Remittances and Real Exchange Rate in CIS Countries

by

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Submitted to

Central European University

Department of Economics

In the partial fulfillment of the requirements for the degree of Master of Arts in Economics

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Budapest, Hungary

June 2012

Abstract

For CIS countries, remittances have been growing drastically over the past decade. They have become an important source of financial inflows and make from 1% up to 45% of domestic product, and their share is still expanding.

This paper explores the empirical evidence of impacts that remittance inflows can have on domestic economy, particularly on real exchange rate. I test whether increasing remittances lead to appreciation of the real exchange rate and cause Dutch disease phenomenon.

Using panel data for six CIS countries over the time period 1998-2011, I test the hypothesis with the help of fixed-effects least squares models with and without instrumental variables (OLS and 2SLS). The findings indicate that indeed money sent by migrant workers from abroad tend to appreciate the local currency and cause Dutch disease effects.

Acknowledgement

I would like to thank all professors and employees of Economics Department at CEU for their great work.

I would like to express my sincere gratitude to my academic supervisor, Professor István Kónya, for his valuable comments and advice, great support and professional input into my graduate work.

I am grateful to the Academic Writing Center and particularly to David Ridout for his assistance and consultations.

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1 Introduction

CIS countries became a part of international labor migration only in 1991 when the Soviet Union was abolished. Since then, the region has become a great source of migrants, and most part of such flows is due to economic reasons: workers are attracted by higher salaries and levels of life in more developed countries. The countries of destination are pretty diverse, but most of the migrants stay within the region, focusing mainly on Russia and Kazakhstan. The main reasons for that is that there are no visa requirements to pass through the border for the CIS citizens, the costs of emigrating are lower, and there is usually no need to learn a new language (Russian) and consequently it is easier to find a job.

CIS countries in the last 20 years have started to be not only one of the major migrant sender regions in the world, but also huge remittance receivers. The total value of international remittances to the eight CIS countries that are being analyzed in this paper (Armenia, Azerbaijan, Belarus, Georgia, Kyrgyzstan, Moldova, Tajikistan, and Ukraine) have increased more than 30 times during this time period: from 534.07 mln USD in 1996 to more than 16502 mln USD in 2011 (World Bank 2011).

Countries from the region have been included in the list of top remittance receiving countries for the last five years. According to the last *Migration and Remittances Factbook* of the World Bank, Tajikistan is in the 1st place, Moldova in the 5th place, and Kyrgyzstan is in the 6th place among the top remittances-to-GDP countries in the world. For some of these countries remittances overshadowed other types of financial inflows like FDI, foreign aid, and others (Figure 3). Remittances appear to be a more stable source of external financing than foreign direct investment, which has been shown during the last world financial crisis. Reduction in their

value by 20% in 2009 compared to 2008 is much lower than the 54% decline in FDI levels. Overall, in CIS countries that I analyze international remittances range from 0.6% of GDP (Belarus) up to 45.4% of GDP (Tajikistan) in 2011.

In this paper I cover seven CIS countries: Armenia, Belarus, Georgia (which moved out from CIS agreement in 2009 but still has the common socioeconomic patterns of the region), Kyrgyzstan, Moldova, Tajikistan, and Ukraine. I do not include Kazakhstan and Russia, as these countries do not receive, but send huge amounts of capital flows in forms of remittances. Two other countries Turkmenistan and Uzbekistan are excluded from the research because of data unavailability.

Although remittances can influence human capital, and reduce poverty and inequality (Mansoor and Quillin 2007), large amounts of them could be perceived as "posing macroeconomic challenges for the recipient countries" (Barajas et al. 2011). In particular, there is a concern about whether remittances could pressure the real exchange rate due to increase in demand for local currency as they are usually transferred in foreign currency and "Dutch disease" phenomenon effects. These effects are generally pushing up effects on the real exchange rate because of huge financial capital inflows originated from natural resource booms, foreign aid, or remittances. Such large inflows might have adverse effects, because the Dutch disease has negative impact on the manufacturing sector – leads to its shrinkage and reduction in competitiveness (Corden and Neary 1982). These possible negative effects of migrants' remittance inflows on domestic economy raise an important question about their regulation and appropriate reaction to them, and induce to explore the relationship between remittances and real exchange rate more closely.

This study is the first one to provide empirical evidence of the relationship between remittances and the real exchange rate in six CIS countries. The paper argues that the inflows of remittances, as they are usually made in foreign currency, shift up the demand for local currency and thus directly affect exchange rate. Moreover, remittances, as financial inflows, increase household income and raise aggregate demand for tradable and non-tradable goods and thus pressure the real exchange rate. So, the hypothesis to be tested is whether increase in international remittance inflows lead to appreciation of the local currency.

The model chosen for empirical investigation is fixed effects panel model with and without instrumental variables. It will be calculated with the help of panel OLS and 2SLS estimation techniques. The instrumental variables included into analysis are primary school gross enrollment rate and average host country (Russia) per capita GDP. They are supposed to deal with any endogeneity problems that might arise. The fixed effects model helps to capture any unobserved country specific effects in series. The study is based on the analysis of annual data over the period 1998-2011.

The findings suggest that growing remittance inflows tend to appreciate the real effective exchange rate in the analyzed countries. The parameters of remittances, government spending, and GDP per capita, which measures Balassa-Samuelson effect, are all significant and positive.

The paper is organized in the following way. It starts with the overview of remittances to the region, their special patterns and dynamics. It is followed then by the literature review of the main underlying theory, which concerns remittances and exchange rate relationship. Different models and empirical findings are presented briefly. Next, the methodology, data, and empirical results are presented. The study ends with brief conclusion and policy implications.

2 Remittance dynamics and recent trends in their flows

This chapter demonstrates the importance of remittance inflows to the region and provides their main characteristics. The dynamics of their growth with consideration of latest world economic crisis is examined in detail and recent trends in their flows are investigated. Moreover, comparison of their sizes with other capital inflows is included.

The ongoing growth of migration and its massive levels lead to high levels of remittances that are sent to the region, and its continuously increasing trend. According to O'Hara et al. (2009, p.453), remittance inflows are the crucial source of financing the huge external trade deficits in Georgia, Armenia, Moldova, Kyrgyzstan, and Tajikistan. Moreover, in these countries net FDI levels are much lower than the new source of external financing – remittances.

The greatest part of the external labor migrants from the CIS countries stay within the region, preferring Russia and Kazakhstan as destination points. The share of remittances, which come from Russia and Kazakhstan to the observed CIS countries, is huge and varies from 60 to 90 percent of total inflows, except for Moldova. Moldova receives about 42% of its total remittances from Russia (Central Bank of Moldova), and other half come from non-CIS part of the world. Overall, total remittances sent from Russian to CIS countries grew from $600 million in 2011 to $22 billion in 2008. According to the Central Bank of Russian Federation, nowadays the average amount of each transfer of labor migrant from CIS region who is working in Russia equals to about 637 USD. Kazakhstan sent $100 million to CIS in form of remittances in 2000 and $3.5 billion in 2008 (O'Hara et al. 2009, p.452).

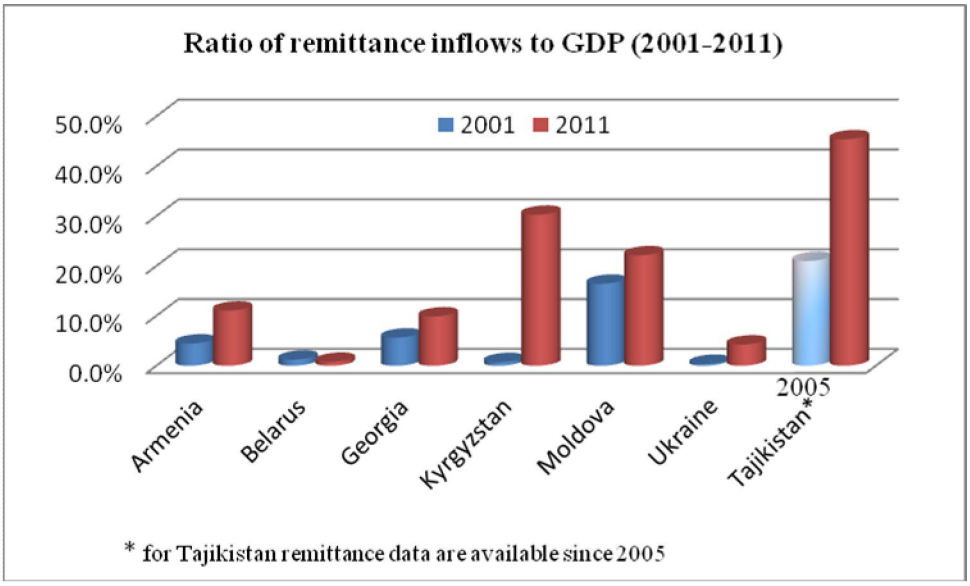
There are great differences between estimated numbers of migrant workers by official services and unofficial approximations. For example, while in 2008 the official number of migrants from CIS to Russia by the Russian Federal Migration Service is less than 450 thousand people, estimations that counted for illegal migrants give approximately 7.3 million labor migrants (O'Hara et al. 2009, p.449). Thus, it seems that there is a big underestimation of labor movements in the region and its importance by official services.

Since 2002, remittances to developing countries have increased more than two times (World Bank). By Ratha et al. (2008, p.7), the reasons of remittances inflows doubling between 2002 and 2007 are: "(a) growth in the migrant stock and incomes, (b) increased scrutiny of flows since September 2001, (c) reduction in remittance costs and expanding networks in the remittance industry, and (d) the depreciation of the U.S. dollar during this period, which encouraged higher remittances to compensate for the loss of purchasing power vis-à-vis appreciating local currencies and rising costs of living in the origin countries." The CIS region supports the global trend of increase in remittances too (Figure 1). This growth is explained by the factors that were highlighted by Ratha et al. (2008), and partly by better reporting and more attentive study of this issue in the last decade.

In particular, Tajikistan is the country with greatest remittances to GDP ratio not only in CIS region, but in the world (World Bank 2011). Remittances made 21% of GDP of Tajikistan in 2005 and continued growing rapidly since then. As a result, in 2011 they already make 45.4% of country's GDP. Remittances made 30% of Kyrgyzstan's GDP in 2011 compared to 0.7% in 2001, whereas remittance inflows to Moldova increased from 16.4% to 22% of country's GDP in ten years. Kyrgyzstan, Moldova, and Tajikistan demonstrate significant growth rates of

remittances, while other countries show still increasing but less steep trend. The remittance inflows to Armenia have increased from 4.5% of GDP to 11% of GDP during the last decade. Inflows to Georgia and Ukraine show rise from 5.6% to almost 10% and from 0.4% to more than 4% respectively, and only remittance levels in Belarus practically didn't change.

Figure 1. Ratio of remittances to GDP



Sources: *Compiled by author from data of the World Bank*

Nowadays remittances are the largest financial inflows to the region, but actually they started gaining importance mainly in last decade (Table 1). For example, the level of remittances in Armenia increased from 92 to 1132 mln. USD in 1998-2011. Remittances to Georgia increased almost seven times from 2000 (274 mln. USD) to 2011 (1419 mln. USD), while for Ukraine their sharpest growth is seen in 2007. The most drastic increase in remittances occurred to Kyrgyzstan, Moldova, and Tajikistan, especially in 2006-2008. For Kyrgyzstan they increased three times in these two years and more than 100 times in one decade (2001-2011).

The similar pattern is observed for Moldova and Tajikistan. In Moldova, for example, remittances increased from 243 mln. USD in 2001 to 1549 mln. USD in 2011. Amount of remittances in Tajikistan almost doubled each year from 2002 to 2006 and continued growing sharply until 2008. In 2009 due to the world crisis incoming money flow decreased and after that the growth rates of remittances slightly slowed down. Belarus seems to be the only country that didn't see a sharp increase in money sent by migrants. The size of remittances to Belarus had even decreased in the early 2000s and then grew back. The maximum level of remittances the country has received in 2008, just before the crisis.

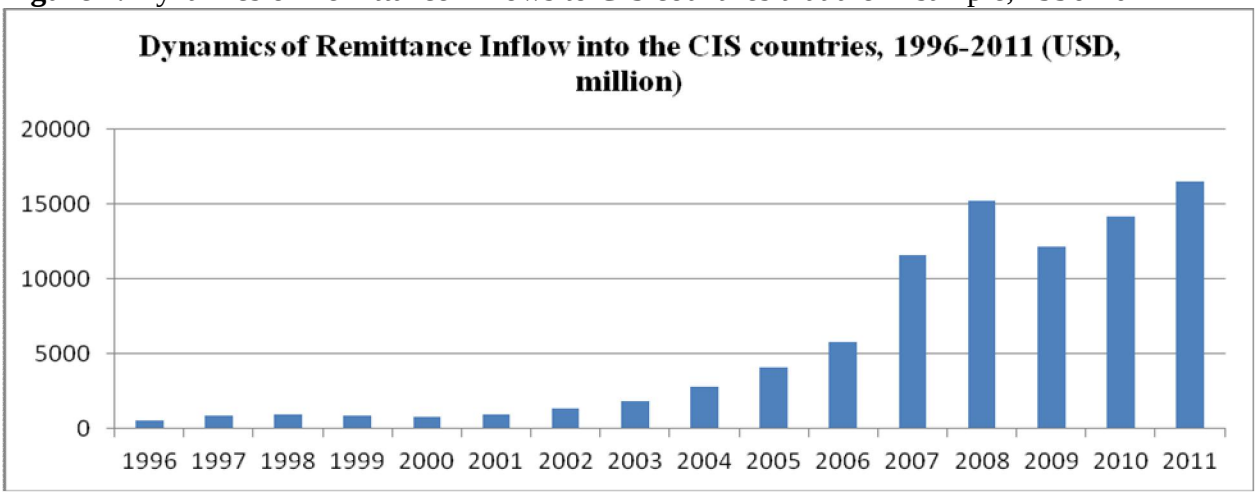
Table 1. Incoming remittances to the region, 1998-2011 (mln.USD)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Armenia	92	95	87	94	131	168	435	498	658	846	1062	769	996	1132
Belarus	315	209	139	149	140	222	257	255	340	354	443	358	376	397
Georgia	373	361	274	181	230	236	303	346	485	695	732	714	806	1419
Kyrgyzstan	25	18	9	11	37	78	189	322	481	715	1232	992	1275	1791
Moldova	124	112	179	243	324	487	705	920	1182	1498	1897	1211	1370	1549
Tajikistan	N/A	N/A	N/A	N/A	79	146	252	467	1019	1691	2544	1748	2254	2680
Ukraine	12	18	33	141	209	330	411	595	829	4503	5769	5370	5862	6949

Sources: *World Bank database and author's calculations based on data from central banks and national statistical offices.*

Figure 2 very well illustrates the behavioral pattern and overall dynamics of incoming remittances to the CIS region for the last decade. The overall trend of money that migrants transfer home is clearly positive with some small drop in 2009. The decline in remittance inflows in 2009 can be explained by the consequences of the world economic crisis and reduced economic activity.

Figure 2. Dynamics of Remittance Inflows to CIS countries that are in sample, 1996-2011

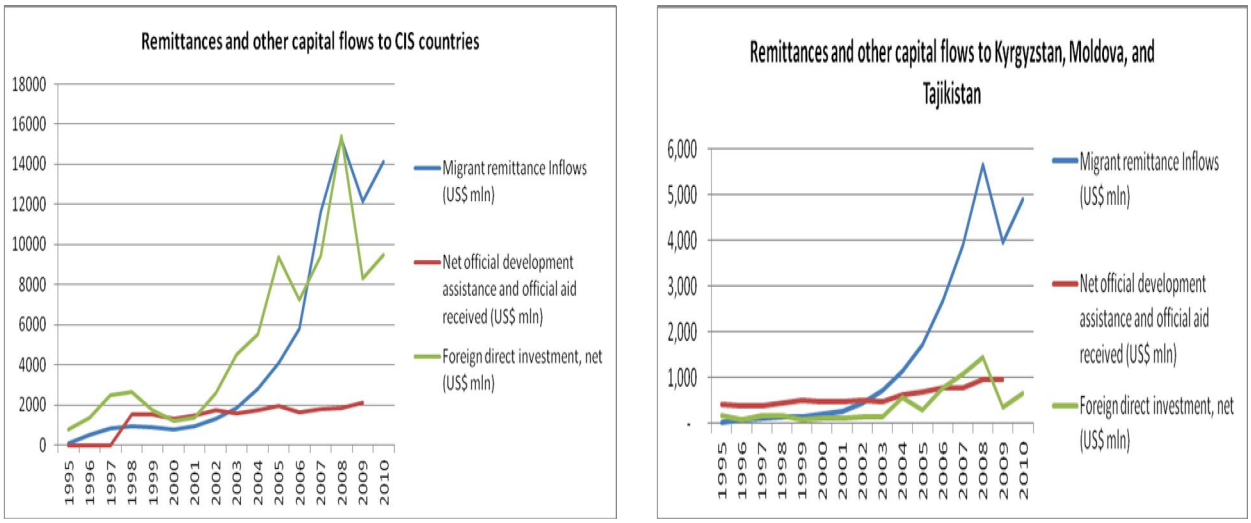


Sources: *Compiled by author from data of the World Bank*

The world economic crisis had adversely affected remittances and made them drop sharply in 2008-2009. Overall, in analyzed CIS countries the volume of migrants' money fell down by more than 21% in 2009 in comparison with the previous year. Countries, which suffered the most from the economic crisis, are Moldova (remittances fell by 36.2%) and Tajikistan (31.3%). Other countries, on the contrary, do not seem to be affected much, like Georgia (4% fall) and Ukraine (12.1%). It matches predictions of the World Bank, who claimed that the Eastern European and the CIS countries will have the largest fall in remittances (O'Hara et al. 2009, p 448). However, by 2011 net international remittances to the region increased back and even beat their pre-crisis record of 15,233 mln USD.

At the same time foreign direct investments to the region could not come back to their 2008 levels and made just 9,460 mln USD, which makes remittances the leading source of capital inflows to the countries of analysis (Figure 3). It meets the predictions of experts, who claim that remittances to our region "will exhibit resilience compared to private capital flows and official aid" (Ratha et al. 2008, p.7), and thus they will keep strongly affecting the economic situation in CIS countries.

Figure 3. Remittances and Other Capital Flows to the Region, 1995-2011



Sources: *Compiled by author from data of the IFS*

In Kyrgyzstan net foreign direct investments made about 10% of national GDP in 2009, when their sharpest drop was observed. In Moldova and Tajikistan FDI contributed just 3% and 1% to the GDP respectively. The second part of Figure 3 illustrates in more details the comparative dominance of remittances as source of financial inflows to the countries in the region, especially for three most remittance receiver countries Kyrgyzstan, Moldova, and Tajikistan.

Undoubtedly, the massive levels of external migration and consequently huge remittances inflows in the CIS region lead to increasing importance of such flows for the individual economies and the region in general. The following part of this paper is aimed to explore the impact of remittances on the sector of tradable and non-tradables, and more precisely on the real exchange rate.

3 Literature review and theoretical consideration of the problem

The appreciation of the real exchange rate due to huge financial inflows is referred to as the Dutch disease phenomenon. Historically, such financial inflows came with the booming manufacturing sectors – natural gas in the Netherlands, minerals in Australia, or oil in Norway. One of the first empirical papers that widely discuss the main principles of the phenomenon, its mechanism and effects in natural resource boomers is written by Corden and Neary (1982). Lately, other kinds of foreign capital inflows such as financial aid and remittances are also being accepted as originators of Dutch disease.

It is proposed that increase in remittance inflows lead to appreciation of domestic currency in CIS countries. This section of the paper contains theoretical justification of our hypothesis and review of found relevant literature on this issue. The analysis of previous studies is organized as following: first, the Dutch disease phenomenon is discussed. Then studies are grouped and investigated by the type of methodology. Next, studies supporting different approaches and having conflicting findings are presented and analyzed.

The existing literature on the subject of remittances and exchange rates is quite limited and recent. Most of them were published in the last ten years, mainly because of the rising global migration problems and increased data availability. There are different models and estimation techniques that are used in the empirical parts of the research works; some economists use time-series models, while others make panel data estimations.

Most of the relevant literature, which is discussing the Dutch disease and its mechanism, uses the Salter-Swan-Conder-Dornbusch model as the theoretical base for further empirical analysis. The main assumption of the model is that the prices for tradable goods are determined

exogenously. The model claims that an increase in remittances is associated with an increase in households' incomes. This income growth makes households spend more on both tradable and non-tradable goods. The prices for tradables are determined exogenously in the model, so countries are price takers in international market. Thus, the additional demand does not push up prices for tradable goods. However, the prices for non-tradables grow due to rise in demand, as they are determined inside of the country, as a result of "spending effect".

Simple neoclassical theoretical framework assumes that the prices of tradable goods are equalized across countries and supposes that changes in the real exchange rate arise mainly from relative movements in the prices of non-tradable goods across countries. Thus, an increase in the price of non-tradable goods relative to the price of tradable ones leads to real exchange rate appreciation. Moreover, the higher prices lead to an expansion in the sector of non-tradable goods and services, which is called as a "resource movement effect". As a result of this effect, resources from the tradable sector move to the non-tradable sector, which might have negative impact on tradable sector and it's shrinking (Ozcan 2011).

Existing works on the issue of remittances - REER relationship and Dutch disease are done both on individual countries as well as on a cross-country level. Most of the scholars that analyze single country do it with the help of unit root testing, cointegrating equations and vector autoregressive models. The most detailed works that focus on individual countries are the study made on Cape Verde by Bourdet and Falck (2006), on Jordan by Saadi-Sedik and Petri (2006), and the study on Mexico by Vargas-Silva (2007).

Bourdet and Falck (2006) have used quite limited time-series data for the period 1980-2000 to prove the hypothesis that more remittance inflows lead to appreciation of the exchange rate. They investigate the case of Cape Verde, where the main sources of capital inflows are

official development assistance, remittances, and tourism revenues. They use Engle & Granger co-integration tests to check their hypothesis. As a result, they suggest that remittances cause Dutch disease effects and thus deteriorate the competitiveness of the tradable sector. The magnitude of this effect, however, is small in comparison with the effect of official aid. Saadi-Sedik and Petri (2006) also obtained very modest results for Jordan by using similar methodology and longer time period (1964-2005).

The other scholar, Vargas-Silva (2007), uses impulse response functions (IRFs) and variance decompositions (VDCs) derived from the VAR to prove that there is a causal relationship between remittances, exchange rates and money demand in Mexico. This work differs from all the other similar papers, because the author considers workers' transfers just from one country (USA) and in one currency (USD) assuming that only migrants working there are remitting money home. In case of Mexico this assumption might be quite reasonable due to migration patterns in this country and a very small (insignificant) portion of remittances from countries other than USA. However, this particular approach might not be appropriate for most of other studies, especially when there are a number of analyzed countries.

While single-country works come to somewhat similar results, panel studies differ in size of datasets, methodology, and final conclusions. Scholars that have a big number of countries and a long time period (Acosta et al. 2009, Lartey et al. 2008) use generalized method of moments' estimator in their work, because it deals with the potential endogeneity in all explanatory variables. Those researchers who have less countries and shorter time periods in their dataset tend to have in their methodological part different kinds of least squares with fixed or random effects. Some of them (Lopez et al. 2007, Amuedo-Dorantes and Pozo 2004, Barajas et al. 2011) add also instrumental variables to avoid the endogeneity in their equations and get

most accurate results, while others (Bourdet and Falck 2006, Ozcan 2011) claim that there is no risk of endogeneity in their regressions and remittance flows are purely exogenous.

Most of empirical studies that have explored the rise in exchange rate in countries that have experienced increases of remittances seem to prove my hypothesis. Lopez et al. (2007), Acosta et al. (2009), Barajas (2011), Amuedo-Dorantez and Pozo (2004), Bourden and Falck (2006), Amuedo-Dorantes and Pozo (2004), and Lartey et al. (2009) all find that remittances cause RER appreciation. Of course, the size of the appreciating effect differs across these studies, but its direction is clearly positive. However, there are studies that have the opposite results. For example, Ozcan (2011) finds no support that remittances lead to Dutch disease. Ozcan (2011) in his analysis of 10 developing countries in 1980-2009 period finds that remittances in fact leads to depreciation of real exchange rate. The obtained results that contradict with Dutch disease theory are explained by the low financial development in the countries that are in sample, and that they can't properly channel remittances to investment in non-tradable sector. However, the obtained results are still unexpected and contradict with both theory and findings of other scholars.

The other small group of authors (Mongardini and Rayner 2009) suggests that there is no relationship between remittances and REER. These authors in their analysis of Sub-Saharan African countries find that remittances in the long run have no effect on appreciation of real exchange rate. They explain it by the existence of much excess capacity in the non-tradable sector for the countries they observe as most of them have post-conflict economies. In this case, remittances are used to "capacity utilization, with no upward pressure on the price of non-tradables and consequently the equilibrium real exchange rate" (Mongardini and Rayner 2009, p.17). However, the case of Sub-Saharan African countries can be considered as an extreme one

(post-conflict economies), and for the case of CIS countries results are likely to be different than that obtained by Mongardini and Payner (2009). In addition, for the Sub-Saharan region large capital inflows are associated with foreign aid rather than remittances, because their inflows are more than three times more (Mongardini and Rayner 2009).

There is a study that finds appreciating, depreciating, and no effect of remittances on exchange rate in different countries. Izquierdo and Montiel (2006) focus on six Central American countries during the period 1985-2004 in their work and obtain mixed results. They have built separate cointegrating equations for each of the country, running panel VAR models. Eventually, for some of the countries (Honduras, Jamaica, and Nicaragua) they find no influence of remittances on the real exchange rate. In Dominican Republic they find the depreciating effect of remittances, and in El Salvador the estimated effect is in opposite appreciating. Such different results might come from the methodology that was used by the authors and country specific characteristics. For example, there might be some specific consumption behavior when most of the incoming remittances are disproportionally spent on traded goods. In this case one could expect no influence of remittances on the exchange rate.

There is currently no consensus on the size of impact of remittances on appreciation of real exchange rate. While Acosta et al. (2009), Barajas (2011) find moderate or small impact, Amuedo-Dorantes and Pozo (2004), and Lopez et al. (2007) argue that rise in remittances lead to significant appreciation of real exchange rates. In particular, Amuedo-Dorantes and Pozo (2004, p.1415) find that "a doubling of the remittances to GDP ratio [author's note: relative to previous level] would lead to a real exchange rate appreciation of above 22 percent". The explanation of difference in findings is that Dorantes and Pozo (2004) focus on Latin American countries, and migration patterns in this region are different from those of other regions. Moreover, in their

work they measure remittances variable as remittances per capita while other researchers usually use total volume of remittances. And last, they do not include any variable reflecting monetary policy conducted in an observed country, which can lead to biasness in their results due to omitting an important variable.

The latest and most detailed work on Dutch disease phenomenon of remittances is the one, which is written by Barajas et al. (2010). The most innovative and original part of the study is the theoretical model, which was built by the authors. They construct the notions of internal and external balances in the market for non-tradable goods, which determine the equilibrium exchange rate and steady-state level of household consumption. Changes in amount of remittances move internal and external balance curves, which affect their intersection point that defines the equilibrium exchange rate.

To check their model, Barajas et al. make some empirical tests using dynamic least squares with fixed-effects method. They have 58 high and upper-middle-income countries, 43 low-income countries, and 38 lower-middle income countries in the sample. Scholars use a small open economy model and find different results for each separate group. According to their findings, the presence of Dutch disease effect and its severity depends highly on degree of openness, factor mobility, share of tradables in total consumption, and the sensitivity of country's risk premium to remittances (Barajas et al. 2010, p 29-30).

Overall, the review of the previous empirical literature on the topic of remittances and exchange rate reveals that studies differ in their findings. Different and sometimes even contradictory results are obtained, depending on country and region specific characteristics, time periods, and econometric methods. Based on the summary of previous studies on remittances and real exchange rate I choose main variables for the empirical model, which will be explained in

more details in next chapter. As I have a cross-section of CIS countries, the generalization of mainly panel studies and their methodologies was done. The estimation technique chosen is fixed-effects lease squares panel model with and without instrumented variables.

4 Data

In my paper I want to see whether there is an appreciating effect of remittances on the real exchange rate in a number of CIS countries and to see its magnitude. To have most precise estimations, I need to control for other factors that could also lead to movements in exchange rate. I have followed the majority of previous researchers (Amuedo-Dorantes and Pozo 2004, Izuierdo and Montiel 2006, Ozcan 2011, Lartey et al. 2008, Acosta et al. 2009) while choosing following explanatory variables for the equation in addition to real effective exchange rate:

- government expenditures,
- world interest rate,
- external terms of trade,
- GDP per capita.

I will briefly describe each variable that is included into model in the following part of the chapter.

Real exchange rate. There is no common agreement among scholars on which measure of the real exchange rate to use. Some of them, like Ozcan (2011), Amuedo-Dorantes and Pozo (2004), use bilateral rate in their studies, while all the others use multilateral rate. Following Izuierdo and Montiel (2006), Lartey et al. (2008), and others, I use the real effective exchange rate index in my estimations. The REER indices come from IFS (International Financial Statistics).

Remittances. International workers' remittances are measured by the ratio of remittance inflows to GDP. I find it more reasonable than using remittances per capita, because in this case their importance relative to the size of the economy is considered. These data come from the central banking offices and World Bank database. Due to absence of data on unofficial money

transfers of migrants, only recorded flows through the money transfer systems will be analyzed. Omitting of unofficial remittances from the investigation may cause an overestimation of cause-effect relationship between remittances and exchange rate appreciation. Still, I expect to confirm the hypothesis (which states that increase in remittance monies leads to local currency appreciation), because local authorities estimate that about ¾ of total remittances come via official channels.

Government spending. Next, I account for the fiscal policy in countries. Relative government spending (Government expenditures/GDP) could affect the exchange rate from the demand side. Depending on the composition of government spending between traded and non-traded goods, relative prices and long-run exchange rates can move in different ways. As government spending is mostly directed to services (non-traded goods) I expect it to have the appreciating effect on REER. Data for government expenditures come from the national statistical offices of the countries.

World interest rates. The exchange rate may be impacted by capital inflows or outflows other than remittances that occur in a country. World interest rates are included into model to control for changes in external financial conditions. I use the US real interest rates on T-bills to measure the world interest rate, and these series come from the IFS.

Terms of trade. The external terms of trade are supposed to measure how external demand and supply affect the tradable part of the economy. The changes in terms of trade cause movements in wages in the tradable sector and then wages and prices in the non-tradable sector through an income effect and substitution effect. For example, if terms of trade improve, then more goods can be purchased, which is called an income effect. At the same time it means that prices for tradable goods decrease, and it leads to fall in demand for non-tradable goods, and

consequently decrease of their prices. This mechanism is called the substitution effect of changes in terms of trade. The direction of total exchange rate movement depends on which of these effects prevail. I use the net barter terms of trade index provided by the World Bank to measure these effects.

GDP per capita. GDP per capita is introduced to my model to take into account the Balassa-Samuelson effect. This effect relies on difference in productivity growth between tradable and non-tradable sectors of countries. By Balassa-Samuelson theory, productivity in tradable sector growth faster than the productivity in non-tradable sector in developing countries that converge towards developed countries. Thus, prices in different sectors decrease with different magnitudes and it eventually leads to appreciation of the exchange rate. GDP per capita data are taken from the national statistical offices of analyzed countries.

The observations include yearly data from 1998 to 2011, as the largest increase in remittance inflows to the region are seen over the last ten years. Another reason of taking such short time period is that there is lack of relevant data on most of the variables before these years. Countries that are being included into calculations are Armenia, Belarus, Georgia, Kyrgyzstan, Moldova, and Ukraine. Data for Tajikistan are not included into main calculations and are used as an extension, because they are available only from 2005.

5 Estimation and Results

Before going to empirical investigations, I want to present the unconditional correlations of remittances and real exchange rate for the CIS countries that are in the sample (Figure 4). Even though it is just a preliminary graphical analysis of the hypothesis, there is a clear positive relationship between main variables of the research. Especially it is revealed in countries with the largest remittances to GDP ratio. For example, Ukraine and Georgia do not show a close relationship between remittances and REER, and their remittances make up to 10% and 4.5% of GDP respectively. At the same time Kyrgyzstan, Moldova, and Tajikistan demonstrate a clear positive correlation starting from 2000. The REER almost dublicates the behavioral pattern of remittance flows for these countries, and two variables are almost moving in parallel.

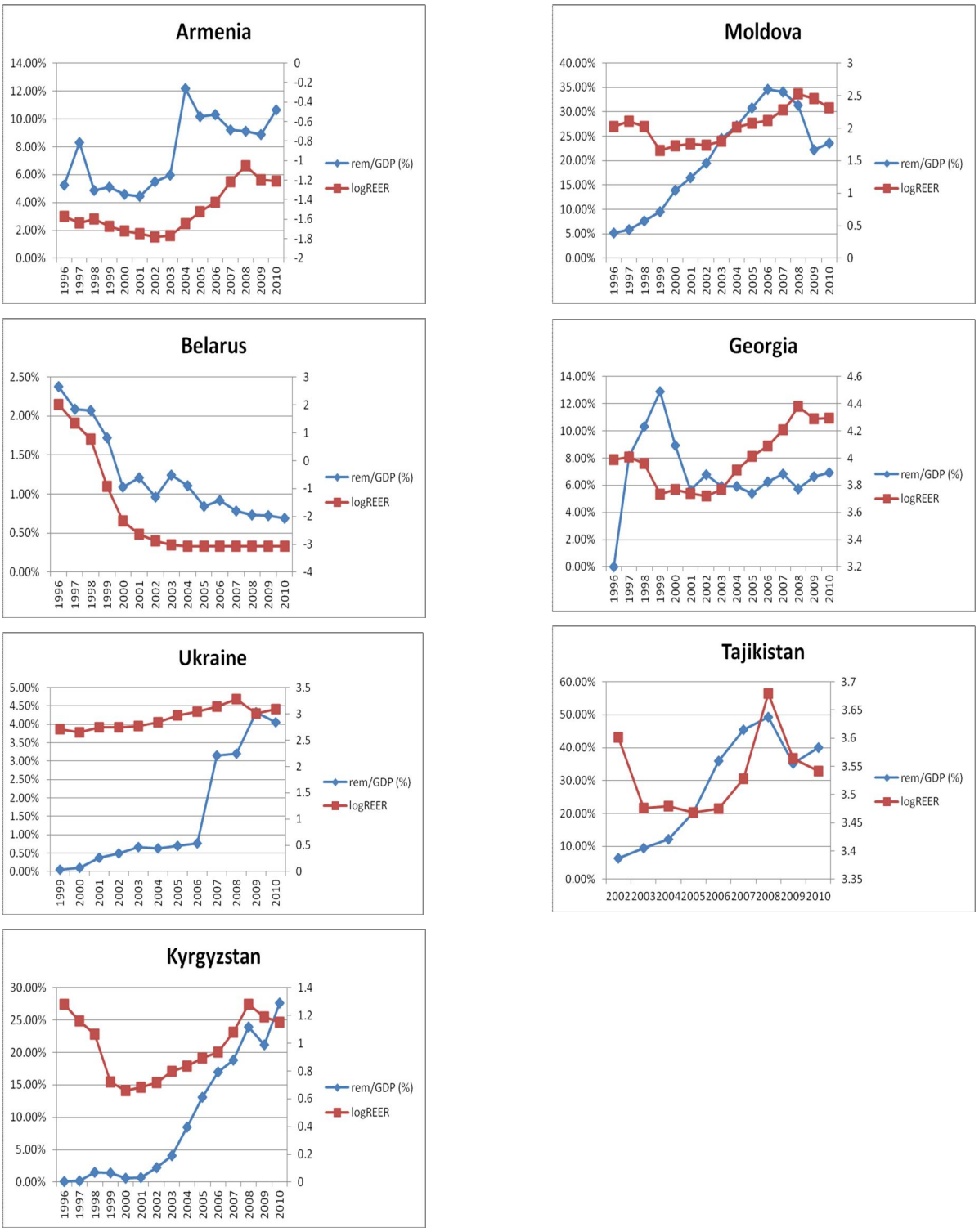
In my empirical model, which is used to test the hypothesis, I tried to include the main determinants of the real exchange rate along with remittances. Justification of their presence in the model is presented in the chapter above, and the implicit version of the model itself is given by

$$REER = f(Remit, G, TOT, R, \chi), \qquad (1)$$

where REER is the real effective exchange rate, Remit is remittances to GDP ratio, G is government spending, TOT is terms of trade, R is world interest rate, and χ is GDP per capita that catches the Balassa-Samuelson effect.

Before estimating the equation (1) and making any further operations I need to transform series for all the variables, except world interest rate, into their natural logarithmic forms. After

Figure 4. Remittances and the real exchange rate



Sources: *Compiled by author from IFS database and author's calculations based on data from central banks and national statistical offices.*

that their stationarity is to be assessed. Depending on presence of unit root, the further empirical model is to be chosen.

To check for the stationarity of the transformed variables, Augmented Dickey-Fuller (ADF) panel unit root tests were conducted. The test checks the null hypothesis, which is that variables have unit root. The results of the ADF test are reported in the Table 2.

Table 2. The Results of Panel Unit Root Tests (ADF test)

Variables	Level		First Difference	
	Statistic	Prob. **	Statistic	Prob. **
Log (REER)	8.21897	0.7678	23.2980	0.0253*
Log (Remit)	6.64417	0.8802	21.1979	0.0476*
Log (G)	5.89838	0.9211	29.5779	0.0032**
Log (TOT)	10.4583	0.5758	23.1754	0.0263*
Log (χ)	13.4491	0.3373	28.0024	0.0055**

According to the ADF test results, for all the variables in their levels the null hypothesis of unit root couldn't be rejected. This means that all the tested series are nonstationary and there is a violation of linear model assumptions for the least squares model (findings of OLS estimations with initial nonstationary variables are in Appendix A.2).

As all the variables in the model, except world interest rate, are not stationary, they cannot be used in further estimations without any adjustments. In order to proceed with the estimation process, I have to transform the nonstationary series into stationary by first-differencing them. Table 2 shows that the first differences of all series that have unit root are indeed stationary at 5% significance level. Some of them like real effective exchange rate, government spending, and GDP per capita show stationary even at 1% significance level.

After appropriate operations, the estimations of equation (1) can be done. To account for the country heterogeneity, I use fixed-effects least squares model. The fixed-effects model helps to take into account any country specific unobserved factors that affect exchange rate and do not

change over time. I could have used the random effects estimator instead of fixed effects, but then I need to assume that the unobserved effect is uncorrelated with all the explanatory variables, which might not be the case.

In order to choose the most relevant method, I have run Durbin-Wu-Hausman specification test. This test is a classical tool to decide which one of fixed or random effects models to use. The basic idea of the test is that we are choosing between the null and alternative hypothesis. Under null, both $\hat{\beta}_{FE}$ and $\hat{\beta}_{RE}$ are consistent, but only random effects estimator is efficient. Under alternative hypothesis, just $\hat{\beta}_{FE}$ is consistent and $\hat{\beta}_{RE}$ is not. The test results (Appendix A.3.) show that there is a significant correlation between the unobserved country-specific effects and other variables, and random effects would lead to inconsistent results. Therefore, fixed-effects model is chosen to estimate the equation (1).

The specified fixed-effects model for the determination of the relationship between real exchange rate and remittances is given by

$$REER_{it} = \alpha_i + \beta_1 Remit_{it} + \beta_2 G_{it} + \beta_3 TOT_{it} + R_t + \chi_{it} + u_i + \varepsilon_{it} \quad (2)$$

where α_i is individual intercepts, β_k are coefficients of interest, *i* and *t* are country and time indices respectively. World interest rate does not vary across countries, but changes over time and has just *t* subscript. u_i is unobserved country fixed effect, which we eliminate by fixed-effects estimation technique.

The main interest here is to estimate the parameter β_1 in the equation (2). This parameter shows that size of contribution of remittances into exchange rate movements and its direction. It is claimed that increase in remittance inflows lead to appreciation of the local currency, so I expect to find $\beta_1 > 0$. If there is no significant cause-effect relationship between remittances and exchange rate, then the hypothesis will be failed to be proven and $\beta_1 = 0$.

As I have mentioned before, a great share of the remittances to the countries of interest come from Russia. Therefore, there is a possibility that there is a contemporaneous correlation between cross-sections. In order to control for this particular issue and presence of cross-section heteroskedasticity, I have selected the Cross-section SUR while specifying settings for the GLS weights. The resulting table is presented above. White period standard errors are used to check for any robustness towards heteroskedasticity across standard errors and covariance statistics.

There is one problem with the fixed-effects least squares model in my estimations. This problem is in possible endogeneity in the remittances – exchange rate relationship. For example, as well as inflow of remittances tends to appreciate local currency, exchange rate movements might cause changes in remittance monies. Lopez et al. (2007) note that an overvalued exchange rate can cause decrease in amount of remittances sent by migrants. Devaluation of the currency, in opposite, can make sending remittances more attractive (Lopez et al. 2007, p.14). To address the potential endogeneity problem, I included instrumental variables (IV) method into my calculations.

I am following Amuedo-Dorantes and Pozo (2004) who propose using primary school gross enrollment rate as instrument for remittances and Barajas et al. (2011) who have average host country per capita GDP as instrumental variable. It seems that these instruments are not correlated with the error terms of equation (2) and are correlated with exchange rate through remittances. Primary school enrollment statistics shows the overall educational situation in the country. The higher enrollment rate in a country means higher educational level among migrants on average. Level of worker's education determines the sector he is being employed in, duration of his employment, and salary. Thus, I propose that higher school enrollment rate would be a

good instrument, because it means higher level of incoming remittances and consequently greater appreciation of the currency.

The second instrument, which is host country (Russia) per capita GDP is correlated with the remittances and through them with the exchange rate in the following way. Higher per capita GDP in a host country will more likely lead to higher earnings among migrant workers and therefore more money sent home by them.

6 Results

I have calculation equation (2) with fixed-effects panel two-stage least squares method, including instrumented variable to avoid potential endogeneity of remittances. GDP per capita of the main host country – Russia – is used as an instrument. The results of estimated fixed-effects with and without IV are presented in Tables 3 and 4. To calculate the model with IV, 2SLS estimation technique is used.

Table 3. Fixed-effects estimation results

Dependent Variable: REER1
Method: Panel EGLS (Cross-section SUR)
Sample (adjusted): 1999 2011
Periods included: 13
Cross-sections included: 6
Total panel (balanced) observations: 78
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMIT1	0.038349	0.012596	3.044475	0.0033
GOVCONS1	0.156511	0.052591	2.975998	0.0041
INTRATETBILLS	0.005154	0.004095	1.258689	0.2125
TOT1	-0.229110	0.079945	-2.865845	0.0056
GDPCAPITA1	0.358079	0.121251	2.953211	0.0043
C	-0.026903	0.012559	-2.142202	0.0358
Effects Specification				
Cross-section fixed (dummy variables)				
Weighted Statistics				
R-squared	0.397046	Mean dependent var		-0.124429
Adjusted R-squared	0.307052	S.D. dependent var		1.289632
S.E. of regression	1.069900	Sum squared resid		76.69397
F-statistic	4.411950	Durbin-Watson stat		2.047247
Prob(F-statistic)	0.000091			
Unweighted Statistics				
R-squared	0.226532	Mean dependent var		-0.001609
Sum squared resid	0.526019	Durbin-Watson stat		2.178461

Table 4. Fixed-effects with IV estimation results

Dependent Variable: REER1
Method: Panel Two-Stage Least Squares
Sample (adjusted): 1999 2011
Periods included: 13
Cross-sections included: 6
Total panel (balanced) observations: 78
White cross-section standard errors & covariance (d.f. corrected)
Instrument specification: GDPPERCAPITARUS SCHOOL GOVCONS1 TOT1 INTRATETBILLS GDPCAPITA1 C

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REMIT1	0.232855	0.111650	2.085591	0.0408
GOVCONS1	0.216504	0.101692	2.129012	0.0369
TOT1	-0.199166	0.222145	-0.896560	0.3732
INTRATETBILLS	0.001512	0.005940	0.254510	0.7999
GDPCAPITA1	0.456308	0.254537	1.792697	0.0775
C	-0.002072	0.021629	-0.095806	0.9240

Effects Specification

Cross-section fixed (dummy variables)

R-squared	-0.154948	Mean dependent var	-0.001609
Adjusted R-squared	-0.327329	S.D. dependent var	0.093980
S.E. of regression	0.108274	Sum squared resid	0.785456
F-statistic	2.054684	Durbin-Watson stat	2.184284
Prob(F-statistic)	0.040873	Second-Stage SSR	0.520468
Instrument rank	12		

I am interested in the coefficient and statistics of REMIT1, which is remittances to GDP ratio, taken into its logarithmic form and first differenced. In general, both tables suggest that there is a positive and statistically significant relationship between remittances and real effective exchange rate. The fixed-effects model without IV could be biased if there is an endogeneity problem. The FE-IV model finds that a percent increase of the remittances to GDP ratio raises the real exchange rate by 23 percents. This effect is much lower than the findings of Amuedo-Dorantes and Pozo (2004) and is similar to results of Lopez et al. (2007) and Acosta et al. (2009).

The FE-IV estimate of the remittances is more than twice as large as the FE estimate, but the standard error of the FE is much larger than FE–IV standard error. FE–IV estimation results for remittances are significant only at 5% significance level. As it was expected, government spending has positive and statistically significant effect. Terms of trade parameters are negative, which means that overall spending effects overweight income effects. World interest rates measured by US short-term real interest rates show very small and statistically insignificant results. The Balassa-Samuelson has the anticipated effect, which is positive and statistically significant at 10% level.

Overall, the results support the hypothesis of the paper that increase in level of remittances sent from abroad by migrant workers would appreciate the local currency, which is one of the main symptoms of Dutch disease phenomenon. This results account country heterogeneity, which might be present in our dataset, and possible endogeneity of remittance flows.

7 Conclusion

The CIS region is one of the major remittance receivers in the world. Moldova, Kyrgyzstan, and Tajikistan are the CIS countries that are among six top remittance receivers in the world. Moreover, remittances to the countries under analysis overshadow other types of financial inflows, and appear to be a more stable source of external financing, especially during the last world financial crisis. Even though remittances have an important role in the region, there is no previous study made on this particular subject. This paper is therefore the first attempt to explore the relationship between remittances and exchange rate in the CIS.

The main question of the study is whether incoming remittances appreciate the real exchange rate in the countries under analysis. In order to prove this hypothesis, some empirical investigations are made. Particularly, they include the fixed effects panel model with and without instrumented variables based on annual data of six CIS countries over the period 1998-2011. Furthermore, some additional operations with data, like unit root tests, converting non-stationary series into stationary, Durbin-Wu-Hausman specification test, and choosing proper instruments are done.

The results of both FE estimated by panel OLS and FE-IV estimated with the help of 2SLS demonstrate that there is a positive and significant relationship between remittances and the real effective exchange rate. Thus, our estimations prove that the currency appreciating effects are present in the case of CIS countries, and there is an empirical support for our initial hypothesis. These results conform to the majority of findings in the existing economic literature on the same topic.

The appreciation of real exchange rate is one of the major symptoms of Dutch disease and gives a clear evidence of its presence. However, in order to conclude that this phenomenon is present in the region, further investigation and checking all other symptoms of Dutch disease is needed. Anyway, there is a clear relationship between inflows of international remittances of the migrant workers and the real exchange rate. This appreciating effect might have a number of negative impacts on the economies of countries-receivers. For example, the currency appreciation might make exports of the country more expensive, which will make a manufacturing sector less competitive. This might also be followed by the movement of resources from the tradable sector to nontradable sector and its shrinkage. Thereafter this research work can be valuable for the further investigation of the remittances-exchange rate issue and the effects of remittances on different economic sectors.

Remittances take a large share of national GDPs in the sample, but not all of them come through the official channels (systems of money transfers, bank accounts, post office, etc.). Taking into consideration their hidden part would give a clearer picture of their behavior. Moreover, adding into analysis other huge remittance receivers like Turkmenistan and Uzbekistan would contribute a lot and expand the number of observations.

International remittances as foreign money inflows have a great potential, which can be used to stimulate some economic and financial sectors that are growing very fast, like systems of microcrediting, private education, and construction sectors. To do so, there is a need in rising of attractiveness of financial assets in a region, because otherwise in a long run perspective this money will settle in the foreign economies, as migrants themselves do.

The huge amounts of money that labor migrants from Kyrgyzstan send home every year, and their increasing importance to the economy raise question of their possible regulation and

adequate reaction of state and society to them. It is clear that the question of international remittances and their influence on different macroeconomic variables is still to be discussed and analyzed further.

Appendix

A.1. Statistical description of the variables of the model

Variable	REER	REMITSHARE	TOT	GOVCONS	GDPPERCAPITA	INTRATETBILLS
Description	Real effective exchange rate	Remittances as share of GDP	Terms of Trade	Government Consumption	GDP per capita in real terms	World interest rate (US interest rate)
Mean	105.24	0.09	104.77	25.02	926.83	2.63
Maximum	155.09	0.45	132.87	40.71	2737.57	5.84
Minimum	72.45	0.01	80.65	10.69	261.28	0.06
Std.Dev.	15.64	0.09	9.61	7.25	575.03	1.96
Observations	84	84	84	84	84	84

A.2. OLS results with no fixed/random effects and initial (non-stationary) variables

Dependent Variable: LREER
Method: Panel Least Squares
Sample: 1998 2011
Periods included: 14
Cross-sections included: 6
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LREMIT	0.016127	0.011597	1.390698	0.1683
LGOVCONS	0.066829	0.050662	1.319106	0.1910
INTRATETBILLS	0.014558	0.009069	1.605271	0.1125
LGDPPERCAPITA	0.014253	0.029239	0.487447	0.6273
LTOT	0.506583	0.208250	2.432571	0.0173
C	1.997647	0.942807	2.118830	0.0373

R-squared	0.140183	Mean dependent var	4.645980
Adjusted R-squared	0.085066	S.D. dependent var	0.141830
S.E. of regression	0.135663	Akaike info criterion	-1.088535
Sum squared resid	1.435549	Schwarz criterion	-0.914905
Log likelihood	51.71847	Hannan-Quinn criter.	-1.018737
F-statistic	2.543392	Durbin-Watson stat	0.573813
Prob(F-statistic)	0.034749		

A.3. Durbin-Wu-Hausman test

Correlated Random Effects - Hausman Test
Equation: IV_GDPPERCAPITARUS
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

* Cross-section test variance is invalid. Hausman statistic set to zero.
** WARNING: robust standard errors may not be consistent with assumptions of Hausman test variance calculation.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
REMIT1	-0.232855	-0.251548	0.001257	0.5980
GOVCONS1	0.216504	0.220678	0.000095	0.6689
TOT1	-0.199166	-0.192519	0.011388	0.9503
INTRATETBILLS	0.001512	0.001606	0.000004	0.9643
GDPCAPITA1	0.456308	0.425484	0.014260	0.7963

Cross-section random effects test equation:
Dependent Variable: REER1
Method: Panel Two-Stage Least Squares
Date: 05/29/12 Time: 17:48
Sample (adjusted): 1999 2011
Periods included: 13
Cross-sections included: 6
Total panel (balanced) observations: 78
White cross-section standard errors & covariance (d.f. corrected)
Instrument specification: GDPPERCAPITARUS SCHOOL GOVCONS1 TOT1 INTRATETBILLS GDPCAPITA1 C

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-0.002072	0.021629	-0.095806	0.9240
REMIT1	-0.232855	0.111650	-2.085591	0.0408
GOVCONS1	0.216504	0.101692	2.129012	0.0369
TOT1	-0.199166	0.222145	-0.896560	0.3732
INTRATETBILLS	0.001512	0.005940	0.254510	0.7999
GDPCAPITA1	0.456308	0.254537	1.792697	0.0775

Effects Specification

Cross-section fixed (dummy variables)

R-squared	-0.154948	Mean dependent var	-0.001609
Adjusted R-squared	-0.327329	S.D. dependent var	0.093980
S.E. of regression	0.108274	Sum squared resid	0.785456
F-statistic	2.054684	Durbin-Watson stat	2.184284
Prob(F-statistic)	0.040873	Second-Stage SSR	0.520468
Instrument rank	12		

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