

**Charles University**

Faculty of Social Sciences  
Institute of Economic Studies



MASTER'S THESIS

**Drivers of financial de-dollarization in CCA  
region**

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Academic Year: **2017/2018**

## Declaration of Authorship

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Prague, July 31, 2018

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Signature

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## Abstract

After the dissolution of the Soviet Union, a number of post-soviet countries are facing a high level of financial dollarisation. This thesis aims to estimate the determinants of both deposit and loan de-dollarisation using panel vector autoregression model. The study covers five countries of Caucasus and Central Asia region within the time frame of 2006:1 to 2017:1. Our findings suggest that deposit de-dollarisation is driven by exchange rate depreciation. On the other hand, a decrease in deposit dollarisation contributes to loan de-dollarisation. We also find out that effective policies toward macroeconomic stability with the development of the financial system can help to a decrease financial dollarisation level.

**Keywords**

CCA region, Financial dollarisation, Panel Vector Autoregression.

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## Abstrakt

Po rozpuštění Sovětského svazu čelí řada post-sovětských zemí vysoké úrovni finanční dolarizace. Cílem této diplomové práce je odhadnout determinanty de-dollarizace vkladů a úvěrů pomocí autoregresního modelu panelových vektorů. Studie se týká pěti zemí Kavkazu a Střední Asie v období 2006: 1 až 2017: 1. Naše zjištění naznačují, že de-dollarizace vkladů je způsobena poklesem hodnoty směnného kurzu. Na druhé straně pokles dolarizace vkladů přispívá k de-dollarizaci úvěrů. Zjistili jsme také, že účinná politika směřující k makroekonomické stabilitě společně s rozvojem finančního systému mohou přispět ke snížení úrovně finanční dolarizace.

**Klíčová slova**

Panelová vektorová autoregrese, země CCA, Finanční dolarizace.

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# Acronyms

<b>CBA</b>	Central Bank of Armenia
<b>CCA</b>	Caucasus and Central Asia
<b>CESEE</b>	Central, Eastern and Southeastern Europe
<b>DRD</b>	Deposit dollarization ratio
<b>DRL</b>	Loan dollarization ratio
<b>EU</b>	European union
<b>EXCH</b>	Exchange rate
<b>EXCHV</b>	Exchange rate volatility
<b>GDP</b>	Gross domestic product
<b>IMF</b>	International Monetary Fund
<b>INF</b>	Inflation rate differential for deposits
<b>IRDD</b>	Interest rate differential for deposits
<b>IRDL</b>	Interest rate differential for loans
<b>NBG</b>	National Bank of Georgia
<b>NBK</b>	National Bank of Kazakhstan
<b>NBKR</b>	National Bank of Kyrgyz Republic
<b>VAR</b>	Vector autoregression

# Master's Thesis Proposal

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<b>Author:</b>	Bc. Ana Zviadadze
<b>Supervisor:</b>	Prof. Ing. Willing Reader, CSc.
<b>Defense Planned:</b>	February 2018

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**Proposed Topic:**

Drivers of financial de-dollarization in CCA region

**Motivtion:**

Dollarization is very popular research topic in academic literature. This phenomenon can be described as a disease for Latin America in 1970s, and at present for a number of post-Soviet states. It is a great concern for countries, operating monetary transmission mechanism through exchange rate channel, as a high level of dollarization prevents efficiency of monetary policy. Central banks are able to solely influence national currency and as there is a strong substitution between the domestic and foreign currencies, monetary policy becomes handicapped and only partially affects economy.

Former Soviet countries in Caucasus and Central Asia (Armenia, Azerbaijan, Georgia, Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan) have highly dollarized financial system. After dissolution of the Soviet Union, these countries were facing high inflation, political instability and severe economic decline. All of these triggered insecurity in domestic currency, resulting incentives toward currency substitution. Nearly three decades have passed, but dollarization rate still remains persistent for those countries, even though they have achieved notable progress in macroeconomic stabilization.

As time passes, achievement of de-dollarization is becoming primary goal for CCA region and is the main reason, why I am interested in this topic.

**Hypothesis:**

1. Hypothesis #1: De-dollarization is driven by macroeconomic stability.
2. Hypothesis #2: Drivers of deposit de-dollarization are different from those of credit de-dollarization
3. Hypothesis #3: Development of financial institutions matter.

**Methodology:**

I will in the first place go through previous empirical analyses and collect data from National Bank of CCA region and National Bureau of Statistics. I intend to examine short-term drivers of financial de-dollarisation across categories of credits and deposits using Vector Autoregressive model. Impulse response function will allow me to see which factors have the significant effect on credit de-dollarisation and which on deposit de-dollarisation and how it differs among countries.

**Expected Contribution:**

Many empirical researches were done to examine causes of dollarisation, but academic literature on de-dollarisation is scant, especially while talking about CCA region. Thus this paper will attempt to partially compensate for this shortage and make incentives for further research.

**Outline:**

1. Introduction
2. Literature review
3. Road to de-dollarization
4. Hypothesis
5. Methodology and data
6. Results
7. Conclusion
8. Bibliography

**Core Bibliography:**

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**Author**

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**Supervisor**

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# Introduction

Financial dollarisation is a persistent phenomenon that was a popular topic among academic scholars for nearly four decades. It all started with Latin American countries in 1980-1990 and after a decade transition economies in Europe and Asia followed their lead. The starting point for all states was the same: the downfall of the economy come after high inflation rate or hyperinflation and devaluation of national currency. Furthermore, frequent volatility of exchange rate and uncertainty about economic stability increased public distrust in national currency as well as, demand towards foreign currency. However, even though the majority of the countries managed to stabilise their economies and financial system, long-lasting memory and anxiety of recurrence helped dollarisation to survive. As high level of financial dollarisation can limit the effectiveness of monetary policy, and result in a liquidity crisis, a number of Central banks include a de-dollarisation process in their primary objectives.

In the beginning, academic literature was mostly studying financial dollarisation in the context of its effect on the economy. However, as the time passed, and some countries showed a slowdown in dollarisation rate, researchers began to pay attention to the determinants of financial de-dollarisation. Ize & Yeyati (1998; 2003) followed by Rennhack & Nozaki (2006) and García-Escribano & Sosa (2011) focused their research on Latin American countries. Rosenberg & Tirpak (2008) and Neanidis & Savva (2009) studied transition economies. Nevertheless, only Asel (2010) and Naceur et al. (2015) have examined drivers of financial de-dollarisation exclusively for CCA<sup>1</sup> region<sup>2</sup>.

The Caucasus and Central Asian states have the most dollarized financial system after Latin American countries. After the collapse of Soviet Union, countries have undergone a major transformation of their economic system; therefore, we believe that CCA region has some unique factors that influence de-dollarisation process. We want to shed light on the drivers of financial de-dollarisation in these economies and see whether they differ from other countries and what are the characteristics.

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<sup>1</sup> Caucasus and Central Asia

<sup>2</sup> Other works also include CCA economies but not as an individual study.

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It is worth to mention that some countries in the CCA region have already started the implementation of de-dollarisation policies. For example, national bank of Georgia (NBK) with the help of Government announced “Larisation” plan of loans. This initiative is the one-off social measures that will help Georgian citizens to convert foreign loans to local currency. In addition, starting from January 2017 commercial banks are not allowed to issue loans in foreign currency if they are below 100 000 Georgian Lari. National bank of Kyrgyz republic (NBKR) has also started de-dollarisation process by implementing prudential measures. In 2015 NBKR announced that it was going to increase the reserve requirements for foreign currency, limiting the capacity of lending in foreign currency.

This thesis aims to study two sides of financial dollarisation – debit and credit and to determine which factors are significant for loan dollarisation and which for debit dollarisation. For that purpose, we decided to utilize panel vector autoregressive (PVAR) model that is widely used technique among researchers. We should underscore that the topic of the thesis gives the possibility of a wide choice of models., however existing academic studies does not distinguish which empirical tool is the best to study financial dollarisation. What is more important is that we are using a different model than in Asel (2010) and Naceur et al. (2015) studies, giving a new insights to related literature.

We are using monthly data over the period January 2006 to January 2017 for five countries of our interest<sup>3</sup>. We find out that deposit de-dollarisation is driven by exchange rate depreciation and stability in inflation rate. On the other hand, a decrease in deposit dollarisation contributes to loan de-dollarisation. Our findings also suggest that effective policies toward macroeconomic stability with the development of the financial system can help to a decrease financial dollarisation level.

The remainder of this thesis is organised as follows. In chapter 1 we discuss how the collapse of Soviet Union was the beginning of dollarisation “disease” and focus on stylised facts of financial dollarisation in the CCA region. Chapter 2 addresses related academic literature ,where we distinguish three types of partial dollarisation, focusing only on one of them. In Chapter 3, we present the hypothesis that are tested in our work. Chapter 4 describes model forming and the data, used to test the hypothesis as well as the empirical results of our thesis. Section 5 gives concluding remarks and policy

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<sup>3</sup> Armenia, Georgia, Kazakhstan, Republic of Kyrgyzstan and Tajikistan.

implications. Chapter 6 provides an overall summation of the thesis. The bibliography and the appendix containing additional graphs can be found at the end.

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# 1 The Road to de-dollarization-stylised facts

After the dissolution of the Soviet Union in 1991, a number of Post-Soviet economies, including the CCA region were facing high inflation, political instability and severe economic decline. All of these triggered insecurity in domestic currency, resulting in incentives toward currency substitution. Nearly three decades have passed, but the dollarization remains persistent for those countries, even though they have achieved notable progress in macroeconomic stability. According to Asel (2010), it is worth to mention that Post-Soviet states have undergone changes from a centrally planned economy to a market economy and were struggling with the development of domestic financial institutions. Thus, saving money in foreign currency was a reasonable step from the population. The author notes that even though countries managed to stabilise their economies and financial system, long-lasting memory and anxiety of recurrence partially explains the existence of high dollarisation.

## 1.1 Caucasus region – Stylised facts

In the following section, we will focus on the Caucasus region (Armenia and Georgia). We will revisit countries formation steps from common economy to a market-based system. We will also discuss how the disintegration of Soviet Union was the beginning of dollarisation “disease”.

### 1.1.1 Armenia

The December 26 of 1991 was the date when the fifteen independent states were formed and became the debate topic among scholars. The road from centrally planned system to the market-based economy was challengeable for Armenia. On the one hand the country

was suffering from economic stagnation, and on the other hand, the economic blockades were imposed by Azerbaijan and Turkey. The latter was devastating for the economy as the country heavily depended on the outside supplies of raw materials.

During the period 1991-1993, GDP growth in Armenia fell more than 50 percentage points. Therefore, in the first years of independence, the government was receiving financial support from the European Union and the central bank of Russia, which on the other hand was increasing foreign debts (see Eliaeson et al. 2015). In addition, Armenians were facing a high rate of unemployment, hyperinflation, poverty, and the energy crisis.

**Table 1. 1 The GDP growth rate (annual %)**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>GDP growth (annual%)</b>	-11.7	-41.8	-8.8	5.4	6.9	5.9	3.3	7.3	3.3	5.9	9.5

Source: Author's calculations. Data from: The World Bank.

In 1994 in the capital of Kyrgyzstan – Bishkek, representatives of Armenia and Republic of Azerbaijan signed ceasefire agreement, also known as Bishkek Protocol, which by policymaker's opinions was the first step toward political and economic recovery.

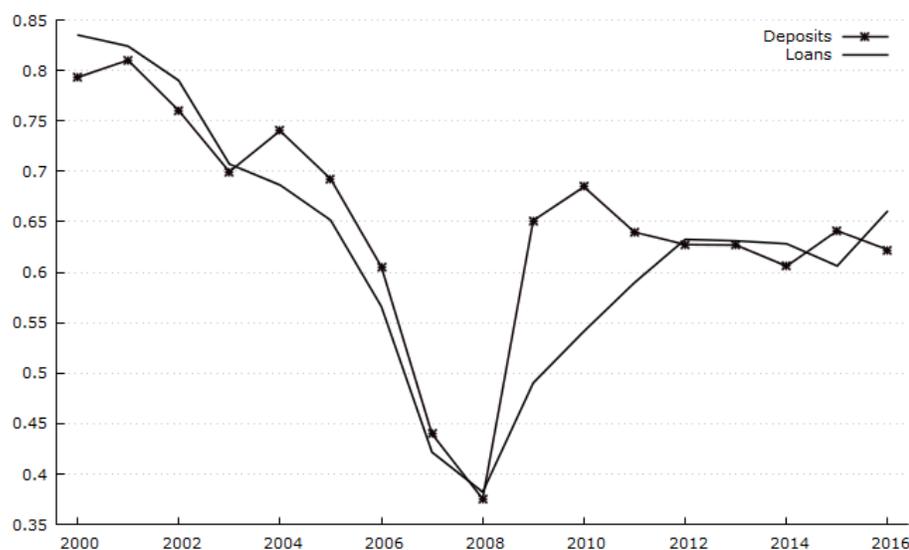
Given all above the government, with the support of International Monetary Fund and World Bank, began to implement macroeconomic policies, that helped the country to start the quick recovery process. Main macroeconomic indicators started to show improvement – inflation fell from 11 000 percentage points to 14 in 1997 while GDP showed gradual growth. However, the achievement was threatened by the global financial crisis in 2008. Once again, the government of Armenia took various measures to provide support to its population, and it took nearly four years to reach pre-crisis numbers.

The central bank of Armenia (CBA) has also contributed to economic development focusing on the monetary and financial stability. During the global financial crises CBA implemented tight monetary policy, which helped to control an inflation rate; however, it

also triggered currency depreciation, which was followed by an increase in dollarization level.

Armenia has suffered from financial dollarisation for many years, which was and is a concern to a country. Therefore, the government with CBA developed the strategy based on macroeconomic stability and prudential measures, taking into account international experience in the de-dollarisation process. Figure 1.1 shows the dollarisation trend in Armenia during the period 2000-2016. We can see that both deposits and loans dollarisation achieved their historical minimum in 2008. According to international monetary fund (IMF) report 2015, the positive impact on deposit de-dollarisation was driven mainly by macroeconomic stability. Increased trust in national currency was an outcome of the increased solvency of the banking sector. In that period country also had a large inflow of foreign investment that on the other hand resulted in an appreciation of the national currency.

During the years 2008-2014 dollarisation ratio for both loan and deposit side sharply increased. While the first wave of the global financial crisis did not have a significant effect on Armenian economy, (due to country's low international integration) Georgian-Russian war in August 2008 was vital. Country's main transportation routes passing through Georgia, were temporarily closed, which resulted in the 600-million-dollar loss. Besides, there was a decrease in remittances from Russian that effected the purchasing power of the population. Furthermore, the government was facing an increase in the deficit. All this combined had decreased trust in national currency, resulting in the boost in dollarisation ratio (Avagyan 2009).

**Figure 1. 1The dollarization level of total deposits and loans in Armenia (%)**

Source: Author's calculations.

Data from: Central Bank of Armenia.

Note: The dollarization ratio is computed as a ratio of foreign currency denominated deposits and loans to total deposits and loans.

According to statistics published in the 2016 on CBA web page, foreign currency denominated deposit and loans reached 62.22% and 66.08% respectively. While it is difficult to predict whether Armenia will successfully continue the de-dollarisation process, IMF staff (IMF report 2015) gave some advice for near future actions:

**Macroeconomic stabilisation:** Reduction in inflation volatility, will positively influence the credibility of the inflation targeting regime and will make a solid foundation for the de-dollarisation process.

**Prudential measures:** Central Bank should continue to monitor currency mismatches and response of commercial banks to regulatory measures.

### 1.1.2 Georgia

After the collapse of the Soviet Union, the transformation from the centrally planned economy to market-based system was not an easy journey for Georgia. In the early years of independence, the country underwent civil disturbance, armed conflict with South

Ossetia and Abkhazia followed by migration of the workforce. In addition to these hyperinflation and high rate of unemployment hit the country, which on the other hand triggered an increase in crimes and corruption. The Government knew that fast and radical economic reforms were needed to stabilise the situation. Privatization of small enterprises and liberalisation of prices helped to facilitate recovery process, which reached to its peak in 1997 when the GDP growth hit the highest number – 10.7% (table 1.2). However, following the Russian financial crisis in 1998, the situation drastically changed, leading to the downfall of the economy. The stagnation continued till the early 2000s, after which “the golden age” began.

**Table 1. 2 The GDP growth rate (annual %)**

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
<b>GDP growth (annual%)</b>	-21.1	-44.8	-29.3	-10.4	2.6	11.2	10.51	3.1	2.8	1.8	4.8	

Source: Author’s calculations. Data from: The World Bank.

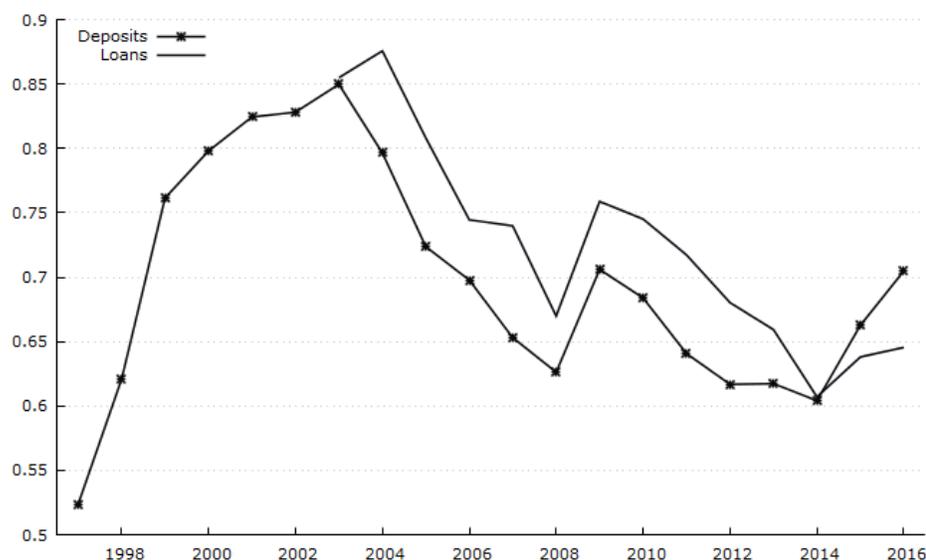
The second wave of social-institutional and economic reforms was implemented after the Peaceful Rose Revolution (the Year 2003). In fact, economy started to grow nearly in double digits. Unfortunately, it did not last long. The financial crisis of 2008 followed by armed conflict with Russia in the same year, had a significant effect on the country.

During the transition phase, banking system underwent radical changes, and national currency – Lari (GEL) was introduced. From 1995 till 1997 Georgia had a fixed exchange system, and national currency was pegged against U.S. dollar, which according to the government was rational decision during the hyperinflation. In 1997 country switched to floating exchange regime, taking into consideration other small economies experience. However, a high rate of inflation followed by exchange rate fluctuation led to distrust in national currency and an increase demand toward foreign, in particular, U.S. dollar. This was the beginning of the so-called “two-currency zone”. Lari was used only for conducting day-to-day transactions, while large investments, such as real estates were priced in U.S. dollar. In addition, citizens preferred to borrow or save in foreign currency. Hence country was facing two types of partial dollarisation – currency

substitution and financial dollarisation, latter reaching to its maximum (86%) in 2005 (see figure 1.2).

While high dollarisation ratio historically remained above 60 percent (Figure 1.2), only in 2010 National Bank of Georgia (NBG), together with the government, announced that lowering dollarisation ratio will be the main priority for the next few years. From the announcement till the beginning of 2014, NBG was successful and managed to decrease the dollarisation ratio to its historical minimum (see figure 1.2). But in 2014 currency crisis occurred and the trust in national currency once again was abandoned, that, on the other hand, resulted in the increase of dollarisation ratio.

**Figure 1. 2 The dollarization level of total deposits and loans in Georgia (%)**



Source: Author's calculations. Data from: Central Bank of Georgia.

Note: The dollarization ratio is computed as a ratio of foreign currency denominated deposits and loans to total deposits and loans.

Devaluation of national currency is a big concern for Georgian population as those who have mortgages or commercial loans in foreign currency are forced to repay twice more. Therefore, at the beginning of 2017 prime-minister of Georgia - Giorgi Kvirikashvili announced the Larization program of credits that will be one-off the social measures for borrowers who suffered from the devaluation of GEL the most. The program on NBG web page is described following way: Georgian citizens (including individual entrepreneurs), who borrowed US dollars (fully or partly collateralised by real estate)

before January 1, 2015, will be able to convert them in GEL denominated loans. The Most interesting part of the program is that the exchange rate for loan conversion will be official exchange rate at conversion date minus 20 tetri. For example, if on the day of conversion, the exchange rate is 2,4 GEL/USD then the loan will be converted with 2,2 GEL/USD rate, and the difference will be compensated from country's budget. Here should be noted following: the program will not concern individuals, whose annual income in 2015 was more than 100 thousand GEL. As Zurab Gvasalia, president of Georgian Banks Association noted the program is viral among Georgian citizens as on the first day after its implementation about 2000 of individuals have expressed willingness of participation (Morrison 2017).

The list of larization measures launched by NBG and described on their web page are:

- *Increased Access to the Long-Term GEL loans:*
  - Considering international monetary fund recommendation, national bank of Georgia developed Liquidity Coverage Ratio under Basel III;
  - Implementation of Pension reform that positively influences economic growth and hence helps to increase long-term GEL resources.
- *Adequate Sharing of FX Risks*
  - Starting from January 15, 2017, loans that are below 100 thousand lari can be issued only in local currency. This will help to hedge the economic agents against the volatility of exchange rate;
  - Loan conversion scheme – mentioned above;
  - Launching macro-prudential measures against unhedged economic agents.
- *Pricing in GEL:*
  - According to change that started functioning from July 1, 2017 pricing of every goods and services should be mandatory only in GEL;
  - Following the changes in pricing government of Georgia together with NBG should launch “escrow” account service, which will ensure that real estate transactions are done safely and less costly, taking into account both sides – buyers and sellers.

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## 1.2 Central Asia – stylised facts

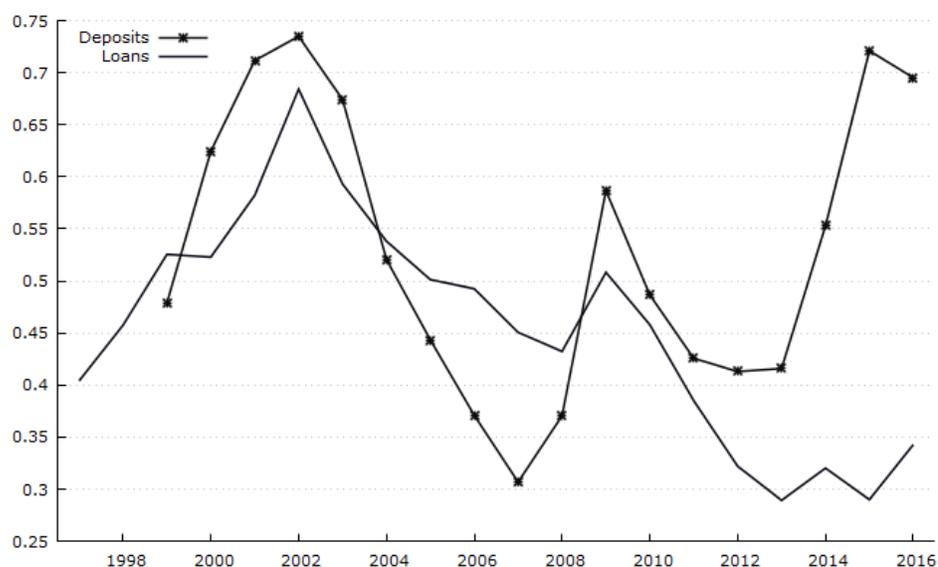
The following section discusses Central Asian countries (Kazakhstan, the Kyrgyz Republic, Tajikistan) and their economic path from centrally planned economy to market-based system, while facing the problem with dollarization.

### 1.2.1 Republik of Kazakhstan

The Republic of Kazakhstan showed dramatic improvement in economic development since the early 2000s, becoming the leading state in Central Asia. However, the transition to the market-based system was painful, followed by the same difficulties as other post-soviet countries were experiencing. Between 1991-1995 GDP dropped more than 50% and hyperinflation reached 1880 percent. The shrink of the economy was mainly caused by the slow speed of reforms. The government was lacking the experience and was not ready for independence, therefore was closely following Russia's steps toward transformation. Thanks to the fact that the country was rich in resources such as oil and natural gas, the stagnation period did not last long and from 1995 macroeconomic indicators started to show improvements.

The early 2000s were exceptional for Kazakhstan – increase in oil prices and foreign direct investments gave to the economy “second life”. The country was doing so well that it was compared to Asian tigers, such as South Korea, Taiwan and Singapore. However, the slowdown of the economy started first from 2008-2009, as a response to the global financial crisis, and then from 2014, when the oil price fell.

Given all above the economy of Kazakhstan is largest among Central Asia and had experienced its share of downfall and rise nearly three decades. Historically, country's problem with dollarisation was not as extreme as in other CCA countries. But everything changed during the period 2014-2015. The most significant difference was in deposit dollarisation, during 2014-2015 periods, when an increase from 55.28 to 72.09 percent (figure 1.3.) happened. As for the loan side, no noticeable change had occurred.

**Figure 1.3 The dollarization level of total deposits and loans in Kazakhstan (%)**

Source: Source: Author's calculations.

Data from: Central Bank of Kazakhstan.

Note: The dollarisation ratio is computed as a ratio of foreign currency denominated deposits and loans to total deposits and loans.

Several reasons triggered an increase in the deposit dollarization level: the fall of the oil price in 2014, followed by Russian financial crisis, and transition from managed to float exchange rate regime. All of these combined caused a drastic devaluation of the national currency, which on the other hand induced dollarisation ratio.

The evolution of Kazakhstan's exchange rate regime is quite interesting. From 1997 till 2013 country was using a managed float regime. On September 2, 2013, National Bank of Kazakhstan (NBK) announced that they would move to a pegged system and link tenge (national currency) to a basket of currencies: U.S. dollar, Euro, and Russian ruble. Later, as the fall in oil price and Ruble weakening occurred, Kazakhstan was forced to devalue tenge by 20 percent. As the Russian financial crisis continued to develop, the country was facing a dilemma, either devalue tenge again or switch to a floating exchange rate regime. The nation chose the last option, and on August 20, 2015, the transition was announced. Following the announcement, Kazakh currency over the night plunged by 23 percent against the dollar and continued to devalue for five months till May 2016, when tenge managed to stabilise. Given all above it is not a surprise that population switched their preference to foreign-denominated deposits.

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Since the high level of dollarisation is a great concern to transition economies NBK's governor announced the de-dollarisation plan. According to him, the process will be long and painful as NBK has to fight not only against economic but against psychological factors as well. Governor state following:

“People are used to calculating their incomes in the foreign currency, regardless of what they spend their money on. ... Especially, it applies to major assets: real estate, cars – they should be priced in tenge. Take real estate. Price formation in this market has historically been tied to the dollar. Currently, however, most of the materials used in construction – 80 percent of all construction materials - come from domestic producers. Thus, this asset is created without dollar, and so it really has little impact on its price formation”. (Urazova 2016)

## 1.2.2 The Kyrgyz Republic

The collapse of the Soviet Union had a significant impact on the economy of the Kyrgyz Republic. The country faced large market loss, as 98% of export went to other former Soviet economies. According to Mogilevsky and Omorova (2011), dissolution of USSR<sup>4</sup> led to fall in demand on military supplies, which was the county's primary source of income. The cheap energy supplies were terminated, which resulted in increase in prices. Subsequently, the Kyrgyz Republic experienced hyperinflation, drastic decline in economic growth and high rate of unemployment. The country was also failing to attract foreign direct investments

All mentioned above was the main reason why the economic performance of the Kyrgyz Republic was among the worsts. However, the country showed improvement from the beginning of 1996 and continued development with the help of several reforms including liberalisation of trade and prices and supporting management toward foreign investments. In 1998 the Kyrgyz Republic was the first among post-soviet countries who

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<sup>4</sup> Union of Soviet Socialist Republics.

joined World Trade Organisation. Nevertheless, the recovery is not significant, and the country is still considered as the poorest among the CCA economies.

The Kyrgyz Republic together with a number of post-Soviet countries was “blessed” with a high level of dollarisation. From the figure 1.4 we can see that the dollarisation of deposits and loans varied between 70 and 45 percentage points. The studies “Financial Sector Development and Dollarization in the Economies of Central Asia” (Asel 2010) explains a jump in dollarisation level during the period 2003-2005 as a response to the increased remittances. Furthermore, according to author an increase in a bank account, held by citizens is also linked to remittances as some individuals are receiving money through the banking system. Lastly, he concludes that a decrease in dollarisation level in 2007 was related to a national currency appreciation toward the U.S. dollar.

Till 2015 the Kyrgyz government with the national bank (NBKR) was not actively involved in the de-dollarisation process. But the recent devaluation of national currency and decrease in economic growth, caused by the fall in oil prices and Russian crisis, gave incentives to NBKR to announce the de-dollarisation program.

**Figure 1. 4 The dollarization level of total deposits and loans in the Kyrgyz Republic (%)**



Source: Source: Author's calculations.

Data from: Central Bank of Kyrgyz Republic.

Note: The dollarization ratio is computed as a ratio of foreign currency denominated deposits and loans to total deposits and loans.

According to 2016 report done by NBKR, implementation of prudential measures and introduction of additional requirements for the loans denominated in foreign currency had a positive influence on dollarisation. Mainly, new regulations applied the credit side of the banking system, requiring a larger volume of reserves for foreign currency. Hence it explains the large gap between deposit and loan dollarisation at the end of 2016 (figure 1.4).

What future reforms should be carried out by the country? IMF report (2016) pointed out that the Kyrgyz Republic should follow international experience in de-dollarisation and implement market-driven de-dollarisation policies, rather than using forced measures. In addition, developing domestic financial market should be an initial step as it will increase the effect of monetary policy.

### 1.2.3 Tajikistan

Tajikistan together with the Kyrgyz Republic has the lowest income per capita in CCA region (see Asel 2010). Country's economy had severely weakened due to Soviet Union dissolution and five years of civil war. Thus, Tajikistan started to recover only after 1997. Remittances and export of cotton and aluminium play a significant part in the country's economy. Historically great part of GDP always consisted of remittances. For example, in 2013, 43.47% of GDP was coming from the money sent by migrants. From table 1.3 we can see that the statistics changed during the period 2014/2015. The decrease is related to the Russian financial crisis as most of the Tajiks are working there. Another part of GDP consists of income generated through the drug trade. According to research done in 2012 heroin industry is equivalent to 30-50% of GDP. Considering all the facts mentioned above, it is not surprising that international investors refrain from entering the Tajik market.

**Table 1. 3 Personal remittances**

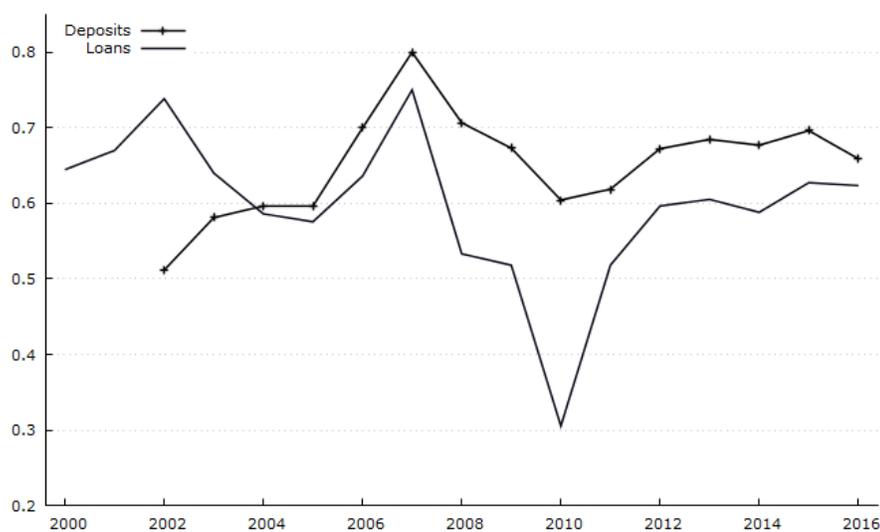
	2010	2011	2012	2013	2014	2015
<b>Remittances (% of GDP)</b>	35.81	41.74	42.22	43.47	36.64	28.76

Source: Author's calculations. Data from: The World Bank.

The difficult environment for business, combined with macroeconomic instabilities, and underdevelopment of the domestic financial market resulted in a high level of dollarisation (figure 1.5). In addition, a large part of the household's income consists of remittances and income from the drug trade that is denominated in a foreign currency. Hence citizens prefer to take a loan or open deposits in foreign currency.

From the figure 1.5, we can see that dollarisation level sharply decreased between the periods 2008-2010. Drop in the ratio is more significant for loan side. This can be explained by the global financial crisis that effected Tajikistan more than other CCA countries. During that period the level of remittances also fell. Besides, according to the report by the Bureau of Economic and Business Affairs during the financial crisis commercial banks reduced issuing loans as one of the ways of hedging against default.

To summarise all above mentioned it would be difficult for Tajikistan to start the de-dollarisation process until a country is facing macroeconomic instability with the high level of corruption and poor development of a financial system.

**Figure 1. 5 The dollarization level of total deposits and loans in the Tajikistan (%)**

Source: Source: Author's calculations.

Data from: Central Bank of Tajikistan.

Note: Dollarization ratio is computed as a ratio of foreign currency denominated deposits and loans to total deposits and loans.

This section tried to give general knowledge about five countries, on which our studies will be conducted. Each of them has experienced radical changes in their economic structure, which was not done without consequences. In the next chapter we will go through academic literature on dollarisation topic. It will help us to underline the importance of this subject.

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## 2 Literature review

The aim of the thesis is to review the drivers of financial dollarisation in the CCA region, more precisely which factors are significant for loan dollarisation and which for debit dollarisation. Before focusing on the main purpose of the thesis, this part of the paper will introduce theoretical and empirical studies on dollarisation. Why dollarisation could be a concern for a country, what could be done to achieve dollarisation, and are there any successful cases of the process – these questions will be answered by reviewing the existing academic literature on this subject.

### 2.1 Dollarisation – Pros and Cons

It is important to distinguish a difference between two types of dollarisation – de jure and de facto. Full or de jure dollarisation occurs when the country starts using foreign currency as legal tender. De facto or unofficial/partial dollarisation in the paper of Ize (2012) is defined as the case when local currency is used as legal tender, but a certain portion of contracts are denominated in foreign currency. The author also notes that there are three types of partial dollarisation: First is financial dollarization, when residents hold a sufficient share of their assets and liabilities in foreign currency; second is payment dollarisation (currency substitution), in this case residents use a foreign currency as a mean of payment; and lastly real dollarization, that is indexing local prices in foreign currency. The literature review will focus on full and financial dollarisation.

In today's world, when a number of developing or transition countries are seeking a way to be a part of the globalised economy, currency stability is becoming essential. As those economies are often facing high and unstable inflation rate, attracting foreign investments become more and more challengeable, which may lead to lower economic growth. On the other hand, when people start losing face in their national currency, substituting it with more stable one becomes the wise desition. Subsequently, it is not a surprise that the vast number of countries are dealing with dollarisation problem.

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The dollarisation debate has become a hot topic among policymakers and economists. Their opinion on it, is somewhat divided. Some are arguing that countries, who are experiencing rapid depreciation of national currency should forgo sentiments and adopt more stable currency as a legal tender, in other words fully dollarized. Others note that by doing it, a central bank will be unable to conduct the monetary policy, making harder for government to stimulate the economy.

Several empirical studies were conducted to address the dollarisation phenomenon. As we already mentioned, dollarisation can have, both a negative and positive effect on the country. According to Baliño et al. (1999), dollarisation should not always be discouraged, as it can be the sign of financial markets gradual integration in the globalisation process. Mendoza (2000) notes that emerging economies can benefit from dollarisation in two ways: eliminate price and wealth distortions triggered by poor policy implications and improve financial markets.

Kokenyne et al. (2010) share the same view as the authors mentioned above and, in their paper, point out the three beneficial aspects of dollarisation: First, countries opening their economy are becoming more exposed to external shocks. Therefore, they require hedging, which on the other hand induces dollarisation and leads to more integration, and hence helps to develop the domestic financial market; Second feature is that Dollarization can decrease the exchange rate risk for investors, which on the other hand will increase their confidence and boost investments: And finally, deposits in foreign currency provide funding for domestic banks. In other words, country hedges against capital flight that can be triggered by unstable macroeconomic conditions.

It should be said that pros, as mentioned above, are valid only when a country decides to use a foreign currency as a legal tender. But making such desition is not easy for government authorities. Karras (2002) examined the macroeconomic costs and benefits of dollarisation for nineteen North, South, and Central American countries. According to him before assessing whether dollarization can be beneficial or not, one should make a joint examination of costs and benefits. The main finding of the paper is that two variables are strongly, positively correlated, making the computation of the net benefits of dollarisation somewhat tricky.

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As the topic of the thesis is determinants of financial (partial) dollarisation, the next part of the literature review will focus on it. To finish the general discussion of full dollarisation, it would be worth to cite the following:

“Some countries have recently considered making another country's currency their own: in particular, adopting the dollar. This is a highly consequential step for any country, one that has to be considered very carefully and, in our view, should not be done without consultation with United States authorities. On one hand, dollarisation offers the attractive promise of enhancing stability. On the other hand, the country also must be prepared to accept the potentially significant consequences of doing without the capacity independently to adjust the exchange rate or the direction of domestic interest rates.” (<https://www.treasury.gov/press-center/press-releases/Pages/rr3093.aspx>, 1999)

Next part of the paragraph will address the issues of financial (partial) dollarisation and why it can be a concern for the country. According to Yeyati (2006) highly dollarized countries are displaying a greater tendency of the bank run because of the national currency depreciation. The author points out that active de-dollarisation policy would be advisable for that kind of economies.

While discussing negative aspects of dollarisation, different authors emphasise the same things: Limitation of the effects of monetary policy; Balance sheet risk; and lastly liquidity crisis.

Schmitt-Grohe and Uribe (2001) noted that costs associated with dollarisation are a loss of seigniorage revenue; the lack of the lender of last resort, and weak monetary policy. However, it should also be mentioned that academic literature does not give clear answer how the dollarisation limits the effectiveness of monetary policy. Reinhart et al. (2003) tried to be more specific and examined effects of dollarisation on three main monetary transmission channels – Interest rate, money aggregate and exchange rate channels in highly dollarized countries. The findings reported in the paper suggest that only countries affected through the exchange rate channel suffer from dollarisation. More precisely, exchange-rate pass-through phenomenon creates large currency mismatches that on the other hand leads to an increase in price level, which can result in an increase of inflation index, and hence induce dollarisation ratio. The exchange-rate pass-through phenomenon

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was also examined by Kokenyne et al. (2010), who point out that partial dollarisation leads to balance sheet risk. Pass-through phenomenon creates currency mismatch, making the banking system more vulnerable that can lead to banking or economic crisis. Ize et al. (2005) in their paper discuss liquidity risk associated with the lender-of-last resort. Authors note that in highly dollarized countries, access to foreign currency funding for commercial banks is somewhat limited, therefore if bank run occurs, foreign currency depositors may face liquidity risk.

## 2.2 Potential Determinants of de-dollarization

A vast number of academic literature identify economic instability, underdevelopment of financial markets, and high inflation as a cause of financial dollarisation. Balino et al. (1999) claim that uncertainty and high inflation reduces confidence in the national currency and influences the public to hold assets in the foreign one that on the other hand induces the high level of dollarisation. As the topic of the thesis is determinants of de-dollarisation, the following section will focus on studies addressing this issue.

Empirical evidence from Latin American countries showed that reduction in inflation level not always causes a decrease in dollarisation ratio. Ize and Yeyati (2003) tried to explain the phenomenon by developing Minimum Variance Portfolio (MVP). In the authors' suggested model, dollarisation depends on inflation rate and real exchange rate depreciation, rather than only on the price stability. Hence policies implemented to stabilise economy can fail to reduce dollarisation if the government also tries to target real exchange rate while making its volatility higher than that of inflation. Authors' findings are supported by others. For example, Kokenyne et al. (2010) claim that a flexible exchange rate regime is a key factor to achieve de-dollarisation, as under such policy foreign exchange risks are more visible. Lin and Ye (2013) tried to further extend Ize and Yeyati's MVP equilibrium to prove that inflation targeting can be a key determinant in the de-dollarisation process. They examined a sample of 106 developing countries and find out that inflation targeting had a significant and adverse effect on dollarisation ratio, leading to its decrease by over 8 percentage points. Overall, they conclude that inflation targeting can be a useful tool for developing countries - dealing with financial dollarisation. In the paper of Barajas and Morales (2003) dollarization of liabilities is studied. Their findings suggest that increase in credit side is strongly

correlated with bank's dollarized deposits and development of financial markets. Neanidis and Savva (2009) studied short-term determinants of financial dollarisation for 11 transition economies. Authors claim that short-run credit dollarisation is affected by banks' currency matching. As for deposit dollarisation, the effect of monetary expansion is negatively correlated with dollarisation ratio, inducing depositors to save in domestic currency, while inflation volatility does not seem to have any effect on their decisions. Results were more significant for highly dollarized countries.

In the paper "What is Driving Financial De-dollarization in Latin America?" García-Escribano and Sosa (2011) examine a group of Latin American countries (Bolivia, Paraguay, Peru, and Uruguay). Authors use multi-country VAR model to determine which factors influence credit side and which debit side of dollarisation. Empirical results show that the implementation of prudential measures, development of domestic financial markets, and de-dollarisation of deposits decreased credit dollarisation. While in the case of foreign currency savings, growth in exchange rate had a significant effect.

Rosenberg and Tirpak (2008) examined the credit side of financial dollarisation in the new member states of the European Union (EU). Authors note that various indirect channels trigger the increase in foreign currency borrowing: liberalisation of capital account – increasing the access to external funding; boost in the ratio of trade to GDP (trade openness) – opening hedging opportunities; believe instability of exchange rate that comes with EU membership.

Determinants for credit and debit dollarisation, but for a different group of countries were studied by Naceur et al. (2015). The paper addresses region - the Caucasus and Central Asian (CCA) that will be further studied in the thesis. Besides, it is the most recent academic literature that examines both sides of de-dollarisation focusing only on the CCA region. According to the authors, empirical results suggest that CCA countries have some unique de-dollarisation determinants that cannot be seen in the other regions. Contrary to other countries, inflation volatility induces both - deposit and credit dollarisation, while higher inflation affects only the credit side. As for deposit dollarisation, it is negatively influenced by the asymmetry of the exchange rate

The last study introduced in this section is by Hake et al. (2014) who investigate the primary drivers of foreign currency lending in CESEE<sup>5</sup> and Latin American countries. Authors conducted a meta-analysis on 32 empirical papers addressing determinants of loan dollarisation. According to them, a macroeconomic instability – expressed by inflation volatility boosts lending in foreign currency for both regions. Meanwhile interest rate differential has a significant and positive effect only on Latin American countries. And lastly exchange rate depreciation, with exchange rate volatility have a negative impact on loan dollarization in Latin America, while for CESSEE region the effect is unclear - empirical results showed that exchange rate depreciation has no effect on lending in foreign currency, on the other hand, exchange rate volatility seems to boost lending, contrary to other regions.

## 2.3 Successful and Unsuccessful cases

In the following section, we will review the list of countries that were successful in the de-dollarisation process, and what methods and policies were used to achieve the goal.

To determine the successful cases of long-lasting de-dollarisation, Reinhart et al. (2003) review 85 economies during the period 1980-2001. A country considered as a successful case if the ratio of foreign currency deposits to broad money declined by 20 percentage points, and following the decrease, settled and remained below 20 percentages. Results suggest that only Israel, Mexico, Pakistan, and Poland met the criteria, by introducing some restriction on foreign deposits. According to the authors, these findings are interesting because Bolivia and Peru have implemented the same policies as Mexico and Pakistan but failed to de-dollarize. Furthermore, the authors identify Israel and Poland, as the only countries that showed long-lasting de-dollarisation with minimal side effects. According to them, Israel and Poland had avoided a problem of capital flight and less financial intermediation, because in both cases, the government developed a strategy based on macroeconomic stabilisation and prudential measures.

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<sup>5</sup> Central, Eastern and Southeastern Europe.

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Menkulasi et al. (2009) underline two types of financial de-dollarisation process – market driven de-dollarisation that is achieved by macroeconomic policies, regulatory/legal reforms, and forced de-dollarisation done by administrative enforcement. Authors claim that countries using a market-driven approach showed significantly better results than countries that have adopted the forced method. Furthermore, Israel, Poland, Chile, and Egypt are given as an example of successful market-driven de-dollarisation. According to the authors, no direct actions were implemented by the governments and positive results were achieved due to combined policies, targeting domestic financial markets and inflation rate. In the paper, Mexico and Pakistan are presented as the only successors in forced driven de-dollarisation process. But it had some consequences in the form of capital flight and less financial intermediation.

The subsequent paper of Mecagni et al. (2015), underlines why market-driven policies are more effective in the long run than forced measures. Bolivia's case is presented as a vivid example. At first, in 1982, the government tried to decrease dollarisation by forcing citizens to exchange foreign deposits into the domestic ones. The consequences of such actions were macroeconomic instability that enforced the government to remove regulatory measures on foreign deposits. Furthermore, the authors studied 42 highly dollarized countries to determine successful and unsuccessful de-dollarisation. The empirical finding showed that only 17 states were able to de-dollarize and were sharing the same characteristics – the higher initial level of inflation and democracy index.

Unsuccessful cases of the de-dollarisation process can be considered countries that were forced to fully dollarized their economy – Ecuador, El Salvador in Latin America and Zimbabwe in Africa, are considering adopting U.S. dollar as legal tender – Venezuela, and those who failed – Argentina, known as convertibility plan.

In January 2000 president of Ecuador, Jamil Mahuad announced that country would adopt U.S. dollar as legal tender in response to the devaluation of the national currency (65%) triggered by banking and economic crisis. After U.S. dollar adoption country began to experience the economic growth. However, the decline in oil prices and strengthening of the U.S. dollar once again threatened an economy, making it similar to situations that Argentina was facing during convertibility system.

A case of Argentina is very interesting as a country has applied all possible monetary policies to stabilise an economy but still failing it. In 1991 Argentina announced the convertibility plan – by pegging Argentinian peso to the U.S. dollar, as an answer to hyperinflation. However, the decision was met with a failer, triggered by several factors including currency board decision. We will not go any further in the discussion of countries mentioned above as it is the other topic for studies, but to conclude the case of these two economies is an excellent example for governance of how the policies should not be implemented.

This part of the thesis tried to show existing academic literature on dollarisation/de-dollarisation topic. Going through different authors works, allowed us to see that de-dollarisation is the long-lasting process which requires the unusual combination of policies and these policies may differ among different countries. Altogether, existing academic literature helped us in a choice of main determinants that positively influence the de-dollarisation process and on which hypothesis of our studies are going to be built.

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## 3 Hypothesis

The aim of the thesis is to examine drivers of financial de-dollarization in CCA region. The choice of the hypothesis that will be tested later is built on already existing studies. Academic literature, addressing the de-dollarization problem, emphasis the role of macroeconomic stability and development of domestic financial institutions. Therefore, we decided to test following hypothesis:

***Hypothesis #1: De-dollarization is driven by macroeconomic stability.***

After the dissolution of the Soviet Union newly formed countries started their journey from centrally planned economy to the market-based system. During the transition period, they experienced the whole series of macroeconomic instability, such as economic stagnation, hyperinflation and high inflation rate, devaluation of local currency, high level of unemployment, etc. However, three decades have passed since then, and countries, with the help of different economic reforms managed to stabilise their position. By testing the hypothesis #1 as mentioned above, we will see if macroeconomic variables indeed have explanatory power in the de-dollarisation process.

***Hypothesis #2: Drivers of deposit de-dollarization are different from those of loan de-dollarization.***

In chapter two we reviewed potential determinants of financial dollarisation and find out that drivers of loan dollarisation might differ from drivers of deposit dollarisation. For example, García-Escribano and Sosa (2011) observed that increase in the deposit dollarisation boosts loan dollarisation but not in another way. Some other studies suggest that exchange rate volatility influences only loan side of dollarisation. However, we should mention that the results also might differ among countries. We want to see if this rule applies for the CCA region as well and test which determinants have significant power on loan and which on deposit de-dollarisation process.

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**Hypothesis #3:** Development of financial institutions matter.

A number of empirical literatures points out that weak financial institutions contribute to both, deposit and loan dollarisation. In the absence of strong domestic financial market commercial banks tend to lend more in foreign currency as one of the ways of hedging against local currency depreciation. As the CCA economies are suffering from weak domestic financial system, we expect that the variables, used to test hypothesis # 3 will show a positive correlation with financial dollarisation. The below table (3.1) shows which variables will be used to test our three hypothesis.

**Table 3. 1 Variables that are used to test hypothesis**

<b>Hypothesis #1</b>	Inflation rate; inflation rate volatility; exchange rate; exchange rate volatility.
<b>Hypothesis #2</b>	To prove this particular hypothesis all variables included in the model should be used.
<b>Hypothesis #3</b>	Interest rate differentials – The difference between the interests of loans/deposits in the foreign and domestic currency.

The detail description of variables used in the empirical model can be found in next chapter.

## 4 Determinants of financial de-dollarisation

In this section we want to study the determinants of financial de-dollarisation for CCA countries and if they are some unique factors, which are valid only for this region. We are conducting a panel vector autoregressive (PVAR) model, which is a widely used technique among scholars. This approach will help us to shed light on the de-dollarisation process from both loans and deposits perspective.

We will estimate panel VAR model in generalised methods of movement (GMM) framework. We are going to use monthly panel data for the period January 2006 - January 2017 for five countries. The starting point of the sample, as well as the number of states, depended on the availability of all necessary data. As for the choice of the variables, we were inspired by the related academic literature.

The remainder of this section is organised as follows. First, we will discuss the tools that were used by other scholars to capture determinants of de-dollarisation. Then we will describe our data as well as the methodology used in the thesis. And the last part will show empirical results using impulse response function and variance decomposition.

### 4.1 Methodology and data

The topic of the thesis gives the possibility to choose different econometric models; however, as we want to study determinants of dollarisation for deposits and loans together, we stopped our choice on panel vector autoregression model, which is widely used technique among researchers. The next section is organised as follows. First, we will discuss the tools used to capture the determinants of de-dollarisation and then describe the model and the data of our choice.

### 4.1.1 De-dollarisation trend and its measures

While studying partial dollarisation, academic literature does not specify which econometric tools show accurate results. The most commonly used approach is the minimum variance portfolio (MVP) provided by Ize and Yeyati (2003). Authors model implies that financial dollarisation depends on the variance of exchange rate depreciation and inflation rate, rather than on inflation and exchange rate itself. Therefore, if the exchange rate depreciation for given inflation rate volatility is more significant, then economic agents will prefer to save in domestic currency. Authors prove the efficiency of their model by examining 23 sample of countries. However, the model mentioned above is used to study only the deposit side of dollarisation. Later authors' hypothesis was proved by Rennack and Nozaki (2006), who built their empirical analysis on the MVP model.

In the subsequent paper of Garcia-Escribano and Sosa (2011) authors estimate multi-country VAR model to examine changes in both loan and debit dollarisation. The sample consists of monthly data for Latin American countries<sup>6</sup>. Authors use the impulse response function and forecast error variance decomposition to illustrate their results. Castilo et al. (2006) also investigate one of the Latin American country – Peru using the Bayesian estimation of dynamic stochastic general equilibrium (DSGE) model. Authors examine two forms of partial dollarisation – currency substitution<sup>7</sup> and prise dollarisation.

Naceur et al. (2015) study sample of the CCA region using Difference - Generalized Methods of Movement (DGMM) model. The quarterly data of years 2001-2014 is used. The variables included in the model are the exchange rate, inflation rate and their volatility. Authors also include loan extended to the private sector over GDP as a proxy for a measurement financial development. Some other studies also use the Random and Fixed effect model<sup>8</sup>

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<sup>6</sup> Bolivia, Peru, Paraguay, Uruguay.

<sup>7</sup> In this work financial dollarisation is referd as currency substitution.

<sup>8</sup> Neanidis and Savva (2009).

### 4.1.2 Panel VAR

Nearly Four decades ago Sims (1980) came up with an alternative strategy for empirical macroeconomics—Vector Autoregressive models that are now widely used techniques in applied econometrics. In the VAR model all variables are treated as endogenous and independent; however the model can be augmented by adding exogenous variables, linear trend etc. (see Canova and Ciccarelli 2013).

General form of p-lag VAR model is following:

$$Y_t = q + B_1 Y_{t-1} + B_2 Y_{t-2} + B_3 Y_{t-3} + \dots + B_p Y_{t-p} + u_t ; t = 0, 1, 2, 3, \dots, T \quad (4.1)$$

Where  $q$  is  $(M \times 1)$  vector of constants,  $Y_t = (y_{1t} \dots y_{Mt})'$  represents a vector of endogenous variables, the  $B_i$  is  $(M \times M)$  coefficient matrices and  $u_t$  is  $(M \times 1)$  vector of error terms (Lütkepohl, Helmut (2005)).

If in the equation (1.1) we will introduce the cross-sectional dimension we will get panel VAR model.

$$Y_{it} = q_i + B_1 Y_{it-1} + B_2 Y_{it-2} + \dots + B_p Y_{it-p} + u_{it} ; t = 0, 1, 2, \dots, T_i \text{ and } i = 1, 2, 3, \dots, I \quad (4.2)$$

According to Canova and Ciccarelli (2013) many researchers choose panel VAR because of it's following features:

“.. they are able to (i) capture both static and dynamic interdependencies, (ii) treat the links across units in an unrestricted fashion, (iii) easily incorporate time variation in the coepicients and in the variance of the shocks, and (iv) account for cross sectional dynamic heterogeneities” (Canova and Ciccarelli 2013)

There are several ways to estimate panel VAR – fixed effect, mean group and GMM estimator. The latter technique is becoming more and more popular. However, within the GMM model, there are different ways of estimation. Most commonly used tools are the first-difference GMM estimator by Anderson and Hsiao (1982) and forward orthogonal

transformation proposed by Arellano and Bover (1995). We are going to use the latter as it minimises data loss, by subtracting the average of future variables.

The steps, necessary to conduct the model and interpret the results are following: stationarity testing of our sample, lag length selection, stability testing of PVAR model, impulse response function, and forecast error variance decomposition.

### 4.1.3 Selection of the Data

The data used in the thesis was collected for five economies of the CCA region. The choice of the countries depended on the availability of all necessary data. For that reason, Azerbaijan, Turkmenistan and Uzbekistan were excluded from the studies. The data covers January 2006 - January 2017 time-period with monthly frequency. The desired time frame for the research was 1995 and onwards - the period from where implementation of macroeconomic reforms began, but the problem with availability of the data arises once again; therefore, the study begins from the year 2006.

The choice of the data was inspired by the related academic literature of García-Escribano and Sosa (2011), Hake et al. (2014), and Naceur et al. (2015). The sources of the data are central banks of respective countries and IMF database. The below table 4.1 represents the list of the data, their sources and sign of variable.

**Table 4. 1 Data description**

<b>Variables</b>	<b>Measures</b>	<b>Source</b>	<b>Sign</b>
<b>Macro Variables</b>			
<i>Inflation</i>	CPI to the previous month %	Central Bank	(+/-)
<i>Inflation Volatility</i>	12 months rolling standard deviation of inflation	Author's own calculation	(+)
<i>Exchange rate</i> <sup>9</sup>	Monthly exchange rate to U.S. dollar	IMF database/ Central Bank	(+)
<i>Exchange rate Volatility</i>	12 months rolling standard deviation of exchange rate	Author's own calculation	(+)
<b>Dollarisation Rate</b>			
<i>Deposit dollarisation ratio</i>	Foreign currency denominated deposits over total deposits	Author's own calculation	(+)
<i>Loan dollarisation ratio</i>	Foreign currency denominated loans over total loans	Author's own calculation	(+)
<b>Interest rate Differential</b>			
<i>Deposit interest rate differential</i>	The difference between the interests of deposits in the foreign and domestic currency	Author's own calculation	(-)
<i>Loan interest rate differential</i>	The difference between the interests of loans in the foreign and domestic currency	Authors own calculation	(-)

Source: Author's calculations.

Note: The data used for calculation of variables - dollarization rate and interest rate differential are from Central banks' databases.

<sup>9</sup> We are using exchange rate to U.S. dollar instead of the nominal/real effective exchange rate, as the data for Tajikistan was available only from year 2010. Therefore, we decided to follow Naceur et al. (2015) paper and replace the effective rate with the exchange rate to U.S. dollar.

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*The inflation rate* is the measure of macroeconomic stability. Countries that experienced an economic crisis involving hyperinflation are suffering from a high rate of dollarisation ratio even though economic performance and inflation rate might have stabilised. *Inflation Volatility*<sup>10</sup> together with the Inflation rate is included in many studies as an explanatory variable of high dollarisation rate. The more volatile is inflation, the more are the incentives towards currency substitution.

*Exchange rate* shows how much national currency is valued in terms of another currency. The theoretical impact of this variable is rather not precise and depends on the side of dollarisation. Depreciation of domestic currency might have the different effect on lenders and borrowers. For example, banks will try to increase the supply of loans, while agents will prefer to borrow in local currency due to the risk aversion Hake et al. (2014). As for the deposit side of dollarisation expectation of national currency's appreciation makes savings in foreign currency less attractive. The studies show that the impact of *Exchange rate Volatility* has a more significant effect on dollarisation than the exchange rate itself.

The above mentioned four variables will help us to test our first hypothesis: De-dollarization is driven by macroeconomic stability.

*Deposit dollarisation ratio* and *Loan dollarisation ratio* is used as a proxy of dollarisation rate. These two variables will be our dependent variables.

Deposit interest rate differential together with Loan interest rate differential in some academic literature is used as a measure of domestic financial system development. Naceur et al. (2015), while studying the CCA region, incorporate the ratio of total loans to the private sector over GDP as a proxy of financial depth. It is worth to mention that authors were not able to include interest rate differential due to the lack of availability<sup>11</sup>. By examining relations between dollarisation ratio and interest rate differentials, we will test our third hypothesis: Development of financial institutions matter.

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<sup>10</sup> For calculation of inflation volatility rolling standard deviation method is used. The same way of calculation is used in several papers including Naceur et al. (2016) and Garcia-Escabano and Sorsa (2011).

<sup>11</sup>For that purpose, we have excluded Azerbaijan, Turkmenistan and Uzbekistan from our sample.

And lastly, comparing the final results of our empirical study, we can discuss whether determinants influencing loan dollarisation and deposit dollarisation are the same or not.<sup>12</sup>

The below table (4.2) provides the summary statistics for the whole sample

**Table 4. 2 Descriptive Statistics**

<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>Minimum</b>	<b>Maximum</b>	<b>SD</b>	<b>Skewness</b>	<b>Kurtosis</b>
<b>DRL</b>	720	0.52	0.23	0.77	0.12	-0.51	2.46
<b>DRD</b>	720	0.63	0.25	0.89	0.13	-0.26	2.60
<b>IRDD</b>	720	-0.27	-0.10	0.03	0.03	-0.51	2.78
<b>IRDL</b>	720	-0.05	-0.15	0.08	0.04	0.42	3.32
<b>INF</b>	720	0.01	-0.04	0.09	0.01	1.02	10.50
<b>INFV</b>	720	0.01	0.001	0.03	0.005	0.72	3.04
<b>EXCH</b>	720	128.40	1.41	491.34	157.85	1.04	2.57
<b>EXCHV</b>	720	4.55	0.003	70.77	9.18	3.64	19.80

Source: Author's calculations.

N stands for the number of observations, SD – standard deviation, DRD deposit dollarisation ratio, DRL loan dollarisation ratio, IRDD interest rate differential for deposits, IRDL interest rate differential for loans, INF inflation rate, INFV inflation rate volatility, EXCH exchange rate, EXCHV exchange rate volatility.

The visual evaluation of variables can be seen in appendix A: figure A1, A2 ..., A8.

## 4.2 Empirical results

This part of the thesis will focus on empirical results and detail explanation of how they were conducted. More precisely we will first examine the data and test for it's stationarity. Then using the PVAR model described in part 4.1.2, we will test our

<sup>12</sup>Hypothesis #2: Drivers of deposit de-dollarisation are different from those of loan de-dollarisation.

hypothesis presented in chapter 3. Finally, with the help of impulse response functions and forecast error variance decomposition, we will interpret the results.

Hoewer before moving to the next part we would like to present the table that summarises monetary policy frameworks<sup>13</sup> for our sample. The table gives us the general information of Central banks objectives, which will be useful during interpretation of empirical results.

**Table 4.3 Monetary policy framework**

<b>Countries</b>	<b>Monetary policy framework</b>	
Armenia	Free floating exchange rate regime	Inflation targeting regime
Georgia	Floating exchange rate regime	Inflation targeting regime
Kazakhstan	Floating exchange rate regime	Inflation targeting regime
Kyrgyz Republic	Fixed exchange rate regime (crawling peg)	Other
Tajikistan	Pegged floating exchange rate regime	Other

Source: National banks.

#### 4.2.1 Estiamtion of the model

Certain checks are required prior to conducting the empirical model, to see with what kind of data we are working. First, we will investigate whether the series are normally distributed and then, we will test the presence of stationarity.

In section 4.1.3 the table 4.1.2, we showed descriptive statistics of our sample<sup>14</sup>. Based on summary we can say that data is strongly balanced. Values of skewness and kurtosis are far from normal levels of 0 and 3, indicating the presence of non-normality. Therefore, we decided to transform the following variables into logs: deposit and loan

<sup>13</sup> Regarding the exchange rate and inflation rate framework.

<sup>14</sup> Please refer to Appendix A: Figure A1; Figure A2... Figure A8 to see the visual examination of the data.

dollarisation ratio; exchange rate and exchange rate volatility. Other variables are kept in levels

The second check is stationarity of data series. For that purpose, we are going to use Levin-Lin-Chu panel unit-root test with the assumption that panel contains a unit root. The results are shown in table 4.4.

**Table 4. 4 Panel Unit root tests.**

Variables	P-Value (Levin-Lin-Chu)
INF	0.0000
INFV	0.0097
IEXCH	0.0442
IEXCHV	0.0025
IDRD	0.2141
IDRL	0.8747
IRDD	0.1146
IRDL	0.0928

Source: Author's calculations.

$H_0$ : Panels contain unit root.  $H_1$  Panels are stationary. We fail to reject  $H_0$  in most of the cases.

INF stands for inflation rate, INFV inflation rate volatility, IEXCH log of exchange rate, IEXCHV log of exchange rate volatility, IDRDL log of deposit dollarisation ratio, IDRL log of loan dollarisation ratio, IRDD interest rate differential for deposits, IRDL interest rate differential for loans.

From the table 4.4, we can see that only four variables (INF, INFV, IEXCH, IEXCHV ) are stationary. To deal with non-stationary time series, one can transform variable using first differences. However, as there is a possibility of information loss, many researchers advise ignoring the stationarity assumption as far as you get the stable model. Given all above we decide to continue model estimation without first differencing the data.

To investigate the determinants of financial dollarisation, we will use the following equation:

$$LDRL_{it} = LEEXCH_{it} + Exchv_{it} + INF_{it} + INFV_{it} + IRDL_{it} + IRDD_{it} + LDRD_{it} \quad (4.3)^{15}$$

$$LDRD_{it} = LEEXCH_{it} + Exchv_{it} + INF_{it} + INFV_{it} + IRDL_{it} + IRDD_{it} + LDRL_{it} \quad (4.4)$$

<sup>15</sup> First, we tried to estimate the model without first differencing the log of the exchange rate and loan dollarisation ratio; however, we were getting inconsistent results.

Where  $\text{IEXCH}$  is log difference of exchange rate,  $\text{Exchv}$  - log of exchange rate volatility,  $\text{INF}$  - an inflation rate,  $\text{INFV}$  - an inflation rate volatility,  $\text{IRDL}$  – interest rate differential for loans,  $\text{IRDD}$  interest rate differential for deposits,  $\text{IDRD}$  – log of deposit dollarisation ratio,  $\text{IIDRL}$  – log difference of loan dollarisation ratio.

Given that the selection of lag length for the PVAR model is crucial, one should be careful while choosing it. Abrigo and Love (2015) suggest using the model and moment selection criteria MMSC for GMM estimator provided by Andrews and Lu (2001). Authors provide mathematical interpretation of MMSC minimisation criterion adjusted for PVAR model.

$$MMSC_{BIC,n}(s, p, z) = J_n(s^2 p, s^2 z) - (|z| - |p|)s^2 \ln n \quad (4.5)$$

$$MMSC_{AIC,n}(s, p, z) = J_n(s^2 p, s^2 z) - 2s^2(|z| - |s|) \quad (4.6)$$

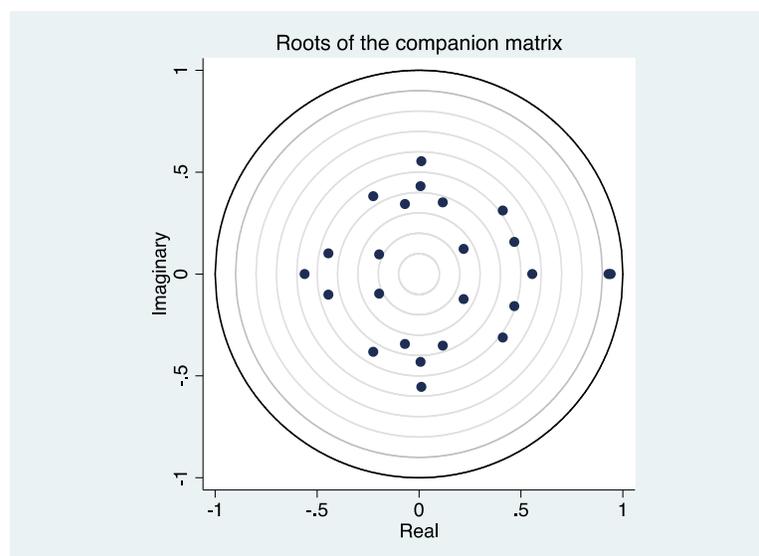
$$MMSC_{HQIC,n}(p, z) = J_n(s^2 p, s^2 z) - R s^2 (|z| - |p|) \ln \ln n, \quad R > 2. \quad (4.7)$$

Where  $J_n(s^2 p, s^2 z)$  represents a J statistic of Hansen over-identified restrictions,  $s$  is the number of parameters in panel VAR model,  $z$  shows number of moment conditions and  $n$  is number of total observations.

We compute information criteria for all countries at once. One should note that Andrews and Lu (2001) advise relying on MMSC-HQIC and MMSC-BIC criteria as MMSC-AIC is not consistent. All three MMSC information criteria suggested using one lag, but after the specification of the model, results were not consistent. Therefore, we ran the PVAR model once again setting the lags  $p=2,3,4,5$ <sup>16</sup>. We decided to use lag three taking into consideration the significance of coefficient and requirements for parsimony. Before checking the stability of the model, we transformed our data into stationary series using the first difference<sup>17</sup>. Then we once again estimated the PVAR with the same ordering and lag length, after which stability test was conducted. From the figure 4.1, we can see that all eigenvalues are inside unit root circle, meaning that our model is stable. For interpretation purposes in the next section, we will present impulse response functions and forecast error variance decomposition below.

<sup>16</sup> After lag three we were getting insignificant coefficients.

<sup>17</sup> We first conducted a stability test for the original model, but PVAR did not satisfy stability condition, given that sample contained unit roots.

**Figure 4. 1. Eigenvalue stability condition**

Source: Author's calculations.

$H_0$ : At least one eigenvalue lies outside the unit circle.  $H_1$  panel vector autoregression does not satisfy stability condition.

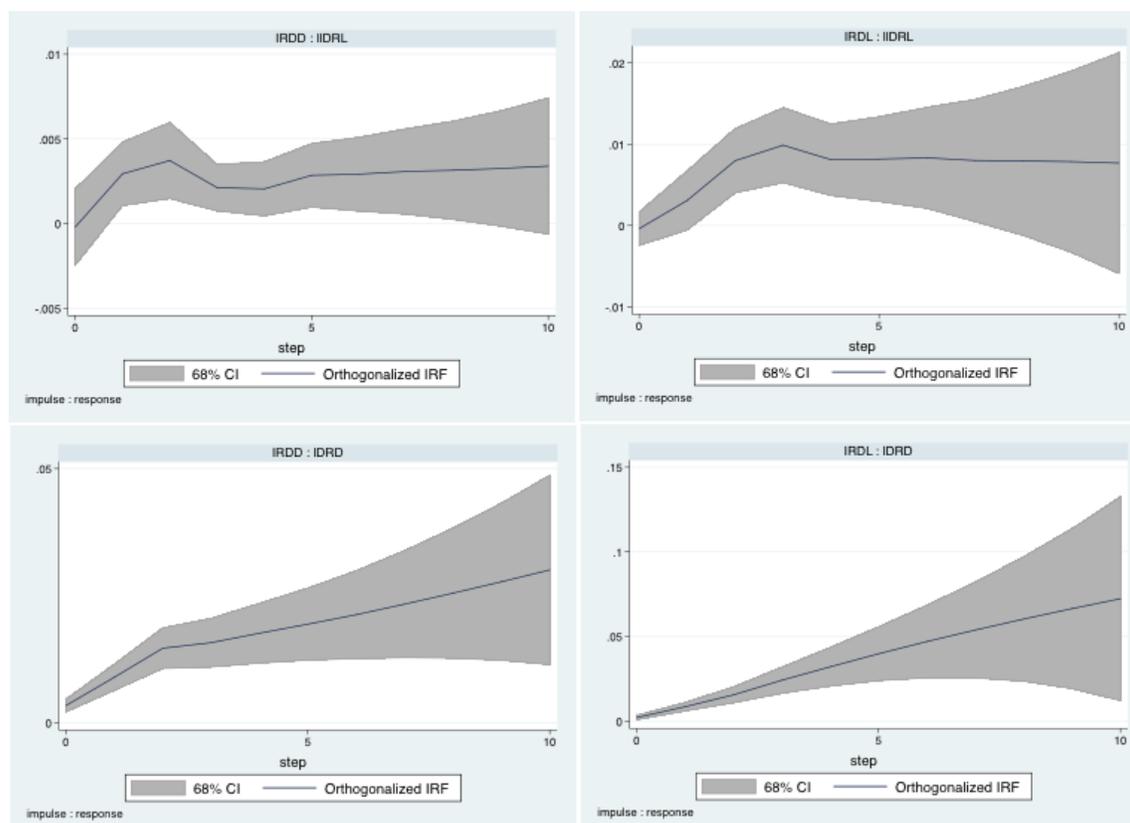
#### 4.2.1 Impulse response functions and Forecast error variance decomposition

The orthogonalized impulse response functions show how one variable reacts to the impulse/shock (one standard deviation) of other variable taking into assumption that other shocks are zero Rossi (2004). In our model, we are using orthogonalised impulse responses with 68% of confidence bands (one standard error confidence bands).

The purpose of the thesis to see what the determinants of financial dollarisation are and if drivers of de-dollarisation differ among deposits and loans. For that reason, we will examine impulse response functions and forecast variance decomposition of deposit and loan dollarisation ratio.

First, we will explain how our variables<sup>18</sup> mentioned above react to macroeconomic stability. The figure 4.2 illustrates the responses of dollarisation ratios to an orthogonalised one standard deviation shock to interest rates differentials.

**Figure 4. 2 Responses of dollarisation ratio to interest rate differentials**



Source: Author's calculations.

Note: The top row (from the left) presents response of loan dollarisation ratio (IIDRL) to interest rate differential-deposits (IRDD) and interest rate differential – loans (IRDL) shocks, The below row shows response of deposit dollarisation ratio (IDRD) to interest rate differential-deposits (IRDD) and interest rate differential – loans (IRDL) shocks. The impulse responses are obtained from a one standard deviation shock and are plotted with 68 % confidence bands, based on 200 Monte Carlo replications.

We can see that the loan dollarisation ratio as a response to the shocks to interest rate differentials (deposit and loan) at first increases, (for a short period) and then stays on the same level. However, the response to IRDL is more significant, comparing to the response to IRDD. Interest rate differential for loans either stabilised or decreased over

<sup>18</sup> Deposit dollarisation ratio (IDRD) and Loan dollarisation ratio (IIDRI).

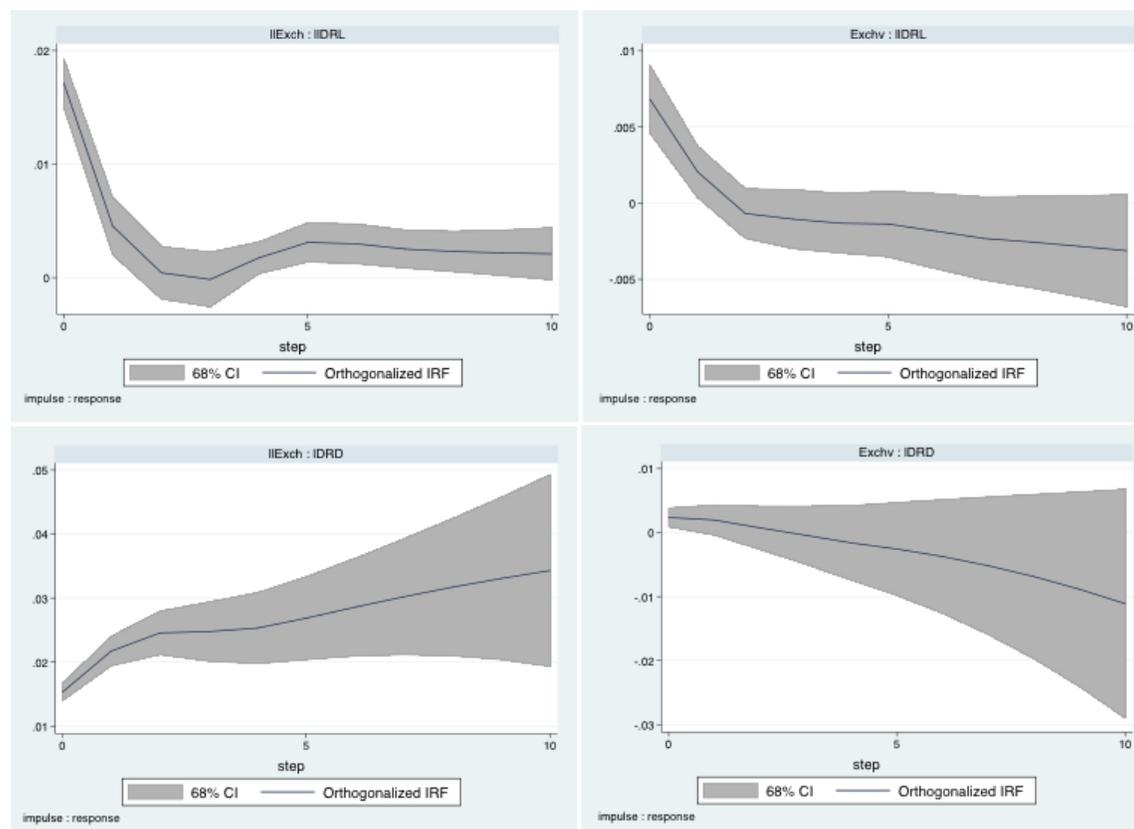
time in CCA region<sup>19</sup>. This means that interest rates on loans denominated in foreign currency are less than loans in national currency. Moreover, this is a common approach of commercial banks in this region, and one of the ways of risk aversion against currency depreciation. Given all the above, borrowing in foreign currency becomes more appealing for borrowers., hence increasing the depth of dollarisation. On the other hand, with the boost in foreign currency lendings, savings in foreign currency deposits might be more convenient for agents. We have a surprise outcome of how deposit interest rate differential influences savings. One might expect that agents will be more motivated to save in local currency, but figure 4.2 shows the opposite. If we have a look on graph B1 appendix B, we will see that spread between the interest rate on deposits, denominated in national and foreign currency is not so big, meaning that agents still might find savings in the foreign currency more appealing. Given all above, we can conclude that the development of financial system indeed influences dollarisation ratio<sup>20</sup>.

Figure 4.3 Shows how dollarisation ratio reacts to shocks to exchange rate and exchange rate volatility. We can see that the response of IDRL to ILEXCH shock is immediate. This is not a surprise. When there is an exchange rate appreciation borrowing in foreign currency becomes more, and the agents' interests are switched to domestic loans. After some time, the response becomes insignificant, and then slightly increases, however, we can not say that change is significant. It seems that exchange rate volatility does not have a significant effect on loan dollarisation as well. While looking at an impulse response function for deposit dollarisation, we can see that it increases to the shock of exchange rate. As we have already mentioned in part 4.1.3 that devaluation of local currency increases the incentives of economic agents to save in foreign currency, allowing hedging against depreciation.

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<sup>19</sup> The results differ between countries (Appendix A: figure A3, figure A4, Appendix B: figure B1, figure B2).

<sup>20</sup> Hypothesis #3: Development of financial institutions matter (Chapter 3).

**Figure 4. 3 Responses of dollarisation ratio to Exchange rate and Exchange rate volatility**

Source: Author's calculations.

Note: The top row (from the left) presents the response of loan dollarisation ratio (IIDRL) to exchange rate (IExch) and exchange rate volatility (Exchv) shocks. The below row shows response of deposit dollarisation ratio (IDRD) to exchange rate (IExch) and exchange rate volatility (Exchv) shocks. The impulse responses are obtained from a one standard deviation shock and are plotted with 68 % confidence bands, based on 200 Monte Carlo replications.

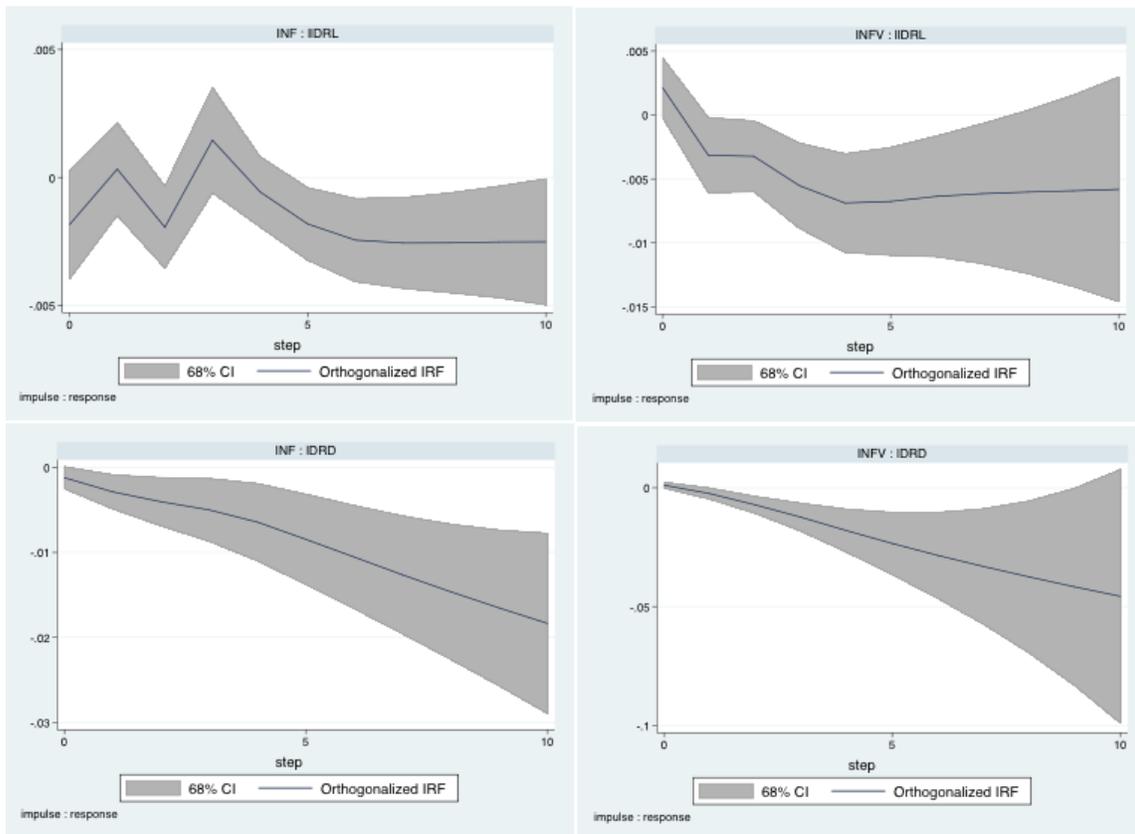
Figure 4.4 illustrates the responses of dollarisation ratios to an orthogonalised one standard deviation shock to the inflation rate and inflation rate volatility. We can see that inflation and inflation volatility has a significant effect on both sides of dollarisation. It is worth to mention that our sample includes periods 2006-2017, during which an inflation rate has already stabilised as an outcome of macroeconomic reforms. In addition, Armenia Georgia and Kazakhstan have adopted inflation targeting regime since 2006, 2009 and 2015 respectively<sup>21</sup>, which contributed to low inflation rate. Therefore, we can conclude that macroeconomic stability is the key determinant of the de-dollarisation

<sup>21</sup> It is worth to mention that national bank of Kazakhstan started transition process from 2003; however, the country was unable to satisfy all pre-requirements of inflation targeting regime till 2015.

process. Our findings are consistent with IMF staffs’ studies<sup>22</sup> and are unique features for the CCA region.

Based on the results from figure 4.3 and 4.4 we were able to prove our first hypothesis: De-dollarization is driven by macroeconomic stability.

**Figure 4. 4 Responses of dollarisation ratio to Inflation rate and Inflation rate volatility**



Source: Author’s calculations.

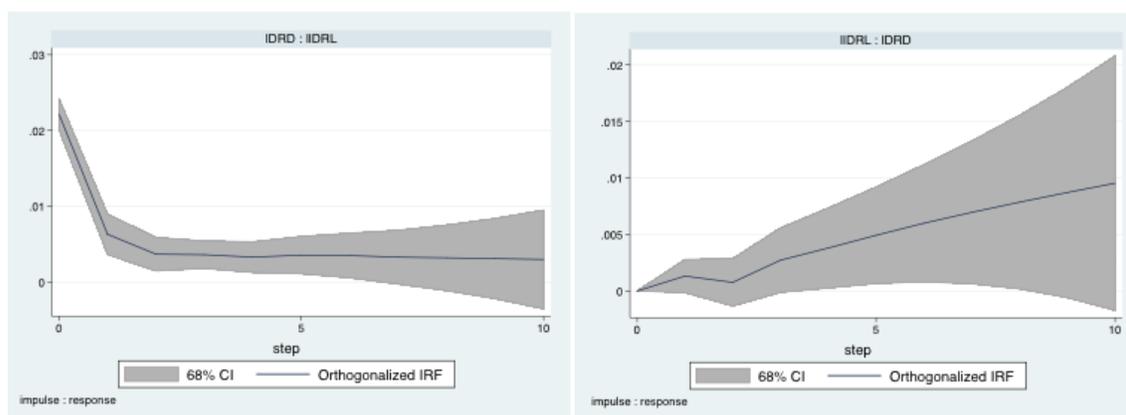
Note: The top row (from the left) presents the response of loan dollarisation ratio (IIDRL) to inflation rate (INF) and inflation rate volatility (INFV) shocks. The below row show response of deposit dollarisation ratio (IDRD) to inflation rate (INF) and inflation rate volatility (INFV) shocks. The impulse responses are obtained from a one standard deviation shock and are plotted with 68 % confidence bands, based on 200 Monte Carlo replications.

The last impulse response function (see figure 4.5) shows the relationship between deposit and loan dollarization. While dollarization of deposits doesnot have a significant effect on level of loan dollarization, deposit dollarization shows gradual increase over

<sup>22</sup> Naceur et al. (2015).

time. In chapter two we had graphically illustrated deposit and loan dollarisations. From the figures we can see that historically, deposit dollarisation ratio was bigger than loan dollarization for the majority of countries.<sup>23</sup> Therefore we can conclude that higher deposit dollarisation induces a higher level of loan dollarisation. This phenomenon is explained by banks behaviour to want to hedge against currency mismatch.<sup>24</sup>

**Figure 4. 5 Responses of dollarisation ratio to dollarisation ratio**



Source: Author's calculations.

Note: The first figure (from the left) presents the response of loan dollarisation ratio (IIDRL) to deposit dollarisation ratio (IDRD) shock. The second figure shows the response of deposit dollarisation ratio (IDRD) to loan dollarisation ratio (IIDRL) shock. The impulse responses are obtained from a one standard deviation shock and are plotted with 68 % confidence bands, based on 200 Monte Carlo replications.

The rest impulse response functions are given in appendix C, figure C1 and table 4.5 summarises our findings.

<sup>23</sup> Georgia is the only exception.

<sup>24</sup> Naceur et al. (2015).

**Table 4. 5 Determinants of financial de-dollarization: summary of results**

Variables (impulses)	Response of Loan Dollarisation	Response of Deposit Dollarisation
Inflation rate	√	√
Inflation rate volatility	√	√
Exchange rate	n.s.	√
Exchange rate volatility	n.s.	√
Interest rate differential – Loans	√	√
Interest rate differential – Deposits	√	√
Loan dollarisation ratio		n.s
Deposit dollarization ratio	√	

### Forecast error variance decomposition

Forecast error variance decomposition is another tool of the PVAR model that allows us to identify the response of one variable to another. More precisely what proportion of forecast errors of other variables are explaining the variation of one variable (see Lütkepohl 2005).

From table 4.5 we can see that in case of deposit dollarisation interest rate differential has the most explanatory power of approximately 30-40%. It is interesting to see that inflation volatility has more proportion than inflation rate itself; however, impulse response function did not show the drastic difference in terms of response. As for exchange and exchange volatility, the contribution to deposit dollarisation variation decreases over time, meaning that both variables are effective only in the short term.

When it comes to loan dollarisation, deposit dollarisation has the largest effect on variation of loan dollarisation. It seems like that interest rate differential for loans also has the major part in loan dollarisation level. While comparing magnitudes of inflation rate and inflation rate volatility, the latter has the more explanatory power of forecast error in the variance of dollarisation. Moving on, the exchange rate and its volatility have the rather opposite effect on the volatility of loan dollarisation. While former has the

higher effect in short-term (5 and 10 months) latter is more persistent in the long run (20 and 25 months).

**Table 4. 6. Forecast error variance decomposition for dollarisation ratios**

Forecasts error variances	Horizon	Proportions of forecast errors by variables:							
		EXCH	EXCHV	INF	INFV	IRDL	IRDD	DRD	DRL
<b>Deposit dollarisation ratio</b>	5	0.161	0.0008	0.0056	0.034	0.12	0.054	0.62	0.0015
	10	0.117	0.003	0.015	0.10	0.27	0.06	0.42	0.0044
	15	0.094	0.012	0.023	0.14	0.35	0.07	0.30	0.0060
	20	0.078	0.026	0.028	0.16	0.39	0.08	0.24	0.0070
	25	0.065	0.047	0.031	0.17	0.40	0.08	0.19	0.0077
<b>Loan dollarisation ratio</b>	5	0.0798	0.013	0.0024	0.025	0.059	0.007	0.14	0.67
	10	0.075	0.016	0.0082	0.063	0.12	0.016	0.13	0.56
	15	0.069	0.027	0.0129	0.084	0.15	0.026	0.12	0.49
	20.	0.064	0.044	0.0163	0.094	0.17	0.038	0.11	0.44
	25.	0.059	0.065	0.0185	0.098	0.18	0.049	0.10	0.41

Source: Author's calculations.

Note: The table presents the proportions of forecast error variances for deposit dollarisation ratio and loan dollarisation ratio explained by exchange rate, exchange rate volatility, inflation rate, inflation rate volatility, interest rate differential – loans, interest rate differential – deposits, and dollarisation ratios itself at horizons of 5, 10, 15, 20 and 25 months.

We have already mentioned that chapter four was dedicated to an investigation of determinants of financial de-dollarisation. We managed to prove our three hypothesis and find similar results as in studies of IMF staff. Next chapter will serve as the summation of results obtained in this part of the thesis.

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## 5 Concluding remarks

This part of the thesis will summarise the empirical results presented in the section 4.2.3. In addition, depending on the significance of the results we will discuss which actions can be implemented by policymakers within a short time. And finally, we will review the possible improvements of the model.

Three hypothesis were tested in Chapter 4 using the PVAR model: Hypothesis #1: De-dollarization is driven by macroeconomic stability. Hypothesis #2: Drivers of deposit de-dollarisation are different from those of loan de-dollarisation. Hypothesis #3: Financial development of the banking system matters. To interpret our results, we used orthogonalized impulse response functions and forecast error variance decomposition.

The impulse response functions of the estimated model depicted that deposit de-dollarisation depends on the volatility of exchange rate and inflation rate. As we have already mentioned depreciation of local currency increases incentives to save in a foreign currency, allowing hedging against devaluation. On the other hand, the change in exchange rate does not have a significant effect on loan-dollarisation<sup>25</sup>. Given all above, we can say that macroeconomic factors are dominant determinants for financial de-dollarisation in CCA region<sup>26</sup>.

We also introduced a new variable - interest rate differential as a measure of financial system development, which also had a significant effect on the de-dollarisation process.<sup>27</sup>

We observed that the spread between the interest rate on loans, denominated in a national currency and foreign currency increased over time; therefore, citizens are finding borrowing in the foreign currency more appealing. Hence, boosting the ratio of loan dollarisation. And lastly, we found out that deposit de-dollarisation had a significant positive effect on a loan de-dollarisation.

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<sup>25</sup> Hypothesis 2.

<sup>26</sup> Hypothesis 1.

<sup>27</sup> Hypothesis 3.

Another tool used in the study was forecast error variance decomposition. Surprisingly, inflation volatility together with interest rate differential on loans had approximately 40-45 % explanatory power in deposit dollarisation ratio. As for loan dollarisation ratio, deposit dollarisation ratio and inflation volatility were more prominent. Based on the above, we can surmise that insecurities and history still linger in the population. As our results correspond with other findings, they can be used for discussing possible policy implication.

First and maybe most important aspect for the country, with the highly dollarized system, is macroeconomic stability, in particular, less volatile inflation rate. Many authors have emphasised that switching to an inflation targeting regime will be a key factor for market-driven financial de-dollarisation. The second important aspect is the development of financial institutions. In the country with weak financial depths, commercial banks are forced to increase the supply of loans, denominated in foreign currency as one of the ways of the hedging against currency devaluation. And finally, policies implemented to stabilise deposit dollarisation eventually will help to reduce loan dollarisation.

We hope that our thesis will contribute to future studies, focused on the CCA region. The topic itself gives a lot of possibilities and choices for researchers. For example, all five countries to a great degree are depended on remittances, one can test if the latter also contributes to financial dollarisation. Furthermore, to improve the results one can consider using a spread between the reserve requirement rate on both domestic and foreign currency as a proxy for prudential measures.

# Conclusion

Financial dollarisation was and is a persistent problem for transition economies. On the one hand, high level of dollarisation makes implementation of the monetary policy less efficient and on the other hand in case of repeating depreciation of local currency, it threatens the solvency of borrowers. Taking into consideration the importance of the topic, the thesis tried to determine what are the shocks that stimulate a decrease in dollarisation level. The main goal of the thesis was to contribute to existing academic literature that primarily focuses on CCA economy.

Our sample consisted of five countries – Georgia, Armenia, Kazakhstan, the Kyrgyz Republic and Tajikistan. We estimated the PVAR model using monthly data from January 2006 till January 2017. We also introduced variable - interest rate differential that was mostly used in other papers as a proxy of financial system development.

We find out that macroeconomic stability together with the development of the domestic financial sector is a key determinant of financial de-dollarisation. Also following Naceur et al. (2015) results, we find out that the CCA region indeed has some unique features when it comes to de-dollarisation. To be more precise inflation rate and inflation rate volatility did not have a significant effect on financial dollarisation in other countries, while in the CCA region, they showed significant positive correlation. Another interesting finding was the relationship between deposit and loan dollarisation. We find out that deposit dollarisation has a significant positive effect on loan dollarisation.

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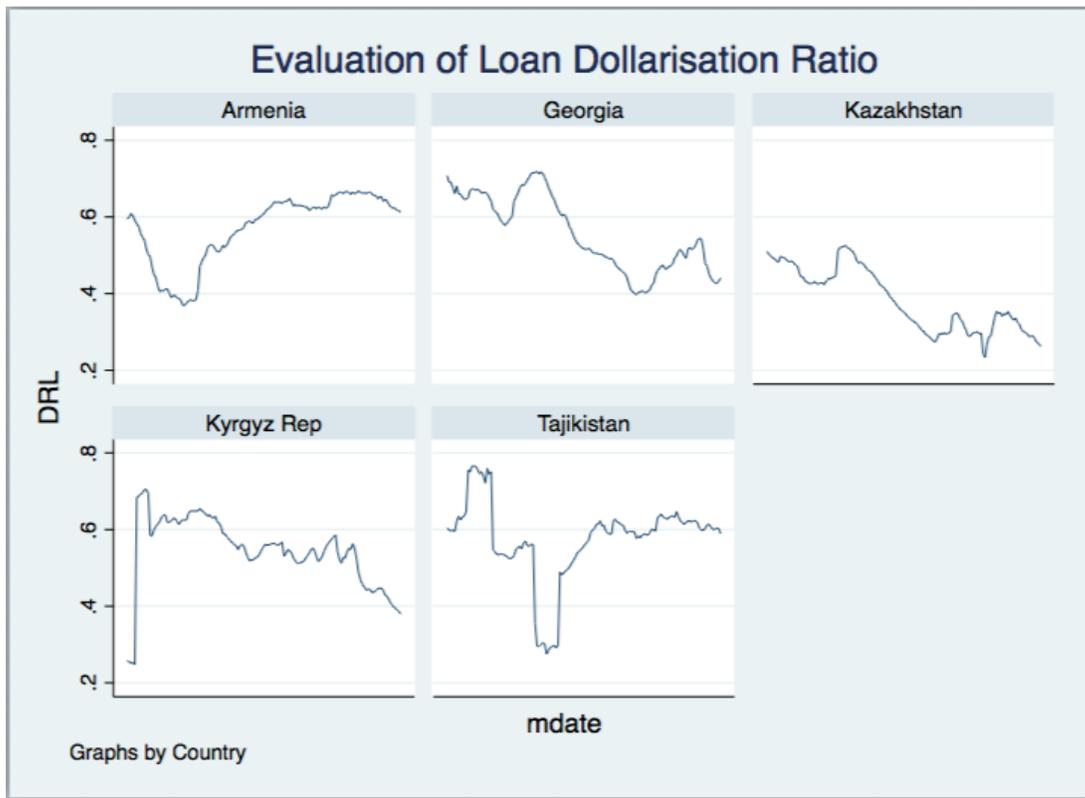
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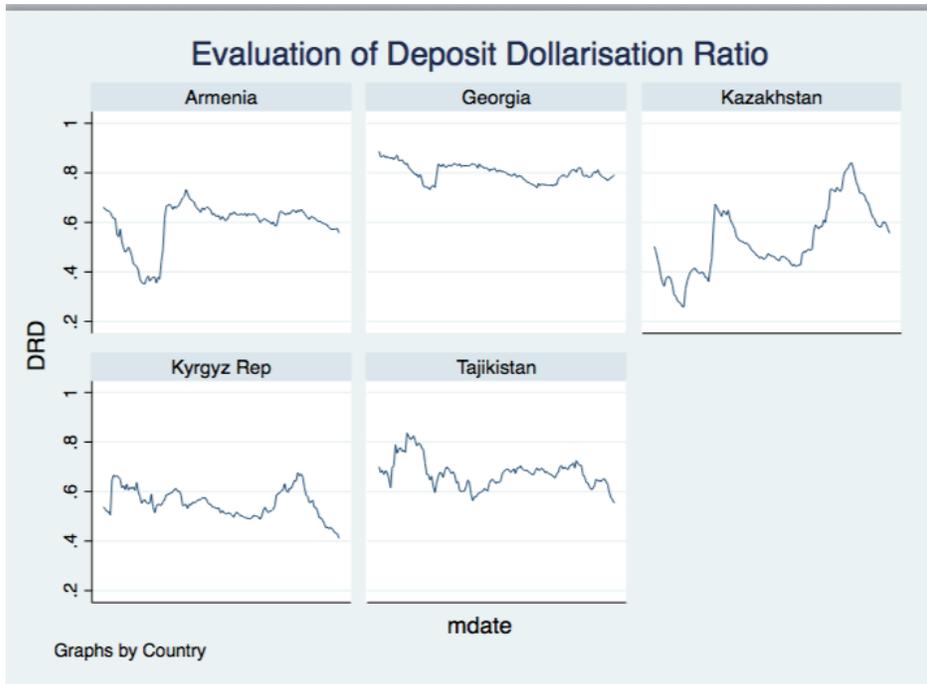
# Apendix

## Apendix A

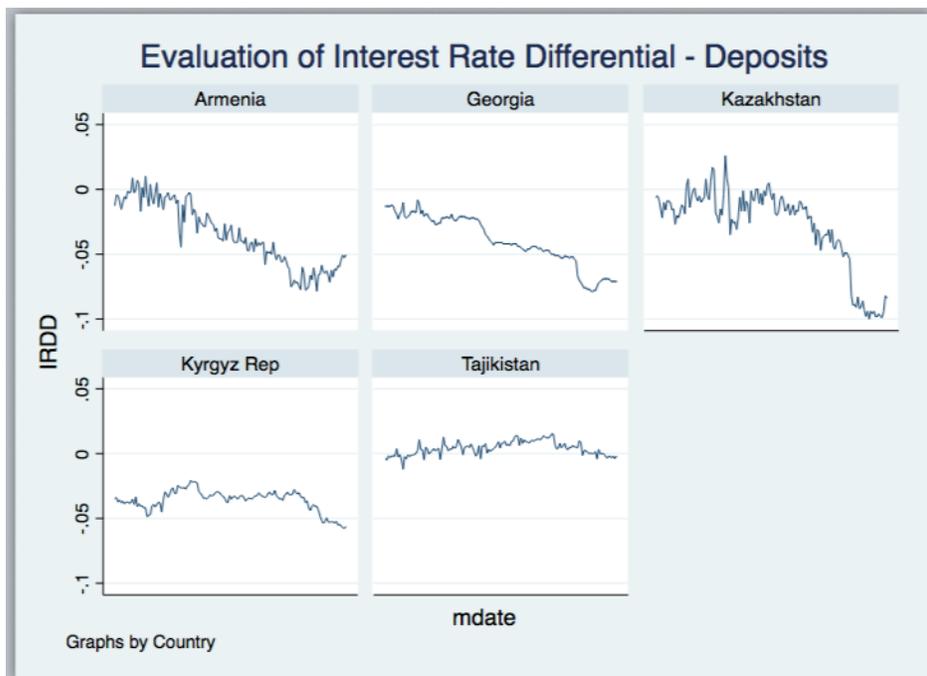
**Figure A. 1 Evaluation of loan dollarization ratio**



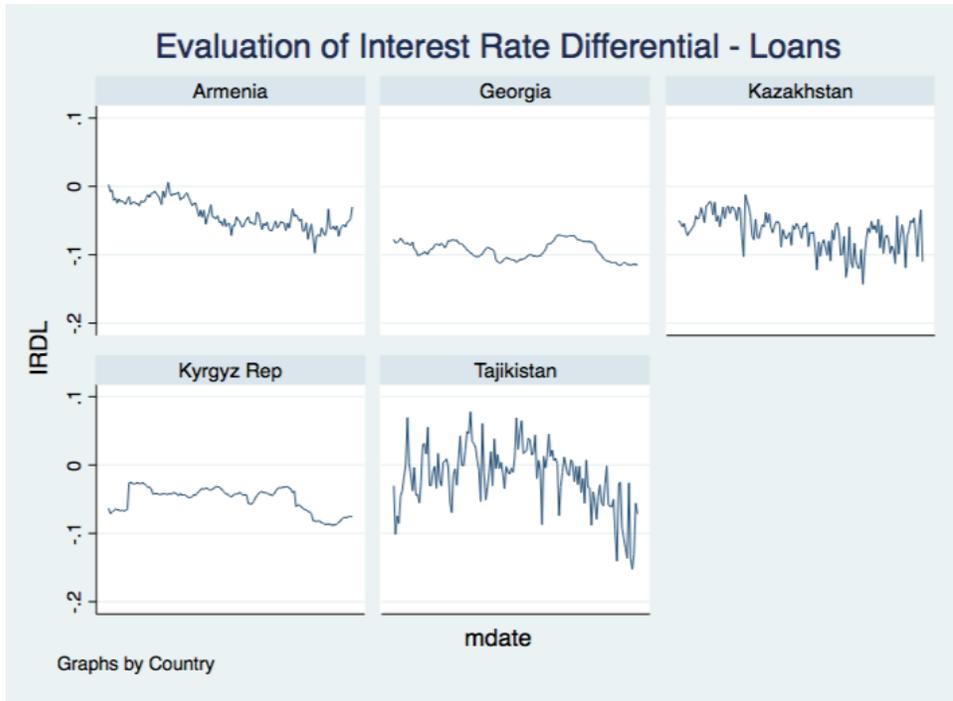
**Figure A. 2 Evaluation of Deposit dollarization Ratio**



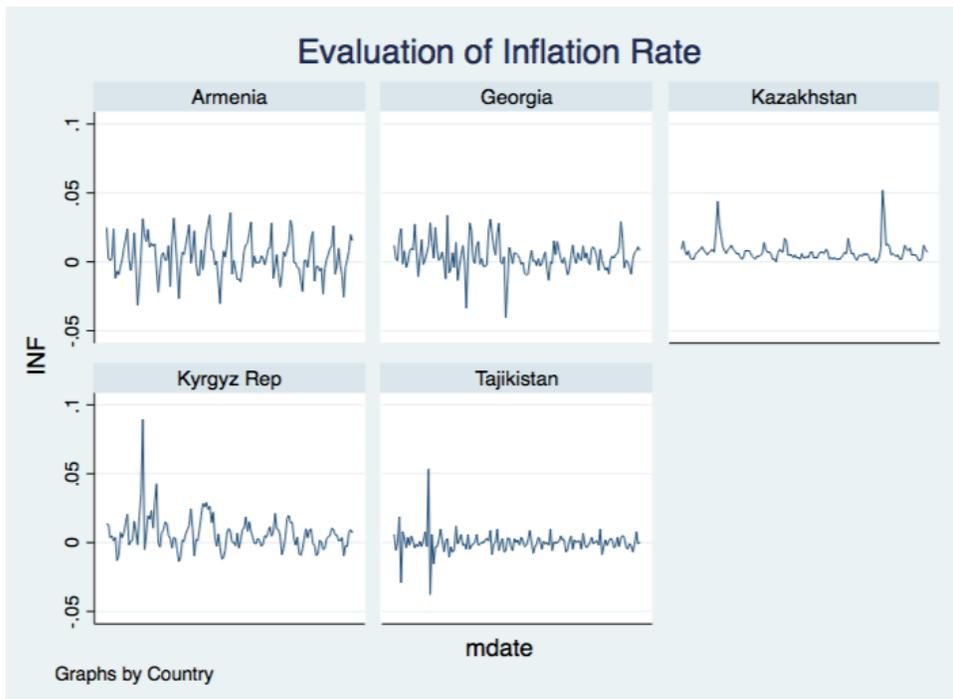
**Figure A. 3 Evaluation of interest rate differential - Deposits**



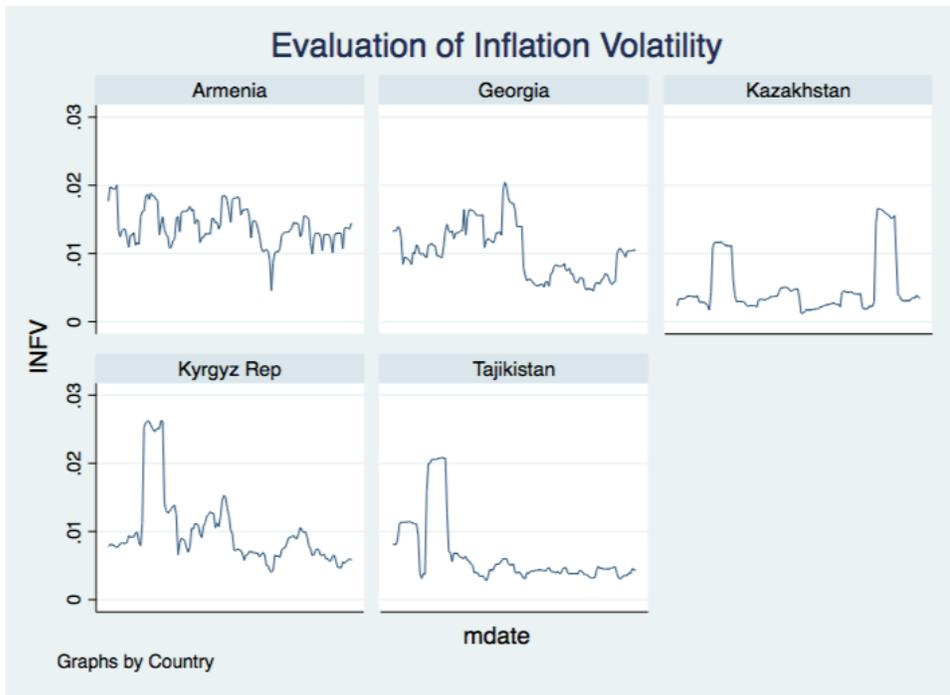
**Figure A. 4 Evaluation of interest rate differential - Loans**



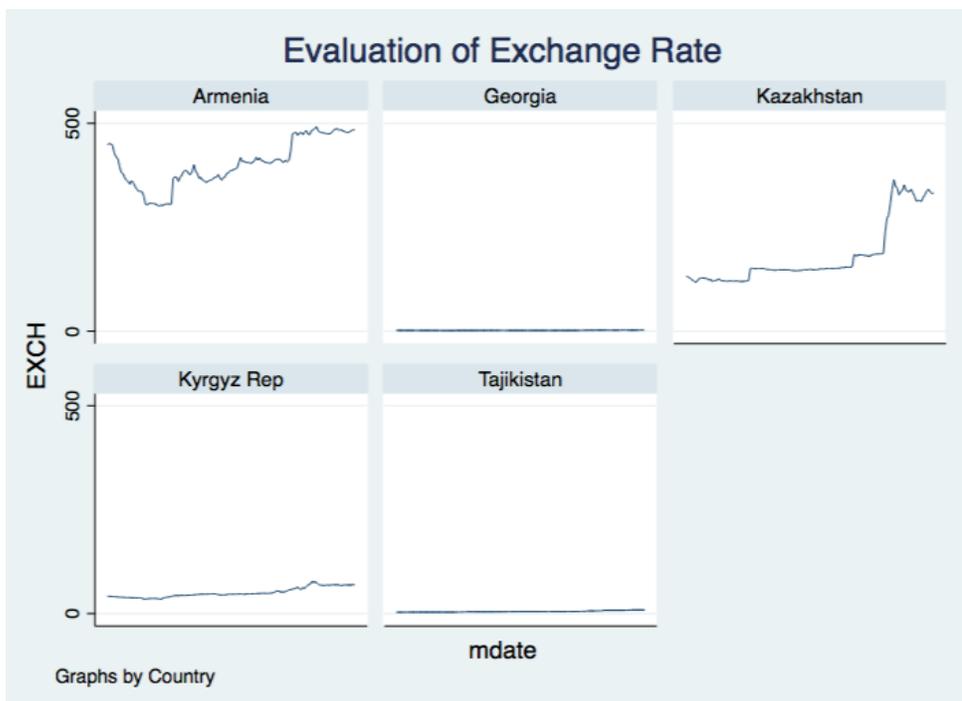
**Figure A. 5 Evaluation of Inflation Rate**



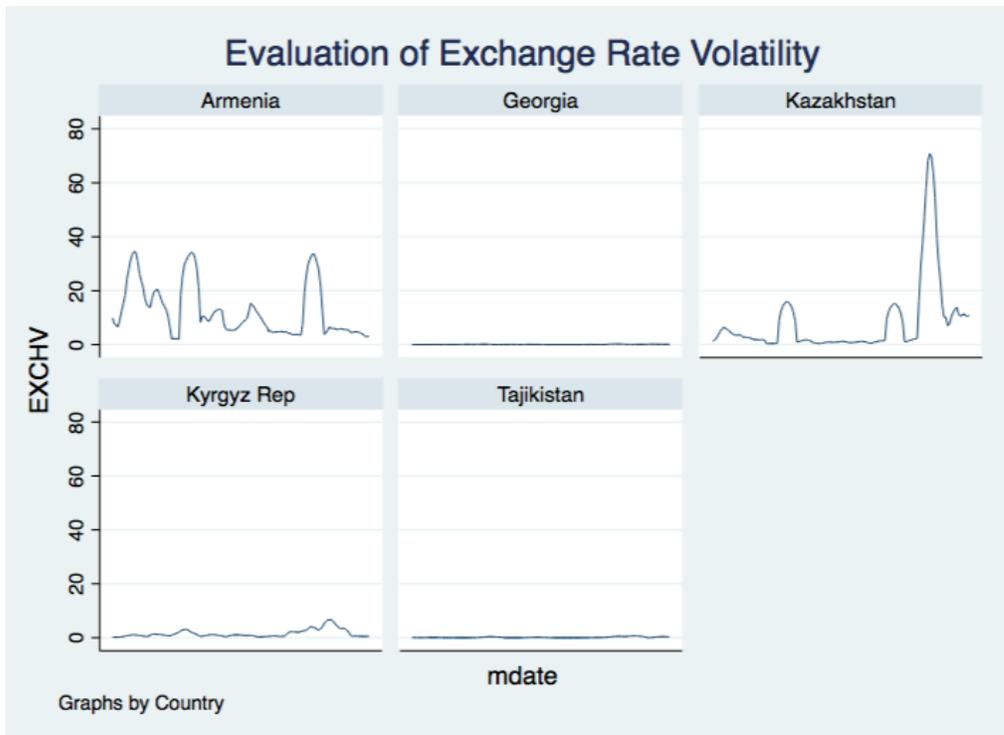
**Figure A. 6 Evaluation of Inflation Volatility**



**Figure A. 7 Evaluation of Exchange rate**

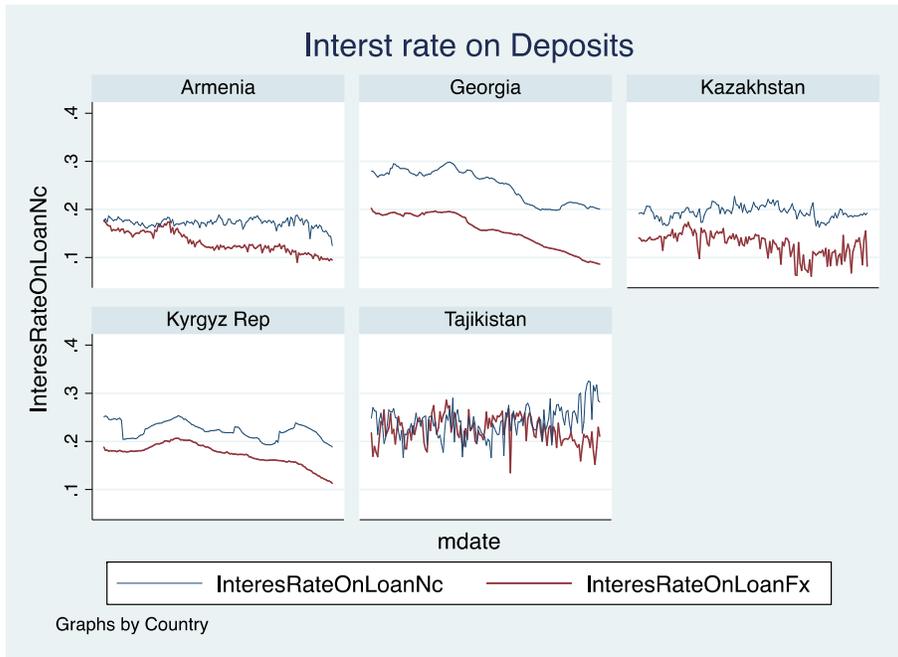


**Figure A. 8 Evaluation of Exchange rate Volatility**

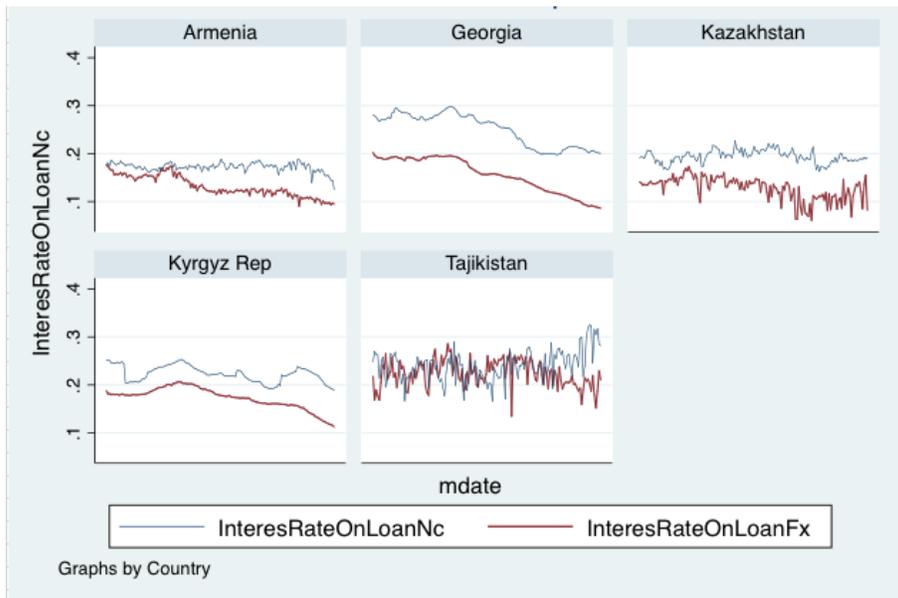


## Apendix B

**Figure B. 1 Interest rate on Deposits**



**Figure B. 2 Interes rate on Loans**



Appendix C

Figure C. 1 Impulse response functions.

