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The Global Crisis of the Late 2000s and Currency Substitution: A Study of Three Eastern European Economies Russia, Turkey and Ukraine

Journal of Central Banking Theory and Practice

Provided in Cooperation with:
Central Bank of Montenegro, Podgorica

Suggested Citation: Akalin, Gurkan I.; Prater, Edmund L. (2015) : The Global Crisis of the Late 2000s and Currency Substitution: A Study of Three Eastern European Economies Russia, Turkey and Ukraine, Journal of Central Banking Theory and Practice, ISSN 2336-9205, De Gruyter Open, Warsaw, Vol. 4, Iss. 2, pp. 5-22, https://doi.org/10.1515/jcbtp-2015-0006

This Version is available at:
https://hdl.handle.net/10419/217572

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DE GRUYTER OPEN

UDK: 330.33.01(4-11)
DOI: 10.1515/jcbtp-2015-0006

Journal of Central Banking Theory and Practice, 2015,2, pp. 5-22
Received: 31 March 2015; accepted: 17 April 2015

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The Global Crisis of the Late 2000s and Currency Substitution: A Study of Three Eastern European Economies Russia, Turkey and Ukraine

Abstract: For the last two decades, most of Eastern European countries moved towards open economies, including Baltic Countries, Ukraine and Russia. Some of these countries adopted the euro such as the case of Montenegro in 2002, Slovakia in 2009, Estonia in 2011, and finally Latvia in 2014. Adoption of the new currency helped these countries further integrate into a larger market, the Eurozone, and stabilize their economies against heavily fluctuating exchange rates. The governments of Ukraine and Russia, on the other hand, did not show interest to join the Eurozone and followed more independent currency policies along with the limited economic liberalization during the period of the 90s and the early 2000s. Similarly, Turkey, not a former Eastern Bloc country, but located geographically very close to these two countries did not peg its currency to the euro or the US dollar. All of these three economies in Eastern Europe had multiple deep financial crises, inflation, devaluations, and weak governments in the last two decades of the 90s and the 2000s (Lissovolik, 2003). For instance, Turkish lira depreciated from 13 TL/$ in 1973 to 1.5 million TL/$ in 2004 (Bahmani-Oskooee, 1996). As a result, of these negative experiences, local people of these countries developed a tendency to keep at least a portion of their savings in a foreign currency (Civcir, 2003). In the case of Turkey, the ratio of reserves held in the foreign currency over the local currency, which is a de facto measure of US dollarization, showed a steady rise during the period from 1983 to 1993, remained steady high around 50% until 2001 and decreased afterwards (Metin-Özcan, 2009). In short,

these countries are examples of highly US dollarized countries (Havrylyshyn & Beddies, 2003; Kaplan, 2008).

This paper is to investigate the changes in the currency substitution during and after the global financial crisis between 2007 and 2010 in Russia, Turkey and Ukraine. These three countries with large economies, recent strong US dollarization experience in the last two decades, and relatively open markets, provide good cases for understanding the global trend in the currency substitution and the status of the US dollar as a reserve currency.

Keywords: Currency Substitution, Monetary Policy, Reserve Currency, Globalization, Financial Crisis

JEL Code: F310, F330, G010

1. Introduction

For the last two decades, most of Eastern European countries moved towards open economies, including Baltic Countries, Ukraine and Russia. Some of these countries adopted the euro such as the case of Montenegro in 2002, Slovakia in 2009, Estonia in 2011, and finally Latvia in 2014. Adoption of the new currency helped these countries further integrate into a larger market, the Eurozone, and stabilize their economies against heavily fluctuating currency exchange rates. The governments of Ukraine and Russia, on the other hand, did not join the euro area and followed their own currency policies along with limited economic liberalization. Similarly, Turkey, not a former Eastern Bloc country and located geographically very close to these two countries, did not peg its currency to the euro or the US dollar.

There are significant similarities between these countries and also there are obvious differences. In terms of similarities, all of these three economies are located in Eastern Europe and had multiple deep financial crises, inflation, devaluations, and weak governments in the last two decades of the 1990s and the 2000s (Lissovolik, 2003). For instance, Turkish lira depreciated from 13 TL/$ in 1973 to 1.5 million TL/$ in 2004 (Bahmani-Oskooee, 1996). As a result of these negative experiences, local people of these countries developed a tendency to keep at least a portion of their savings in a foreign currency (Civcir, 2003). In the case of Turkey, the ratio of reserves held in the foreign currency over the local currency, which is a de facto measure of US dollarization rate, showed a steady rise during the period from 1983 to 1993, remained steady high around 50% until 2001, and decreased afterwards (Metin-Özcan, 2009). In short, these countries are examples of highly US dollarized countries (Havrylyshyn & Beddies, 2003; Kaplan, 2008). In terms of differences among Russia, Turkey, and Ukraine; however, Turkey has much of a functioning market economy and is not a commodity driven economy.

This paper is to investigate the changes in the currency substitution during and after the global financial crisis between 2007 and 2010 in Russia, Turkey and Ukraine. These three countries with large economies, recent strong US dollarization experiences in the last two decades, and relatively open markets, provide good cases for understanding the global trend in the currency substitution and the faith of the US dollar as a reserve currency. This period also excludes all recent geopolitical problems between Ukraine and Russia. It was a period of questioning the status of the US dollar as a stable currency. If foreign, non-US based investors lose their trust in holding and investing in the US dollar and US Treasuries, there will be strong consequences for the US economy. If these three countries showed significant drops in US dollarization rate during this period, it would be a sign of a trouble for the US dollar as a reserve currency in the future. This study is unique in the sense that there is limited or no research in literature on changes in the currency substitution during the global financial crisis. It is also unique that these three countries are included in a common comparative study. What is also interesting is that all these countries also experienced local financial crises after the initial crisis in the US.

1.1. Currency Substitution as a Measure of the US dollar being a Hard Currency

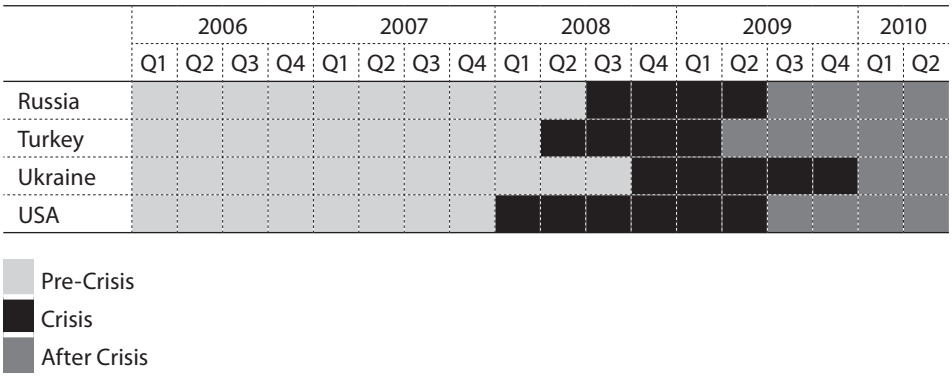
Currency substitution develops when domestic currency loses some of its primary functions such as being a medium of exchange, a unit of account and a store of value against a stronger currency, a hard currency (Feige, 2003). The term "US dollarization" is also used commonly to describe currency substitution. Currency substitution in most of the cases starts with an unofficial switching to another currency as a unit of account and as a store of value instead of the local currency (Calvo & Végh, 1992). Some of these countries may officially opt to adopt foreign currency as the legal tender in the final phase of currency substitution. For instance, Ecuador in 2000 and El Salvador in 2001 switched to the US dollar from their local currencies (Salvatore, 2001). This process can be a voluntary political decision in countries with the stable economy and low inflation in order to join a larger economic zone such as in expanding the euro area, or as the last option for less developed or developing countries with hyperinflation or unstable currency. For instance, Zimbabwe switched to the US dollar in 2009 after a long period of hyperinflation. Business owners and residents of countries with high inflation, politically unstable governments or small economies that are integrated closely with a stronger neighbor economy may choose to accept foreign currency for payments in addition to local currency such as the case of many countries in Western Balkans with Deutsche Mark first and the euro eventually. They can

also save their wealth in foreign currency in order to protect their savings from depreciation or a possible devaluation of the local currency.

Unless the size of the economy is relatively small and hence the dependency on a certain foreign currency is inevitable, and/or currency substitution is a political decision to gain access to a larger market region, currency substitution has many negative consequences. Under a full currency substitution following an independent monetary policy becomes problematic, if not obsolete. In such cases, the monetary authority cannot effectively control money supply, while inhabitants of the country prefer and use a foreign currency. As a consequence, currency substitution is a matter of health of the entire economy unless the economy is small or the decision was based on joining a larger currency zone.

1.2. Global and Local Financial Crises

The global crisis started with troubles in some of the largest financial institutions in the United States and resulted in widespread recessions in many countries (Acemoglu, 2009). In this paper, however, there is no attempt to define the start or the end of the financial crisis in the US, nor analyzing the reasons. Instead, a generally accepted definition of a quarterly drop of seasonally adjusted GDP will be used. Based on this definition, the financial crisis in the US was from the first quarter of 2008 (including) to the second quarter of 2009 (including). 2008-Q2 is also included for the US even though it has a positive growth. Following the same definition, the crisis in Russia from 2008-Q3 (including) to 2009-Q2 (including), in Turkey – from 2008-Q2 (including) to September 2009-Q1 (including) and in Ukraine – from 2008-Q4 (including) to 2009-Q4 (including).



Clearly, the local crises and the crisis in the US do not completely overlap with each other: the US crisis was earlier, while in those three countries it occurred

later. However, it would be misleading to consider that the effects of the financial crisis were over just after those aforementioned periods. Obviously, there was a continuation of the global crisis that is well into 2010 after these periods in the US as well as in other countries. Hence, we also include post-crises periods.

Before the crisis, in 2006, the percentage of foreign currency accounts over all accounts was roughly 24% in Russia, 35% in Turkey, and 37% in Ukraine. During the local financial crises, these ratios jumped to 34% in Russia, 39% in Turkey and 50% in Ukraine (Central Banks of Russia, Turkey, and Ukraine). There is an increase in the currency substitution in terms of the store of value function of money. However, this paper is more focused on the effects of the financial crisis in the US on the currency substitution in these countries. It is expected to have a negative impact on currency substitution. In other words, the crisis in the US should have decreased the currency substitution during the financial crisis of this period. Results indicate a moderate but a significant negative effect of the crisis in the US on the currency substitution in all three countries. This effect continued after the period defined as the crisis in the US, but with less strength. On the other hand, the overall picture is different. Local crises were much stronger and they increased the currency substitution (citizens trust less their local currency than the US dollar for storing their savings).

2. Data

The data were collected from the central banks of Russia, Turkey and Ukraine covering the period from January 2006 to June 2010. January 2006 is the earliest date when the public data of all three countries were available. This period covers 56 months including the period before, during and after the financial crisis in the US and aforementioned countries. There are four sets of data used from each country in the analysis. These are interest rates on local currency, interest rates on the US dollar accounts, exchange rates, and deposits in foreign and local currencies. Deposits in foreign and local currencies are used in calculating the ratio of foreign currency deposits over total currencies. This ratio is a good proxy for the currency substitution.

The preference of foreign currencies over national currencies occurs because either of changes in relative interest rates between foreign and national currencies, changes in exchange rates, or the lack of investor confidence in the national currency. Some countries with high trade deficits may have high interest on foreign deposits to attract investors. Investors may also use currency as an investment vehicle, if exchange rates show an upward trend against a local currency. For

all of these three countries, deposits in foreign currencies are stated in terms of their local currency equivalent. In other words, because of a sudden change in exchange rates, the value of foreign deposits in terms of local currency can be inflated or deflated without a change in the amount of foreign deposits. Exchange rates are included in the study to control these effects of exchange rates over the ratio of foreign deposits. In terms of exchange rates, the US dollar exchange rates over local currencies are used. For these aforementioned three countries, historically the natural choice for a foreign currency has been the US dollar with a developing new interest in the euro. However, the US dollar still overwhelmingly dominates over the euro as the currency of foreign deposits. Therefore, in this study only the US dollar exchange rate is included.

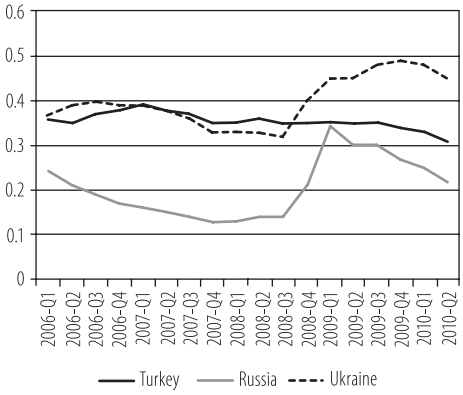
In calculation of the US dollar exchange rate, the average exchange rates over a month from the end-of-day rates are used. Average exchange rates better reflect investors' behavior in holding foreign deposits. Average exchange rates also better show the changes in exchange rates occurring during the month but then disappearing towards the end of it. The usage of simple the end-of-month exchange rate can be misleading since the calculation ignores the movement of exchange rates within the month. Another important factor in exchange rates is that in this paper, indirect exchange rates are used for American investors, while direct exchange rates are used for local investors. Local investors prefer using direct exchange rates in order to understand how much one US dollar is worth in terms of the local currency. Exchange rates are official central bank exchange rates that are calculated based on bid and ask rates on each business day.

In general, this paper is concerned about interest rates on individual accounts and deposits in individual accounts rather than interbank interest rates or corporate deposits. Since changes in the currency substitution are interested during and after the financial crisis, compared to what was before, individual investors rather than corporations are more concerned. Especially in Russia, there are larger export firms, including oil-gas industries that are earning large amounts of foreign deposits mostly in the US dollars. For instance, an increase in international oil prices may abruptly change the amount of the US dollar deposits for these corporations. However, this does not show a real change in the preference of the US dollar against a local currency. Individual interest rates on the US dollar and local currency accounts show how attractive each instrument becomes for local investors. An increase in interest rates on the US dollar accounts may increase the US dollarization ratio. In this study short-term interest rates are used that are less than or equal to one year. Investors in these countries have less trust in the local banks and are less likely to consider any periods longer than a year

for investment. Central banks of the aforementioned countries provided local and foreign interest rates.

Figure 1 shows percentage of foreign currency accounts in the US dollar over all deposits for Russia, Ukraine, and Turkey. On the x axis, there are quarters from 2006 to the second quarter of 2010. Before the crisis in the second quarter of 2008, the foreign currency ratio was 13.71 % for Russia, 32.23% for Ukraine and 34.93% for Turkey. During the crisis period, this ratio jumped to 33% in the first quarter of 2009 in Russia, 44.60% in Ukraine and 35.40% in Turkey. In general, however, there was a small decline in Turkey and a significant increase in Russia and Ukraine. Russia later had lower rates towards 2010.

Figure 1: Percentage of deposits of the US dollar accounts over all deposits



Source: Author`s figure based on data of relevant institutions of the selected countries.

Table 1: US dollarization rate in Russia and Turkey

Russia	Q1	Q2	Q3	Q4	Turkey	Q1	Q2	Q3	Q4
2006	0.24	0.21	0.19	0.17	2006	0.36	0.35	0.37	0.38
2007	0.16	0.15	0.14	0.13	2007	0.39	0.38	0.37	0.35
2008	0.13	0.14	0.14	0.21	2008	0.35	0.36	0.35	0.35
2009	0.34	0.30	0.30	0.27	2009	0.35	0.35	0.35	0.34
2010	0.25	0.22			2010	0.33	0.31		

Source: Author`s table based on data of relevant institutions of the selected countries.

Table 2: US dollarization rate in Ukraine

Ukraine	Q1	Q2	Q3	Q4
2006	0.37	0.39	0.4	0.39
2007	0.39	0.38	0.36	0.33
2008	0.33	0.33	0.32	0.4
2009	0.45	0.45	0.48	0.49
2010	0.48	0.45		

Source: Author`s table based on data of relevant institutions of the selected countries.

Table 1 and Table 2 show trends in the US dollarization rates among three countries. Exchange rates show similar trend with the ratio of foreign currency deposits. During the period from 2008 to 2009, Russian ruble jumped from around 24 rubles to 34 rubles per 1 US dollar; Ukrainian hryvnia jumped from 4.847 hryvnia to 7.91 hryvnia per 1 US dollar; Turkish lira jumped from 1.2 liras to 1.65 liras per 1 US dollar. Similar trends are observed in interest rates during this period. Interest rates on local currencies jumped from 6.97% to 10.80% for Russia and 13.63% to 20.67% for Ukraine. Whereas in Turkey, after a short increase from 18.50% to 19%, interest rates on local currency dropped to 9.73% in the first quarter of 2010. Interest rates on the US dollar accounts mostly increased during the defined crisis period for these three countries. In Russia, this rate jumped from 5.07% to 5.97%, in Ukraine it jumped from 8.73 % to 11.50%. In Turkey; however, interest rates on US dollar accounts remained stable around 4.5% and later dropped to 2.63% in 2010.

3. Methodology

This study is a continuation of earlier studies in the currency substitution of Arango-Nadiri (1981) and Bahmani-Oskooee (1996) (Arango & Nadiri, 1981; Bahmani-Oskooee, 1996). In their studies, they developed a model based on exchange rates, interest rates and GDP. In their model, M2 (Money Supply 2) is defined as the dependent variable against independent variables of exchange rates, interest rates and GDP. M2 includes currency in circulation demand deposits, time deposits. Therefore, deposits in individual accounts are also the part of M2. If M2:

Equation 1: $$M2 = a + b*\log i + c*\log E + d*\log GDP + e$$

Here M2 represents the money supply, "i" represents interest rates, E represents exchange rates, and GDP is the gross domestic product. Interest rates are nominal rates for short-term deposits. In some models in literature, another term for inflation is used in the model. Inflation has definitely a strong relationship with the currency substitution; countries with high inflation are more likely to have the currency substitution. As nominal interest rates and inflation show a strong positive relation, a parameter for inflation was not added. Moreover, a recent study did not find any significant relationship between money demand (M2) and inflation in Russia from 1999 to 2006 (Korhonen & Mehrotra, 2007). Then money supply is separated into money supply in a foreign currency (the US dollar) and in a domestic currency.

Equation 2: $M2(\$) = a + b1*\log i(\$) + c1*\log E + d1*\log GDP + e$

Equation 3: $M2(Local) = a + b2*\log i(Local) - c2*\log E + d2*\log GDP + e$

Two different interest rates are used as local and US dollar interest rates. Also exchange rates have opposite effects on domestic and US dollar money supplies. For US dollar deposits, a depreciation in exchange rates for local investors (E goes up) causes US dollar deposits to grow. In other words, when the US dollar appreciates against the local currency, the US dollar deposits go up as well as M2. On the other hand, exchange rates have negative effect on local currency deposits. GDP is positive for both domestic and foreign deposits. The ratio of the US dollar deposits over total deposits is calculated as follows:

Equation 4: $$\frac{M2(\$)}{M2(\$) + M2(Local)} = a + b1*\log i(\$) - b2*\log i(Local) + c*\log E + e$$

GDP is excluded at this point as a result of an assumption that a change in GDP will result in equal percent changes in M2($) and M2(Local). In other words, a change in GDP will not result in the composition of monetary supply even though it is expected to change monetary supply levels. Interest rates on the US dollar accounts positively affect the ratio while local interest rates are expected to have negative influence. Exchange rates are expected to be positively affecting the ratio. As it is mentioned earlier, individual deposits are good proxies for M2 since they are also a part of M2. If R is defined as the ratio of individual US dollar accounts over all accounts, following equation can be written:

Equation 5: $R = a + b1*\log i(\$) - b2*\log i(Local) + c*\log E + e$

During the late 2000s financial crisis, there were possible changes on this ratio since the US economy first and local economies secondly experienced a downturn. While the effects of the crisis in the US and in local economies are investigated, it is necessary to separate them into two parts. Following are the hypotheses:

H1: The crisis in the US negatively affected the US dollarization rate during and after the defined period of the crisis of the US.

H2: The local crises in aforementioned countries had positive effects on US dollarization rates in these countries during and after the defined periods of local crises.

In order to test these hypotheses, additional four dummy variables are added to the model. First dummy variable is US_before, which shows if the month of

analysis falls into the period of crisis in the US. This dummy variable is 0 for months other than the crisis period, and it is 1 during those months. The second dummy variable is US_after, which shows the period after the period defined. Variables L_before and L_after are added finally for during and after periods of local crises. So the model becomes:

Equation 6: **R= a + b1*log i($) - b2*log i(Local) + c*log E+ f*US_before + g*US_after+ h*L_before + j*L_after+ e**

If there is no effect of the crisis in the US, f and g need to be close to 0 and similarly h and j need to be close to 0, if there is no effect of the local crises on US dollarization rate. However, there are, expected changes in interest rates and exchange rates because of the crisis in the US and local crises as well. In order to eliminate multicollinearity, it is necessary to "clean" the effects of the US crisis and local crises on interest rates and exchange rates. This is done by the first running individual regressions of interest rates and exchange rates where they are dependent variables while dummy variables are independent variables. The second step is the calculation of the residuals from these regressions for each interest rate and exchange rate from three aforementioned countries. In other words, the model uses adjusted interest rate on the US dollar accounts, adjusted interest rate on accounts in local currency, and adjusted exchange rates based on calculated residuals left after running individual regressions.

4. Results

In this part, country specific analyses are conducted followed by a general comparison of three countries.

4.1 Russia

4.1.1 Exchange Rates in Russia during the 2006-2010 period

First, the effects of the crisis in the US and the local crisis on interest rates and exchange rates will be investigated. There is a 4% (t-stat=4.38) appreciation effect of the ruble against the US dollar due to the crisis in the US. This appreciation effect continued with 5% (t-statistics= 3.29) after the defined period of the crisis (2008 Q3 – 2009 Q2). The local crisis, on the other hand, led to the significant depreciation effect of the ruble against the US dollar (11%, t-statistics= 10.17) and this effect continued after the defined period of the local crisis (11%, t-statistic= 6.38).

Therefore, the crisis in the US and the crisis in Russia had opposite effects on the exchange rate. The overlapping/added effect of both crises is negative in terms of ruble's value against the US dollar. This was expected, as usually the crisis in a country leads to decrease in investor confidence in that currency. In case of the crisis in the US, a decrease in value of the US dollar against other currencies was expected. But the overall picture is that local crisis of Russia had more significant effect than the crisis in the US.

4.1.2 Interest Rates in Russia during the 2006-2010 period

The picture for interest rates is not as clear as for exchange rates. The crisis in the US had no significant effect on local interest rates in Russia for both interest rates on local currency deposits and dollar deposits. However, during the local crisis, there was an increase in local interest rates (14%, t-statistics= 9.47), which did not continue after the crisis period. These results were expected, financial crises led to an increase in interest rates in the local market and Russia was not an exception. The Russian crisis led to an increase in interest rates for US dollar deposits (4%, t-statistics= 2.49). However, after the period of both crises in the US and in Russia is over, the interest rates on US dollar deposits in Russia dropped significantly. The cumulative effect is a reduction of 15% compared to the crisis period.

4.1.3 Currency Substitution Rates in Russia during the 2006-2010 period

The exchange rates between the US dollar and the Russian ruble, and the interest rates on local currency deposits and the US dollar deposits have considerable effect on the currency substitution ratio. When the ruble depreciates against the US dollar, the deposits held in ruble would lose their value against the US dollar deposits simply by a matter of translation. Other than this simple translation effect, residents of the country may switch their deposits to foreign currency deposits with the expectation of further depreciation of the local currency. Similarly, when the interest rate on the local currency increases, it is expected to attract more deposits or discourage customers to convert their deposits to the foreign currency deposits. Since our main goal is to understand deposit holders' behavior during local crisis and the crisis in the US, the effects of exchange rates and interest rates need to be included in the analysis. We also need to take into account the fact that the interest rates and exchange rate are affected by crises themselves. Table 3 shows the results of the model in Russia with all these issues considered.

Table 3: Summary table for currency substitution rate regression in Russia

	Intercept	Local Crisis in Russia	Crisis in the US	After Local Crisis	After Crisis in the US	Adjusted Log Exchange Rate	Adjusted Log Local Interest rate	Adjusted Log US Dollar Interest rate	R square
Mean	0.1721	0.148	-0.037	0.091	-0.034	1.055	0.409	0.159	97%
T-statistic	70.87	26.32	-8.050	10.54	-4.370	12.24	6.240	3.210	

Source: Author`s table based on data of relevant institutions of the selected countries.

There is a significantly high R-square of 97% in the model, using 7 variables, where four of them measure the effects of crises in the US and Russia, and two of them calculate the effects of interest rates and exchange rates. The adjusted means here the effects of local and the US crises are eliminated in the exchange and interest rates. Currency substitution rate shows the ratio of deposits held in US dollars compared to all deposits.

Next, the relationship of exchange rates and interest rates with the currency substitution ratio will be discussed. An increase in the exchange rate (depreciation of the local currency) significantly increases the substitution ratio / US dollarization rate. It can be caused by the increase in value of foreign deposits in terms of local currency after depreciation of the ruble. Also it may be caused by the increase in investor preference in the US dollar against the ruble. Interest rate on US dollar accounts also shows a positive relationship with the currency substitution rate. No surprise, as the increase in interest rates on the US dollar makes it more attractive to investors. However, the relationship between interest rates on local currency with the US dollarization rate is surprising. There is also a positive relation between local interest rates and US dollarization rate in Russia. In other words, investors prefer investing in the US dollar even though there is an increase in interest rates in local currencies. A good explanation might be related to investor confidence. When investors see an increase in interest rates, they may expect an increase in inflation and depreciation of a local currency. Therefore, investors might choose the US dollar as a safer investment tool.

Lastly, the effects of the local crisis in Russia and the crisis in the US on US dollarization rate are investigated. As it is hypothesized earlier, the crisis in the US had a negative impact on US dollarization rate (-3.7%, t-statistics=-8.05), while the local crisis had a positive effect (14.80%, t-statistics=26.32). Both of them are highly significant. In terms of weight comparison, the local crisis had a stronger effect than the crisis in the US. Local investors react more heavily on local changes than the global changes, which was expected. After the defined crisis in the US and Russia, their effects continued. The US crisis had a negative effect (-3.4%,

t-statistics=-4.37), while the local crisis had a positive effect (9.1%, t-statistics=10.54) after the defined periods.

4.2 Turkey

4.2.1 Exchange Rates in Turkey during the 2006-2010 period

Crisis in the US caused depreciation of the US dollars, whereas the local crisis in Turkey caused appreciation. In terms of the exchange rate, similar to Russia, the crisis in the US had a negative effect on the exchange rate (-6%, t-statistics=-5.81), while the crisis in Turkey had a positive effect (12%, t-statistics=10.40). In other words, during the US crisis local currency in Turkey appreciated and during the local crisis it depreciated. Similar to Russia, the local currency appreciated after the crisis in the US (-8%, t-statistics=-4.24) and depreciated against the US dollar after the local crisis (12%, t-statistics=6.21). However, in total there was depreciation of Turkish lira after the period of the local and the US crises.

4.2.2 Interest Rates in Turkey during the 2006-2010 period

The interest rate on local currency shows the different from the Russia's result. Interest rates on the Turkish lira did not increase during either the local crisis or the crisis in the US. More strikingly, after the both crises in the US and Turkey, interest rates went down in Turkey (-13%, t-statistics=-6.15 for the US crisis; -11%, t-statistics=-5.06 for Turkey). This shows that Turkey responded better than Russia on the crises. The reasons why Turkey had a better response are not in the scope of this paper. It is also interesting to notice that Turkey did not experience an increase in interest rates on US dollar accounts as well. Neither the crisis in the US nor the crisis in Turkey led to an increase in interest rates on US dollar accounts. After the local crisis passed, however, there was even a decrease in interest rates on US dollar accounts (-16%, t-statistics= -4.34). So Turkey resisted well to raising interest rates during the US and local crises, and after they passed, interest rates went down.

4.2.3 Currency Substitution Rates in Turkey during the 2006-2010 period

Turkey has some similarities and differences with the results in Russia. General R-square is 87%, which is less than the Russia's R-square, but it is still highly significant. Exchange rate had a positive effect on currency substitution rate; ap-

preciation of the US dollar against Turkish lira increases currency substitution rate. This is similar to Russia; this may be due to a simple appreciation in values of foreign deposits against domestic currency or due to a change in investors` preferences. Available data is not enough to diagnose the root reasons. In terms of direct effects of the crises in the US and Turkey on the currency substitution rate, there are some differences from Russia. The crisis in the US again negatively affected the currency substitution rate in Turkey during and after the defined period (-1.6%, t-statistics= -5.60 during; -1.6%, t-statistics= -2.70 after). However, the local crisis in Turkey did not have the same effect as Russia's crisis. During and after Russia's local crisis, the currency substitution rates went up in Russia; however, in Turkey's crisis there was no significant increase in currency substitution. Moreover, there was a decrease in the currency substitution after the crisis in Turkey (-2.6%, t-statistics= -4.170). This shows that Turkish investors had more confidence during and after the crisis, unlike Russian investors. Table 4 shows results of the model in Turkey.

Table 4: Summary table for currency substitution rate regression in Turkey

	Intercept	Local Crisis in Turkey	Crisis in the US	After Local Crisis	After Crisis in the US	Adjusted Log Exchange	Adjusted Log Local Interest rate	Adjusted Log US Dollar Interest rate	R square
Mean	0.369	0.001	-0.016	-0.026	-0.016	0.158	0.068	0.150	87%
T-statistic	225.630	0.360	-5.650	-4.170	-2.700	3.030	1.200	5.190	

Source: Author`s table based on data of relevant institutions of the selected countries.

4.3 Ukraine

4.3.1 Exchange Rates in Ukraine during the 2006-2010 period

Ukraine had a constant exchange rate of 5.05 hryvnias per 1 US dollar up until May 2008. Then the the National Bank of Ukraine appreciated the hryvnia to 4.85 exchange rate. After October 2008, in a matter of couple weeks exchange rate jumped to 7.7, and then to 8 hryvnias per 1 US dollar by August 2009. Even though the crisis in the US positively influenced (hryvnia appreciation) the exchange rate, it was short-lived; the local crisis in Ukraine had a remarkable effect on the exchange rate afterwards.

4.3.2 Interest Rates in Ukraine during the 2006-2010 period

Interest rates on local currency increased significantly during all that period during and after both crises in the US and Ukraine (11.6%, t-statistics=9.59 during local crisis; 7.3%, t-statistics=3.89 after local crisis; 3.8%, t-statistics=3.63 during the crisis in the US; 6.3%, t-statistics=3.63 after the crisis in the US). In comparison, Turkey was able to reduce interest rates on local currency after both financial crises were over in definition. Russia had only an increase in interest rates during their local crisis but not after the local crisis period. Interest rates on US dollar accounts also increased in Ukraine during and after the crisis in the US and during the local crisis, but not after the local crisis (9.2%, t-statistics=8.07 during local crisis; 4.2%, t-statistics=4.36 during the crisis in the US; 4.3%, t-statistics=2.7 after the crisis in the US). As a result, Ukraine's currency depreciated, interest rates went up during this entire period.

4.3.3 Currency Substitution Rates in Ukraine during the 2006-2010 period

General R-square for Ukraine is 91%, which is again highly significant. Table 5 shows the results of the model in Ukraine.

Table 5: Summary table for currency substitution rate regression in Ukraine

	Intercept	Local Crisis in Ukraine	Crisis in the US	After Local Crisis	After Crisis in the US	Adjusted Log Exchange	Adjusted Log Local Interest rate	Adjusted Log US Dollar Interest rate	R square
Mean	0.373	0.094	-0.046	0.072	0.014	0.459	0.136	-0.001	91%
T-statistic	84.78	9.020	-3.560	5.220	0.700	4.65	1.090	-0.010	

Source: Author`s table based on data of relevant institutions of the selected countries.

The relationship of exchange rates and interest rates with the currency substitution rate in Ukraine has similarities and differences with the ones in Russia and Turkey. Similar to Turkey and Russia, the exchange rate had a positive relation (0.459% increase for every 1% increase in interest rates, t-statistics=4.65). An increase in exchange rates leads to an increase in currency substitution rates. However, interest rates on both the local currency and the US dollar accounts had no significant relation with the currency substitution rate. This might be a result of investors' skepticism about interest rates in Ukraine or interest rates were not attractive enough to convince investors to invest in local money or foreign deposits.

Similar to Russia and Turkey, the currency substitution rate dropped in Ukraine during the crisis in the US (-4.6%, t-statistics=-3.56). However, unlike Russia and Turkey this did not continue after the defined period of the crisis in the US (January 2008-June 2009). Similar to Russia, Ukraine increased the currency substitution rate during and after the local crisis (9.4%, t-statistics=9.02 during; 7.2%, t-statistics=5.22 after). This is in contrast to Turkey, where the currency substitution dropped afterwards. As a result, Ukraine had a net increase in the currency substitution rate due to a stronger local crisis effects compared to the effects of the crisis in the US.

5. Conclusions

The effects of the crisis in the US and the local crises over the currency substitution during and after crises periods have been investigated in this paper. If we compare three countries all together, here are following conclusions. Both hypotheses that the crisis in the US had a negative effect (decreased the currency substitution) and local crisis had positive effects (increased currency substitution) are supported in all three countries. The only mild exception is Turkey that did not have a significant increase during the local crisis. The negative effect of the crisis in the US continued after the defined period of the crisis was over. The only exception is Ukraine, in which the negative effect did not continue (currency substitution increased). Local crises also continued and positively influenced Russia and Ukraine; on the other hand, Turkey had a negative result in the currency substitution after the local crisis was over. Exchange rates in all three countries had a positive significant relation with the currency substitution. Only in Russia, interest rates on local currency increased currency substitution. This was the most surprising result in the study. The US dollar interest rates had a positive impact on the currency substitution rate, except in Ukraine.

This study successfully shows that the US dollar would remain as a safer currency for the foreseeable future looking from 2010 onwards unless another stronger currency is largely accepted. The large-scale hopes for the euro are still in the distant future, while Europeans need to take care of their domestic issues first. The currencies, which are not even directly tied to these major currencies such as Turkish lira, Russian ruble or Ukrainian hryvnia may actually show much larger depreciation compared to a hard currency such as the US dollar because of investors' expectancy of possible large-scale domestic economic problems. In terms of production capability, companies may opt to produce in such weaker-economy countries to lower their total costs. Companies may need to cut their sales in such risky economies or be ready to accept reductions in profits from sales due to de-

preciation of the local currency. A rule of thumb is that the strongest convertible currency remains strong even after a large-scale domestic crisis due to investor relative risk comparison with smaller economies.

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