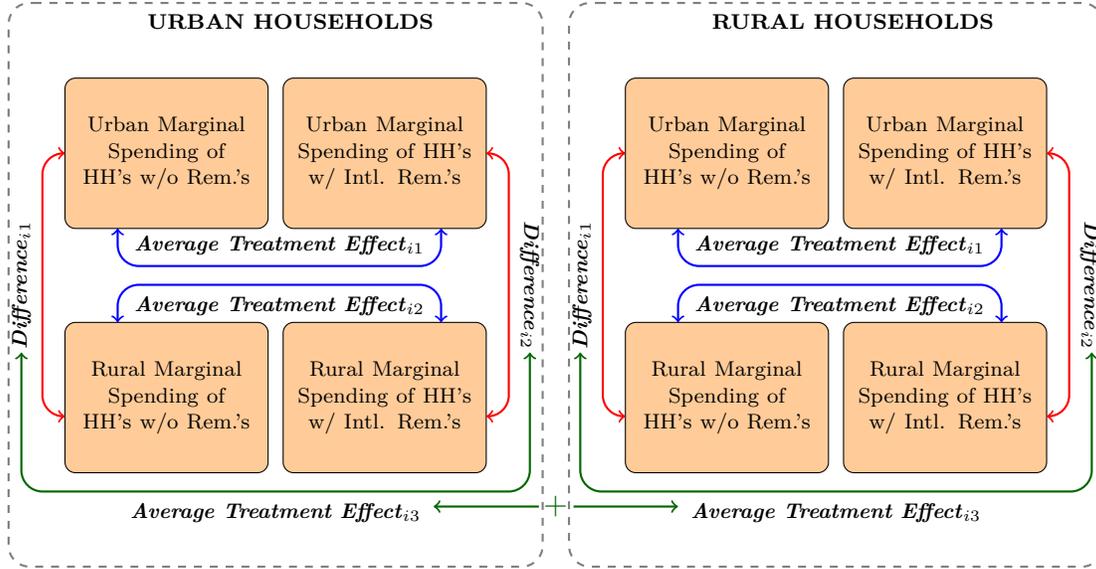


Figure 2.2: The impact of remittances using consumer theory models in a regional framework.

tained by adding the two *Average Treatment Effect*<sub>*i*3</sub> from the urban and rural cases together.

#### 2.4.2 REGIONAL MODEL SPECIFICATION

As discussed in subsection (2.4.1), a fundamental change that I introduce in the model is the separation of expenditure categories based on their location. Also, in order to facilitate the estimation of the crowding-out effect, the set of socio-demographic characteristics,  $H_j$ , is interacted by the regional dummy that indicates the households' location. This is done to separate the socio-demographic characteristics of rural and urban households as explained in Figure 2.2 (I show this in general form as  $H_{jb}$ ; see subsection (1.4.1) for more details). Thus, the regional model can be represented as follows:

$$e_i^a = \alpha_{i,a} + \theta_{1i,a} \ln \bar{d} + \theta_{2i,a} \ln \bar{d}E + \beta_{1i,a}E + \beta_{2i,a}E \ln E + \sum_j (\gamma_{ij,b}H_{jb} + \delta_{ij,b}H_{jb}E), \quad (2.1)$$

where  $a$  identifies the type of the expenditure location ( $a=1$  identifies expenditures taking place in urban regions and  $a=2$  identifies expenditures in rural regions).

From equation (2.1), one can obtain the Budget Shares,  $w_i$ , and the Marginal Budget Shares,  $MBS_i$ , in the following way:

$$w_i^a = \frac{e_i^a}{E} = \frac{\alpha_{i,a}}{E} + \frac{\theta_{1i,a} \ln \bar{d}}{E} + \theta_{2i,a} \ln \bar{d} + \beta_{1i,a} + \beta_{2i,a} \ln E + \sum_j \left( \frac{\gamma_{ij,b} H_{jb}}{E} + \delta_{ij,b} H_{jb} \right) \quad (2.2)$$

$$MBS_i^a = \frac{\partial e_i^a}{\partial E} = \beta_{1i,a} + \theta_{2i,a} \ln \bar{d} + \beta_{2i,a} (1 + \ln E) + \sum_j \delta_{ij,b} H_{jb} \quad (2.3)$$

Based on the explanations in subsection (1.4.2) (after including the selection correction term and fully specifying the variables), the complete model to be estimated at the regional level can be represented as follows:

$$\begin{aligned} \frac{e_{ci}^a}{E} = & \frac{\alpha_{ci,a}}{E} + \frac{\theta_{1ci,a} \ln \bar{d}}{E} + \theta_{2ci,a} \ln \bar{d} + \beta_{1ci,a} + \beta_{2ci,a} \ln E + \text{URBAN} \times \left( \frac{\gamma_{ci1} \text{SIZE}}{E} + \delta_{ci1} \text{SIZE} + \right. \\ & + \frac{\gamma_{ci2} \text{AGE}}{E} + \delta_{ci2} \text{AGE} + \frac{\gamma_{ci3} \text{CHILD12}}{E} + \delta_{ci3} \text{CHILD12} + \sum_l \frac{\gamma_{ci4,l} \text{OCC}_l}{E} + \sum_l \delta_{ci4,l} \text{OCC}_l + \\ & + \sum_m \frac{\gamma_{ci5,m} \text{EDU}_m}{E} + \sum_m \delta_{ci5,m} \text{EDU}_m + \frac{\gamma_{ci6} \text{PC}}{E} + \delta_{ci6} \text{PC} + \frac{\gamma_{ci7} \text{INTERNET}}{E} + \\ & + \delta_{ci7} \text{INTERNET} + \left. \sum_p \delta_{ci8,p} \text{SREG}_p + \mu_{ci,k} \hat{\lambda}_{i,k} \right) + \text{RURAL} \times \left( \frac{\gamma_{ci8} \text{SIZE}}{E} + \delta_{ci9} \text{SIZE} + \right. \\ & + \frac{\gamma_{ci9} \text{AGE}}{E} + \delta_{ci10} \text{AGE} + \frac{\gamma_{ci10} \text{CHILD12}}{E} + \delta_{ci11} \text{CHILD12} + \sum_q \frac{\gamma_{ci11,q} \text{OCC}_q}{E} + \\ & + \sum_q \delta_{ci12,q} \text{OCC}_q + \sum_r \frac{\gamma_{ci12,r} \text{EDU}_r}{E} + \sum_r \delta_{ci13,r} \text{EDU}_r + \frac{\gamma_{ci13} \text{PC}}{E} + \delta_{ci14} \text{PC} + \\ & + \left. \frac{\gamma_{ci14} \text{INTERNET}}{E} + \delta_{ci15} \text{INTERNET} + \sum_s \delta_{ci16,s} \text{SREG}_s + \mu_{ci,k} \hat{\lambda}_{i,k} \right) + u_{ci,a} \end{aligned} \quad (2.4)$$

The validity of the instrumental variables, used to estimate the selection correction variable and discussed in Chapter 1, holds at the regional level as well. Table 2.1 provides the results of the Sargan tests of overidentification for the regional expenditure categories with the  $\chi^2$  statistics that have p-values for which the null hypothesis that all instruments are uncorrelated cannot be rejected (with only one exception in the case of the urban durables expenditure).

Another set of tests discussed in Chapter 1 refer to the endogeneity of the international remittances variable. Table 2.2 shows the results of the Wu-Hausman tests for endogeneity at the regional level. These results confirm the high significance (1% level) of endogeneity in both urban and rural expenditure categories and, hence, validates the use of the two-stage estimation process at this level as well.

Table 2.1: Regional Sargan Test Results

	$\chi^2(2)$	p-value
Urban Expenditure Category		
Personal expenses	0.992	0.6088
Durable goods	4.941	0.0845
Other services	1.913	0.3843
Housing	0.314	0.8549
Education	3.742	0.1540
Healthcare	0.356	0.8371
Debt payment	0.566	0.7536
Business Development	0.003	0.9985
Rural Expenditure Category		
Personal expenses	2.661	0.2644
Durable goods	0.868	0.6481
Other services	0.012	0.9941
Housing	0.051	0.9748
Education	1.433	0.4885
Healthcare	4.253	0.1192
Debt payment	0.087	0.9572
Business Development	–	–

N=474 observations.

Table 2.2: Regional Wu-Hausman Test Results

	Residual t-statistic	p-value
Urban Expenditure Category		
Personal expenses	-4.63	0.000
Durable goods	-1.29	0.198
Other services	-0.90	0.371
Housing	-4.14	0.000
Education	-0.15	0.883
Healthcare	-0.56	0.573
Debt payment	0.81	0.417
Business Development	-1.09	0.274
Rural Expenditure Category		
Personal expenses	3.65	0.000
Durable goods	0.32	0.752
Other services	3.37	0.001
Housing	5.22	0.000
Education	2.51	0.012
Healthcare	3.25	0.001
Debt payment	0.86	0.390
Business Development	1.85	0.065

N=1,188 observations.

### 2.4.3 REGIONAL REMITTANCE EFFECTS

Based on the foundations introduced in subsections (1.4.3) and (2.4.2), to achieve the objectives described in the introduction of this chapter, one must first calculate the regional MBS for each of the two states ( $c = 1$  and  $c = 2$ ) and then the counterfactual for state  $c = 1$  (counterfactual MBS for households not receiving remittances conditioning on the characteristics of households that choose to receive remittances).

I start by estimating the pair of budget shares as represented:

$$E\left(\frac{e_{2i}^a}{E} \middle| c = 2\right) = \frac{\alpha_{2i,a}}{E} + \frac{\theta_{12i,a} \ln \bar{d}}{E} + \theta_{22i,a} \ln \bar{d} + \beta_{12i,a} + \beta_{22i,a} \ln E + \sum_j \left( \frac{\gamma_{2ij,b} H_{jb}}{E} + \delta_{2ij,b} H_{jb} \right) + \mu_{b2i,1} \hat{\lambda}_{bi,1} \quad (2.5)$$

$$E\left(\frac{e_{1i}^a}{E} \middle| c = 2\right) = \frac{\alpha_{1i,a}}{E} + \frac{\theta_{11i,a} \ln \bar{d}}{E} + \theta_{21i,a} \ln \bar{d} + \beta_{11i,a} + \beta_{21i,a} \ln E + \sum_j \left( \frac{\gamma_{1ij,b} H_{jb}}{E} + \delta_{1ij,b} H_{jb} \right) + \mu_{b1i,2|c=2} \hat{\lambda}_{bi,2|c=2} \quad (2.6)$$

Using equations (2.5) and (2.6), one can calculate the MBS for the treated and the counterfactual groups in a similar way as in equation (2.3). The effect of remittances on the regional marginal propensity to spend is obtained by taking the difference between the two MBS as follows:

$$ATT_{21i,a} = \beta_{12i,a} - \beta_{11i,a} + (\theta_{22i,a} - \theta_{21i,a}) \ln \bar{d} + (\beta_{22i,a} - \beta_{21i,a})(1 + \ln E) + \sum_j (\delta_{2ij,b} - \delta_{1ij,b}) H_{jb} + \mu_{b2i,1} \hat{\lambda}_{bi,1} - \mu_{b1i,2|c=2} \hat{\lambda}_{bi,2|c=2} \quad (2.7)$$

So, equation (2.7) represents the regional case (when  $a = 1$  the model estimates urban ATT's and when  $a = 2$  it estimates rural ATT's); the national case, discussed in Chapter 1, is represented by simply dropping the subscript  $a$  (no difference between urban and rural expenditures, as in equation (1.12)). Moreover, I interact the selection correction variable ( $\lambda_{i,k}$ ) with the regional dummies (URBAN and RURAL) in the regional case in order to separate the effects of this component on households that reside in urban and rural localities.

The final, and most important, objective of this study is to estimate the effect of remittances in the regional dynamics case (crowding-out effect). This is done in a similar way as described earlier; however, the ATT's are calculated after first taking the difference between the MBS of urban and rural expenditures for urban households separately and then for rural households separately within each state (without remittances and with remittances). Since the same household can be observed incurring an expenditure in both an urban locality as well as a rural locality, I take the direct difference between urban MBS and rural MBS within the same household state (these are the *Difference<sub>i1</sub>* and *Difference<sub>i2</sub>* in Figure 2.2).

The regional differences in the MBS of the counterfactual is calculated as follows:

$$E(\text{MBS}_{1i}^1 - \text{MBS}_{1i}^2 | c = 2) = \beta_{11i,1} - \beta_{11i,2} + (\theta_{21i,1} - \theta_{21i,2}) \ln \bar{d} + (\beta_{21i,1} - \beta_{21i,2})(1 + \ln E) + \sum_j (\delta_{1ij,1} - \delta_{1ij,2}) H_j + \mu_{11i,2|c=2} \hat{\lambda}_{1i,2|c=2} - \mu_{21i,2|c=2} \hat{\lambda}_{2i,2|c=2} \quad (2.8)$$

The regional difference in the MBS of households receiving remittances is calculated as follows:

$$E(\text{MBS}_{2i}^1 - \text{MBS}_{2i}^2 | c = 2) = \beta_{12i,1} - \beta_{12i,2} + (\theta_{22i,1} - \theta_{22i,2}) \ln \bar{d} + (\beta_{22i,1} - \beta_{22i,2})(1 + \ln E) + \sum_j (\delta_{2ij,1} - \delta_{2ij,2}) H_j + \mu_{12,1} \hat{\lambda}_{1i,1} - \mu_{22,1} \hat{\lambda}_{2i,1} \quad (2.9)$$

Finally, the crowding-out effect of remittances on the households' marginal propensity to spend in urban regions is determined by evaluating the ATT based on expressions (2.8) and (2.9) (note that this process is done separately for households that reside in urban localities and then separately for households that reside in rural localities; this is the *Average Treatment Effect<sub>i3</sub>* shown in Figure 2.2).

## 2.5 EXPENDITURES AT THE REGIONAL LEVEL

Table 2.3 provides the regional (urban/rural) disaggregation of Table 1.6. Thus, the country level expenditure is the sum of the urban and rural components (i.e.  $E_{country} = E_{urban} + E_{rural}$ ; for example, the total country level average expenditure of

Table 2.3: Descriptive Statistics of Households' Regional Expenditure Shares and Values

Expenditure category	Expenditures in Urban Region		Expenditures in Rural Region		t-test (1) vs (2)	t-test (3) vs (4)
	(1) Do not rec. remittances	(2) Receive remittances	(3) Do not rec. remittances	(4) Receive remittances		
<i>Average Budget Shares (ABS):</i>						
Personal expenses	0.2011 (0.23)	0.2123 (0.26)	0.1776 (0.24)	0.1601 (0.23)	0.50	-0.68
Durable goods	0.0265 (0.09)	0.0460 (0.13)	0.0046 (0.04)	0.0043 (0.03)	2.70**	-0.11
Other services	0.0618 (0.10)	0.0717 (0.12)	0.0224 (0.05)	0.0301 (0.07)	1.67	1.22
Housing	0.1992 (0.22)	0.2045 (0.23)	0.1368 (0.19)	0.1124 (0.17)	0.20	-1.05
Education	0.0222 (0.06)	0.0296 (0.08)	0.0054 (0.03)	0.0075 (0.03)	1.68	0.86
Healthcare	0.0830 (0.13)	0.0827 (0.13)	0.0456 (0.11)	0.0256 (0.09)	-0.04	-1.99*
Debt payment	0.0099 (0.05)	0.0094 (0.04)	0.0031 (0.02)	0.0022 (0.02)	-0.19	-0.60
Business	0.0001 (0.002)	0.0016 (0.03)	0.0007 (0.01)	0.00 (0.00)	1.05	-1.69
Development						
<b>Total</b>	<b>0.60</b>	<b>0.66</b>	<b>0.40</b>	<b>0.34</b>		
<i>Expenditure Values (MDL):</i>						
Personal expenses	10,650.24 (15,376.54)	13,864.05 (21,385.22)	6,117.70 (10,622.61)	8,996.30 (13,711.81)	1.91*	5.75***
Durable goods	3,519.97 (15,336.70)	7,676.95 (36,280.88)	302.82 (2,850.99)	420.55 (3,367.24)	3.74***	0.63
Other services	7,014.09 (50,954.95)	7,052.25 (17,416.00)	1,299.33 (4,171.59)	2,621.39 (7,206.69)	0.02	2.15*
Housing	17,968.64 (96,486.67)	24,472.15 (87,889.85)	6,191.54 (12,712.72)	10,008.88 (30,051.71)	1.16	1.85*
Education	1,540.24 (4,633.20)	2,517.51 (8,360.34)	331.93 (2,112.66)	383.21 (1,278.35)	2.00*	0.58
Healthcare	4,541.01 (15,309.25)	6,449.79 (28,670.59)	1,789.65 (6,980.07)	1,326.96 (5,017.45)	1.45	-0.93
Debt payment	1,078.35 (6,403.78)	873.33 (4,621.87)	190.45 (1,652.20)	129.48 (1,100.28)	-0.50	-0.54
Business	4.90	438.06	48.32	0.00	1.13	-1.51
Development	(113.80)	(8,827.80)	(715.08)	(0.00)		
<b>Total</b>	<b>46,317.45</b> <b>(167,518.10)</b>	<b>63,344.09</b> <b>(118,141.50)</b>	<b>16,271.75</b> <b>(24,796.30)</b>	<b>23,886.77</b> <b>(42,661.44)</b>	<b>1.69</b>	<b>2.63**</b>

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

households receiving remittances is 87,230.86, which is equal to the sum of 63,344.09 MDL total average expenditure taking place in the urban region and 23,886.77 MDL total average expenditure in the rural region). Urban expenditures make the largest portion of the total expenditure (60% for households without remittances and 66% for households receiving international remittances).

The change in ABS for urban and rural expenditures between households with and without remittances is mixed. In the urban region, only durable goods ABS

category presents a statistically significant change (durable goods increase from an average of 2.65% for households that do not receive remittances to 4.60% for households receiving remittances). All other urban expenditure ABS report less significant increases due to remittances (only healthcare has a small decrease). In the case of rural ABS, healthcare is the only category exhibiting a statistically significant change due to remittances (healthcare category decreases from a share of 4.56% for households without remittances to a share of 2.56% for those with remittances).

Although the other ABS categories do not report statistically significant t statistics, nevertheless one can see that remittances lead to a decrease in most rural consumption budget shares. Moreover, the business development category also shows a decrease as no households report rural spending on business development. On the other hand, rural education and savings ABS have small increases.

Turning to the expenditure values for urban and rural cases, one can see several differences as well. Urban expenditures show significant increases due to remittances only for personal expenditures, durable goods, and education. On the other hand, when looking at rural expenditures, one can see significant increases for personal expenditures, other services, and housing. Rural business development expenditure goes to nil in the case when households receive remittances.

Urban and rural total expenditures register increases in the case of remittances; urban total expenditures increase from 46,318 MDL to 63,344 MDL for households receiving remittances, while rural total expenditure increases from 16,272 MDL for households that do not receive remittances to 23,887 MDL in the case of households that receive remittances.

## 2.6 REGRESSION RESULTS

### 2.6.1 TWO-STAGE REGRESSION RESULTS

The regression results at the regional level present a similar picture like the one at the national level, as discussed in subsection (1.6.1). Tables 2.4 and 2.5 report selected second-stage OLS regression results for *urban* and *rural* average budget shares, respectively.<sup>12</sup> Each table provides the main regression coefficients for households that do not receive remittances in the top section and for those that receive remittances in the bottom section, respectively. Also, as explained in Chapter 1, the coefficients presented in these tables are used to calculate the regional *MBS* for each expenditure category, which are in turn used to determine the effect of remittances with the help of the *ATT* approach. Interestingly, the coefficients for the selection correction term ( $\lambda_k$ ) becomes significant at the 10% level in the case of urban and rural education expenditures as well as rural personal expenditures (in all three instances for households receiving remittances). These results further confirm the significance of endogeneity; without controlling for selection the results of the analysis may be biased.<sup>13</sup>

In the case of urban expenditures for households that do not receive remittances, the average distance and total household expenditure variables have significant coefficients in a number of expenditure categories. The average distance variable is significant at the 1% level in the case of other services and healthcare expenditures. The inverse of total expenditure is significant at the 10% level in the case of the debt payment expenditure, while the log of the total expenditure is significant at the 1% level for durables and housing expenditures as well as at the 5% level for the education expenditure. In the case of urban expenditures for households that receive international remittances, the average distance variable is significant at the 5% level

---

<sup>12</sup>The full OLS regression results are available upon request.

<sup>13</sup>See the discussion in subsection (2.4.2) related to the results of the Wu-Hausman tests for endogeneity.

Table 2.4: Selected Second-Stage OLS Regression Results for Urban Expenditures

Second-Stage OLS Regression of Urban Average Budget Shares for Households that Do Not Receive Remittances								
Variable	Personal	Durables	Other Services	Housing	Education	Healthcare	Debt Payment	Business Development
Average Distance	0.0182 (0.0120)	0.0148 (0.0097)	0.0265*** (0.0088)	0.0091 (0.0123)	0.0127 (0.0079)	0.0431*** (0.0133)	-0.0014 (0.0047)	-0.0000 (0.0001)
Average Distance ×1/E	275.9487 (307.2547)	-166.1248 (162.0125)	-110.1643 (147.4798)	99.6206 (231.3631)	-34.0500 (120.3083)	-529.1968 (329.7633)	-6.6601 (70.9767)	-0.0125 (1.0187)
1/E	144.7178 (1,251.1879)	630.6310 (625.4462)	-373.0988 (575.3048)	1,018.2915 (1,057.7377)	-115.3795 (357.5400)	-143.3012 (1,072.0920)	-606.4663* (316.7264)	-10.6893 (11.8650)
ln E	-0.0188 (0.0160)	0.0288*** (0.0110)	0.0142 (0.0151)	0.1153*** (0.0264)	-0.0137** (0.0061)	-0.0158 (0.0185)	0.0051 (0.0045)	-0.0001 (0.0001)
λ <sub>2</sub>	-0.0098 (0.0119)	-0.0006 (0.0085)	-0.0036 (0.0077)	0.0026 (0.0129)	-0.0052 (0.0066)	0.0075 (0.0117)	-0.0043 (0.0032)	0.0000 (0.0001)
Constant	0.2222 (0.2003)	-0.3202** (0.1320)	-0.1051 (0.1664)	-1.1645*** (0.2846)	0.1361* (0.0789)	0.1356 (0.2222)	-0.0016 (0.0550)	0.0014 (0.0015)
R <sup>2</sup>	0.63	0.26	0.31	0.58	0.26	0.19	0.19	0.05

N=714, standard errors in parentheses obtained by clustering at the sampling region and bootstrapping with 500 repetitions.  
 \*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

Second-Stage OLS Regression of Urban Average Budget Shares for Households that Receive Remittances								
Variable	Personal	Durables	Other Services	Housing	Education	Healthcare	Debt Payment	Business Development
Average Distance	0.0247 (0.0235)	0.0296* (0.0153)	0.0292** (0.0120)	0.0023 (0.0237)	0.0074 (0.0089)	0.0130 (0.0174)	0.0007 (0.0047)	-0.0048 (0.0052)
Average Distance ×1/E	-118.0312 (1,091.5161)	-520.7130 (435.4439)	-138.2672 (381.2352)	909.2176 (865.9957)	-0.8705 (288.0288)	139.3343 (619.9841)	-78.8016 (133.9576)	175.0506 (192.5578)
1/E	4,776.5270 (4,248.8614)	1,710.3953 (2,457.3040)	-1,869.1905 (1,548.8348)	-1,875.7906 (3,274.8274)	-574.5497 (1,246.6806)	184.6485 (2,596.2743)	-296.7730 (958.8320)	-438.3633 (592.8625)
ln E	-0.0834** (0.0366)	0.0499* (0.0269)	-0.0215 (0.0155)	0.0922** (0.0390)	-0.0143 (0.0109)	0.0099 (0.0273)	-0.0021 (0.0057)	0.0080 (0.0073)
λ <sub>1</sub>	-0.0002 (0.0145)	0.0075 (0.0082)	-0.0049 (0.0065)	-0.0003 (0.0115)	-0.0091* (0.0057)	-0.0065 (0.0098)	0.0003 (0.0028)	-0.0022 (0.0023)
Constant	0.7411 (0.4577)	-0.5869* (0.3323)	0.2626 (0.1935)	-0.7525 (0.4881)	0.1887 (0.1377)	-0.1349 (0.3782)	0.0813 (0.0931)	-0.0760 (0.0740)
R <sup>2</sup>	0.52	0.24	0.34	0.48	0.18	0.29	0.14	0.14

N=474, standard errors in parentheses obtained by clustering at the sampling region and bootstrapping with 500 repetitions.  
 \*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

Table 2.5: Selected Second-Stage OLS Regression Results for Rural Expenditures

Second-Stage OLS Regression of Rural Average Budget Shares for Households that Do Not Receive Remittances								
Variable	Personal	Durables	Other Services	Housing	Education	Healthcare	Debt Payment	Business Development
Average Distance	-0.0552*** (0.0160)	-0.0047* (0.0028)	-0.0033 (0.0052)	-0.0283** (0.0126)	-0.0075 (0.0051)	-0.0289*** (0.0100)	0.0041 (0.0028)	0.0009 (0.0011)
Average Distance × 1/E	217.9425 (507.2586)	75.0162 (52.2498)	89.0201 (116.5839)	-76.5787 (277.0833)	-6.2567 (91.7131)	278.9733 (291.0732)	-101.2816** (50.1252)	-6.1960 (14.3303)
1/E	279.4347 (1,587.3474)	-357.5624 (246.0572)	119.2098 (380.8183)	129.6265 (1,186.5875)	457.0940 (316.4997)	-960.1330 (1,206.2019)	-134.2246 (136.4607)	-78.1501 (71.2420)
ln E	-0.0969*** (0.0191)	-0.0020 (0.0043)	-0.0030 (0.0060)	-0.0128 (0.0191)	0.0030 (0.0031)	0.0005 (0.0172)	-0.0037* (0.0022)	-0.0001 (0.0015)
λ <sub>2</sub>	0.0052 (0.0152)	-0.0032 (0.0075)	0.0010 (0.0046)	0.0101 (0.0106)	0.0026 (0.0018)	-0.0028 (0.0067)	0.0001 (0.0013)	0.0004 (0.0006)
Constant	1.3484*** (0.2399)	0.0505 (0.0467)	-0.0020 (0.0740)	0.4402* (0.2315)	-0.0237 (0.0426)	0.2124 (0.2052)	0.0600* (0.0343)	0.0103 (0.0164)
R <sup>2</sup>	0.66	0.17	0.29	0.56	0.26	0.34	0.11	0.12

N=714, standard errors in parentheses obtained by clustering at the sampling region and bootstrapping with 500 repetitions.  
 \*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

Second-Stage OLS Regression of Rural Average Budget Shares for Households that Receive Remittances								
Variable	Personal	Durables	Other Services	Housing	Education	Healthcare	Debt Payment	Business Development
Average Distance	-0.0118 (0.0186)	-0.0055 (0.0039)	-0.0162** (0.0075)	-0.0384** (0.0153)	-0.0033 (0.0022)	-0.0266*** (0.0091)	-0.0003 (0.0016)	0.0000 (0.0000)
Average Distance × 1/E	-2,276.6736** (928.6204)	116.9743 (109.4407)	157.9849 (225.4812)	767.4597 (629.1409)	-51.2718 (120.4500)	917.6682** (438.1332)	0.9393 (42.9790)	0.0000 (0.0000)
1/E	-2,928.1280 (2,748.9954)	-27.2807 (348.6116)	-484.2033 (967.1442)	2,211.8921 (2,456.5890)	-1,021.73** (421.9637)	736.8591 (1,561.5025)	-104.3113 (164.2867)	0.0000 (0.0000)
ln E	-0.0812*** (0.0249)	0.0071* (0.0042)	-0.0044 (0.0086)	0.0521** (0.0264)	-0.0057* (0.0031)	-0.0037 (0.0123)	-0.0029 (0.0019)	0.0000 (0.0000)
λ <sub>2</sub>	0.0177* (0.0098)	0.0015 (0.0022)	0.0037 (0.0054)	-0.0040 (0.0090)	0.0023 (0.0017)	-0.0049 (0.0074)	-0.0008 (0.0012)	0.0000 (0.0000)
Constant	1.2399*** (0.3589)	-0.0797 (0.0599)	0.1085 (0.1547)	-0.4212 (0.3486)	0.0510 (0.0476)	0.2070 (0.1693)	0.1709 (0.1052)	0.0000 (0.0000)
R <sup>2</sup>	0.65	0.16	0.36	0.53	0.37	0.27	0.36	-

N=474, standard errors in parentheses obtained by clustering at the sampling region and bootstrapping with 500 repetitions.  
 \*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

for other services expenditure and at the 10% level for durables expenditure, while the log of the total expenditure is significant at the 5% level for personal and housing expenditures and at the 10% level for durables expenditure.

Moving on to the regression results for rural expenditures, one can observe a similar situation. Thus, in the case of rural expenditures for households that do not receive remittances, the average distance is significant at the 1% level for personal and healthcare expenditures, at the 5% level for housing expenditure, and at the 10% level for durables expenditure; the interaction term between the average distance and the inverse of the total expenditure is also significant at the 5% level for the debt payment expenditure. The log of the total expenditure is significant at the 1% level for personal expenditure and at the 10% level for the debt payment expenditure. Finally, in the case of rural expenditures for households that receive international remittances, average distance is significant at the 1% level for the healthcare expenditure as well as at the 5% level for other services and housing expenditures; also the interaction term between average distance and the inverse of total expenditure is significant at the 5% level for personal and healthcare expenditures. The inverse of total expenditure is significant at 5% level for the education expenditure, while the log of the total expenditure is significant at the 1% level for the personal expenditure, at the 5% level for the housing expenditure, and at the 10% level for the durables and education expenditures.

Importantly, the above-mentioned tables of regression results also present information about the  $R^2$ . This statistic varies between 0.05-0.63 in the case of regressions for urban expenditures of households that do not receive remittances, 0.14-0.52 for regressions in the case of urban expenditures of households that receive remittances, 0.11-0.66 for regressions of rural expenditures of households that do not receive remittances, and, finally, 0.16-0.65 for regressions of rural expenditures of households that receive remittances. The interesting aspect about these statistics is that the

level of fit appears to increase at the deeper regional level (the highest level of fit in the case of regressions at the national level is 0.39, compared to 0.66 and 0.65 for rural expenditures).

## 2.6.2 IMPACT OF REMITTANCES AT THE REGIONAL LEVEL (REGIONAL CASE)

The impact of international remittances on regional consumption and investment activities is shown in Table 2.6. The top section of the table shows the findings for marginal spending in urban regions (residing in both urban and rural regions). According to this section of the table, the share of the total urban marginal spending is 67% for households that receive remittances, while the total counterfactual urban share is 75%. Households that do not receive remittances report the highest urban MBS for housing (0.2528) and personal expenses (0.1501). An interesting observation is that households that do not receive remittances have a zero marginal propensity to invest in urban business development activities, while households that receive international remittances have a zero marginal propensity to invest in rural business development activities (bottom section of Table 2.6). In the case of households that receive remittances, the highest urban MBS are also for housing (0.2483) and personal expenditures (0.1485).

Based on the counterfactual MBS, the effect of remittances in urban regions (recall that in this case the urban region refers to the region where spending occurs, which may not necessarily coincide with the region where households originating the spending reside) has a negative sign for almost all categories and is most significant for education (-44%) and housing (-11%). At the same time, remittances have a positive impact on marginal investment in healthcare (+9.65%, although it is not statistically significant) and marginal savings as urban debt payment decreases significantly (-45%). Another positive impact is observed in the case of urban business

Table 2.6: Impact of Remittances on Marginal Spending at the Regional Level

Urban Expenditure Case						
Expenditure Category	(1)		(2)		ATT <sub>21</sub>	% Δ
	No Remit. MBS	No Remit. Counterfactual MBS	Receive Remit. MBS	Receive Remit. MBS		
Personal expenses	0.1501	0.1477	0.1485	0.0007 (0.07)	0.50%	
Durable goods	0.0571	0.0831	0.0827	-0.0004 (-0.04)	-0.48%	
Other services	0.0826	0.0977	0.0829	-0.0147 (-1.51)	-15.08%	
Housing	0.2528	0.2796	0.2483	-0.0313 (-1.92)*	-11.20%	
Education	0.0260	0.0515	0.0287	-0.0228 (-2.24)**	-44.28%	
Healthcare	0.0716	0.0594	0.0651	0.0057 (0.86)	9.65%	
Debt payment	0.0165	0.0269	0.0147	-0.0122 (-1.81)*	-45.31%	
Business	0.0000	0.0001	0.0036	0.0036 (1.63)	6,169.74%	
Development						
Total	0.66	0.75	0.67			

Rural Expenditure Case						
Expenditure Category	(1)		(2)		ATT <sub>21</sub>	% Δ
	No Remit. MBS	No Remit. Counterfactual MBS	Receive Remit. MBS	Receive Remit. MBS		
Personal expenses	0.1262	0.0981	0.1227	0.0246 (3.83)***	25.13%	
Durable goods	0.0081	0.0151	0.0063	-0.0088 (-1.75)	-58.28%	
Other services	0.0237	0.0193	0.0413	0.0220 (3.17)***	114.01%	
Housing	0.1350	0.0863	0.1302	0.0440 (2.08)*	50.93%	
Education	0.0047	0.0050	0.0054	0.0005 (0.15)	9.11%	
Healthcare	0.0409	0.0252	0.0177	-0.0075 (-1.12)	-29.85%	
Debt payment	0.0038	0.0049	0.0019	-0.0030 (-1.98)*	-61.45%	
Business	0.0009	0.0003	0.0000	-0.0003 (-0.43)	-100.00%	
Development						
Total	0.34	0.25	0.33			

two-tailed t statistics in parentheses obtained by robust clustering at the sampling region.

% Δ is obtained by dividing ATT<sub>21</sub> (column 5) by the counterfactual (column 3).

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

development, which increases by 6,170% (this increase however is at the border of being statistically significant).

The bottom section of Table 2.6 shows similar information for the marginal spending in rural regions. When compared with the counterfactual, remittances appear to increase significantly the propensity to spend in almost all rural consumption categories (+25% for personal expenses, +114% for other services, and +51% for housing). Two other negative effects of remittances in rural regions are related to the overall decrease in the human capital categories (approximately +9% for education and -30% for healthcare; although in both cases the effects are not statistically significant)

and the decrease in business development which goes to zero. The only significant positive impact of remittances in rural regions comes in the form of increased savings (debt payment expenditure decreases significantly by 62%). Since the model requires additivity to hold, notice that the total rural share of the marginal spending is 33% for households receiving remittances, while the total counterfactual share is 25%, respectively.<sup>14</sup>

According to these results, it can be seen that urban regions benefit the most. There are increases in marginal savings, business development, and partially in human capital investments, as well as decreases in marginal propensities to consume (especially in the case of housing, which has the biggest share of the total budget). Rural areas, however, see limited benefits in the form of increased savings only (marginal spending in the biggest consumption categories have significant increases, while human capital and business development marginal spending decrease).

As discussed in Chapter 1, the heterogeneity in the effects of remittances across the regions of a country is an important element in this analysis. Figures 2.3 and 2.4 present boxplot graphs similar to those in Figure 1.7 that compare the counterfactual MBS and the MBS of households receiving remittances in the urban and rural cases. As in Chapter 1, these figures present volatilities in the urban and rural ATT's across regions.

---

<sup>14</sup>These results conform perfectly with the additivity condition of the theoretical model ( $\sum_i w_i = 1$ ) and confirm the precision and accuracy of results. Surprisingly, the results reported in Adams and Cuecuecha (2010) seem to have problems either with the model specification or with data management because the sum of the shares in their analysis does not equal unity (Table 8 on page 1636), which raises concerns about the accuracy of results reported in their study. A final observation about Table 2.6 is that the marginal spending propensity is higher for urban regions (0.66 for households that do not receive remittances and 0.68 for those receiving remittances) than for rural regions (0.34 and 0.32, respectively), which fits well in the discussion that rural communities are disadvantaged due to the lack of infrastructure, stores, malls and other institutions providing goods and services.

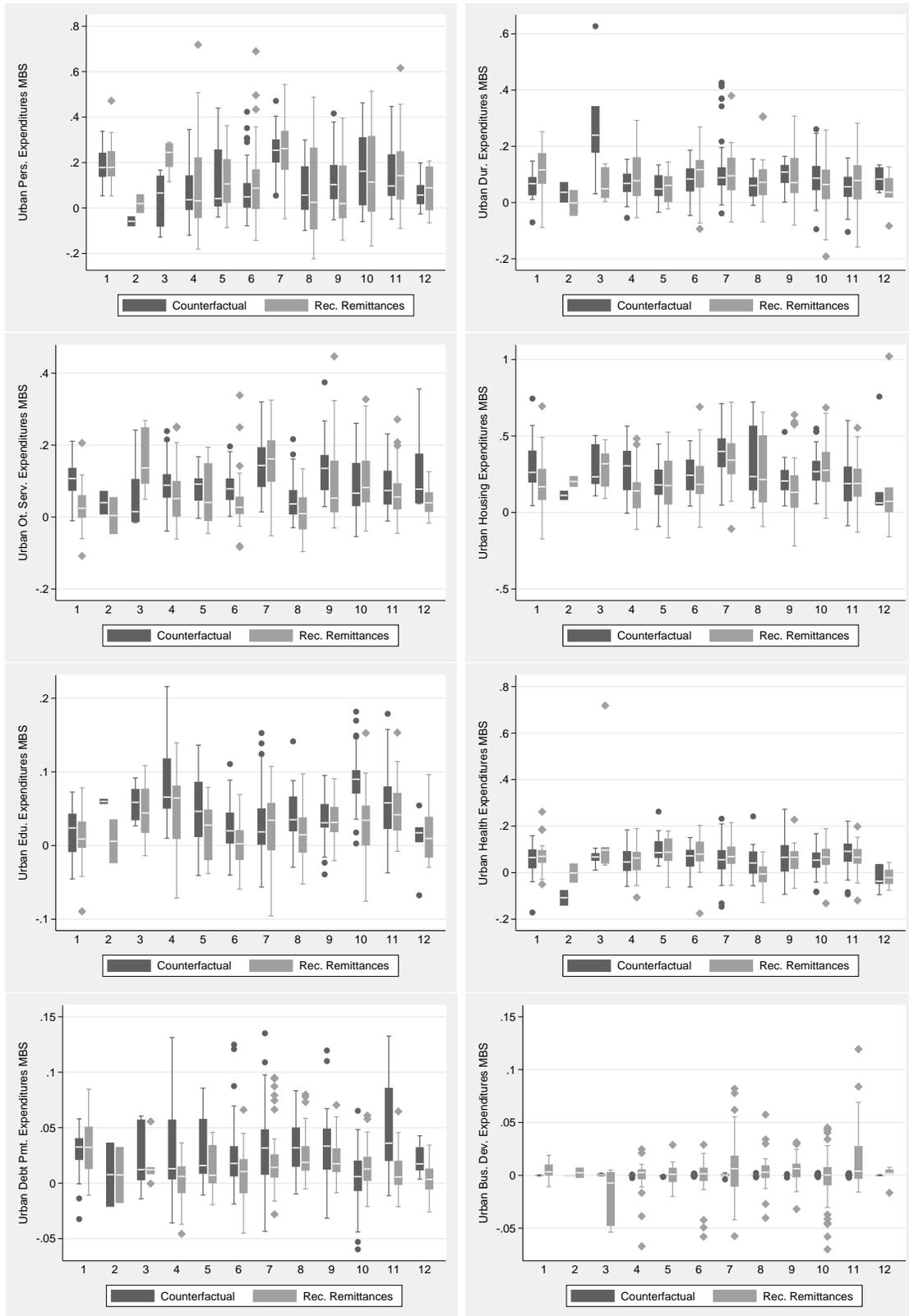


Figure 2.3: Distribution of Urban Marginal Budget Shares Across 12 Regions in Moldova.

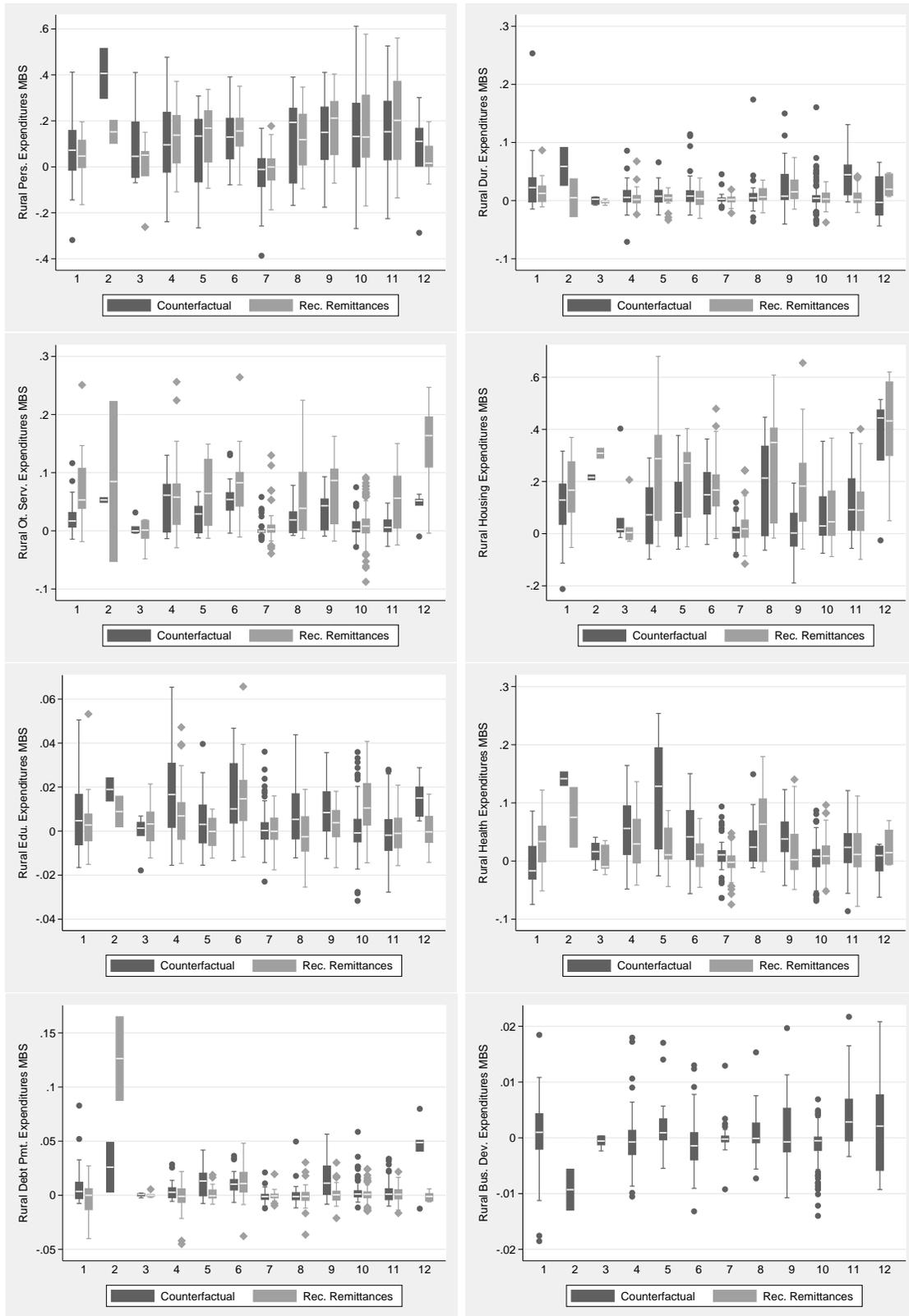


Figure 2.4: Distribution of Rural Marginal Budget Shares Across 12 Regions in Moldova.

### 2.6.3 CROWDING-OUT EFFECTS OF REMITTANCE (REGIONAL DYNAMICS CASE)

The main hypothesis that the current study tests concerns whether international remittances lead to a “Dutch Disease”-like situation, in which a booming sector (services) has a crowding-out effect on the productive factors of the lagging sectors (agriculture and manufacturing). This additional step in the analysis brings more clarity in the final regional economic impact of remittances.<sup>15</sup> Since most of the service providing institutions are concentrated in urban centers, it is expected that there would be a “capital flight” from rural to urban areas due to remittances. In addition, since spending in a region may be originated by both residents and non residents of the respective region, then it is also important to separate the urban and rural spending of urban households from urban and rural spending of rural households. This helps us identify the effect of remittances on the regional preference for marginal spending of urban households separately from the regional preference for marginal spending of rural households (these are the two *Average Treatment Effect<sub>i3</sub>* terms in Figure 2.2).

Tables 2.7 and 2.8 show the breakdown of urban and rural expenditures for urban and rural households, respectively. Table 2.7 shows the effects of remittances on the extra-regional movement of funds originated by urban households. The top section of this table shows the effects on the marginal propensity of *urban* households to spend on *urban* categories. In particular, the effects on consumption categories are mixed: personal expenses, durable goods, and other services appear to decrease, ATT's are -0.1331, -0.0052, and -0.0244, while housing exhibits a strong increase, ATT is 0.0729. The MBS for urban human capital investments by urban households also appear to increase due to remittances, however the impact is significant only for education (ATT is 0.0094, and the t-statistic is 1.89). The other positive effects of remittances

---

<sup>15</sup>See the discussion related to Rose and Stevens (1991), Jones (1995, 1998), and De Haas (2007a,b) in the literature review section (2.3).

Table 2.7: Impact of Remittances on Regional Spending Propensity of Urban Households

Urban Expenditure by Urban Households				
	(1)		(2)	
Expenditure Category	MBS for No Remit.	MBS for No Remit. Counterfactual	MBS for Receive Remit.	ATT <sub>21</sub>
Personal expenses	0.1366	0.1273	-0.0058	-0.1331 (-5.62)***
Durable goods	0.0423	0.0623	0.0571	-0.0052 (-0.79)
Other services	0.0937	0.1050	0.0806	-0.0244 (-3.53)***
Housing	0.2565	0.2776	0.3505	0.0729 (3.76)***
Education	0.0052	0.0194	0.0288	0.0094 (1.89)*
Healthcare	0.0174	0.0144	0.0177	0.0033 (0.83)
Debt payment	0.0416	0.0490	0.0380	-0.0110 (-2.31)**
Business Development	0.0002	0.0002	0.0116	0.0114 (4.74)***
Total	0.59	0.66	0.58	

Rural Expenditure by Urban Households				
	(1)		(2)	
Expenditure Category	MBS for No Remit.	MBS for No Remit. Counterfactual	MBS for Receive Remit.	ATT <sub>21</sub>
Personal expenses	0.1168	0.0751	0.1503	0.0751 (7.23)***
Durable goods	0.0144	0.0143	0.0012	-0.0130 (-5.31)***
Other services	-0.0215	-0.0233	0.0256	0.0489 (6.20)***
Housing	0.1590	0.1466	0.0987	-0.0479 (-4.29)***
Education	0.0046	0.0033	-0.0099	-0.0132 (-4.87)***
Healthcare	0.1171	0.1134	0.0799	-0.0335 (-7.43)***
Debt payment	0.0104	0.0098	0.0757	0.0659 (5.70)***
Business Development	0.0056	0.0056	0.0000	-0.0056 (-5.34)***
Total	0.41	0.34	0.42	

Crowding-out Effect of Remittances on Urban Households				
	(1)		(2)	
Expenditure Category	$\Delta_{MBS}$ for No Remit.	$\Delta_{MBS}$ for No Remit. Counterfactual	$\Delta_{MBS}$ for Receive Remit.	ATT <sub>i3</sub>
Personal expenses	0.0198	0.0521	-0.1561	-0.2082 (-6.25)***
Durable goods	0.0279	0.0481	0.0559	0.0078 (0.97)
Other services	0.1153	0.1283	0.0550	-0.0733 (-5.12)***
Housing	0.0975	0.1310	0.2518	0.1208 (4.09)***
Education	0.0006	0.0161	0.0387	0.0226 (3.26)***
Healthcare	-0.0996	-0.0990	-0.0622	0.0368 (10.16)***
Debt payment	0.0312	0.0392	-0.0378	-0.0769 (-5.79)***
Business Development	-0.0055	-0.0054	0.0116	0.0170 (5.60)***

two-tailed t statistics in parentheses obtained by robust clustering at the sampling region.

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

$\Delta_{MBS} = \text{Urban}_{MBS} - \text{Rural}_{MBS}$ ; " $\Delta_{MBS}$  for No Remit. Counterfactual" and " $\Delta_{MBS}$  for Receive Remit." are the  $\text{Difference}_{i1}$  and  $\text{Difference}_{i2}$  in the L-H-S dashed box of Figure 2.2

are represented by the statistically significant increase in marginal savings as well as business development activities (ATT's are -0.0110 and 0.0114, respectively).

The middle section of Table 2.7 presents the effects of remittances on the marginal propensities of *urban* households to spend on expenditures in *rural* localities. The main observation is that remittances appear to have mixed results on the consumption categories (personal expenses and other services increase significantly; durable goods and housing decrease significantly), while there is an explicit indication of the decrease in human capital categories, savings as well as rural business development.

The bottom section of Table 2.7 is the main analysis section of this table. It shows the difference between the urban and rural marginal spending propensities of urban households (i.e., it shows the extra-regional leakage or the crowding-out effect of remittances on urban households). In other words, the column titled “ $\Delta_{MBS}$  for No Remit. Counterfactual” represents *Difference<sub>i1</sub>* in the L-H-S dashed box of Figure 2.2, while the column titled “ $\Delta_{MBS}$  for Receive Remit.” represents *Difference<sub>i2</sub>* in the L-H-S dashed box of Figure 2.2. Finally, the last column in the bottom section of Table 2.7 represents the *Average Treatment Effect<sub>i3</sub>* in the L-H-S dashed box of Figure 2.2. The same columns in the bottom section of Table 2.8 refer to the R-H-S dashed box of Figure 2.2.

Thus, the bottom section of Table 2.7 shows the effect of remittances on the regional preference of marginal spending for households residing in urban regions. When the ATT figures are positive then funds are accumulating in urban regions (households have a bigger preference for spending the extra unit of income coming from remittances in the urban region, rather than in the rural region) and when the ATT figures are negative funds are accumulating in rural regions (except for debt payment, where the reasoning is inverse). The main conclusion is that the effect of remittances on the accumulation of consumption categories is mixed, while there is clear indication of statistically significant urban accumulation of all productive investment expenditures (human capital, savings, and business development investments). A final observation from Table 2.7 is that remittances expand the urban

households' expenditure locations (total MBS of urban households for urban expenditures decreases from 66%, in the counterfactual case, to 58% in the remittances case).

Table 2.8 breaks down the urban and rural expenditures for *rural* households and then analyzes (in the bottom section) the impact of remittances on the movement of funds originated by these households across the two regions. Just like in Table 2.7, the bottom section of Table 2.8 is the most important part. It shows the crowding-out effect of remittances on rural households (the effect of remittances on the regional preference of marginal spending for households residing in rural regions). Again, a positive ATT means an increasing propensity to spend on that category in urban regions, while a negative ATT represents the opposite (increasing marginal propensity to spend on the particular categories in rural areas).

The signs of the ATT in the bottom section of Table 2.8 are exactly the same as the signs of the ATT in the bottom section of Table 2.7, which means that remittances have the same crowding-out effect on rural households as on urban households. The results are mixed for the consumption categories (it appears that remittances lead to a significant accumulation of personal expenditures and other services in rural areas, while in the case of durable goods and housing there seems to be a preference for urban centers). On the other hand, the results show a clear and statistically significant increase in the marginal propensity of rural households receiving remittances to spend on urban human capital categories, savings as well as urban business development. A final observation in Table 2.8 is that remittances seem to reduce the diversity of geographic areas where spending occurs for rural households (total urban MBS of rural households decreases from 42% in the counterfactual case to 33% in the remittance case).

Looking at the combined results in the bottom two sections of Tables 2.7 and 2.8, one can see that remittances lead to an unambiguous accumulation of produc-

Table 2.8: Impact of Remittances on Regional Spending Propensity of Rural Households

Urban Expenditure by Rural Households				
	(1)	(2)		
Expenditure Category	MBS for No Remit.	MBS for No Remit. Counterfactual	MBS for Receive Remit.	ATT <sub>21</sub>
Personal expenses	0.0242	0.0270	-0.0875	-0.1145 (-4.29)***
Durable goods	0.0309	0.0508	0.0475	-0.0033 (-0.47)
Other services	0.0559	0.0698	0.0218	-0.0480 (-5.33)***
Housing	0.1656	0.2180	0.2459	0.0279 (1.35)
Education	0.0022	0.0104	0.0216	0.0112 (1.30)
Healthcare	0.0205	0.0126	0.0362	0.0236 (3.91)***
Debt payment	0.0314	0.0361	0.0335	-0.0027 (-1.15)
Business Development	0.0002	0.0001	0.0096	0.0095 (4.32)***
Total	0.33	0.42	0.33	

Rural Expenditure by Rural Households				
	(1)	(2)		
Expenditure Category	MBS for No Remit.	MBS for No Remit. Counterfactual	MBS for Receive Remit.	ATT <sub>21</sub>
Personal expenses	0.2236	0.1897	0.2382	0.0485 (5.12)***
Durable goods	0.0193	0.0248	0.0077	-0.0171 (-3.85)***
Other services	0.0074	0.0030	0.0636	0.0606 (7.56)***
Housing	0.2600	0.2138	0.2142	0.0004 (0.02)
Education	0.0088	0.0102	-0.0029	-0.0131 (-3.24)***
Healthcare	0.1331	0.1162	0.0880	-0.0282 (-3.54)***
Debt payment	0.0117	0.0127	0.0628	0.0500 (3.94)***
Business Development	0.0052	0.0049	0.0000	-0.0049 (-4.38)***
Total	0.67	0.58	0.67	

Crowding-out Effect of Remittances on Rural Households				
	(1)	(2)		
Expenditure Category	$\Delta_{MBS}$ for No Remit.	$\Delta_{MBS}$ for No Remit. Counterfactual	$\Delta_{MBS}$ for Receive Remit.	ATT <sub>i3</sub>
Personal expenses	-0.1994	-0.1627	-0.3257	-0.1630 (-4.92)***
Durable goods	0.0117	0.0259	0.0398	0.0138 (1.86)*
Other services	0.0485	0.0669	-0.0418	-0.1086 (-7.21)***
Housing	-0.0944	0.0041	0.0316	0.0275 (0.63)
Education	-0.0066	0.0002	0.0245	0.0243 (1.94)*
Healthcare	-0.1126	-0.1036	-0.0518	0.0518 (4.07)***
Debt payment	0.0196	0.0234	-0.0293	-0.0527 (-4.03)***
Business Development	-0.0050	-0.0047	0.0096	0.0143 (4.67)***

two-tailed t statistics in parentheses obtained by robust clustering at the sampling region.

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

$\Delta_{MBS}$  = Urban<sub>MBS</sub> - Rural<sub>MBS</sub>; " $\Delta_{MBS}$  for No Remit. Counterfactual" and " $\Delta_{MBS}$  for Receive Remit." are the  $Difference_{i1}$  and  $Difference_{i2}$  in the R-H-S dashed box of Figure 2.2

tive investments in the urban centers. There is also unambiguous accumulation of funds intended for durable goods and housing expenditures in urban centers, while personal expenditures and other services expenditures accumulate unambiguously in

rural (peripheral) regions. Such an accumulation of marginal expenditures (especially investment expenditures) in particular urban regions could have detrimental effects on the economic development of the rural economy (especially in the case of developing countries that rely mostly on agricultural activities) because it can lead to an unsustainable ballooning of the consumption-oriented service sector accompanied by a deterioration of the productive sectors. This may thus explain how remittances can potentially lead to the destabilization of the economic sectors through their effects on the crowding of valuable productive factors out of rural regions and into the cities (see Figure 1.1).

For example, the accumulation of marginal spending by urban and rural households on education in urban regions may lead to a local brain drain from rural to urban regions. Remittances may motivate rural households to spend more on higher quality education in urban centers and as a result these households may have fewer incentives to bring the acquired skills back into the village due to the lack of jobs requiring such skills. In addition, the brain drain may not be entirely efficient because remittances affect the choice of specialization: some members from rural households may be better prepared (have better abilities) and suited for specialization in rural economy professions (agricultural or some type of industrial technologies) that they could obtain at local professional schools or technical colleges that also have lower tuition costs; instead remittances increase their budget constraints and allow them to enter universities with higher tuition costs and where they specialize in professions that may provide higher future returns (for example, higher paying jobs in the financial services, law, engineering, etc.)<sup>16</sup> In such an example, both urban and rural regions can lose: rural regions lose potential human capital that could be used effectively to modernize the agricultural infrastructure and technologies, while urban economies

---

<sup>16</sup> Faggian and McCann (2010) discuss along similar lines the effects of local brain drain of tertiary educated individuals on the development potential of central and peripheral regions of the country. This particular situation is analyzed in Chapter 3 of the dissertation.

gain mediocre professionals (moderately skilled bankers, lawyers, engineers, doctors, etc.) that may crowd out higher skilled professionals by forcing them to emigrate.<sup>17</sup>

Similarly, the agglomeration of spending on healthcare in urban regions may lead to a decrease in the quality of medical staff and equipment at rural hospitals and clinics, which may further accelerate the closure of many rural healthcare institutions. Or if remittances accelerate the accumulation of marginal savings in urban regions this could lead to destabilizations in the activity of financial institutions across the country and availability of credit for future rural business development.<sup>18</sup>

## 2.7 CONCLUSION

The fundamental contribution of this essay is to provide an alternative approach to the analysis of the regional impact of remittances, taking into account the spatial characteristics of spending. Rose and Stevens (1991) emphasize the importance of the transboundary income and expenditure flows, which may alter the estimates for

---

<sup>17</sup>Heyneman et al. (2008) strongly supports this observation; it shows that Moldova has one of the most corrupt education systems in Europe. On page 4, this study reports that approximately 40% of Moldovan students have indicated using some illegal method of gaining admission to the university compared to the 20% level in other Eastern European countries. This study also indicates that Moldovan students would have a higher propensity to pay bribes than students in other comparable Eastern European countries. Similar observations are made in Valentino (2007). Thus, it is highly possible that a share of the individuals from rural regions with lower abilities due to the lower quality education institutions in rural regions use the income from remittances to gain admission at prestigious universities located in urban areas through illegal methods as well as bribe professors to get good grades on exams.

<sup>18</sup>Kahn et al. (2003) explain that smaller community banks have an important role in rural economies because they are closer to their customers and are more open to providing credit based on a “personal knowledge of customers’ creditworthiness and a keen understanding of business conditions in the communities they serve;” while the few larger banks are usually further away from their customers and employ sophisticated systems to evaluate credit applications that may discriminate against smaller rural businesses. Importantly, the financial system of Moldova is highly unstable as it is and has been recently at the center of an embezzlement scandal that had a major impact on the economy of the country and the financial relationships with external partners (Higgins (2015)). The high volume of remittances (up to \$2 billion per year, based on official data alone) has led to a high dependence of the Moldovan banking sector on the liquidity from this major income source (International Monetary Fund (2008)); as a result the accumulation of savings in only a few large banks that are also prone to instability due to the high levels of corruption may lead to major destabilizations in the financial system of the country.

the induced effects of income sources. In addition, De Haas (2007a,b) call for more analyses regarding the impact of remittances on the “extra-regional leakage” effect between central (urban) and peripheral (rural) regions within countries.

Thus, this paper provides evidence related to the effect of remittances on extra-regional movement and concentration of funds originated by urban and rural households. Remittances lead to an unambiguous accumulation of productive investments in the form of human capital (education and healthcare), savings, and business development specifically in urban centers.<sup>19</sup> This finding is true for both urban as well as rural households. Accordingly, this study suggests that remittances engender a crowding-out of the productive investments in rural communities, which benefits urban centers.

To the best of my knowledge, no other study analyzes the effect of remittances on the concentration of expenditures in particular regions, using a rigorous consumer theory structure as well as proper econometric techniques. This study is the first to offer an effective framework for determining whether remittances have a crowding-out effect on productive activity across central and peripheral regions within a country. In addition, the current analysis departs from earlier studies on remittances as it carries out the analysis in the regions where the spending actually takes place, rather than in the communities where the survey was carried out.

The methodology used in this paper could be applied in other regional studies that analyze the impact of exogenous income transfers (for example, foreign aid or governmental subsidies for the agricultural, healthcare or education sectors) on the regional concentration of expenditures. This study could also be extended to control

---

<sup>19</sup>The positive effect of remittances in urban regions may be potentially further enhanced by the urban concentration of marginal spending on housing, considered by some economists (Adams and Cuecuecha (2010)) as investments in physical capital. These economists believe that investment in housing can lead to income and employment multiplier effects (especially in the construction sector).

in a more consistent way for the spatial autocorrelation bias if more large-scale spatial spending data becomes available.

Also, the main findings have potential implications for regional economic policy in the face of globalization. A series of recent studies try to link remittances, among other factors shaped by globalization, with particular policy interventions. These studies offer two apparently opposing views on the most effective ways to implement policy interventions: space-neutral approach (World Bank (2009)) or place-based approach (Barca (2009)). The space-neutral approach recognizes the agglomeration effects of large cities, and claims that regional economic development across central and peripheral regions will be unbalanced. The World Bank (2009) study believes that developing countries will follow the same growth paths of the developed countries (Barca et al. (2012)). On the other hand, the place-based approach emphasizes the importance of space when deciding upon the path of interventions. This approach advocates that local social, cultural, and institutional characteristics will have an important effect on the effectiveness of policy interventions and ignoring them could actually undermine the original scope of the policy. Barca et al. (2012) summarize the place-based approach by characterizing it as a series of integrated regional policies that are capable of coordinating infrastructure development projects with the engagement of locally targeted human capital, technology, and business development in order to promote local economic development as well as aggregate growth through spillovers.

For many developing countries, ignoring the effects of remittances could have serious implications on the effectiveness of policy interventions. As mentioned in section (1.2), Moldova receives between one and two billion U.S. dollars in international remittances on an annual basis through official channels alone, while the official foreign assistance funding, primarily from the EU, for infrastructure development projects and institutional reforms is approximately €750 million for the entire period 2014-

2020 (European Commission (2014)). In turn, the policy interventions orchestrated by these international stakeholders in Moldova may actually be misguided without a proper understanding of how international remittances change regional spending dynamics and the distribution of capital (human and physical) across urban and rural economies.

Since the current intervention policies sponsored by the EU and the major international organizations in Moldova have a more space-neutral approach with the aim of achieving “economic convergence” (European Commission (2014)), the current study raises important questions regarding the efficacy of these policies. Modernizing the rural infrastructure (irrigation systems, energy, and environmental sustainability), as well as decentralization of public administration institutions, are less effective when remittances crowd productive factors out of the rural economy and into urban centers.

In the long-term, such an accumulation of productive investments in a limited number of urban locations may have damaging effects, especially for the rural economy. There are signs of this happening in Moldova, where national authorities report an accelerating disappearance of villages as people emigrate or move to urban regions (Dabija (2011), Imedia.md (2011)). Thus, future researchers should seriously consider the impact of international remittances as a major force in globalization that is realigning and shaping regional development.

# CHAPTER 3

## THE REGIONAL EFFECTS OF INTERNATIONAL MIGRATION ON DOMESTIC ACCUMULATION OF HUMAN CAPITAL

### 3.1 INTRODUCTION

International migration is a major factor that influences economic development and growth in both source and receiving countries. According to a World Bank migration brief (World Bank (2015a)), the total stock of migrants was approximately 247 million people in 2013 and is expected to surpass 250 million in 2015. Interestingly, prior to the early 2000's, most studies analyzed the impact of migration through the prism of neoclassical theories that focused on the issue of factor price equalization, ignoring the implications of international remittances<sup>1</sup> (De Haas (2007a)). However, recent studies link international migration with remittances and analyze the implications that both of these factors have on economic development and growth in source countries. World Bank estimates that the total level of worldwide remittances was approximately \$590 billion in 2015 and will probably reach the \$610 billion figure in 2016 (World Bank (2015b)). Out of this total, remittances sent to developing countries account for approximately 75%. Importantly, international remittances sent to developing countries represent in most cases the biggest source of international money flows, surpassing official development assistance as well as foreign direct investment.

---

<sup>1</sup>The portion of wealth earned by migrants that is sent back to their families or friends at home.

Most modern studies on international migration and/or remittances focus on understanding how these factors influence the development of human capital, which many economists believe to be relevant to long-term economic development. These studies are generally split in two major areas: educational attainment (school enrollment) and brain drain (or knowledge-based migration). Thus, since international migration could either improve human capital development by increasing the educational attainment rates of the left-behind household members (Cox Edwards and Ureta (2003)) or worsen it by leading to further brain drain<sup>2</sup>, the final impact of international migration and/or remittances on long-term economic development stemming from human capital formation is still ambiguous. In addition, the potential circular relationship between educational attainment and brain drain may further complicate the relationship between remittances and brain drain: since highly skilled and educated household members earn higher returns in foreign destination labor markets then this may cause more households to invest in higher education in source countries with the purpose of subsequent emigration (Adams (2003); Beine et al. (2008)).

Before proceeding with the analysis, it is important to clarify the meaning of human capital. According to Faggian and McCann (2010), the traditional concern of earlier literature was generally on enrollment in primary and/or secondary education institutions. The 2010 study, however, mentions that the definition of human capital has evolved to focus on tertiary education as a result of the technological transformations due to the globalization process that started in the mid 1980's. Thus, Faggian and McCann (2010) explain that the skills acquired in secondary education institutions are not competitive in the current global economy anymore, with more value being put on skills coming from tertiary education. Accordingly, while earlier studies

---

<sup>2</sup>Social networks created between first waves of migrants and their relatives and friends that stay behind may lessen emigration costs and provide more information that facilitates the decision of subsequent household members to migrate (McKenzie (2006); Mora and Taylor (2006); De Haas (2007a); Beine et al. (2008); Dabalen and Miluka (2010)).

related to international migration/remittances and school enrollment provide valuable insights in the effects of international migration on schooling in general, they may actually overstate the true impact on economic development in the source countries.

One important aspect of the relationship between international migration and human capital development that seems to be ignored entirely, but is captured by the current study, is the impact of international migration on the regional development and accumulation of human capital in the source countries. In this chapter, I analyze the interrelationships between international migration, on one hand, and the local migration decision, on the other hand, which manifests itself in the regional job choice of college graduates (tertiary educated individuals). The question of whether international migration (and remittances, implicitly) affect the regional choice of employment of left-behind household members is important. While rural regions generate a significant portion of international migrants, these communities might not see any significant benefits from international migration if income from international remittances sent home to rural regions is spent (in part) on higher quality education in urban centers and subsequently college graduates continue to concentrate in urban areas, given better job prospects, higher wages, amenities and other beneficial characteristics of these localities. Thus, while most studies find a positive relationship between migration/remittances and human capital development at the national level, none of them try to identify whether this finding holds in all the regions of the country. This important question, however, may have crucial ramifications on balanced economic growth of developing countries.

Previous studies ignore that poor developing countries depend heavily on labor-intensive activities. Human capital that results from remittances may not be distributed regionally in an efficient way. A part of the human capital that forms due to remittances may be targeted specifically for activities in urban regions and as a result the rural communities may suffer from brain drain. Furthermore, some members of

remittance-receiving households may have better abilities for obtaining a specialization in some rural-economy professions (for example, jobs in agriculture or industries located in rural economies) that usually have lower wages and that could be obtained from local low-cost professional schools or technical colleges. However, international remittances may provide these individuals an easier access to higher ranked universities in big cities that are also more expensive and offer specializations with higher wages/salaries. In this scenario, both rural and urban regions may suffer: rural communities may see an exodus of specialized human capital that would be highly needed to increase their economic competitiveness and productivity, while urban centers may see an influx of mediocre professionals that can potentially crowd higher skilled professionals and, eventually, force them to emigrate.

Surprisingly, few papers investigate the mobility of human capital between regions (Faggian and McCann (2010)). One paper that addresses these issues tangentially is Mora and Taylor (2006). This study looks at the impact of various individual-specific, household-specific, and community-specific factors on the likelihood of Mexican rural household members to migrate locally or internationally (United States) as well as to get employed in farm or non-farm activities. Mora and Taylor (2006), however, do not investigate the linkages between international migration and local migration decisions of tertiary educated people.

The main findings of Chapter 3 show that, in general, exposure to international migration reduces significantly the preference for urban jobs of tertiary educated people coming from rural communities. However, after a more rigorous control for regional heterogeneity, one can observe that exposure to international migration of tertiary educated individuals from rural communities located *outside the primate city region* increases significantly their likelihood of choosing urban jobs. Moreover, although the international migration variable does not present an endogeneity bias in this data set, nonetheless I run a recently-introduced model that controls for binary

endogenous variables within discrete choice models. The results of the model controlling for endogeneity of international migration are robust to the results of the main probit model when controlling for regional heterogeneity, which confirms the main hypothesis that international migration may lead to local brain drain.

Finally, this study extends the analysis to investigate a set of determinants affecting the utility of choosing specific urban choices within a set of 40 urban alternatives in Moldova. This analysis focuses on the impact of these determinants on the probability of choosing particularly the four major urban choices in Moldova (cities of Chişinău, Bălţi, Cahul, and Comrat), each compared with the other 39 alternatives. The main finding of the analysis is that exposure to international migration reduces, on average, the probability of choosing an urban alternative compared to the other urban choices. When looking at the four major urban choices in particular, the negative impact of exposure to international migration on the likelihood to choose the respective alternative is strongest in the case of Chişinău (the primate city).

Chapter 2 of this dissertation links the accumulation of spending on human capital in urban regions, with potentially negative policy implications. The current study reinforces these results. For example, Barca et al. (2012) describe place-based policy interventions that encompass coordination of infrastructure investments with locally targeted schooling, business development, and technology advancement in order to improve local economic development as well as aggregate growth. Thus, due to the brain drain and potential misalignment of professional specialization with actual abilities, such policies may miss their targets. This is also true of the space-neutral type of policies (which are currently promoted by the EU through their European Neighbourhood Instrument (ENI)).

The remainder of this chapter is organized in six sections. Section (3.2) provides a brief overview of the human capital potential of the Republic of Moldova. Section (3.3) discusses the main studies in this literature. Section (3.4) presents the empirical

approach, while section (3.5) describes the data used in the analysis. Section (3.6) presents the main results and section (3.7) provides the main conclusions of the study.

## 3.2 HUMAN CAPITAL POTENTIAL OF THE REPUBLIC OF MOLDOVA

According to the Ministry of Education of Moldova, in 2015 there were 28 tertiary education institutions (universities) in the country. Seventeen universities are public and eleven are private. All of the universities are concentrated in five cities: Chişinău (23 universities), Bălţi (two universities), Cahul (one university), Comrat (one university), and Taraclia (one university).

Based on a research of Moldovan databases of all types of educational institutions (universities, colleges, professional schools, lyceums/high schools, gymnasiums, art schools, sports schools, elementary schools/kindergartens, and public libraries), I have graphed the distribution of the total number of educational institutions in the main cities of Moldova (Figure 3.1).<sup>3</sup> The cities with the most number of educational institutions are: Chişinău (372), Bălţi (98), Cahul (41), Soroca (31), Orhei (30), Ungheni (30), Comrat (25), Ceadâr-Lunga (24), and Căuşeni (20). Notice that there are almost four times as many educational institutions in Chişinău as in the second largest city, Bălţi, while in the rest of the country most cities have less than a tenth of the number of institutions in the capital.

Interestingly, Morcotîlo (2014) presents a short study of the regional economic development indicators in Moldova that have similar patterns described above. According to this study, the capital city of Chişinău has a disproportionate concentration of services and light-food processing industry institutions, while the rest of the country is heavily agricultural. In addition, more than 45% of the country's GDP is generated by the economic activity in Chişinău (for comparison, the municipality of

---

<sup>3</sup>Cities with more than 20 institutions are colored in maroon color.

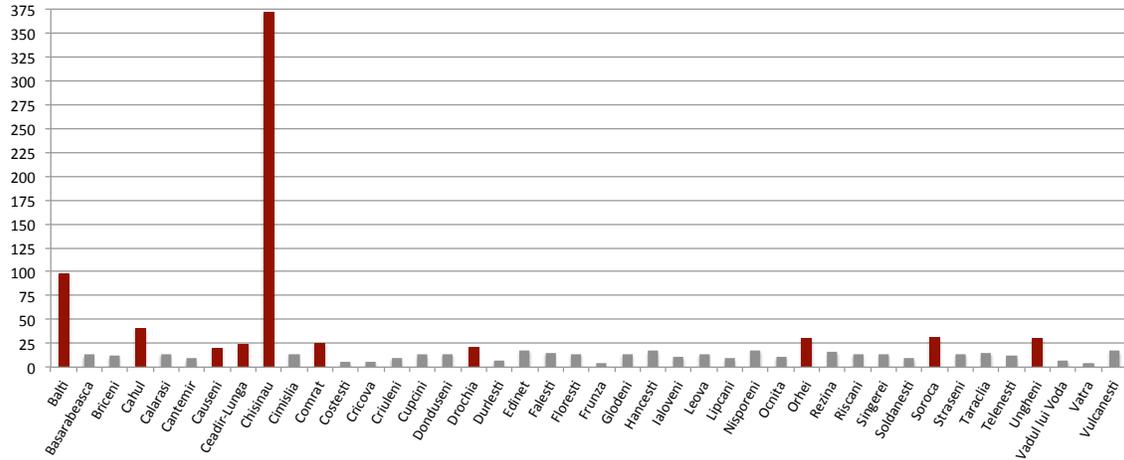


Figure 3.1: Number of Educational Institutions Across Cities in Moldova.  
 (Source: Author Estimations from Various Moldovan Databases in 2015)

Bălţi concentrates only approximately 6%). It follows that based on the population figures, the number and type of institutions, as well as the concentration of economic activity, Chişinău is an obvious example of a *primate city* (Jefferson (1939)) that accumulates a large portion of the productive factors of the country. This primate city concept will become important in the analysis model specification and in the correct interpretation of final results of this study.

### 3.3 LITERATURE REVIEW

Massey et al. (1993) propose an overview of the international migration theory starting with the neoclassical macroeconomic theory studies of Lewis (1954), Ranis and Fei (1961), Harris and Todaro (1970), and Todaro (1976). This stream of research looks at the flow of migration in terms of the differential in wages across source and destination countries. Thus the main effects of international migration observed in this literature are related to the equalization in factor prices in the two types of countries. On the other hand, Massey et al. (1993) observe that the same set of studies assume that human capital flows in the opposite direction because migration source

countries are human capital scarce and they present higher returns for the high-skilled workers that move from destination countries to source countries. This second observation seems to be contradicted by the later studies that link international migration with acceleration of brain drain (the emigration of high skilled-workers out of source countries).

According to Reichert (1981), most of the extant literature examined the impact of international migration on destination (developed) countries. This study was among the first to analyze the consequences of international migration in source countries (particularly in Mexican rural communities). In addition, this is among the first papers that recognize the negative effects of international migration on the source communities. The findings show that the money earned through out-migration helped finance major infrastructure projects that benefited all members of the community. Additionally, the author finds that the income earned in the U.S. improved the standard of living of migrants. Overall, the locality witnessed high economic growth due to this out-migration. However, probably the most important observation is that international migration did not lead to investment in productive activities that would foster further sustainable development. Thus, the researcher concludes that the process of migration “tends to perpetuate itself” and becomes a “migrant syndrome,” which leads to more people choosing to migrate and forcing the community to become dependent on this process.

Generally, during the 1980’s a new theory related to labor migration started to emerge. Taylor et al. (1996) review the “New Economics of Labor Migration” theory that was formalized in Stark (1978, 1980), Lucas and Stark (1985), Katz and Stark (1986), and Stark and Lucas (1988). These are also among the first papers (along with Reichert (1981)) that introduce in the discussion the element of remittances and selectivity of migrant households. One of the main contributions of this literature is that the migration decision is not made at the individual level, but rather at the

household level and is based on credit market constraints as well as risk exposure levels. Taylor et al. (1996) explain this finding by pointing out that international migration is viewed as an intermediating process that provides rural households with better access to capital and reduces risk by diversifying their income sources. Thus, contrary to the neoclassical theory, governments that want to regulate international migration should prioritize their policies related to credit and risk market failures, rather than dealing with the low equilibrium wage.

As mentioned in the introduction section, the modern literature on international migration and human capital development is generally divided in two major camps: one looks at the impact of international migration on school enrollment (educational attainment) and the second one studies the relationship between international migration and brain drain. Representative papers in the first group include: Cox Edwards and Ureta (2003), Bansak and Chezum (2009), Dabalen and Miluka (2010), Mastrotrillo and Fagiolo (2014). Specifically, Cox Edwards and Ureta (2003) employ a Cox hazard model that estimates the effect of remittances on the hazard of dropping out of school in El Salvador. Interestingly, this model compares the effects of remittances in urban and rural areas and finds that remittances reduce the hazard of leaving school in rural areas, while in urban areas this factor has no effect. Bansak and Chezum (2009) present a simple model that estimates the effect of remittances as well as absenteeism on the likelihood of being enrolled in school in Nepal. This study tries to estimate the effect of remittances on younger (ages 5 to 10) males and females as well as older (ages 11 to 16) males and females. The main results show that remittances affect more positively young males than females, while young females may suffer less from absenteeism (in terms of offsetting the migrant member's market and non-market work).

Dabalen and Miluka (2010) and Mastrotrillo and Fagiolo (2014) use similar data from Albania; the 2010 study employs data from a 2005 survey, while the 2014 study

uses the same survey data from 2008 and 2012 in Albania. These papers employ binomial regression models that correct for the endogeneity of migration to study the effect of international migration on school enrollment. The 2010 study finds overall negative effects of migration on school enrollment in Albania; the negative effects are significant for households in rural areas and for females. The 2014 study is essentially a continuation of the 2010 study based on new survey data from 2008 and 2012. This later paper also employs a new technique of controlling for endogeneity of discrete variables in binomial models with the use of the special regressor approach (Lewbel et al. (2012)). The results in Mastroiello and Fagiolo (2014) confirm the main results in Dabalén and Miluka (2010): migration has significant negative effects on school enrollment for females in rural regions.

Recent papers from the second group of studies related to international migration and brain drain include Adams (2003) and Beine et al. (2008). Adams (2003) uses a data set of 24 countries to study the relationship between international migration and brain drain. While the analysis techniques do not employ any rigorous econometric methods and uses rough estimates of migration from statistics published by the United States and the OECD, it does provide an interesting perspective on how international migration engenders brain drain (the emigration of the highly skilled adult population that holds university degrees). The paper has several interesting findings. Firstly, emigration of the high skilled workers is associated mainly with legal migration. Secondly, and most importantly, exposure to international migration does not seem to pull a high share of the tertiary-educated population out of the source countries (less than 10% of the tertiary educated people in 22 out of 33 source countries have migrated to either the United States or the OECD). Finally, the paper also finds that the countries where international migration has the highest toll on brain drain are a few Latin American countries that are closest in distance to the United States.

Beine et al. (2008) uses a slightly different approach to the study of migration and brain drain. The paper looks at the relationship between the emigration of highly skilled workers (brain drain) and human capital formation (brain gain) in the source countries; in other words, this study estimates whether brain drain causes more people in the source country to invest in education (“or people to invest more [in education],” as Docquier and Rapoport (2012, page 698) put it), which may lead to an overall positive impact of brain drain on the formation of human capital in source countries. As in other recent papers, the analysis of this study recognizes the importance of controlling for the endogeneity of migration and accomplishes this through a two-stage estimation process with instrumental variables. The main result of this research is that it identifies winners and losers from international migration of the highly skilled workers (brain drain). Specifically, in countries that have relatively low emigration rates and low levels of human capital (China, India, Brazil) there is a positive net effect of emigration of the highly skilled workers. On the other hand, countries with high levels of the migration rate among highly skilled workers (more than 20%) and with a high share of human capital may experience negative effects as a result of brain drain. In relative terms, the losses of the losing countries are much higher than the benefits of the winning ones; however, in absolute terms (converting the benefits and losses into actual numbers for specific developing countries), there is an overall positive effect due to brain drain.

From a regional science perspective, probably one of the most prominent studies that explain migration of the highly skilled workers is Jefferson (1939). This paper focuses on the formation of primate cities as a result of national unity and migration of the brightest and most entrepreneurial people out of the provinces into the primate cities of their countries.<sup>4</sup> Interestingly, this study mentions the city of Chişinău when

---

<sup>4</sup>According to the author, in most cases the primate cities correspond with the capitals of the countries.

Basarabia<sup>5</sup> was still part of Romania (1937) as the second largest city after Bucharest. A fundamental observation that Jefferson (1939) makes is that the growth of primate cities depends in an essential way on their proximity to other more developed regions. When more advanced regions surround the country then the population that may otherwise migrate to the capital of the respective country, could instead choose the more lucrative outside regions. This observation is still valid and, as a result, the purpose of the current study is to analyze the impact that international migration has on local migration and accumulation of human capital, controlling for the primate city region.

Faggian and McCann (2010) and Arzaghi and Rupasingha (2013) are several recent regional studies that analyze human capital, migration, and regional economic development. Faggian and McCann (2010) links migration decisions with human capital both at the national (non-spatial) as well as at the regional levels. This paper presents a comprehensive review of the literature on migration and human capital formation starting with the neoclassical studies of the 1950's and 1960's and ending with the new migration theory of the 1980's and 1990's. The authors make several fundamental observations that tie very well in the current study. Firstly, the authors recognize that the effects of human capital on regional economic development depend in a significant way on the potential counteracting effects of labor force mobility. In this sense, Faggian and McCann (2010, page 137) observe that "The migration of individuals with high "embodied human capital" introduces a complication in the human capital - regional development relationship because the increase in human capital due to education can easily leak out of an area even when produced there, and therefore not generate the forecasted 'multiplier effects'." It follows that future studies related to human capital and regional development must take into account the potential increased mobility of tertiary educated workers that seek higher returns

---

<sup>5</sup>The greater region that also included the present-day Republic of Moldova.

(better-paying jobs). Faggian and McCann (2010, page 145) (as well as Faggian and McCann (2009)) make another pertinent observation related to big cities that have a scale effect by attracting younger and higher educated workers and thus draining the human capital resources from peripheral regions: "... Dixon (2003) shows that London is a net recipient not only of young migrants, but also of migrants at higher education levels. This escalator aspect of the London economy has had repercussions for other parts of the country. The regions immediately adjacent to London have benefited from human capital spillovers, whereas more geographically peripheral regions are increasingly suffering net outflows of human capital." This observation is important because a similar result related to the primate city region in Moldova is detected in the current study as well.

Arzaghi and Rupasingha (2013) employs a discrete choice model based on random utility maximization, similar to the current study, to evaluate how various factors (distance, income correlation between origin and destination locations, per capita income, unemployment rate, industrial dissimilarity, and amenity index) influence the choice of the migration destination. As the authors recognize, this research builds upon some of the theoretical underpinnings of the new economics of labor migration theory and introduces econometric techniques to evaluate the determinants of the migration choice. The main findings of this paper are in line with the findings in earlier literature that links the decisions to migrate with the desire to diversify household risks and income sources. The current study builds on the modeling techniques and theoretical assumptions from Arzaghi and Rupasingha (2013) in the second part of its analysis.

## 3.4 EMPIRICAL APPROACH

### 3.4.1 BACKGROUND

As explained in the preceding sections, the primary purpose of the current study is to analyze the relationship between international migration on one side and the local migration of the highly skilled workers (household members with at least a university degree) on the other side. Although there are already studies that look at the determinants that influence local migration choices of the highly skilled workers (Faggian and McCann (2010)), the current study takes a different path. It is motivated by the increasing literature that finds positive effects of international remittances, the consequence of international migration, on the economic growth and development of source (mainly developing) countries through the formation of human capital (Cox Edwards and Ureta (2003); Adams (2005); Taylor and Mora (2006); Bansak and Chezum (2009); Adams and Cuecuecha (2010)).

While this formation of human capital as a result of international migration and remittances may be a valid result at the national level, Chapter 2 of this dissertation shows that international remittances may actually lead to the drain of productive investments (including human capital categories of education and healthcare) from rural areas and into urban centers. Thus, since the poor, rural communities are the primary regions that drive international migration in many developing countries (Taylor et al. (1996); De Haas (2007a)) and remittances change the regional spending preferences of households residing in these regions, then it becomes essential to understand whether the investments by rural households in human capital acquired at colleges and universities that are (usually) located in urban areas materialize in higher economic development potential for the original rural regions.

In other words, this important crowding out observation leads to the obvious question: if international migration/remittances increase(s) the propensity to spend

on education in urban areas at the expense of rural areas then do the college graduates with rural roots apply their acquired skills in their home communities or, instead, they decide to stay in the urban centers that have better job prospects, higher wages, better amenities, and more opportunities for career development? If the former is observed, then international migration and remittances may lead to a faster convergence of the rural and urban regions due to a balanced accumulation of human capital (De Haas (2007a)). However, if the latter is observed, then international migration may distort regional economic development and lead to negative repercussions for the peripheral (rural) regions as human capital agglomerates predominantly in urban areas. This in turn leads to loss of productivity and competitiveness of the rural economy.

In addition, as Chapter 2 finds, there may be grounds for negative effects in urban regions as a result of this human capital accumulation because remittances affect the choice of specialization. Some members from rural households may be better prepared and suited (may have higher ability) for specialization in rural economy professions (agricultural or some type of industrial technologies associated with rural economic activities) offered at professional schools or technical colleges. Instead, remittances increase their budget constraints and allow them to enter universities where they learn skills required for professions that may provide higher future returns (for example, jobs in financial services, law, etc.) In such an example, both urban and rural regions could lose. Rural regions lose potential human capital that could be used effectively to increase productivity by modernizing the agricultural infrastructure and technologies employed in these regions, while urban economies may gain mediocre professionals

(moderately or even questionably<sup>6</sup> skilled bankers, lawyers, engineers, doctors, etc.) that may actually crowd out the truly higher-skilled professionals by forcing them to emigrate.<sup>7</sup>

### 3.4.2 MODEL SETUP

One way to model the relationship between the choice of region (urban or rural) of highly skilled workers' first job and the exposure to international migration in the households where these members originate is through the use of a binary choice model (Greene (2008)). In such a model, the highly skilled household member chooses employment after graduation in one of two possible locations: an urban job location ( $y = 1$ ) or a rural job location ( $y = 0$ ). If the urban outcome has probability  $p$  then the rural outcome must have probability  $1 - p$ , which means that the probability mass function of the outcome is  $p^y(1 - p)^{1-y}$ , where  $E(y) = p$  and the variance is  $p(1 - p)$ . Moreover, one can create a regression model in which the probability of choosing one outcome is predicted by a set of covariates like socio-demographic characteristics (including the migration variable) of the household represented by vector  $\mathbf{X}$  and a vector of unknown parameters  $\beta$  that need to be estimated. This

---

<sup>6</sup>This observation stems from the fact that international remittances that are used to fund rural students' education may also make it easier for a part of them to pay bribes and pass the rigorous acceptance and graduation exams of the Moldovan Higher Education Institutions (HEI) located in urban centers. Heyneman et al. (2008) provide statistics of high levels of corruption in HEI's across Central and Eastern Europe, including Moldova. The statistical data on corruption in Moldovan HEI's is particularly high; on page 4 the authors highlight that "On average, between 18 and 20 percent of the students in Bulgaria, Croatia, and Serbia and 40 percent of the students in Moldova reported that they had used some illegal method to gain admission to their university." In the same study, Moldovan students indicate the highest rates for readiness to offer bribes to receive a certain grade (31% compared to 20% or less in the other countries). In addition, Valentino (2007) also provides evidence on page 6 that Moldova's education system is the fourth most corrupt system out of 15 (behind police, customs, and medical services) that were investigated in a 2005 Global Corruption Barometer.

<sup>7</sup>Besides corruption at various levels and institutions, Moldova also struggles with issues of nepotism in the labor market (Rumleascaia (2001)).

conditional probability can be represented as follows:

$$p \equiv Prob(y = 1|\mathbf{X}) = F(\mathbf{X}'\boldsymbol{\beta}), \quad (3.1)$$

where  $F(\cdot)$  represents the cumulative distribution function. Usually, the literature on migration employs random utility models with a latent-variable identification framework (Mora and Taylor (2006); Arzaghi and Rupasingha (2013)). Based on this, individuals place different utilities for the choice to migrate and the choice to stay in their current region; the decision to migrate to a different region is made if the migration utility after adjusting for the cost of migration is higher than the utility of remaining in the current region. In this sense, suppose that  $U^a$  and  $U^b$  are the respective utilities and they can be represented as follows:

$$U^a = \mathbf{X}'\boldsymbol{\beta}_a + \varepsilon_a \quad \text{and} \quad U^b = \mathbf{X}'\boldsymbol{\beta}_b + \varepsilon_b \quad (3.2)$$

If one normalizes the utility to stay in the same region to zero ( $U^b = 0$ ), then the decision to migrate ( $y = 1$ ) is observed only when  $U^a > U^b$  or  $U^a > 0$ . In other words, migration decision ( $y$ ) is an index function that takes value one if the latent utility function is positive and zero otherwise:

$$y = \begin{cases} 1, & \text{if } U_i^a > 0 \\ 0, & \text{if } U_i^a \leq 0 \end{cases} \quad (3.3)$$

Based on the latent-variable model expressed in (3.2) and (3.3), we can explain expression (3.1) as follows:

$$\begin{aligned} Prob(y = 1|\mathbf{X}) &= Prob(U^a > U^b) \\ &= Prob(U^a > 0|\mathbf{X}) \\ &= Prob(\mathbf{X}'\boldsymbol{\beta} + \varepsilon > 0|\mathbf{X}) \\ &= Prob(\mathbf{X}'\boldsymbol{\beta} > -\varepsilon|\mathbf{X}) \\ &= \Phi(\mathbf{X}'\boldsymbol{\beta}), \end{aligned} \quad (3.4)$$

where  $\Phi(\mathbf{X}'\beta)$  is the standard normal CDF that is used in Probit regression models.

In the current study, the dependent variable “job\_region”, a discrete variable, is equal to 1 if the job choice of the tertiary educated household member after graduation is located in an urban location and 0 otherwise. Finally, the specification of the Probit model is completed by identification of the covariates that are included in vector  $\mathbf{X}$  described in Table 3.1.

Table 3.1: Description of the covariates used in the Probit regression

Variable Name	Description
SIZE	Continuous variable showing the size of the household (number of household members)
SEX	Discrete variable showing the gender of the household head (Female=1)
UNIVERSITY	Continuous variable showing the number of household members with university education
NRTEENS	Continuous variable showing the number of children between 12 and 18 years in the household
EDUSHARE	Continuous variable showing the share of the education expenditure in the household's total expenditure (budget).
INTERNET	Discrete variable showing whether the household has access to the Internet (Yes=1)
CHISINAU	Discrete variable showing whether the household is inside the primate city region (Yes=1)
MIGRATION	Discrete variable showing whether the household has international migrants (Yes=1)

In addition, since the object of the current study is to investigate the effect of international migration on the likelihood that tertiary educated individuals coming from rural households choose jobs located in urban centers, it is important to specify the Probit model in such a way that separates the effects for individuals coming from urban households on one side and from rural households on the other side. Consequently, the specification of the Probit model is completed by using STATA's ability to regress the regional job choice (job\_region) using the “probit” regress command with factor variable interactions.<sup>8</sup> In other words, the above-mentioned covariates are

<sup>8</sup>See STATA's [guide](#) for full explanation on factor variables.

each interacted with a regional indicator variable (URBAN=1 refers to urban households and URBAN=0 refers to rural households). Importantly, because the primate city region (municipality of Chişinău)<sup>9</sup> agglomerates a big part of the population as well as number of education institutions (see Figure 3.1), it is crucial to identify the effect of international migration, especially in the case of individuals coming from rural localities outside this region. In other words, the model employs a three-way interaction of the MIGRATION, CHISINAU, and URBAN variables to test specifically for the effect of international migration in rural households outside the primate city region.

### 3.4.3 ENDOGENEITY OF REMITTANCES

McKenzie and Sasin (2007) point out that the variable of migration is usually endogenous, which means that observable household decisions related to migration, remittances, labor supply, allocation of the household budget to specific expenditure categories, school enrollment, and others are made simultaneously. As a result, factors that explain the household's decision to participate in international migration may simultaneously influence some household's activity (in this case the decision of tertiary educated household members to get jobs in urban regions after graduation). In addition to observable factors, there may also be unobservable factors (like general ability, risk aversion, etc.) that may simultaneously affect such decisions. These situations lead to endogeneity of migration, or selection bias (migrant households self-select and as a result they are fundamentally different from non-migrant households).

I ran the standard tests for exogeneity provided by the *ivprobit* and *ivreg2* packages in STATA to determine whether endogeneity bias is present. These tests reveal

---

<sup>9</sup>This region includes the city of Chişinău as well as six smaller towns and 28 villages. Overall, the National Bureau of Statistics of Moldova considers the municipality of Chişinău as an urban region, but for the purpose of the current study one should separate rural-type locations inside the primate city region from rural-type locations outside this central region (see Faggian and McCann (2010) for further details).

that the migration variable does not present endogeneity issues in the current data set (the null hypothesis,  $\rho = 0$ , cannot be rejected). However, since the effectiveness of these tests depends on the quality and quantity of data, it would be wise to check the robustness of the main results of the probit model by comparing them to the results of a model that controls consistently for endogeneity.

Depending on the type of data and the scope of the study, economists emphasize various forms of dealing with selection bias, mainly: difference-in-difference (with panel data), instrumental variables (IV), or a matching technique. Moreover, dealing with endogeneity in binomial models is generally more complicated than in linear regression models. For example, previous studies (Mora and Taylor (2006); Dabalén and Miluka (2010)) employ the probit model with instrumental variables (ivprobit in STATA, which works as a control function model, Dong and Lewbel (2015)). Nonetheless, the ivprobit model is not recommended to estimate the effect of migration on the binary outcome because it works consistently only with *continuous* endogenous variables (Baum et al. (2012); Dong and Lewbel (2015)), while migration is a discrete variable. Another model that is widely used to estimate binary outcomes with endogenous variables is the Two Stage Least Squares Linear Probability Model (2SLS LPM). Although researchers generally praise the simplicity of this model, nevertheless it may not be consistent mainly because the fitted values are not within the unit interval (it may provide probabilities that are negative or greater than one).

To address the issues related to control functions and the LPM, Lewbel et al. (2012) introduce a new technique of controlling for endogeneity in binomial models with discrete endogenous variables called the “special regressor” (SR) approach. This model is further discussed in Baum et al. (2012) and Dong and Lewbel (2015). According to Dong and Lewbel (2015), the SR model is similar in implementation to the 2SLS LPM, it nests the probit and logit as special cases, and avoids the major flaws of the LPM with binary outcomes. The main assumptions of the model are

all concerning the special regressor, specifically: 1) the regressor is continuously distributed with a large support (its probability distribution has thick tails); 2) it is conditionally independent of the error term (this is also cited as the main weakness of the model, Baum et al. (2012)); and 3) it appears additively to the error term in the model. Thus, the SR model is represented as follows:

$$y = I(\mathbf{X}'\boldsymbol{\beta} + V + \varepsilon \geq 0), \quad (3.5)$$

where  $I(\cdot)$  is the indicator function that equals one if its argument is true and zero otherwise,  $\mathbf{X}$  is the vector containing all other regressors (including the endogenous one(s)),  $\boldsymbol{\beta}$  is a vector of coefficients to be estimated,  $V$  is the special continuously distributed regressor, and the error term  $\varepsilon$  has a constant variance equal to  $\sigma_\varepsilon^2$ . Notice that the coefficient of  $V$  is normalized to equal one; this is equivalent to the probit model normalizing the variance of the error term to equal one.<sup>10</sup>

I implement the SR model by using EDUSHARE as the special regressor.<sup>11</sup> It complies with the main assumptions of this model and, importantly, literature on migration supports the premise that there may be a linear relationship between the household's education level and its likelihood of exposure to international migration (Beine et al. (2008)). The resulting estimates of this package in STATA are the marginal effects at the mean. As in the probit or ivprobit models, the results that quantify the effects of the regressors are not the estimated regression coefficients, but rather the marginal effects. One additional characteristic of the SR model discussed above is that it offers a simplified method of calculating the marginal effects with the use of the Average Index Function (AIF), as opposed to the Average Structural Function (ASF). Baum et al. (2012) observe that in some cases the AIF is easier to

---

<sup>10</sup>According to Dong and Lewbel (2015), this choice of normalization does not impact the estimation of choice probabilities or the marginal effects.

<sup>11</sup>To accomplish this, I employ the `sspecialreg` package in STATA developed by Yingying Dong and Christopher F. Baum (presented in Baum et al. (2012)).

estimate and that it could be considered as a “middle ground” between the propensity score approach and the ASF approach.

#### 3.4.4 DETERMINANTS OF URBAN JOB CHOICE LOCALITIES

As discussed in subsection (3.4.2), the modeling of the regional job choice can be explained using the Random Utility Maximization theory. This approach could be further refined in order to estimate the effect of alternative specific as well as individual (household) specific characteristics on the likelihood of choosing particular locations within the set of existing urban job choice locations. Since the four major university centers in Moldova are Chişinău, Bălţi, Cahul, and Comrat, in order of importance, I am particularly interested in estimating the effects of alternative specific and individual specific characteristics on the probabilities of choosing jobs in these locations compared with all the other existing alternatives. This could be achieved by employing the Conditional Logit Model (CLM), which requires the specification of the utility function for choosing the job in a particular urban location of the country. Thus, I assume that the utility of choosing one of the existing urban alternatives has a linear relationship with the alternative specific and individual specific characteristics presented in Table 3.2.

The reason for including dummy variables for the primate city location follows from the observations made in section (3.2). The municipality of Chişinău concentrates a big portion of the country’s population (approximately 22%) as well as the overwhelming number of human capital institutions and economic activity of the country. As a result, it is imperative to separate the effect of this region in the model. In addition, I am expecting that variables *d1*, *EDUINST*, and *DENSITY* will have a positive relationship with the likelihood of choosing a particular urban alternative, while *DISTANCE* will have a negative relationship because longer distances should reflect higher costs of relocation to the respective urban location. Finally, since the

Table 3.2: Description of variables used in the CLM regression

<b>Alternative Specific Determinants</b>	
d1	Discrete variable identifying whether the job location is in the primate city region (municipality of Chisinau). It is used to capture the unobserved features of the primate city region.
DISTANCE	Continuous variable that measures the distance (in Km) from the individual's household location to the job choice location.
EDUINST	Continuous variable that shows the number of educational institutions in the respective job choice location.
DENSITY	Continuous variable that shows the population density (people per square Km) in the respective job choice location.
<b>Individual Specific Determinants</b>	
d2	Discrete variable identifying whether the household is located in the primate city region (municipality of Chisinau).
EDUSHARE	Continuous variable showing the share of the education expenditure in the household's total expenditure (budget).
MIGRATION	Discrete variable showing whether the household participates in international migration (Yes=1).

CLM estimates the likelihood of choosing a particular alternative conditioning on the characteristics of all the other existing alternatives, the individual specific characteristics (that vary across individuals, but not across choices) enter this model as interactions with the alternative specific variables (that vary across choices only).

Based on the above, I specify the utility of choosing a particular urban alternative as follows:

$$\begin{aligned}
 U_{ij} = & \beta_1 DISTANCE_j + \beta_2 DISTANCE_j \times d2_i + \beta_3 DISTANCE_j \times MIGRATION_i + \quad (3.6) \\
 & + \beta_4 d1_j + \beta_5 EDUINST_j \times EDUSHARE_i + \beta_6 DENSITY_j + \\
 & + \beta_7 DENSITY_j \times d2_i + \varepsilon_{ij},
 \end{aligned}$$

where  $\varepsilon_{ij}$  is the random error term. According to equation (3.6), the utility of choosing urban alternative  $j$  ( $j = 1, \dots, 40$ ) by individual  $i$  ( $i = 1, \dots, 465$ ) is made up of a deterministic element and a stochastic element. Figure 3.2 shows the map of Moldova with the 40 major urban choices available to the college graduates in Moldova. Based on McFadden (1974) and assuming that the error term is independent and identically distributed with type 1 extreme value distribution, one can estimate the probability



Figure 3.2: Urban Job Choices Used in the Conditional Logit Model.  
 (Source: Created using IMAS-INC survey data with QGIS and Google Earth Software)

of choosing alternative  $j$  (out of a set of  $J$  alternatives) as follows:

$$Prob(y = 1) = \frac{\exp(\mathbf{X}'_{ij}\beta)}{\sum_j \exp(\mathbf{X}'_{ij}\beta)} \quad (3.7)$$

This method of estimating the probability assumes the Independence from Irrelevant Alternatives (IIA), which means that the error terms are independent among individuals as well as the alternative choices. As in the case of probit, the magnitude of the effects is calculated through the marginal effects. However, in the case of CLM, marginal effects are more complicated to estimate because a small change in the characteristic of one alternative has an impact on the respective alternative choice (own-effect) as well as on all the other alternatives in the set (cross-effect). The object of this study however is to report the average marginal own-effects on the probability of choosing choice  $j$ . Thus, the marginal effects in the CLM can be estimated manually using Excel, or based on the code explained in sections 10.6.10 and 15.5.8 in Cameron and Trivedi (2010). In addition, the marginal effect in the case of binary variables, is simply obtained by calculating the difference in probabilities in the case when the binary variable is set to one and when it is set to zero.

## 3.5 DATA

### 3.5.1 DESCRIPTIVE STATISTICS

As explained in Chapter 1, the data for the analysis in this dissertation come from an original survey that I implemented in the Republic of Moldova during the first half of 2013. Out of the total sample of 582 individuals 331 come from households located in urban locations and most of them (322) select jobs after graduation that are also located in urban locations (Table 3.3a). There are 251 tertiary educated individuals that come from rural households; however, these individuals have a closer division of job choices in the two regions: 108 of them choose jobs in the rural regions and 143 take jobs in the urban regions.

Table 3.3a: Cross tabulation of the regional job choice by type of household

Type of Household	Region of First Job After Graduation		Total
	Rural	Urban	
Rural	108	143	<b>251</b>
Urban	9	322	<b>331</b>
<b>Total</b>	<b>117</b>	<b>465</b>	<b>582</b>

In general, out of the 582 college graduates, 465 choose urban job locations (or approximately 80%). Moreover, out of the 465 individuals choosing urban locations 219 come from the primate city region (47%) and 199 out of the 219 take jobs also in the primate city region (91%). The primate city region is the municipality of Chişinău (region 7 on the map in Figure 1.3). Officially, this region is made up of seven cities (including the city of Chişinău, the capital) and 28 villages. In the current study, 226 out of 582 individuals reside in the primate city region (Table 3.3b), particularly: 197 are from the city of Chişinău, 18 are from three other smaller towns in this region, and 11 are from two villages in this region. Thus, the primate city region has a clear impact on the regional job choices: a big portion of the tertiary educated individuals come from this region and the big majority of them choose to remain inside the region. As a result, the analysis model separates the effect on the regional job choice for rural and urban individuals coming from the primate city region and from outside.

Table 3.3b: Cross tabulation of households by primate city region and type of household

Type of Household	Household Inside Primate City Region		Total
	No	Yes	
Rural	240	11	<b>251</b>
Urban	116	215	<b>331</b>
<b>Total</b>	<b>356</b>	<b>226</b>	<b>582</b>

Figures 3.3 and 3.4 provide more details about the frequency of jobs across the regions in Moldova as well as the share of urban jobs across these regions. Interestingly, Figure 3.3 shows an unambiguous concentration of jobs taken by college graduates

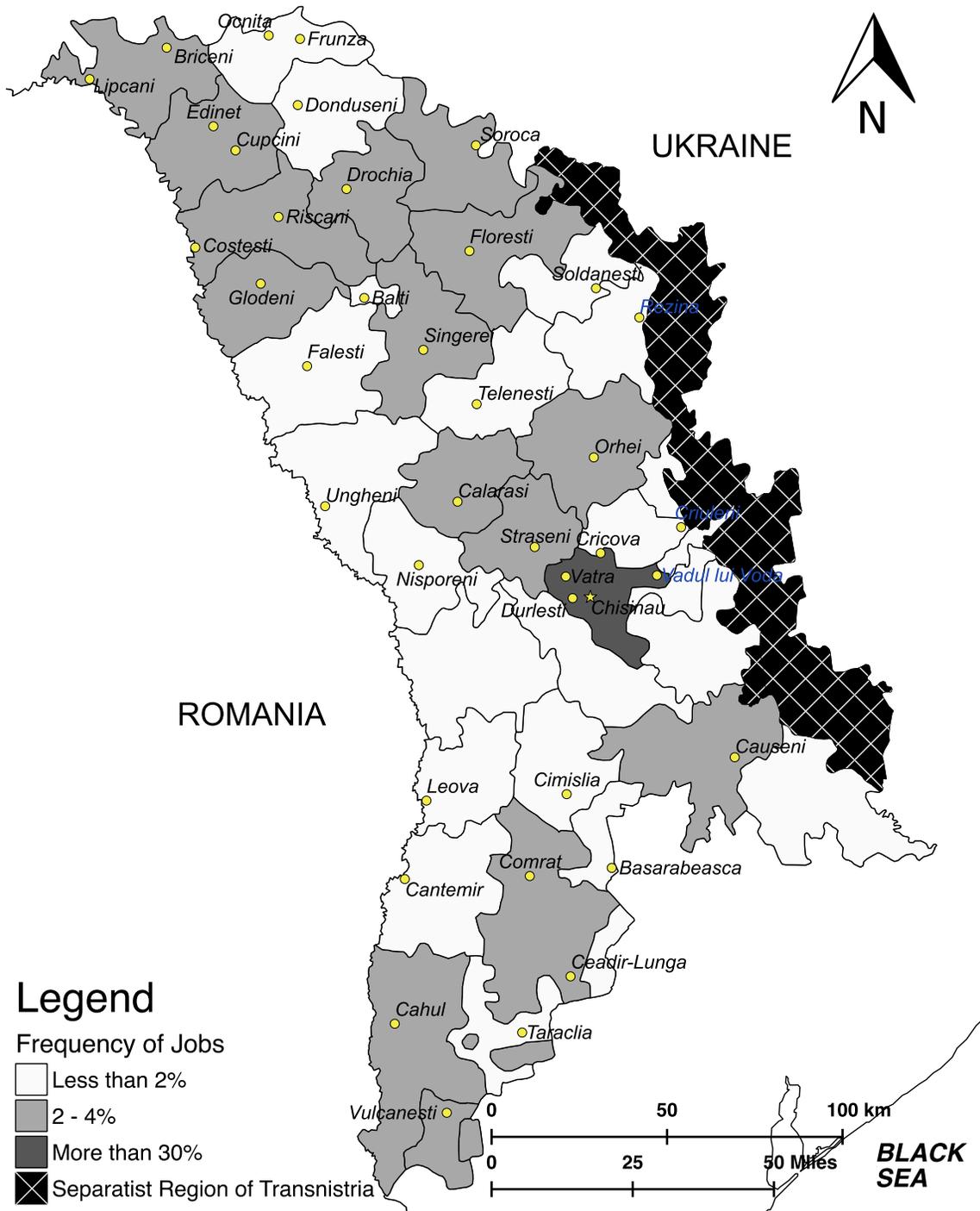


Figure 3.3: Frequency of Jobs by District of Moldovan College Graduates.  
 (Source: Created using IMAS-INC survey data with QGIS and Google Earth Software)

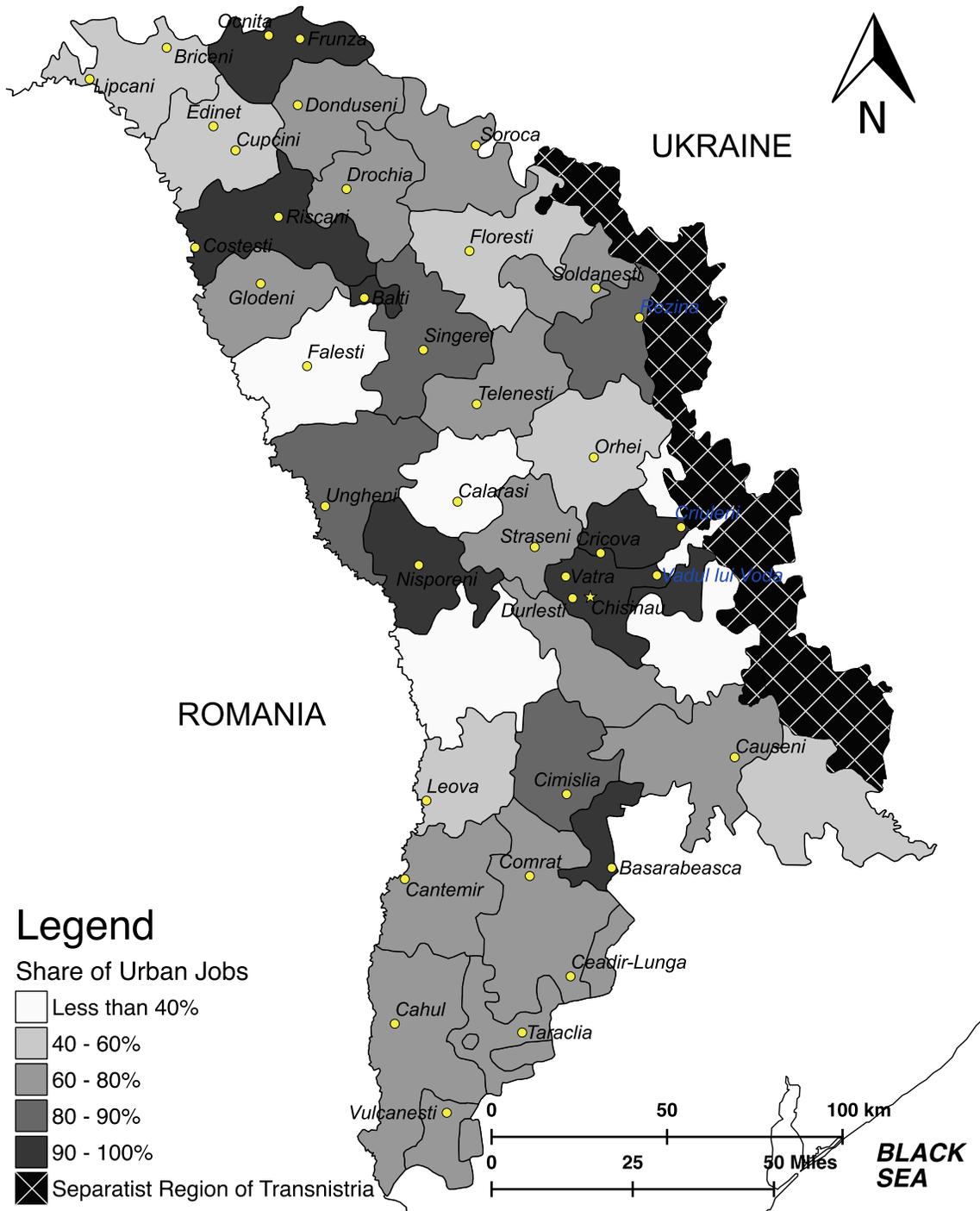


Figure 3.4: Frequency of Urban Jobs Taken by Moldovan College Graduates.  
 (Source: Created using IMAS-INC survey data with QGIS and Google Earth Software)

in the primate city region (more than 30% of all jobs taken by college graduates are concentrated in this region). Figure 3.4 complements this information by showing that urban jobs in this region as well as in several other regions of Moldova account for more than 90%.

The sample of tertiary educated individuals has a very similar distribution of exposure to international migration (or receipt of international remittances) as the larger survey sample of 1,813 households. Thus, 238 individuals out of 582 come from households with international migrants (41%, Table 3.3c). Figure 3.5 provides more detailed information about the frequency of college graduates coming from households with international migrants. Based on this figure, it is clear that households located in the northern regions of the country are the most exposed to international migration (of the total number of college graduates originating from several of these regions, more than 75% are exposed to international migration). The individuals exposed to international migration are almost evenly distributed across urban and rural regions: 118 originate in rural households and 120 in urban ones. In addition, urban job choice is more popular among individuals coming from households with international migrants than rural jobs (183 individuals out of 238, or approximately 77%, exposed to international migration choose urban locations compared to only 55, or 33%, that choose rural locations; Table 3.3d).

Table 3.3c: Cross tabulation of exposure to international migration by type of household

<b>Access to International Migration</b>			
<b>Type of Household</b>	Without International Migrants	With International Migrants	<b>Total</b>
Rural	133	118	<b>251</b>
Urban	211	120	<b>331</b>
<b>Total</b>	<b>344</b>	<b>238</b>	<b>582</b>

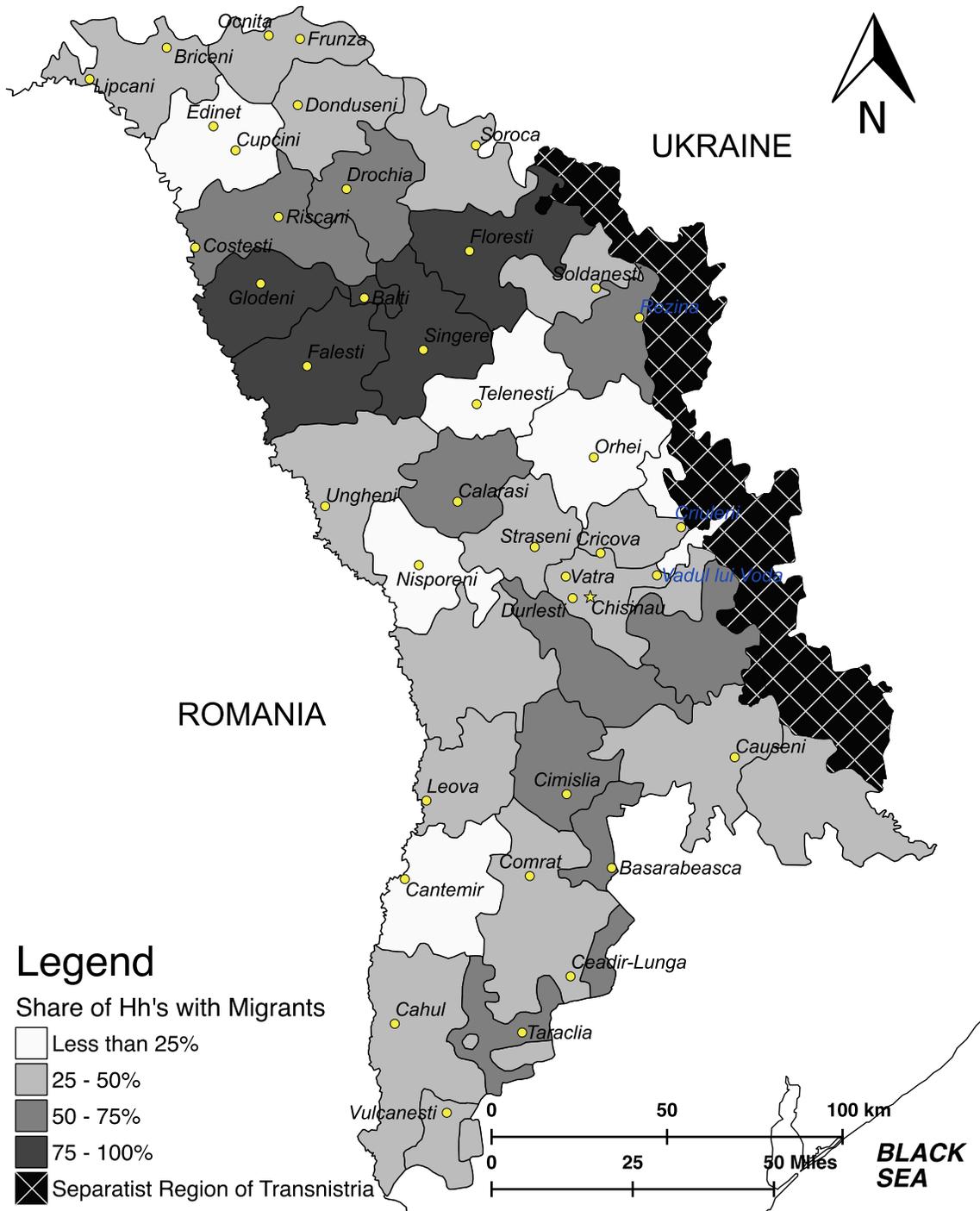


Figure 3.5: Frequency of Households Exposed to International Migration.  
 (Source: Created using IMAS-INC survey data with QGIS and Google Earth Software)

Table 3.3d: Cross tabulation of exposure to international migration by region of first job

<b>Access to International Migration</b>			
<b>Region of First Job After Graduation</b>	Without International Migrants	With International Migrants	<b>Total</b>
Rural	62	55	<b>117</b>
Urban	282	183	<b>465</b>
<b>Total</b>	<b>344</b>	<b>238</b>	<b>582</b>

On average, approximately 39% of individuals who choose urban jobs are exposed to international migration, compared with 47% for those who choose rural jobs (Table 3.3d). Interestingly, out of the 238 individuals who are exposed to international migration, 65 (27%) come from households located inside the primate city region, while 173 (73%) come from outside this region (Table 3.3e).

Table 3.3e: Cross tabulation of exposure to international migration by primate city region

<b>Access to International Migration</b>			
<b>Household Inside Primate City Region</b>	Without International Migrants	With International Migrants	<b>Total</b>
No	183	173	<b>356</b>
Yes	161	65	<b>226</b>
<b>Total</b>	<b>344</b>	<b>238</b>	<b>582</b>

Table 3.4 also presents descriptive statistics of the main household characteristics described earlier in Table 3.1 and provides more detail for the data presented in Tables 3.3a - 3.3e. There is significant variation across all these variables for individuals coming from: 1) all types of households; 2) households located in urban locations; and 3) households located in rural locations. The main human capital variables (UNIVERSITY and EDUSHARE) indicate that, in general, individuals who choose urban jobs also come from households with more members who hold tertiary degrees and spend more on education (the same is observed in the case of urban households). Interestingly, on the other side, individuals who choose rural jobs and also originate

Table 3.4: Descriptive statistics of variables used in Probit regression

	(1)			(2)			t-test (1) vs. (2)		
	Job Region - Urban			Job Region - Rural			All	Urban	Rural
	All	Urban	Rural	All	Urban	Rural			
SIZE	3.563 (1.373)	2.297 (1.815)	1.267 (2.102)	3.769 (1.632)	0.274 (0.997)	3.496 (1.897)	-1.26	16.23***	-11.13***
SEX (Female=1)	0.518 (0.500)	0.387 (0.488)	0.131 (0.338)	0.436 (0.498)	0.009 (0.093)	0.427 (0.497)	1.60	15.66***	-6.12***
UNIVERSITY	1.557 (1.024)	1.060 (1.038)	0.497 (1.013)	1.342 (0.993)	0.077 (0.375)	1.265 (1.020)	2.09**	16.58***	-7.30***
EDUSHARE	0.025 (0.066)	0.011 (0.034)	0.014 (0.059)	0.023 (0.065)	0.001 (0.005)	0.022 (0.065)	0.28	6.26***	-1.28
NRTEENS	0.136 (0.361)	0.090 (0.294)	0.045 (0.228)	0.333 (0.670)	0.043 (0.242)	0.291 (0.644)	-3.09***	1.82*	-4.07***
INTERNET	0.794 (0.405)	0.592 (0.492)	0.202 (0.402)	0.752 (0.434)	0.068 (0.254)	0.684 (0.467)	0.94	16.01***	-10.26***
MIGRATION	0.394 (0.489)	0.245 (0.431)	0.148 (0.356)	0.470 (0.501)	0.051 (0.222)	0.419 (0.496)	-1.49	6.78***	-5.57***
CHISINAU	0.471 (0.500)	0.454 (0.498)	0.017 (0.130)	0.060 (0.238)	0.034 (0.183)	0.026 (0.159)	12.87***	14.67***	-0.53
URBAN	0.693 (0.462)	-	-	0.077 (0.268)	-	-	18.83***	-	-

N=582, standard deviations shown in parentheses.

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

in rural households come from households that have more members with tertiary education and higher spending on education compared to individuals coming from rural households that choose urban jobs.

Another interesting observation is related to the primate city region (CHISINAU); according to Table 3.4, in general, approximately 47% of individuals choosing urban jobs come from the primate city region compared to 6% choosing rural jobs. Within each job region group, a higher share of urban individuals from inside the primate city region than rural individuals choose urban jobs (45% vs. 2%), while in the case of rural jobs the trend is similar (3.4% vs. 2.6%). In addition, it appears that within each job region group, there are more individuals exposed to international migration who also choose jobs inside their region of residence (25% of individuals choosing urban jobs come from urban households exposed to international migration compared with 15% of rural individuals, while on the other side approximately 42% of individuals choosing rural jobs also come from rural households exposed to international migration compared to 5% of urban individuals).

In the case of the CLM model variables, it is worth mentioning that the average distance from the household location to a job choice location out of the 40 possible locations is approximately 141 Km (with a standard deviation of approximately 86 Km and the highest distance being 448 Km). Figure 3.2 presents a map of all the 40 major cities where individuals in the current study chose urban jobs.

As mentioned in section (3.2), Figure 3.1 presents data about the number of education institutions across the 40 urban choices. Chişinău clearly stands out, followed by Bălţi and Cahul. On average, however, urban locations in Moldova have approximately 26 education institutions with a standard deviation of approximately 57 (the maximum number of institutions is 372, in Chişinău, and the minimum is 4). According to the CLM utility function specification, the variable on number of educational institutions (EDUINST) is interacted with the individual specific variable that shows the share of the education expenditures in the household's total budget (EDUSHARE). On average, the share of spending on education is approximately 2.5% with a standard deviation of 6.6% (the highest value of the education spending share is approximately 68%). Another alternative-specific variable of interest is population density. On average, population density in urban locations of Moldova is approximately 2,058 people per Km<sup>2</sup> with a standard deviation of approximately 946 people per Km<sup>2</sup> (the maximum density is 5,483 people per Km<sup>2</sup> and the lowest is 799).

## 3.6 RESULTS

### 3.6.1 PROBIT REGRESSION RESULTS

The objective of this study is to estimate the effect of exposure to international migration on the likelihood of tertiary educated individuals to choose urban jobs after graduation. The main focus, however, is related to how this factor affects the regional

job choices of individuals coming from rural households. In addition, since the majority of rural households are located outside the primate city region (municipality of Chişinău) it is also important to control for this region. Thus, the main question is whether exposure to international migration (which results in the receipt of international remittances) increases the likelihood of tertiary educated individuals coming from rural households in general and those located outside the primate city region in particular to choose jobs located in urban regions.

Table 3.5 presents the results of the probit regression model explained in subsection (3.4.2). The pivotal variable in this table is MIGRATION. Interestingly, the general effect of international migration is negative and significant at the 5% level, which means that at the country level exposure to international migration reduces the likelihood of tertiary educated individuals to choose urban jobs. On one hand, this is an encouraging result because it confirms that international migration and remittances do not necessarily lead to a local rural-urban brain drain. On the other hand, however, it may be misleading because it does not control for the regional heterogeneity. Consequently, it is important to take into consideration the coefficients of the regional interaction terms. Thus, exposure to international migration in the case of urban households increases the likelihood of choosing urban jobs compared with rural households, however the result is not statistically significant.

The most important observation however is related to the case where one also controls for the primate city region. Accordingly, exposure to international migration in the case of tertiary educated members of rural households located outside the primate city region increases the likelihood of choosing urban jobs after graduation at the 5% significance level. The same is true for individuals coming from urban households located outside the primate city region, however in this case the result is not statistically significant.

Table 3.5: Probit Regression Results

Variable Name	Estimate
SIZE	0.054 (0.056)
SEX (Female=1)	-0.145 (0.173)
UNIVERSITY	0.177 (0.081)**
EDUSHARE	3.443 (1.226)***
NRTEENS	-0.427 (0.177)**
INTERNET (INTERNET=1)	-0.354 (0.2)*
OUTSIDE CHISINAU (CHISINAU=0)	-1.226 (0.582)**
URBAN (URBAN=1)	0.706 (1.077)
MIGRATION (MIGRATION=1)	-1.868 (0.898)**
-----	
SIZE (URBAN=1)	0.114 (0.227)
SEX (Female=1 & URBAN=1)	1.565 (0.528)***
UNIVERSITY (URBAN=1)	0.120 (0.268)
EDUSHARE (URBAN=1)	5.189 (10.359)
NRTEENS (URBAN=1)	-0.813 (0.5)
INTERNET (INTERNET=1 & URBAN=1)	0.089 (0.689)
OUTSIDE CHISINAU (CHISINAU=0 & URBAN=1)	0.366 (0.872)
MIGRATION (MIGRATION=1 & URBAN=1)	0.745 (1.08)
-----	
MIGRATION (MIGRATION=1 & CHISINAU=0 & URBAN=0)	1.991 (0.915)**
MIGRATION (MIGRATION=1 & CHISINAU=0 & URBAN=1)	0.436 (0.798)

N=582, standard deviations shown in parentheses.

Pseudo  $R^2=0.3657$ ; LR  $\chi^2(19)=213.62$

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

The rest of the household characteristics appear to have effects that conform with existing theory. Accordingly, individuals coming from households with higher human capital (higher UNIVERSITY and higher EDUSHARE) have a significantly higher likelihood of choosing urban jobs. Individuals coming from households with more children have a significantly lower likelihood of choosing urban jobs. Interestingly, exposure to technology (INTERNET=1, in other words, household has access to internet) reduces the likelihood of choosing urban jobs at the 10% significance level. However, in the case of individuals coming from urban households, exposure to internet is not statistically significant. Finally, the region of the household, as explained before, also has important ramifications. As expected, individuals coming from urban households have a higher likelihood of choosing urban jobs. Individuals coming from

households outside the primate city region have a significantly lower likelihood of choosing urban jobs; however, individuals coming from urban households outside the primate city region have a higher likelihood, although it is not statistically significant.

These results confirm the fact that exposure to international migration (and, implicitly, international remittances) has an important impact on the accumulation of human capital originated by rural households located outside the primate city region. Without the extra income from remittances, tertiary educated individuals coming from rural households (particularly those outside the primate metro area) would have lower chances of choosing urban jobs and would probably return to their rural communities. This model provides a good fit as the pseudo R squared is 0.37 and the outcomes based on this model are correctly classified at a rate of 83%.

To quantify the magnitude of the covariates' effects it is important to calculate the marginal effects after the estimation process. Accordingly, Table 3.6 presents the post estimation marginal effects in four cases: 1) average marginal effects (AME); 2) marginal effects at URBAN=0 (i.e. for all rural households); 3) marginal effects at URBAN=0 & CHISINAU=0 (i.e. for rural households located outside the primate city region); and 4) controlling for endogeneity bias as explained in subsection (3.4.3). The average marginal effect of exposure to international migration is -0.02, although it is not statistically significant. In the case of individuals coming from rural households (URBAN=0), the marginal effect of exposure to international migration is -0.211 and is significant at the 5%. However, in the case of tertiary educated individuals coming from rural households outside the primate city region (CHISINAU=0 & URBAN=0), the marginal effect of exposure to international migration is 0.046, although it is not statistically significant at the 10% level.

Importantly, after controlling for endogeneity the marginal effect at the mean of exposure to international migration is positive: 0.102 in case of the “sorted data density estimator” (with a 95% confidence interval of -0.041 to 0.244) and 0.054 in

Table 3.6: Marginal Effects

Variable Name	Marginal Effects after Probit			Marginal Effects after specialreg	
	AME	At URBAN=0	At URBAN=0 & CHISINAU=0	Sorted Data Density Estimator	Standard Kernel Density Estimator
SIZE	0.013 (0.350)	0.017 (0.018)	0.02 (0.021)	0.003 (0.024)	0.006 (0.017)
SEX (Fem.=1)	0.013 (0.030)	-0.046 (0.055)	-0.54 (0.065)	0.047 (0.054)	0.065 (0.037)*
UNIVERSITY	0.035 (0.014)**	0.056 (0.025)**	0.067 (0.029)**	0.016 (0.028)	0.009 (0.02)
EDUSHARE	0.752 (0.320)**	1.091 (0.391)**	1.286 (0.44)**	2.352 (0.893)**	4.72 (1.264)**
NRTEENS	-0.098 (0.029)**	-0.135 (0.057)**	-0.16 (0.064)**	-0.074 (0.074)	-0.065 (0.058)
INTERNET	-0.06 (0.032)*	-0.11 (0.06)*	-0.131 (0.072)*	-0.116 (0.069)*	-0.071 (0.052)
CHISINAU	-0.044 (0.056) <sup>a</sup>	-0.109 (0.118) <sup>a</sup>	-0.109 (0.118) <sup>a</sup>	0.143 (0.102) <sup>b</sup>	0.097 (0.059) <sup>ab</sup>
URBAN	0.35 (0.047)**	0.35 (0.047)**	0.414 (0.041)**	0.104 (0.085)	0.096 (0.051)*
MIGRATION	-0.02 (0.031)	-0.211 (0.103)**	0.046 (0.067)	0.102 (0.073)	0.054 (0.055)

N=582, standard deviations shown in parentheses.

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

a: CHISINAU=0

b: CHISINAU=1

the case of “standard kernel density estimator” (with a 95% confidence interval of -0.053 to 0.162). Comparing the two special regressor methods, we find that the kernel data density estimator appears to provide the most significant results, however the marginal effect of migration is closer to the boundary of statistical significance in the sorted data density estimator model.

Based Table 3.6, the results reveal that international migration has a significant negative impact on the likelihood of tertiary educated individuals from rural households to choose jobs in urban centers. This supports the results in the literature on remittances and international migration that highlight the positive impact of these factors on the development of human capital. However, exposure to international migration in rural households outside the primate city region may lead to an increase in the likelihood of rural household members with tertiary education to choose jobs in urban centers, which may lead to local brain drain (this however is not statistically significant at the 10% level). Since the majority of the rural population is located outside the primate city region, this result is particularly important. In addition, this

is confirmed by the results of the model that incorporates controls for the endogeneity bias of international migration, as the marginal effect of exposure to international migration at the mean increases the likelihood of urban job choice by approximately 5% to 10% (this result however is at the border of being statistically significant).

### 3.6.2 CLM REGRESSION RESULTS

The final part of this study looks at the determinants of particular urban choices within a set of 40 urban job alternatives in Moldova. Recall that out of the 582 college graduates in the study, 465 choose a urban location for the first job after graduation from college. Thus, since each of these individuals has the option to choose any of the 40 urban choices, the conditional logit model estimates the data set of 18,600 observations ( $= 465 \times 40$ ).

Table 3.7 provides estimates of the regression coefficients in this model. As expected, the overall effect of distance is negative, which is consistent with other literature on migration. The interaction of distance and exposure to international migration is expected to show the impact of additional income from international remittances on the costs of relocation. According to the results in Table 3.7, exposure to international migration decreases the probability of choosing the respective urban choice. In addition, the exposure to unobserved characteristics of the primate city region (d1) has a significant positive impact on the probability of choosing the urban alternative. The human capital characteristics of an urban choice also have a positive impact on the likelihood of choosing that urban alternative. Finally, the variable of density as well as the one showing its interaction with the indicator of whether the household is located inside the primate city region (d2) appear to have a significant positive impact on choosing the respective urban choice.

As in the case of the probit model in the previous subsection, it is also important to quantify the effects of these variables by calculating their marginal effects on the

Table 3.7: CLM Regression Results

Variable Name	Estimate
DISTANCE	-0.028 (0.002)***
DISTANCE×d2	0.027 (0.004)***
DISTANCE×MIGRATION	-0.005 (0.003)**
d1	0.641 (0.264)**
EDUINST×EDUSHARE	0.017 (0.005)***
DENSITY	0.001 (0.0001)***
DENSITY×d2	0.001 (0.0001)***

N=18,600, standard deviations shown in parentheses.

Pseudo  $R^2=0.6036$ ; LR  $\chi^2(7)=2070.58$

\*\*\* - significant at 1% level; \*\* - significant at 5% level; \* - significant at 10% level

probability of choosing choice  $j$ . In addition, as explained in subsection (3.4.4), the current study is interested in the average own marginal effects of these factors on the probability of choosing each alternative as well as the average own marginal effects in the case of the four major locations with the most numerous education institutions (Chişinău, Bălţi, Cahul, and Comrat). Respectively, Table 3.8 has a general section as well as four separate sections for the major urban choices.

According to these results the biggest impacts on the probability of choosing a particular urban choice come from share of households' spending on education, whether the household is located inside the primate city region or not, exposure to the unobserved characteristics of the primate city region, and, finally, the exposure of households to international migration. Thus a unit increase in household's share of spending on education increases the probability of choosing choice  $j$  by approximately three percentage points; the household being located inside the primate city region increases the probability of choosing alternative  $j$  by approximately 17 percentage points; exposure to the unobserved characteristics of the primate city region increases the probability of choosing alternative  $j$  by approximately one percentage point; and, finally, the household's exposure to international migration reduces the probability of choosing alternative  $j$  by 0.4 percentage point.

The marginal effects appear to be highest in the case of the city of Chişinău. Respectively, an increase of one unit in the distance to Chişinău reduces the prob-

Table 3.8: Marginal Effects after CLM

Variable Name	Estimate
DISTANCE	-0.0003 (0.0009)
EDUINST	5.88e-06 (0.00004)
EDUSHARE	0.0268 (0.1648)
DENSITY	0.00002 (0.00004)
d2	0.1714 (0.2414)
d1	0.0097 (0.0247)
MIGRATION	-0.0040 (0.012)
-----	
Balti (N=465)	
DISTANCE	-0.0003 (0.0007)
EDUINST	7.04e-06 (0.00003)
EDUSHARE	0.016 (0.033)
DENSITY	8.94e-06 (0.00002)
d2	0.136 (0.1587)
d1	0.0082 (0.0161)
MIGRATION	-0.0027 (0.0038)
-----	
Cahul (N=465)	
DISTANCE	-0.0002 (0.0009)
EDUINST	1.45e-06 (0.00001)
EDUSHARE	0.0049 (0.0204)
DENSITY	6.34e-06 (0.00003)
d2	0.0501 (0.0809)
d1	0.0054 (0.0221)
MIGRATION	-0.0011 (0.0045)
-----	
Chisinau (N=465)	
DISTANCE	-0.0026 (0.003)
EDUINST	0.0001 (0.0002)
EDUSHARE	0.9624 (0.4296)
DENSITY	0.0002 (0.0001)
d2	0.6944 (0.1845)
d1	0.1021 (0.0452)
MIGRATION	-0.0417 (0.0501)
-----	
Comrat (N=465)	
DISTANCE	-0.0002 (0.0005)
EDUINST	1.99e-06 (0.00001)
EDUSHARE	0.0024 (0.0069)
DENSITY	5.17e-06 (0.00002)
d2	0.0826 (0.1191)
d1	0.0047 (0.0134)
MIGRATION	-0.0014 (0.0038)

N=18,600, standard deviations shown in parentheses.

ability of choosing this choice by 0.26 percentage point. An increase by one unit in the number of education institutions in Chişinău increases the probability of choosing Chişinău by 0.01 percentage point. An increase of one unit in the share of spending on education increases the probability of choosing Chişinău by 96 percentage points. An increase of one unit in the population density of Chişinău increases the probability of choosing Chişinău by 0.02 percentage point. If the household is located inside the primate city region this increases the probability of choosing Chişinău by 69 percentage points. The unobserved characteristics of Chişinău increase the probability of choosing Chişinău by 10 percentage points. Finally, exposure of households to international migration decreases the probability of choosing Chişinău by four percentage points.

The marginal effects in the case of the other three major urban alternatives follow a similar pattern; however their magnitudes are much smaller. Interestingly, the negative impact of international migration on the probability of choosing one of these four urban choices is smallest in the case Cahul (-0.11 percentage point) and is largest in the case of Chisinau (-4.2 percentage points).

### 3.7 CONCLUSION

This study presents a new approach to estimating the impact of international migration on the development and accumulation of human capital inside migrant sending (and international remittance-receiving) countries. The main portion of the analysis is based on a discrete choice model that employs factor variable interactions to control consistently for regional heterogeneity. Although the endogeneity of international migration does not appear to play a significant role in this data set, nevertheless I also run a novel estimation model that controls effectively for the endogeneity of this discrete variable within a binary choice model.

In its second part, the study employs the random utility maximization theory at the base of the analysis by investigating a set of factors that influence the utility of choosing specific alternatives within the set of urban choices. In this part of the analysis, I employ a conditional logit model and estimate the marginal effects of changes in alternative specific and individual specific factors on the probability of choosing a city out of the 40 alternatives for employment after graduation. Particularly, I investigate the effects of these factors on the probability of choosing a job in the cities of Chişinău, Bălţi, Cahul, and Comrat (the main urban choices in Moldova); each compared with the other 39 possible urban choices.

To estimate a more accurate effect of exposure to international migration on rural households in the first part of the study, the model also controls for the primate city region (municipality of Chişinău). I include this control because the share of the population residing inside the primate city region of Moldova is large (approximately 22%) and part of it resides in rural villages inside the municipality, while the truly peripheral rural households are located outside the primate city region (this is also in line with the observations in Faggian and McCann (2010)). Thus, exposure to international migration increases significantly the likelihood of choosing urban jobs in the case of college graduates coming from rural households located outside the primate city region (the marginal effect is approximately 5%.) After controlling for the selection bias of international migration, I reinforce the findings in the main probit model. Accordingly, after controlling for endogeneity, exposure to international migration leads, at the mean, to an increase in the likelihood of choosing urban jobs (this, however, is at the boundary of being statistically significant). The marginal effect after controlling for endogeneity appears to be also in the range of 5-10%, similar to the probit model without selection control.

Finally, in the second part of the paper, which looks at the determinants of urban job choices among 40 possible alternatives, I find that, on average, exposure to

international migration has a negative impact on the likelihood of choosing a city compared to the set of other existing urban choices. When looking at the marginal effects specifically for the four major urban choices, we see that international migration has the largest negative impact on the choice of Chişinău city (-4 percentage points) and the least negative effect on the choice of Cahul city (-0.11 percentage point).

These results confirm the main hypothesis that the study sets to investigate. Primarily, exposure to international migration, particularly in the case of rural households located outside of the primate city region of the country, may lead to local brain drain. Within the urban choice set, exposure to international migration also appears to reduce, with a varying degree, the preference towards the main urban choices. Thus, the regional concentration of human capital sponsored by international remittances may have several negative impacts on the development of both rural and urban regions inside developing countries. Peripheral rural communities may suffer the most as they lose key specialists that could increase the productivity and competitiveness of their economies. On the other hand, urban communities may also be negatively affected. In countries that are affected by high corruption levels in the higher education system (like Moldova, according to Heyneman et al. (2008)), international remittances may reduce the barriers of people with lower abilities to enter prestigious universities. As a result, people from rural regions that obtained their secondary education in lower quality rural schools gain easier entry into universities with the purpose of specializing in professions that pay higher income in urban economies (for example, jobs in the financial sector, law, public positions, etc.) However, as the accumulation of mediocre professionals grows (due to bribing university professors and/or administrators to pass particular subjects), this may displace the higher skilled professionals leading to emigration, which could explain the results in

previous research on the topic of international brain drain (Adams (2003); Beine et al. (2008)).

The results of this study call for further investigation into the effects of international migration on the formation of human capital at the regional level. Specifically, future research should analyze the quality of human capital that is sponsored by international remittances. Special attention should be given to the impact of corruption in higher education institutions on further international brain drain or gain.

## BIBLIOGRAPHY

- Acosta, P. A., E. K. Lartey, and F. S. Mandelman (2009). "Remittances and the Dutch disease". *Journal of International Economics* 79(1), 102–116.
- Adams, R. H. (2003). "International Migration, Remittances, and the Brain Drain: A Study of 24 Labor-Exporting Countries". World Bank Policy Research Working Paper 3069.
- Adams, R. H. (2005). "Remittances, Household Expenditure and Investment in Guatemala". World Bank Policy Research Working Paper 3532.
- Adams, R. H. and A. Cuecuecha (2010). "Remittances, Household Expenditure and Investment in Guatemala". *World Development* 38(11), 1626–1641.
- Adelman, I. and J. E. Taylor (1990). "Is structural adjustment with a human face possible? The case of Mexico". *The Journal of Development Studies* 26(3), 387–407.
- Alderman, H. (1996). "Saving and economic shocks in rural Pakistan". *Journal of Development Economics* 51(2), 343–365.
- Arzaghi, M. and A. Rupasingha (2013). "Migration as a Way to Diversify: Evidence from Rural to Urban Migration in the US". *Journal of Regional Science* 53(4), 690–711.
- Bansak, C. and B. Chezum (2009). "How Do Remittances Affect Human Capital Formation of School-Age Boys and Girls?". *The American Economic Review* 99(2), 145–148.

- Barca, F. (2009). “An Agenda for A Reformed Cohesion Policy: A Place-Based Approach to Meeting European Union Challenges and Expectations”. Independent Report, Prepared at the request of the European Commissioner for Regional Policy, Danuta Hübner, European Commission, Brussels.
- Barca, F., P. McCann, and A. Rodríguez-Pose (2012). “The Case for Regional Development Intervention: Place-Based Versus Place-Neutral Approaches”. *Journal of Regional Science* 52(1), 134–152.
- Baum, C. F., Y. Dong, A. Lewbel, and T. Yang (2012). “Binary Choice Models with Endogenous Regressors”. Stata Conference, San Diego, Available online at <http://repec.org/san2012/baum.san2012.pdf> [Accessed on July 20, 2015].
- Beine, M., F. Docquier, and H. Rapoport (2008). “Brain Drain and Human Capital Formation in Developing Countries: Winners and Losers”. *The Economic Journal* 118(528), 631–652.
- Berriane, M. (1997). “Emigration internationale du travail et mirco-urbanisation dans le rif oriental: Cas du centre de Taouima (Région de Nador, Maroc)”. In *Migration Internationale et Changements Sociaux dans le Maghreb. Actes du Colloque Internationale du Hammamet, Tunisie (21-25 juin 1993)*, pp. 75–97.
- Borjas, G. J. (1989). “Economic Theory and International Migration”. *International Migration Review* 23(3), 457–485.
- Bourguignon, F., M. Fournier, and M. Gurgand (2007). “Selection bias corrections based on the multinomial logit model: Monte Carlo comparisons”. *Journal of Economic Surveys* 21(1), 174–205.
- Cameron, A. C. and P. K. Trivedi (2010). “*Microeconometrics Using Stata,*” Revised Edition. Stata Press Publication.

- Chami, R., C. Fullenkamp, and S. Jahjah (2003). “Are Immigrant Remittance Flows a Source of Capital for Development?”. IMF Working Paper WP/03/189.
- Clément, M. (2011). “Remittances and Household Expenditure Patterns in Tajikistan: A Propensity Score Matching Analysis”. *Asian Development Review* 28(2), 58–87.
- Corden, W. M. and J. P. Neary (1982). “Booming sector and de-industrialisation in a small open economy”. *The Economic Journal* 92(368), 825–848.
- Cox Edwards, A. and M. Ureta (2003). “International migration, remittances, and schooling: evidence from El Salvador”. *Journal of Development Economics* 72(2), 429–461.
- Dabalén, A. and J. Miluka (2010). “Who is Bearing the Burden? Exploring the Role of Albanian International Migration on Education”. *Eastern European Economics* 48(6), 36–56.
- Dabija, N. (2011). “Depopulare vs explozie demografica [Depopulation vs demographic explosion]”. Available at: <http://www.reporterdegarda.md/depopulare-vs-explozie-demografica>.
- De Haas, H. (2007a). “Remittances, Migration and Social Development: A Conceptual Review of the Literature”. UNRISD Programmer on Social Policy and Development, Paper Number 34.
- De Haas, H. (2007b). “The impact of international migration on social and economic development in Moroccan sending regions: a review of the empirical literature”. International Migration Institute, James Martin 21st Century School, University of Oxford, Working Paper 3.
- Dixon, S. (2003). “Migration within Britain for job reasons”. *Labour Market Trends* 111(4), 191–202.

- Docquier, F. and H. Rapoport (2012). “Globalization, Brain Drain, and Development”. *Journal of Economic Literature* 50(3), 681–730.
- Dong, Y. and A. Lewbel (2015). “A Simple Estimator for Binary Choice Models With Endogenous Regressors”. *Econometric Reviews* 34(1-2), 82–105.
- Dubin, J. A. and D. L. McFadden (1984). “An Econometric Analysis of Residential Electric Appliance Holdings and Consumption”. *Econometrica: Journal of the Econometric Society* 52(2), 345–362.
- Durand, J. and D. S. Massey (1992). “Mexican migration to the United States: a critical review”. *Latin American Research Review* 27(2), 3–42.
- European Commission (2014). “Programming of the European Neighbourhood Instrument (ENI) - 2014-2020”. Single Support Framework for EU support to the Republic of Moldova (2014-2017), European Commission, Brussels.
- Faggian, A. and P. McCann (2009). “Human Capital, Graduate Migration and Innovation in British Regions”. *Cambridge Journal of Economics* 33(2), 317–333.
- Faggian, A. and P. McCann (2010). “Human capital and regional development”. In R. Capello and P. Nijkamp (Eds.), *Handbook of Regional Growth and Development Theories*, pp. 133–151. Edward Elgar.
- Göbel, K. (2013). “Remittances, expenditure patterns, and gender: parametric and semiparametric evidence from Ecuador”. *IZA Journal of Migration* 2(1), 1–19.
- Gorton, M. (2001). “Agricultural Land Reform in Moldova”. *Land Use Policy* 18(3), 269–279.
- Greene, W. H. (2008). *“Econometric Analysis”* (Sixth, International ed.). Pearson Education.

- Gudim, A. (2004). "Case of Moldova: Mass Labor Migration as a Consequence of Inefficient Reforms". Note prepared for the Workshop on International Migration Regimes and Economic Development, Workshop of the Expert Group on Development Issues, Swedish Ministry of Foreign Affairs, Stockholm.
- Harris, J. R. and M. P. Todaro (1970). "Migration, unemployment and development: a two-sector analysis". *The American Economic Review* 60(1), 126–142.
- Heyneman, S. P., K. H. Anderson, and N. Nuraliyeva (2008). "The Cost of Corruption in Higher Education". *Comparative Education Review* 52(1), 1–25.
- Higgins, A. (2015). "Moldova, Hunting for Missing Millions, Finds Only Ash". *The New York Times*.
- Imedia.md (2011). "Un fenomen alarmant, depopularea satelor [An alarming phenomenon, the depopulation of villages]". (In Romanian), Available at: <http://www.imedia.md/libview.php?l=ro&id=2963&idc=243> [Accessed: 22 October 2013].
- International Monetary Fund (2008, August). "Republic of Moldova: Financial System Stability Assessment - Update". Approved by Jaime Caruana and Michael Deppler, Country Report 08/274, Washington, D.C.
- Jefferson, M. (1989/1939). "Why Geography? The Law of the Primate City". *Geographical Review* 79(2), [originally appeared in the *Geographical Review* in 1939, Vol. 29], 226-232.
- Jones, R. C. (1995). *Ambivalent journey: US migration and economic mobility in North-Central Mexico*. University of Arizona Press.
- Jones, R. C. (1998). "Remittances and Inequality: A Question of Migration Stage and Geographic Scale". *Economic Geography* 74(1), 8–25.

- Kahn, G. A., L. Schroeder, S. Weiner, W. Keeton, J. Harvey, and P. Willis (2003). “The role of community banks in the US economy”. *Economic Review (Kansas City)* 88(2), 15–44.
- Katz, E. and O. Stark (1986). “Labor Migration and Risk Aversion in Less Developed Countries”. *Journal of Labor Economics* 4(1), 134–149.
- Leser, C. E. V. (1963). “Forms of Engel Functions”. *Econometrica: Journal of the Econometric Society* 31(4), 694–703.
- Lewbel, A., Y. Dong, and T. T. Yang (2012). “Comparing Features of Convenient Estimators for Binary Choice Models With Endogenous Regressors”. *Canadian Journal of Economics* 45(3), 809–829.
- Lewis, W. A. (1954). “Economic Development With Unlimited Supplies of Labor”. *The Manchester School of Economic and Social Studies* 22, 139–191.
- Lucas, R. E. and O. Stark (1985). “Motivations to Remit: Evidence from Botswana”. *The Journal of Political Economy* 93(5), 901–918.
- Lücke, M., T. O. Mahmoud, and P. Pinger (2007). “Patterns and Trends of Migration and Remittances in Moldova”. International Organization for Migration Mission to Moldova.
- Massey, D. S., J. Arango, G. Hugo, A. Kouaouci, A. Pellegrino, and J. E. Taylor (1993). “Theories of International Migration: A Review and Appraisal”. *Population and Development Review* 19(3), 431–466.
- Mastrorillo, M. and G. Fagiolo (2014). “International Migration and School Enrollment of the Left-Behinds in Albania: A Note”. Laboratory of Economics and Management Working Paper Series, Scuola Superiore Sant’ Anna, Italy.

- McFadden, D. (1974). “Conditional Logit Analysis of Qualitative Choice Behavior”. In P. Zarembka (Ed.), *Frontiers in Econometrics*, pp. 105–142. New York: Academic Press.
- McKenzie, D. and M. J. Sasin (2007). “Migration, Remittances, Poverty, and Human Capital: Conceptual and Empirical Challenges”. World Bank Policy Research Working Paper 4272.
- McKenzie, D. J. (2006). “Beyond Remittances: The Effects of Migration on Mexican Households”. In Ç. Özden and M. Schiff (Eds.), *International Migration, Remittances & The Brain Drain*, pp. 123–147. The World Bank and Palgrave Macmillan.
- Mîslițcaia, I. and G. Vakhitova (2009). “Remittances for the Republic of Moldova: A way to Survive or a Chance to Succeed?”. Kyiv Economic Institute, Kyiv School of Economics.
- Mora, J. and J. E. Taylor (2006). “Determinants of Migration, Destination, and Sector Choice: Disentangling Individual, Household, and Community Effects”. In Ç. Özden and M. Schiff (Eds.), *International Migration, Remittances & The Brain Drain*, pp. 21–51. The World Bank and Palgrave Macmillan.
- Morcotîlo, I. (2014). “Dezvoltarea regională și două realități paralele: Analiza distribuției geografice a creșterii economice în Republica Moldova”. An Analysis and Economic Forecasting Document prepared for the Independent Analytical Center “Expert-Grup” [in Romanian].
- Ranis, G. and J. C. Fei (1961). “A Theory of Economic Development”. *The American Economic Review* 51(4), 533–565.
- Reichert, J. (1981). “The Migrant Syndrome: Seasonal US Wage Labor and Rural Development in Central Mexico”. *Human Organization* 40(1), 56–66.

- Rose, A. Z. and B. H. Stevens (1991). "Transboundary Income and Expenditure Flows in Regional Input-Output Models". *Journal of Regional Science* 31(3), 253–272.
- Rumleascaia, Z. (2001). "Privatization in Higher Education of Moldova". Master's thesis, University of Massachusetts - Amherst.
- Stark, O. (1978). "*Economic-Demographic Interactions in Agricultural Development: the Case of Rural-to-Urban Migration*", Volume 6. Food & Agriculture Organization of the United Nations, Rome.
- Stark, O. (1980). "On the Role of Urban-to-Rural Remittances in Rural Development". *Journal of Development Studies* 16(3), 369–374.
- Stark, O. and R. E. B. Lucas (1988). "Migration, Remittances, and the Family". *Economic Development and Cultural Change* 36(3), 465–481.
- Stark, O. and J. E. Taylor (1991). "Migration Incentives, Migration Types: The role of Relative Deprivation". *The Economic Journal* 101(408), 1163–1178.
- Tabuga, A. D. (2007). "International Remittances and Household Expenditures: The Philippine Case". Technical report, Philippines Institute for Development Studies, Discussion Paper No. 2007-18.
- Taylor, J. E. (1999). "The New Economics of Labour Migration and the Role of Remittances in the Migration Process". *International Migration* 37(1), 63–88.
- Taylor, J. E., J. Arango, G. Hugo, A. Kouaouci, D. S. Massey, and A. Pellegrino (1996). "International Migration and Community Development". *Population Index* 62(3), 397–418.
- Taylor, J. E. and J. Mora (2006). "Does Migration Reshape Expenditures in Rural Households? Evidence from Mexico". World Bank Policy Research Working Paper 3842.

The Economist (2012). “Remittance corridors: New rivers of gold”. Available at: <http://www.economist.com/node/21553458> [Accessed: 12 March 2015].

Todaro, M. P. (1976). “Internal Migration in Developing Countries”. International Labour Office.

United Nations (1997). “Irrigation in the Countries of the Former Soviet Unions in Figures”. Food and Agriculture Organization, Rome, Available at <http://www.fao.org/docrep/w6240e/w6240e00.htm> [Accessed: 12 March 2015].

United Nations (2005). “Definition of Personal Remittances in the Balance of Payments Context”. U.N. Technical Subgroup on Movement of Natural Persons, Eighteenth Meeting of the IMF Committee on Balance of Payments Statistics, Washington, D.C. (BOPCOM-05/9).

United Nations (2011). “Country Analysis: United Nations - Moldova”.

Valdivia López, M. and F. Lozano Ascencio (2010). “A Spatial Approach to the Link Between Remittances and Regional Growth in Mexico”. *Migraciones Internacionales* 5(3), 7–41.

Valentino, V. (2007). “Managing Corruption in Higher Education in Moldova”. Master’s thesis, Kennedy School of Government, Harvard University, Available at [http://www.culiuc.com/papers/vvalentino\\_corruption.pdf](http://www.culiuc.com/papers/vvalentino_corruption.pdf) [Accessed: July 22, 2015].

Valero-Gil, J. N. (2009). “Remittances and the Household’s Expenditures on Health”. *Journal of Business Strategies* 26(1).

Wakabayashi, M. and G. J. Hewings (2007). “Life-Cycle Changes in Consumption Behavior: Age-Specific and Regional Variations”. *Journal of Regional Science* 47(2), 315–337.

World Bank (2009). “World Development Report 2009: Reshaping Economic Geography”.

World Bank (2011). “Migration and Remittances Factbook 2011”. Second Edition.

World Bank (2015a). “Migration and Development Brief 24”. Migration and Remittances Unit, Development Prospects Group.

World Bank (2015b). “Migration and Development Brief 25”. Migration and Remittances Unit, Development Prospects Group.

# APPENDIX A

## COPYRIGHT PERMISSION

Whitman

Marian Manic <manicm@whitman.edu>

---

### Final Version Files for JORS-14-097.R3

---

Journal of Regional Science <jregsci@osu.edu>  
To: Marian Manic <manicm@whitman.edu>

Fri, Apr 22, 2016 at 9:01 AM

Here is the response I received from our editor at Wiley:

"Formal permission to reuse the article for the author's dissertation isn't required under the terms of the Copyright Transfer Agreement. Authors retain the right to reuse the material (as long as it's not for commercial purposes). Since the administrator is asking for formal permission, can you confirm if the author can wait until the article has published either in an issue or on Early View (in which case she can get instant permission via Rightslink)? Otherwise, I can ask our Permissions Department for assistance."

If you absolutely need to get permission still, the best we can do is wait until the paper is published online. Does that sound like a good plan? I could send the final files to the publisher immediately so we can begin that process, then once the paper is published online (which would be in a month or so), you could get the formal permission. I am not sure what the timeline is on your end regarding your PhD thesis.

Let me know what you think.

~Casey

---

**From:** Marian Manic [manicm@whitman.edu]  
**Sent:** Tuesday, April 19, 2016 12:12 PM  
**To:** Journal of Regional Science  
**Subject:** Re: Final Version Files for JORS-14-097.R3