



WP/20/185

IMF Working Paper

Impact of Remittances on Natural Rate of Dollarization—
Trends in Caucasus and Central Asia

Rocio Gondo, Altynai Aidarova, and
Manmohan Singh

IMF Working Papers describe research in progress by the author(s) and are published to elicit comments and to encourage debate. The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper**Monetary and Capital Markets Department****Impact of Remittances on Natural Rate of Dollarization—Trends in Caucasus and Central Asia****Prepared by Rocio Gondo, Altynai Aidarova, and Manmohan Singh**

Authorized for distribution by Jihad Alwazir

September 2020

***IMF Working Papers* describe research in progress by the author(s) and are published to elicit comments and to encourage debate.** The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

Abstract

This paper discusses migration and remittances trends, and calculates the natural (or benchmark) level of dollarization in Caucasus, Central Asia and others in the region. This natural level of dollarization is conceptually linked to the currency allocation in a portfolio of deposits to maximize welfare, in line with Ize and Levy Yeyati (2003). The fall in remittances due to the economic slowdown since the spread of COVID-19 affects the macroeconomic fundamentals that determine demand for foreign currency deposits. We calculate the natural dollarization level by integrating structural macroeconomic characteristics. We show that despite the reduction in deposit dollarization, there is still a gap with respect to the natural level of dollarization, especially in a scenario of (persistent) lower remittance inflows.

JEL Classification Numbers: F24; F22; F30

Keywords: natural rate of dollarization, Russia, COVID, remittances, Central Asia, Caucasus

Author's E-Mail Address: msingh@imf.org; rocio.gondo@bcrp.gob.pe; aaidarova@nbkr.kg;

Contents	Page
Abstract	2
I. Introduction	4
II. Stylized Facts about Remittances and Dollarization.....	5
III. Determinants of Remittance Inflows and Estimation for Remittance Drop in 2020.....	9
IV. Estimation of Natural Level of Dollarization and Impact of Drop in Remittances.....	13
References.....	18
Tables	
1. Bilateral Remittances, 2017	6
2. Loan and Deposit Dollarization	7
3. Real GDP Growth Forecast	10
4. Exchange Rate per U.S. dollar	11
5. Natural Rate of Dollarization, 2020.....	17
Figures	
1. Remittances as a Share of GDP in 2019 (in percent).....	6
2. Dollarization and Remittances	7
3. Predicted Percentage Change in Remittances, 2020.....	12
4. Predicted Percentage Change in Remittances, 2020.....	13
5. Natural Rate of Dollarization, 2019.....	16
Box	
1. Trends in Migration and Remittances in Post-Soviet Republics	8
Appendices	
I. Natural Rate of Dollarization Regressions	19
II. Regression Results from the Gravitational Model for Remittances.....	20
III. Predicted Change in Remittances in the Current Scenario: Interval between Different Regression Specifications	21
IV. Predicted Change in Remittances in the Counterfactual Scenario: Interval between Different Regression Specifications	21

I. INTRODUCTION

The current scenario of global recession poses an important reduction in remittance flows, due to lower income and employment in sending countries. This is especially relevant for countries with high ratios of remittances to GDP, including some countries in Central Asia and the Caucasus that receive high remittances flows such as the Kyrgyz Republic (KGZ) and Tajikistan, with inflows in 2019 equivalent to 29 percent and 28 percent of GDP, respectively. In the region as a whole,¹ inflows from Russia represented 62 percent of total bilateral remittances in 2017, whereas bilateral flows including all countries in the region add up to 76 percent of total remittance flows. The recent sharp reduction in oil prices and slowdown in global economic growth is expected to negatively affect remittances. For instance, remittances to the KGZ dropped 26 percent in the period January–May 2020, partially reflecting the economic downturn after the global widespread of COVID-19.

Many countries in the region present high rates of dollarization. Some degree of dollarization is optimal in a small open economy as it contributes to foreign exchange transactions in international trade, especially in countries with low levels of financial deepening and low capital market development with limited investment options in local currency.² However, excessive dollarization has costs such as higher exposure to financial risks due to currency mismatch and lower effectiveness of monetary policy. The de-dollarization process in some countries in the region in previous years has contributed to reduce the impact of the significant exchange rate depreciation due to COVID-19. For instance, de-dollarization policies adopted by the national bank of Kyrgyz Republic (NBKR) since 2016 partially contributed to a reduction in deposit dollarization from 65.6 percent in 2015 to 38.2 percent in 2019. Other factors that could have contributed to dedollarization is an increasing financial deepening, stronger macroeconomic foundations and higher credibility of policymakers.

Countries with high remittance inflows, like KGZ and Tajikistan, are more prone to higher levels of financial dollarization. Remittances are an important source of foreign exchange which can be kept in the economy as dollar deposits.³ Also, remittance inflows improve financial deepening and access to finance for local economies. Empirical evidence validates this link (as shown in Figure 1), where countries with higher remittances exhibit higher levels of deposit dollarization. This paper calculates the benchmark or natural level of dollarization

¹ The sample of countries considered in this study includes Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Ukraine and Uzbekistan. Moldova and Ukraine are included in the sample because they are post-Soviet Republics with (previously) strong links to Russia and high remittances,

² Empirical evidence in De Nicolo, and other (2005) and Basso, and others (2011). suggests that financial dollarization with initially low levels of financial depth contributes to development in credit markets and the banking sector, linking financial deepening, cross boarder banking activities and asset substitution.

³ Evidence in Stix (2008) and Narazani (2013) suggests that countries with high levels of remittances are more prone to deposit dollarization or euroization. Households who receive remittances are more likely to hold foreign currency for diversifying their portfolio (OECD, 2007; and Brown and Tix, 2014). Other findings such as Seater (2008) suggest that remittances could proxy higher income, more savings and a more diversified portfolio in terms of currency composition.

for the countries in the region. We focus on KGZ and shows that despite the reduction in deposit dollarization, there is still a gap with respect to the benchmark level of dollarization, especially in a scenario of lower remittance inflows. The fall in remittances due to the economic slowdown since the spread of COVID-19 affects the macroeconomic fundamentals that determine demand for foreign currency deposits. This natural dollarization level is calculated by assuming structural macroeconomic characteristics and considers a history of sound policies.

The current scenario assumes a deterioration of macroeconomic fundamentals across all the countries in the region, which translate into lower remittance inflows for most countries in our sample. The scenario accounts for the following factors: (i) generalized recession across countries, with negative expected GDP growth rates for 2020; (ii) exchange rate depreciation, observed during March–April after worldwide spread of COVID-19 and increased risk aversion; and (iii) recession in Russia, due to global recession and massive reduction in oil prices.

However, compared to other countries in the region, deposit dollarization in some countries is closer to its natural level even after we include the impact of the remittances drop in the current scenario. In the case of the KGZ, our estimations show a natural level of dollarization of 36.6 percent for 2019—only 1.6 percentage points below the actual dollarization rate of 38.2 percent. Even in a scenario of slow recovery from the COVID-19 shock, we estimate a reduction of 0.9 percentage points in the natural dollarization rate, widening the gap to 2.5 percentage points. However, the gap is still the smallest compared to other countries in the sample, which range to up to 41.2 percentage points for Azerbaijan.

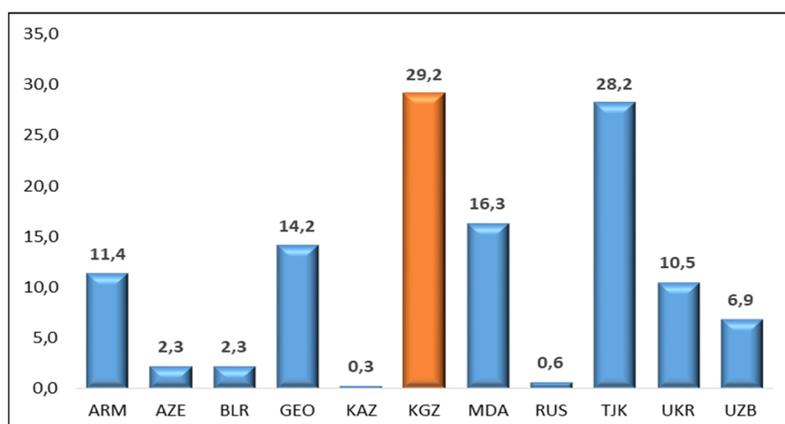
This paper is organized as follows. First, we present some stylized facts about remittances and dollarization in the countries in our sample (including a Box on the migration patterns since dissolution of USSR). Second, we estimate the impact on remittances of changes in the current macroeconomic scenario. Third, we use our forecast of remittances to calculate the effect on the natural level of dollarization. Finally, we conclude by comparing the observed levels of deposit dollarization with our estimates on the natural level of dollarization.

II. STYLIZED FACTS ABOUT REMITTANCES AND DOLLARIZATION

Remittances represent a significant and stable source of income for the region, although there is some heterogeneity across countries. The main source of remittances comes from Russia due to historical links. As of 2019, Figure 1 shows that remittances vary between 0.9 percent of GDP in Kazakhstan and 29.2 percent of GDP in KGZ. Bilateral remittances data for 2017 in Table 1 shows that Russia is the country with the highest participation in sent remittances to all countries in the region, with an average of 63 percent of total remittances.⁴ If we add all countries in the sample, remittances from the selected sample of countries represent 76 percent

⁴ Last data available from World Bank for bilateral remittances corresponds to 2017. However, in the case of Ukraine, there has been a substantial change since 2018, with higher remittances from Poland and declining remittances from Russia.

Figure 1. Remittances as a Share of GDP in 2019 (in percent)



Source: World Bank

Table 1. Bilateral Remittances, 2017
(Percentage of Total Remittances)

	Russia	Other countries in sample	Other
ARM	63,6	10,4	26,0
AZE	58,1	31,7	10,2
BLR	45,4	26,8	27,7
GEO	58,7	18,4	22,9
KAZ	63,5	11,9	24,6
KGZ	76,6	7,8	15,6
MDA	32,5	19,7	47,8
TJK	76,0	14,8	9,2
UKR	51,2	13,3	35,5
UZB	100,0	0,0	0,0
Total	62,6	13,4	24,0

Source: World Bank

Deposit dollarization is also high in many countries in the region, ranging from 38.2 percent for KGZ Republic to 61.0 percent for Georgia in 2019. Many countries in the region show a significant reduction in deposit dollarization, with the largest drop since 2014 in Armenia by 25.8 percentage points; whereas de-dollarization in KGZ adds up to 18.1 percentage points in the same period.

In general, there is no broad evidence that credit and deposit dollarization are always matched (Basso, and others, 2011), so we include some stylized facts about loan dollarization in the region to account for the existence of higher currency mismatches in certain countries. In general, loan dollarization is also high in many countries in the region, ranging from 32.9 percent in Moldova to 55.1 percent in Georgia in 2019. Compared to the rates of deposit dollarization, the evidence suggests the existence of a currency mismatch in the banking system. Thus, exchange rate depreciation poses financial stability risks. Some countries like

Kazakhstan and Belarus show a wider gap between deposit and loan dollarization and larger currency mismatches in banks' balance sheet, which could potentially be affected by the COVID-19 shock in an environment of exchange rate depreciation. However, for other countries with smaller currency mismatches (such as Ukraine), high dollarization is relevant as it reduces effectiveness of monetary policy.

Table 2. Loan and Deposit Dollarization

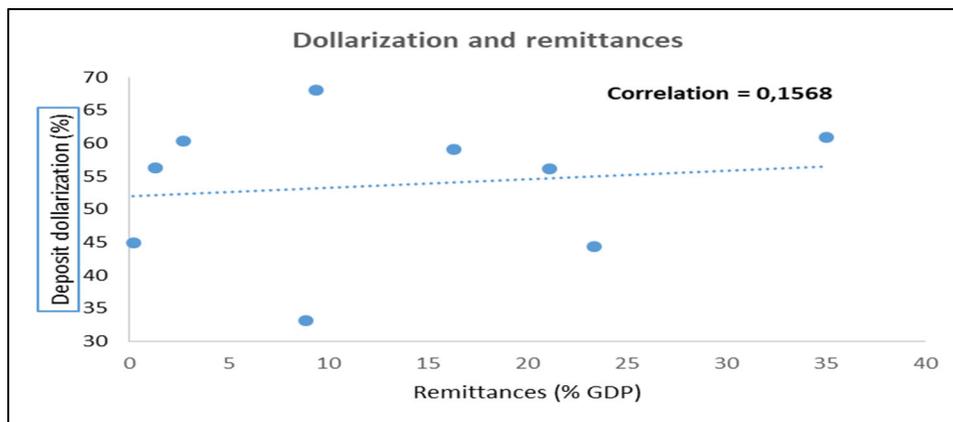
	2014		2019		Difference	
	Loan	Deposit	Loan	Deposit	2014	2019
ARM	66,0	65,3	50,7	55,4	-0,7	4,7
BLR	52,3	63,3	48,6	61,2	11,0	12,6
GEO	60,3	63,6	55,1	61,6	3,3	6,5
KAZ *	30,7	54,1	23,3	42,7	23,5	19,4
KGZ	54,9	60,8	34,7	39,8	6,0	5,0
MDA	39,1	51,7	32,9	41,8	12,6	8,9
TJK	61,9	57,4			-4,6	
UKR	47,8	49,3	41,2	42,8	1,5	1,6

* Last available is 2018.

Source: IMF Financial Soundness Indicators

There is a positive correlation between remittance inflows and deposit dollarization in the sample. Figure 2 plots remittance inflows and deposit dollarization for selected countries. Each dot represents the average remittances and deposit dollarization between 2001 and 2019. We find evidence of a positive correlation of 0.16.

Figure 2. Dollarization and Remittances



Sources: World Bank, and FSI IMF

Box 1. Trends in Migration and Remittances in Post-Soviet Republics

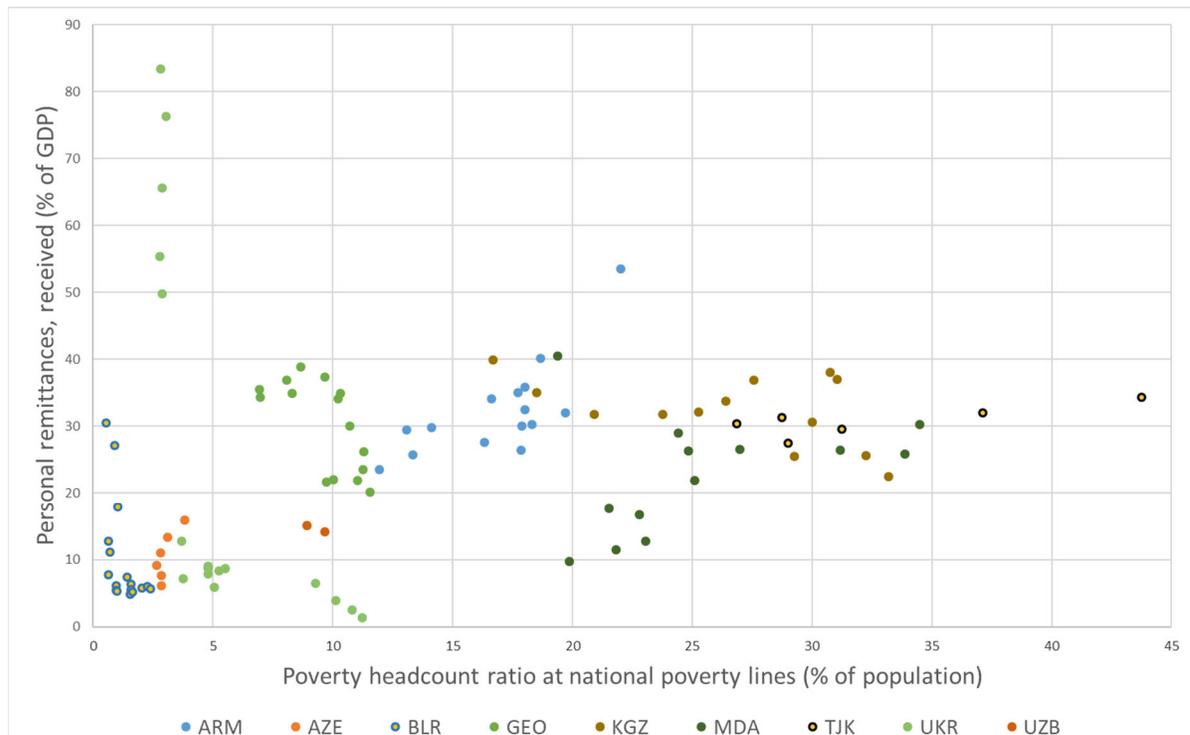
#

Common history and lack of language barrier, active cross-border trade, and transport infrastructure built during Soviet time are the main factors that shape geography of migrations and remittances. In the early 1990s, a return migration of ethnic Russians, Ukrainians, Germans, and other nationalities was observed. Later in 2000s, it was replaced by migration of the nationals of Central Asia and the Caucasus to Russia. Russian statistical agency reports about more than 11 million migrants working in the Russian Federation, of which one-third came from Tajikistan, Uzbekistan, and Kyrgyz Republic. Around 650,000–700,000 of Kyrgyz people are officially registered in Russia as of November 1, 2019 (and more unofficially). Foundation of the Eurasian Economic Union, which implies “four freedoms,” including common labor market, further deepened legal migration and movements of remittances within the Union. Migrants mostly employed in service sector and construction, the sectors that are strongly affected by economic cycles.

Migration and related to it remittances played a big role in decreasing poverty and improving life quality in labor exporting countries. More sizable amount of remittance inflow was reported in 2002–2005, gradually becoming the main channel of currency inflow. From 2005 and on in Kyrgyz Republic, Uzbekistan, and Tajikistan, almost 90 percent of remittances come from Russia.

According to the demographic forecast of Rosstat, until 2035, the population of the Russian Federation will range from 135 million to 150 million people, depending on different scenarios. By this time, the natural population decline will increase and will not be replaced by a natural increase. Reduction of population requires policy actions, as labor force shortage could negatively affect maintaining or accelerating economic growth. To this end, the Russian Federation introduced measures to facilitate provision of citizenship. It was decided to fill in the missing working-age population through various programs by providing citizenship, residence, educational programs, and targeted recruitment of specialists among former USSR nationals. Migration flows represented mostly by young males with basic education and low professional qualification. Recently, feminization of migration was observed. Data for 2019 shows that about 40 percent of Kyrgyz migrants are females, and the number is growing: for Uzbek and Tajik migrants, this share is less than 20 percent. For Ukraine and Moldova, it was the opposite: the share of female migration was prevailing—more than 50 percent.

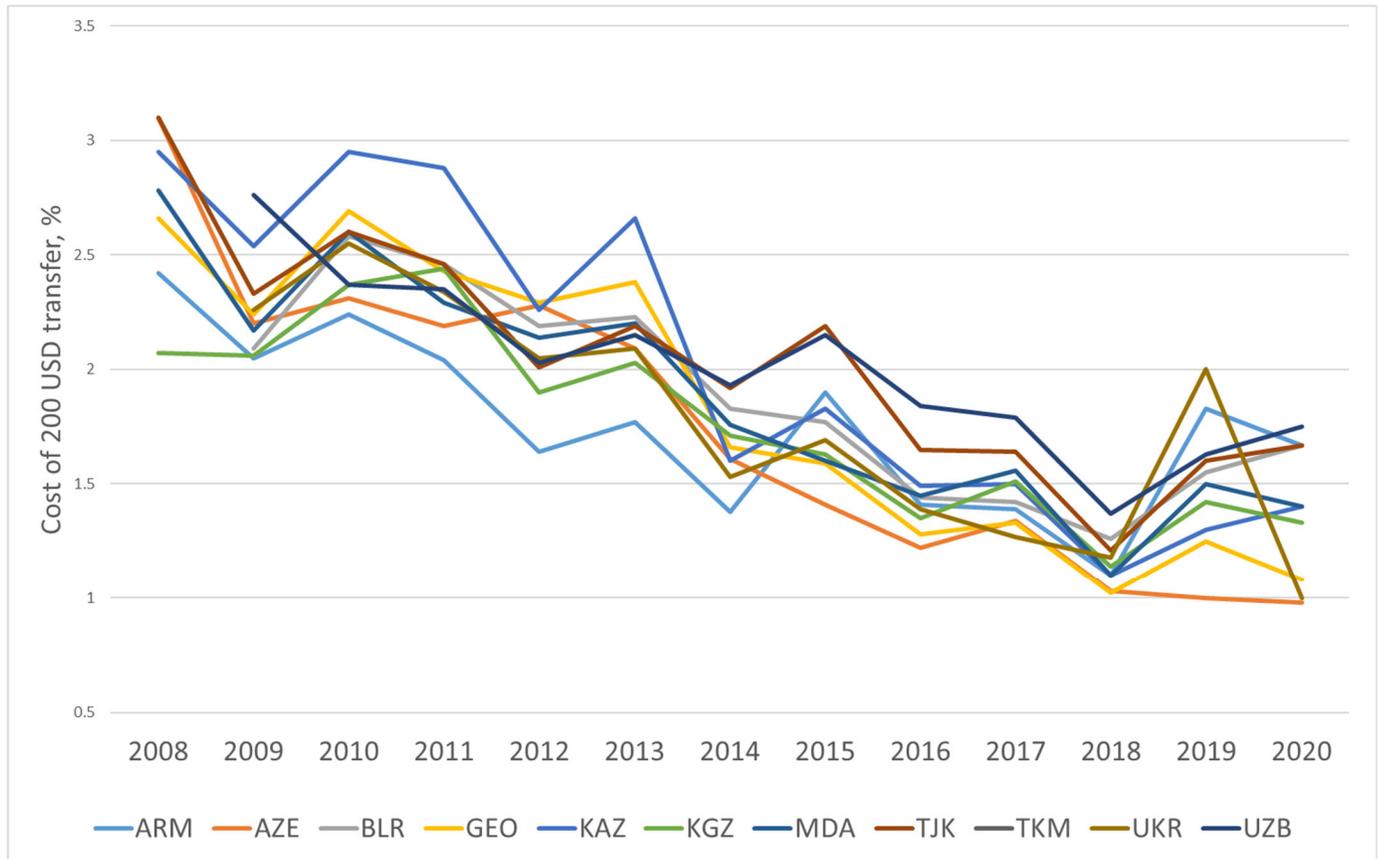
Remittances and poverty level are correlated. The poorer the region, the higher migration level was observed, especially from rural areas. Surveys of households receiving remittances prove that major portion of remittances is used for current consumption (Muktarbek k. A., Seitov Ch., Jenish N. (2015)), which is inelastic to shocks. Ukueva and Becker (2010) conclude that large portion of remittances inflow is channeled to consumption, particular imported durables. Various surveys show that poverty, high unemployment, low and unprotected salaries for seasonal work are the main push factors for labor export. We see that higher poverty level is comparable with higher remittances inflow to country (see below).



Box 1. Trends in Migration and Remittances in Post-Soviet Republics (concluded)

Technological improvements in the banking system and low cost of transaction charged by money transfer systems also become attractive for small business. Simple forms to fill out, no need to disclose information on the sender and sources of that money, low commission cost, and absence of tax on transfers are making money transfer systems attractive to migrants and small businesses. The average cost of sending US\$200 remittances from Russia is about 1.9 percent, and overall, it has been getting cheaper (figure below).

Cost of Remittances is Decreasing



Source: The World Bank, Remittance Prices Worldwide (<http://remittanceprices.worldbank.org>)

#

Transfers in rubles from Russia to CIS countries have been gradually increasing for the last seven years. More than 53 percent of cross-border transfers were conducted in rubles. However, it varies from country to country. For example, 87.7 percent of remittances to Tajikistan are in rubles; to Uzbekistan, the opposite—80 percent are in U.S. dollars; to Kyrgyzstan, about 90 percent of remittances are ruble transfers.

In January 2019, the Bank of Russia urged financial institutions to be more attentive to certain money transfer transactions and ensured that they are transferred through the appropriate money transfer system. Personal monthly transfer limits were set to not exceed 150,000 rubles for Kazakhstan and 100,000 rubles for the Kyrgyz Republic, China, and Vietnam. This measure was aimed at decreasing the number of unofficial transactions by non-registered agents. As a result, remittances from Russia to Kazakhstan, by the end of 2019, dropped by almost 28.5 percent and by 13.8 percent to the Kyrgyz Republic.

The COVID-19 pandemic brought to life drastic measures of social distancing and restrictions on economic activity. Most countries announced states of emergency and curfews that hit the migrants hard and led to sharp drop in remittances. In Armenia, remittances inflow from Russia dipped by almost 16 percent in the first quarter of 2020 compared to the first quarter of 2019, while in Kyrgyz Republic, the drop was almost 19 percent. In April 2020, the amount of money transfer from Russia to Georgia and Kyrgyz Republic dropped by more than 60 percent compared to April 2019 based on preliminary data. Personal remittances from abroad to Ukraine in April also fell by 13.2 percent.

III. DETERMINANTS OF REMITTANCE INFLOWS AND ESTIMATION FOR REMITTANCE DROP IN 2020

Countries that send remittances to the region have been highly affected by the global widespread of COVID-19, and it is expected that most countries in the world will experience negative growth rates for 2020. Under the current unexpected scenario of Great Lockdown, global GDP in real terms is expected to fall by 3.0 percent in 2020, whereas countries in the region will be highly affected as well.⁵ For instance, Russia, the main remittance sender of the countries in our sample, is expected to have negative growth of 5.5 percent in 2020, which in addition captures the sharp drop in oil prices, given its position as a major oil exporter. Table 3 presents the GDP forecast for all countries in the sample, ranging from an increase in Uzbekistan of 1.8 percent to a contraction of 7.7 percent in Ukraine.

Table 3. Real GDP Growth Forecast

	2019	2020	2021
ARM	7,6	-1,5	4,8
AZE	2,3	-2,2	0,7
BLR	1,2	-6,0	3,5
GEO	5,1	-4,0	3,0
KAZ	4,5	-2,5	4,1
KGZ	4,5	-4,0	8,0
MDA	3,6	-3,0	4,1
TJK	7,5	1,0	5,5
UKR	3,2	-7,7	3,6
UZB	5,6	1,8	7,0

Source: IMF WEO April 2020.

In addition, countries receiving remittances have been affected by significant exchange rate depreciation. In March, the global spread of COVID-19 also affected financial markets by creating episodes of high volatility and increased risk aversion, which resulted in capital outflows from emerging countries and exchange rate depreciation. In our sample, many countries experienced a sharp exchange rate depreciation, with cumulative depreciation for April 2020 up to 16.8 percent in Uzbekistan.

⁵ The expected 3.0 percent contraction in real GDP corresponds to the forecast in the April 2020 edition of the IMF World Economic Outlook. We use the forecasts from that edition for all our estimations.

Table 4. Exchange Rate per U.S. dollar

	2019	Apr 2020	% change
ARM	486,5	487,2	0,1
AZE	1,7	1,7	0,0
BLR	2,1	2,4	16,3
GEO	2,8	3,2	14,6
KAZ	384,2	421,0	9,6
KGZ	69,6	77,5	11,3
MDA	17,7	18,0	1,3
TJK	8,2	9,3	12,8
UKR	26,8	26,8	0,1
UZB	8652,2	10110,0	16,8

Source: IMF WEO April 2020 and central bank websites.

In order to calculate the expected fall in remittances under this scenario, we consider estimations using the gravity model in Poghosyan (2020)⁶ for bilateral flows between each country and the rest of countries in the sample and Russia. The regression results from the original paper that we use to calculate the impact on remittances are presented in Appendix III. A summary of the determinants of bilateral flows is presented below:

- GDP from the sending country: Larger countries tend to send more remittances.
- GDP from receiving country: Larger countries tend to receive more remittances.
- Physical distance: Countries with greater physical distance tend to have lower bilateral remittances due to higher transaction costs.
- Inflation in receiving country: High inflation in receiving country encourages more remittances to compensate for loss of purchasing power.
- Nominal exchange rate depreciation in receiving country: Depreciation of national currency reduces remittances, since less dollars can buy the same goods basket as before the depreciation.
- Other controls include contiguity dummy, common language dummy, migrants from receiving country, female migrant participation and age dependency ratio.

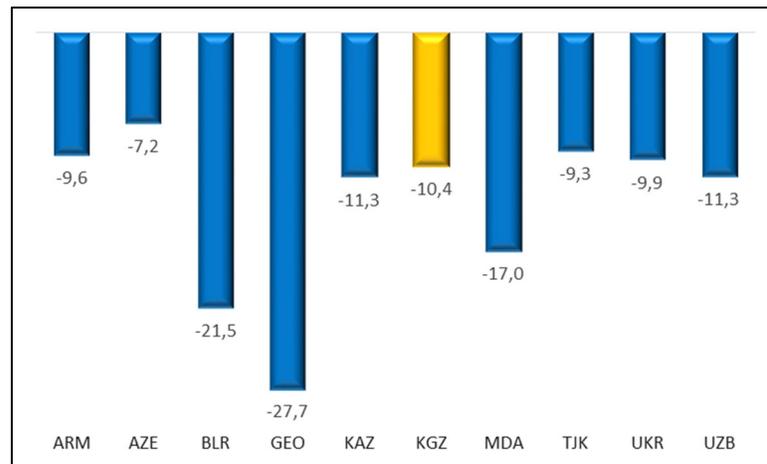
We calculate the expected YoY percentage change in bilateral remittances for 2020 by considering the marginal effect of changes in time-varying variables—i.e., determinants mentioned above except physical distance. We present the interval of our calculations for different regression specifications in Appendix II. As an input for our estimate, we need

⁶ “Remittances in Russia and Caucasus and Central Asia: The Gravity Model” IMF Working paper 20/128 by Tigran Poghosyan.

forecasts for these determinants. The forecast for macroeconomic variables such as GDP from receiving and sending countries and inflation differentials are obtained from the April 2020 IMF World Economic Outlook. For the nominal exchange rate, we use the exchange rate at the end of April 2020, and we are assuming that financial markets have already adjusted to the COVID-19 effect, with large depreciations observed in March. All calculations consider the same forecast values for the determinants, what changes between specifications are the selection of variables and the estimated parameter values.

We construct the forecast for YoY percentage change in aggregate remittances by combining bilateral remittance inflows and the participation of each.⁷ The results in Figure 3 show the impact on remittances obtained from the regression specification that provides the most pessimistic results,⁸ where KGZ shows an expected reduction in remittances of 10.4 percent. Other countries that show larger effects are Belarus, Georgia and Moldova. The importance of remittances is not significant for Belarus (less than 5 percent of GDP). In the case of Georgia and Moldova, the results reflect a sharp reduction in inflation. The effect of lower GDP growth in KGZ is partially compensated by the forecast of 12 percent inflation in 2020, which should increase the purchasing power of remittances in U.S. dollars.

Figure 3. Predicted Percentage Change in Remittances, 2020
Current Scenario



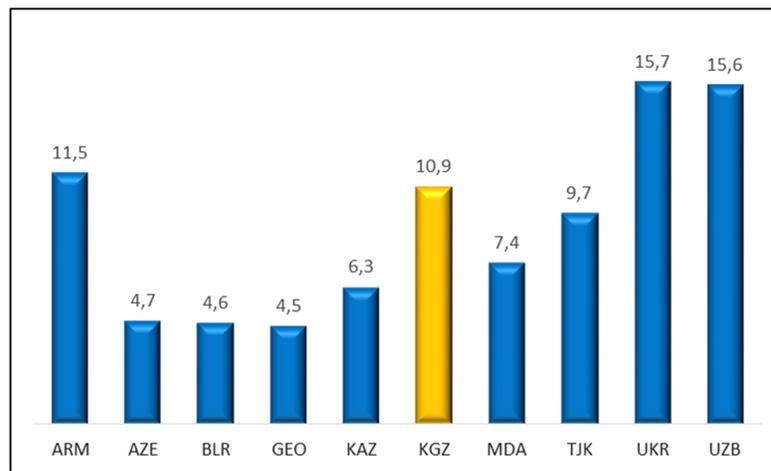
Source: Authors' estimation.

⁷ The latest available data for the structure of bilateral remittances is for 2017 and is obtained from World Bank.

⁸ The interval of the estimated impact on remittances for the other regression specifications are depicted in the Appendix.

We compare this result with a counterfactual scenario—i.e., macroeconomic forecasts before COVID-19.⁹ For the counterfactual scenario, we consider the forecast for macroeconomic variables (GDP, inflation and exchange rates) presented in the October 2019 IMF World Economic Outlook. In a scenario of normal output growth for 2020, remittances were expected to increase in all countries in the sample, ranging from 4.5 percent for Georgia to 15.7 percent for Ukraine in the regression with the most optimistic results.¹⁰ Hence, the effect of COVID-19 poses a significant drop in remittances compared to the counterfactual scenario of normal times. In the case of KGZ, remittances would have increased up to 10.9 percent, which implies a loss due to COVID-19 of up to 21.4 percentage points.

Figure 4. Predicted Percentage Change in Remittances, 2020 Counterfactual Scenario



Source: Authors' estimation.

IV. ESTIMATION OF NATURAL LEVEL OF DOLLARIZATION AND IMPACT OF DROP IN REMITTANCES

Conceptually, there is an optimal dollarization level, under which the benefits of dollarization should outweigh the costs. From the benefit side, dollarization supports financial deepening, especially in countries with low levels of capital market development. From the cost side, dollarization creates risks due to unhedged currency risk exposure and the weakening of monetary policy transmission. Dedollarization policies are optimal to strengthen monetary policy transmission; however, it may also reduce financial intermediation by making foreign currency intermediation more expensive in an environment without substitutes for portfolio

⁹ In order to measure the impact of COVID-19 on remittances, we present the comparison with a scenario without the shock. In the counterfactual scenario where the global economy would have grown at normal rates, migrants would have obtained higher income, hence remittances would have been higher. The difference between the Covid-19 scenario and this counterfactual could shed some light on the magnitude of the change in the macroeconomic scenario on remittance flows.

¹⁰ The interval of the estimated impact on remittances for the other regression specifications are depicted in the Appendix.

diversification towards assets in domestic currency. However, it is difficult to make a quantitative measure of these factors.

Following the model of Ize and Levy Yeyati (2003), we focus on a portfolio diversification perspective and define a benchmark level of dollarization for deposits which depend on the relative volatility of inflation and the real exchange rate. The intuition of their model states that not only expected inflation and expected exchange rates but also the second moments are relevant for the allocation of the savings portfolio by currency. The results are derived from a welfare optimization problem.

An extension of the model could include two sources of income for households who decide how to allocate their savings portfolio: (i) income in domestic currency and (ii) income from remittances in foreign currency. Households distribute their savings portfolio according to the minimum variance. The minimum variance portfolio reacts to the relative volatility in inflation and exchange rates. Thus, if the COVID-19 shock creates higher volatility in financial markets and hence in the exchange rate than in inflation, this translates into lower hedging ability of dollar assets and lower benchmark dollarization.

The benchmark level of dollarization would be related to the minimum variance portfolio, defined as:

$$\lambda^* = \frac{S_{\pi\pi} + S_{\pi s}}{S_{\pi\pi} + S_{ss} + 2S_{\pi s}}$$

where S_{xy} represents the variance covariance between variables x and y , and π represents inflation and s represents the exchange rate.

In contrast, observed deposit dollarization not only depends on the benchmark dollarization, given by the minimum variance portfolio, but also on other factors such as: (i) expected interest rate differential between deposits in local and foreign currency and (ii) participation of local income and foreign income from remittances. A reduction in income of the remitter in the host country, in line with the data available, would reduce dollarization. However, if domestic revenue contracts even more, this would support dollarization in a shrinking financial sector.

From the asset side, the model of portfolio allocation considers the possibility of borrowing in two currencies. As a result, the authors find that the observed loan dollarization rate responds to the same benchmark of minimum variance portfolio and to a term that depends on the expected interest rate differential for loans in domestic and foreign currency.

We use the estimations by Della Valle, and others (2018) for the whole sample of countries and periods and include the minimum variance portfolio to obtain a benchmark rate of dollarization for each economy, using its macroeconomic fundamentals and assuming convergence of policy variables to their benchmark levels. Policy variables include measures of inflation and exchange rate volatility and a measure of the minimum variance portfolio. As explained in Della Valle, and others (2018), they first estimate a regression of the

determinants of deposit dollarization. Then, they set the values of this second set of policy variables to a benchmark level to calculate the benchmark dollarization rates for each country. Thus, benchmark dollarization considers a conditional mean for each country which includes the convergence of policy variables to their benchmarks. This benchmark is called the natural rate of dollarization by the authors.

The estimation includes the following macroeconomic fundamentals:

- Population: Larger countries demand higher amounts of local currency for transactions.
- GDP per capita: Countries with higher income use more local currency.
- Remittances: Countries that receive more remittance inflows have larger foreign exchange inflows into the economy.
- Trade: Countries with more foreign trade transactions demand more foreign currency.
- Capital account restrictions: Countries with more restrictions on their capital account have lower inflows of foreign exchange.

The estimation also assumes that policy variables converge to their benchmark levels consistent with the minimum variance portfolio and consider the following variables:

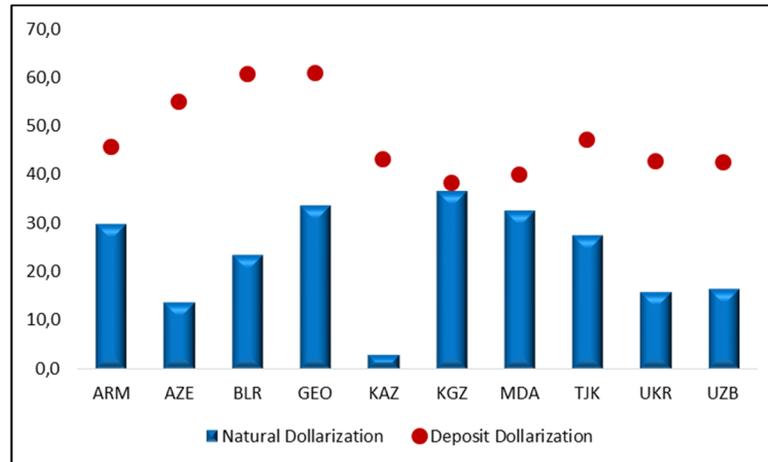
- Inflation: Countries with higher inflation demand more foreign currency as insurance.
- Exchange rate variation: Countries with more exchange rate flexibility demand less foreign currency given the exposure to currency mismatch.

We estimate the natural rate of dollarization using the equation that includes both macroeconomic and policy variables for the whole sample of countries in Della Valle, and others (2018).¹¹ Estimates for the natural rate of dollarization show a high heterogeneity across countries, where countries with more foreign exchange inflows coming from either trade or remittances should efficiently converge to higher rates of dollarization. As shown in Figure 5, the natural rate of dollarization estimates for 2019 range from 3.0 percent in Kazakhstan to 36.6 percent in KGZ. In addition, if we compare these benchmarks to observed deposit dollarization, KGZ shows a large reduction in dollarization since 2014, converging to a small gap between observed and natural dollarization rate of 1.6 percent.

¹¹ This work considers the estimation for natural rate of dollarization using the large sample of countries with the regression models presented in Della Valle, and others (2018). The regression results from their study is displayed in Appendix I for reference. For robustness check, Appendix I presents results for the estimation performed only for the countries considered in this note, taking into account that a smaller sample poses some challenges such as low power for statistical significance. However, we can see that the impact of macroeconomic variables on dollarization are qualitatively similar: countries that are larger and have higher income have lower dollarization rates, whereas countries with more remittances and trade; i.e., with higher foreign exchange inflows into the economy, have higher dollarization rates.

However, other countries in the region show large deviations from the natural rate, of more than 40 percentage points in countries such as Azerbaijan and Kazakhstan. All countries in the sample have relatively high levels of deposit dollarization, above 40 percent for 2019. However, the larger gap for Azerbaijan and Kazakhstan is mainly explained by the low level of remittances in both countries, below 5 percent of GDP, as shown in Figure 1. In addition, in the case of Kazakhstan, this could also be related to the larger size of its economy and higher per capita GDP, which reduces incentives for migration and remittance flows.

Figure 5. Natural Rate of Dollarization, 2019



Source: Authors' estimation.

The current scenario of lower remittances could affect dollarization, as it would imply a lower flow of income in foreign currency, which translates into lower dollar deposits. From a theoretical perspective, the effect on the natural rate of dollarization depends on the persistence of the reduction in remittances. If the shock is temporary, the natural rate of dollarization would stay the same. However, if the shock is more persistent, especially in terms of its effect on the labor market, migrants will reduce their income and send lower flows of foreign exchange to their home countries. However, the empirical estimation shows a quantitatively small effect on the natural level of dollarization, ranging from 0.0 percentage points for Kazakhstan (with very low level of remittances) to over 1.0 percentage point for KGZ and Tajikistan (given their significant ratio of remittances of close to 30% of GDP), as shown in Table 5.

Table 5. Natural Rate of Dollarization, 2020

	2019	Baseline	Counterfactual	Difference
ARM	29,8	29,4	30,0	-0,6
AZE	13,7	13,7	13,8	-0,1
BLR	23,4	23,3	23,5	-0,2
GEO	33,6	32,8	33,5	-0,7
KAZ	3,0	3,0	3,0	0,0
KGZ	36,6	35,7	37,1	-1,4
MDA	32,5	31,7	32,6	-0,9
TJK	27,5	26,5	27,8	-1,3
UKR	15,9	15,5	16,2	-0,6
UZB	16,5	16,3	16,9	-0,6

Source: Authors estimation.

REFERENCES

- Basso, H. S., Calvo-Gonzalez, O., Jurgilas, M. (2011). Financial dollarization: The role of foreign-owned banks and interest rates. *Journal of Banking & Finance*, 35(4), 794-806.
- Bettin, G., Presbitero, A., and N. Spatafora. 2017. "Remittances and Vulnerability in Developing Countries," *The World Bank Economic Review*, 31 (1): pp. 1-23.
- Brown, M. and H. Stix. 2015. "The euroization of bank deposits in Eastern Europe," *Economic Policy*, CEPR;CES;MSH, vol. 30(81), pages 95-139
- Catao and Terrones Determinants of Dollarization the banking side
- Della Valle, G., Kota, V., Veyrune, R., Cabezon, E. R., & Guo, S. (2018). Euroization drivers and effective policy response: An application to the case of Albania.
- De Nicoló, G., Honohan, P., Ize, A. (2005). Dollarization of bank deposits: Causes and consequences. *Journal of Banking & Finance*, 29(7), 1697-1727
- Ize, A. and E. Levy-Yeyati. 2003. "Financial dollarization," *Journal of International Economics*, 59 (2) (2003), pp. 323-347
- Khvedchuk, K., Sinichenko, V., & Topf, B. 2019. "Estimating a Natural Level of Financial Dollarization in Ukraine". *Visnyk of the National Bank of Ukraine*, (247), 38-44.
- Kokenyne, A., J. Ley, and R. Veyrune, 2010, "Dedollarization," IMF Working Paper No. 10/188.
- Lueth, E. and M. Ruiz-Arranz. 2008. "Determinants of Bilateral Remittance Flows," *The B.E. Journal of Macroeconomics*, 8 (1): pp. 1–21.
- Narazani, E. 2013. "A Micro Level Perspective of Euroization in Albania," wiiw Balkan Observatory Working Papers 109, The Vienna Institute for International Economic Studies. Poghosyan, T. 2020 "Remittances in Russia and Caucasus and Central Asia: The Gravity Model" mimeo.
- Seater, J. (2008): "The demand for currency substitution," *Economics*, Open access, EJournal, 2-1-30 Stix, Helmut. 2008. "Euroization: What Factors drive its Persistence?," Working Papers 140, Oesterreichische Nationalbank (Austrian Central Bank). Stix,
- World Bank. 2020. "COVID-19 Crisis Through a Migration Lens," Migration and Development Brief 32 (Washington, D.C.).

APPENDIX I. NATURAL RATE OF DOLLARIZATION REGRESSIONS

Natural Rate of Dollarization Regressions

(Only considers the sample of countries under this study)

	(1)		(2)		(3)	
Population	-9,94	**	-49,13		-105,68	*
	(4,13)		(50,62)		(57,22)	
GDP per capita	-3,10		-25,96	***	-26,53	*
	(6,48)		(7,26)		(13,98)	
Remittances	-0,10		0,16		0,66	*
	(0,43)		(0,21)		(0,38)	
Trade	0,12	*	0,07		0,24	**
	(0,06)		(0,08)		(0,11)	
Europe (Dummy=1)	-7,29		-26,81	***	-29,77	***
	(8,07)		(3,32)		(2,50)	
Constant	241,77	**	1011,33		1842,29	***
	(94,37)		(722,19)		(749,52)	
Observations	105		105		105	
R-Squared	0,4513		0,7027		0,8106	
Country FE	NO		YES		YES	
Time FE	YES		NO		YES	

Dummy variable Europe takes value of 1 if country is in Europe.

Estimated using panel regressions with fixed effects and robust standard errors.

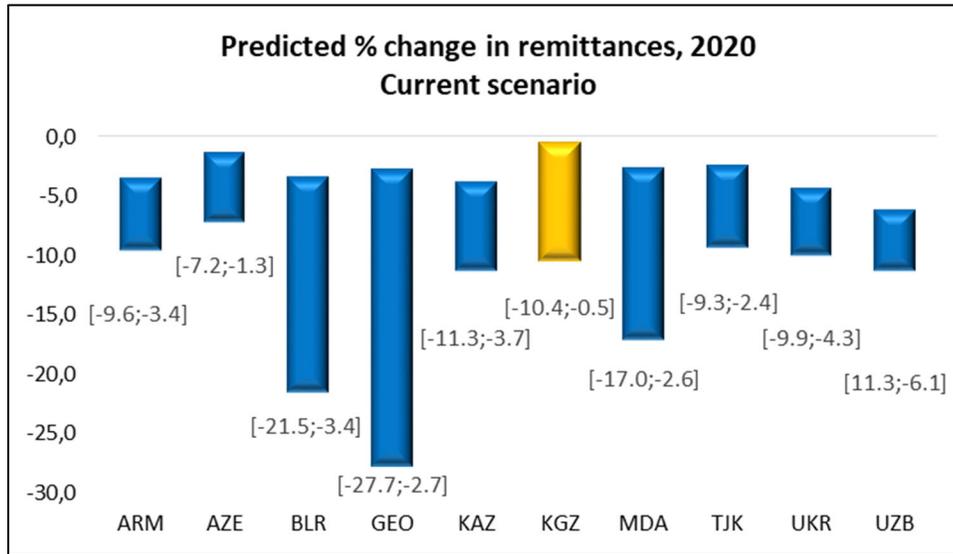
*** p<0.01; ** p<0.05; * p<0.1. Numbers in parenthesis denote standard errors.

**APPENDIX II. REGRESSION RESULTS FROM THE GRAVITATIONAL MODEL FOR
REMITTANCES**

Regression results from Poghosyan (2020) for the model which includes macroeconomic controls

	(1)	(2)	(3)	(4)	(5)
log(GDP_USD) in sending country	0.45** (0.23)	0.57*** (0.19)	-0.08 (0.80)	0.59*** (0.20)	-0.06 (0.87)
log(GDP_USD) in receiving country	-0.17 (0.32)	1.47** (0.75)	0.18 (0.59)	1.50** (0.74)	0.21 (0.61)
log(Distance)	-0.25 (0.70)	-1.19*** (0.36)	-1.20*** (0.35)		
Contiguity dummy (=1 if countries share border)	-0.90* (0.47)	-0.74** (0.36)	-0.73** (0.35)		
Language dummy (=1 if countries share official language)	-0.14 (0.47)	1.15*** (0.42)	1.15*** (0.42)		
Log(Number of migrants) in sending country	0.57*** (0.18)	0.08 (0.11)	0.05 (0.11)	0.16 (0.16)	0.06 (0.13)
Share of female migrants in sending country	-0.47* (0.25)	-0.46*** (0.13)	-0.47*** (0.13)		
Inflation rate in receiving country	0.04 (1.52)	0.55 (0.76)	4.05* (2.09)	0.66 (0.79)	4.08** (2.08)
Exchange rate depreciation in receiving country	-0.17 (0.31)	0.47 (0.50)	-0.90** (0.45)	0.44 (0.47)	-0.89* (0.47)
Age dependency ratio in receiving country	-0.01 (0.04)	0.09*** (0.02)	-0.01 (0.10)	0.09*** (0.02)	-0.01 (0.11)
Intercept	-5.61 (9.49)	-43.06* (22.06)	10.11 (29.01)	-52.73** (23.21)	3.08 (31.80)
Observations	504	504	504	392	392
Pseudo R-squared	0.726	0.912	0.927	0.926	0.943
Log-likelihood	-49058	-15765	-13001	-11636	-8937
AIC	98139	31584	26067	23286	17888
BIC	98185	31698	26206	23314	17916
Country FE		YES	YES		
Country-Pair FE				YES	YES
Year FE			YES		YES

**APPENDIX III. PREDICTED CHANGE IN REMITTANCES IN THE CURRENT SCENARIO:
INTERVAL BETWEEN DIFFERENT REGRESSION SPECIFICATIONS**



**APPENDIX IV. PREDICTED CHANGE IN REMITTANCES IN THE COUNTERFACTUAL SCENARIO:
INTERVAL BETWEEN DIFFERENT REGRESSION SPECIFICATIONS**

