

DETERMINANTS OF CURRENCY SUBSTITUTION IN SOUTHEAST EUROPEAN COUNTRIES

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Abstract: Currency substitution is widespread in less developed countries. Since it increases financial vulnerability and limits the effectiveness of monetary policy, it is often in the focus of scientists and experts. In this paper, we analyze the importance of euroization determinants in Serbia and neighboring countries - Albania, Bosnia and Herzegovina, FYR Macedonia, Romania and Croatia for the period 2003-2014. We examine the impact of domestic inflation, nominal exchange rate of the domestic currency against the euro, interest rate spread on domestic and foreign currency, foreign currency inflow in the form of foreign direct investments and exports, as well as the euroization of banks' financial resources on the degree of loan euroization. The results obtained by multiple regression panel methods confirm the statistical significance and assumed direction of the influence of all analyzed variables except inflation and current account balance.

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1. Introduction

In the past the phenomenon of currency substitution was usually linked to Latin American countries. However, it is not the regional problem. Economies with high currency substitution are almost equally present in Latin America, Asia, Africa and some parts of Europe. Currency substitution is characteristic of developing countries and transition economies worldwide. Although some other currencies were also used as substitutes for domestic currency, the US dollar has been the dominant substitute currency for a long time, and the term dollarization has become synonym for currency substitution. Since the introduction of the euro, it has also been used as a reserve (substitute) currency and in recent times the use of the term euroization is increasing. In this paper the terms currency substitution, dollarization and euroization are used as synonyms.

Currency substitution occurs as a result of loss of confidence in the national currency by market participants, among other things, due to the long period of macroeconomic instability (characterized by high inflation rates and sudden depreciations of the national currency with frequent and massive interventions in the foreign exchange market) and the underdevelopment of financial markets. During the periods of high inflation in the eighties and early nineties, transition economies and developing countries have switched from monetary aggregates targeting to exchange rate targeting. In this way, they managed to curb inflation and restore macroeconomic stability. After that, some countries have decided to move to inflation targeting, and a considerable number of countries maintained a fixed exchange rate regime due to the underdevelopment of financial markets and inefficient interest rate transmission channel.

However, despite the significant progress that has been made over the last twenty years in reducing inflation and establishing and maintaining macroeconomic stability, the share of assets and liabilities in foreign currency in these countries has not been reduced. During the period of stability and significant capital inflows from abroad, the problem of the high degree of euroization was mainly ignored. However, when foreign capital began to flow out during the last crisis, developing countries suffered strong depreciations of the national currencies, macroeconomic stability was seriously compromised, and the problem of currency mismatches and unofficial euroization again got into the spotlight. Surprisingly, the analysis of this phenomenon in less developed European countries got little attention, although the level of euroization is quite high.

2. Concept and Types of Currency Substitution

Currency substitution exists when currency of some other country is in use in the economy, whereby foreign currency can be used alongside or instead of

domestic currency, taking from it some or all of the functions of money. Depending on functions of money it takes, Levy-Yeyati (2003) distinguishes between currency, assets and financial substitution. Currency substitution refers to the situation when foreign currency is used as a means of payment or unit of account. Assets substitution exists when foreign currency serves as a store of value. Financial substitution refers to the holding of assets and liabilities in foreign currency by residents. Similarly, Nicolo et al. (2003) distinguishes between payments dollarization, which exists when residents perform transactions in foreign currency and when the demand deposits are in foreign currency, real dollarization, which occurs when domestic prices and wages are either indexed or directly denominated in foreign currency, and financial dollarization which exists when a large part of assets and/or liabilities of residents are denominated in foreign currency.

Payments dollarization is usually followed by financial dollarization, because it is logical to hold financial assets in the currency in which payments are made (Balino et al, 1999). On the other hand, assets dollarization does not have to go hand in hand with payments dollarization, because economic agents may save in foreign, and perform transactions in local currency.

As market participants want to protect the value of their (financial) assets, local currency usually loses first its store of value function, meaning that financial substitution occurs first. After that, prices start to be expressed in the foreign currency and it takes over the function of the unit of account. This process begins at the products of higher value such as real estate and cars, and soon spreads to all products and services, and real substitution occurs. Finally, foreign currency takes over from the national currency the function of a medium of exchange, and payment substitution occurs. This sequence of events is the result of rational behavior of market participants trying to protect their interests in an unstable environment.

In the literature, beside the division into payments, real and financial, there is a distinction between domestic and external financial dollarization (Ize and Levy Yeyati, 2005). The first occurs when onshore deposits and loans to residents are mostly in foreign currency and the second when financial contracts between domestic and foreign residents are in foreign currency.

Reinhart, Rogoff and Savastano (2003) argue that the dollarized economy is one in which economic agents hold part of their portfolio in foreign currency, and/or one in which the private and public sector borrowing is mainly in foreign currency. Therefore, financial euroization implies euroization of the deposits and/or loans, although it is important to make a distinction, considering that both represent a potential risk to the financial system, but in a different way. High deposit euroization could lead to a liquidity crisis in the event of sudden and massive withdrawal of foreign currency deposits, which would require a

reaction of the central bank and result in melting of the foreign exchange reserves of the country. On the other hand, high euroization of loans may lead to a solvency crisis, because the debtors' ability to repay their foreign currency or foreign currency-indexed obligations would be reduced in the case of large depreciation of the domestic currency. Problems in one sector usually spill over very quickly to other sectors in the economy, and in both cases macroeconomic stability could be seriously compromised.

3. Euroization Measurement

In the literature one may find a number of euroization measures. The choice of specific measurement will depend on the characteristics of the economy and the purpose for which it is used. Traditional approaches to measuring euroization are mainly based on foreign currency deposits. Usually, the share of foreign currency deposits in relation to the broadest monetary aggregate is taken. The IMF used this indicator for a long time as a measure of euroization of the economy, and the "critical" was the level of 30%. The IMF believed that the level of below 30% does not distort the transmission mechanism of monetary policy, while the higher level of euroization is not favorable in terms of monetary policy implementation, because it weakens interest rate channel (Ivkovic, 2011, p. 78).

The share of foreign currency deposits in total deposits is often taken as a measure of euroization. However, measuring euroization in this way also gives an incomplete picture of the true level of currency substitution, because it does not take into account the foreign currency in circulation and cross-border deposits.

To obtain a picture of the actual euroization level of the country, the foreign currency in circulation should also be taken into account. However, history of macroeconomic instability is characteristic for countries with significant currency substitution, and due to mistrust in the system, a large number of transactions are carried out outside the banking system and a large part of the savings are kept outside the banks. Therefore, it is a big problem to determine the total quantity of cash in foreign currency. Feige et al. (2002) have made a significant contribution in this regard. They gave estimation of the amount of dollars in circulation for many transition countries worldwide based on data from Report of International Transportation of Currency or Monetary Instruments. For the euro, the estimate of the amount that circulates outside the euro zone is done by ONB (Central Bank of Austria) based on surveys conducted periodically. However, these data certainly must be taken with a grain of salt.

Reinhart, Rogoff and Savastano (2003) tried to overcome the shortcomings of traditional measures by creating a composite index that combines the share of foreign currency banks deposits in M2, total external debt to GDP ratio and

share of domestic public debt denominated or indexed in foreign currency in total domestic public debt.

On the assets side, euroization is usually calculated as the ratio of foreign currency and foreign currency-indexed loans to total loans. This measure became particularly important during the last crisis, given that most of the currencies in developing countries strongly depreciated, which had a negative impact on the obligations of the private and public sectors (that are mainly in foreign currency, unlike their income).

4. Why is High Euroization a Problem?

From a macroeconomic point of view, in the long run euroization should contribute to the reduction of inflation and it's approaching to the inflation of the country whose currency is used as a substitute. In the case of high currency substitution, domestic monetary policy is not in focus, but the monetary policy of the country whose currency is used and its credibility. The arbitration leads to equalisation of domestic prices with the prices of the country whose currency is used as a substitute, which in most cases results in a rise in inflation in the short run, and its reduction in the long run. Therefore, inflation convergence occurs in the long term. Of course, this does not mean equalization of prices of all goods and services. Prices of non-tradable goods and prices under administrative control will not be corrected. Besides that, one should not expect that the inflation rate will be the same in countries that use the same currency, because they have different economic growth, which results in different inflation rates.

Euroization should also lead to a gradual reduction in interest rates in the country. However, although the interest rates reduction is likely, it is not realistic to expect its unification with interest rates in the country whose currency is used as substitute because of the country risk. The higher the country risk, the higher the difference in interest rates.

In addition, the euroization should contribute to the development of domestic capital markets, reduction in transaction costs in international trade and rapid integration into global trends.

On the other hand, euroization goes hand in hand with a series of problems. In principle, there are two groups of consequences. On one hand, it is widely accepted that high level of currency substitution complicates the conduct of monetary policy (weakening of interest rate channel). The effectiveness of the interest rate channel is reduced when most financial contracts are in foreign currency, because the rates on foreign currency and foreign currency inflow are beyond domestic monetary authorities' control. Foreign currency loans may increase freely in case of foreign currency inflow, and an increase in domestic interest rates has a little impact on the cost of foreign currency loans. Also, in

the case of official euroization, central bank loses lender of last resort function and seigniorage.

The second group of consequences refers to the impact of euroization on macroeconomic and financial stability. Although a certain level of euroization is desirable as a form of protection against exchange rate risks, widespread financial euroization inevitably leads to currency mismatches in the economy (Levy-Yeyati, 2003). Mismatches can be in the banks' balance sheets (granting loans in local currency based on liabilities in foreign), and in this case the banks are directly exposed to exchange rate risk, which results in a greater probability of banking and financial crisis. Mismatches can also occur in non-banking sectors if economic agents indebted in foreign currency have revenues mainly in domestic currency. In this case, due to currency mismatches, the net position of households, enterprises and government becomes sensitive to exchange rate movements, exposing these market participants to solvency risk. On the other hand, banks reduce their exposure to exchange rate risk by transferring it to the customers, but their exposure to credit risk increases (especially if the foreign currency loans are granted to non-tradable sectors), which in the end has the same outcome - increased exposure of the economy to banking and financial crisis. Therefore, financial euroization may represent a systemic threat to the economy.

The existence of currency mismatches in the economy and the corresponding fear of sudden and large domestic currency depreciations (Calvo and Reinhart, 2002) affect the willingness of monetary authorities to use the exchange rate as a shock absorber. Namely, the monetary policy makers in highly euroized economies are usually not willing to allow large and sudden depreciations of the domestic currency ("fear of floating"), because that would create a big problem in terms of debt repayment and thus lead to the financial system instability. Therefore, there is no possibility to use the exchange rate as external shocks absorber and the economies with a high currency substitution are more vulnerable to external shocks. Also, the problem is that expectations in terms of exchange rate stability, because of all mentioned above, contribute to the additional increase in euroization, thus creating a vicious circle. In addition, due to the limited possibilities for the implementation of anti-cyclical economic policy, euroized economies are more prone to boom and bust cycles.

5. Determinants of Financial Euroization

The high level of euroization of the economy may be the outcome of modest domestic sources of financing, which is why economic agents are turning to foreign markets looking for additional sources. On the other hand, high euroization could be the consequence of rational behavior of market participants who, in order to protect their interests turn to safer foreign currency (Marinkovic, 2009). In any case, the high level of currency substitution poses a

threat to financial and macroeconomic stability, and most countries are trying to decrease the euroization level of their economies. However, the process of de-euroization is not easy and simple, but rather difficult and long-term and the best proof is the fact that only a few countries in the world managed to decrease significantly the level of currency substitution. In order to reduce euroization successfully in the economy, it is necessary to bear in mind its triggers when defining measures and activities that will be undertaken.

In the literature, one can come across a number of factors that explain the decisions of economic agents to hold a large part of assets or liabilities in foreign currency. Usually, the main causes of high loan euroization are considered to be: high inflation, the depreciation of the domestic currency, the difference in interest rates on domestic and foreign currency, capital inflow (based on exports, foreign direct investment, etc.), but also the high euroization of liabilities. We review below the contribution of theoretically and empirically oriented literature on the determinants of currency substitution, along with analysis of the results obtained by two different models of panel regression analysis.

5.1 Dataset and Methods

This paper analyzes the impact of a set of variables on the level of euroization of bank loans. We examined how much these variables contributed to the high loan euroization in six countries of South East Europe: Albania, Bosnia and Herzegovina, FYR Macedonia, Romania, Serbia and Croatia. List of used variables is attached in the appendix, along with structural characteristics, i.e. definitions (Table A1). The data set is shown in diagrams of time series (A2) and diagrams of dispersion (A3) in the appendix. We used data from official sources of the International Monetary Fund. The list of sources used for the data set construction is given in the list of references.

The relatively short time series of annual data were used due to the problems with consistency of data. We examined the combined impact of nine independent variables on the degree of loan euroization for the period from 2003 to 2014. The nature of data disenable the correct use of a model for time series analysis and the logical choice was to analyze the so-called panel data, as a combination of cross section data and time series. In that way we obtained a large number of observations ($N \times T = 720$), by multiplication of the data structures ($N = 60$) and time series data ($T = 12$). Longer series were available for a number of states, but we omitted the years preceding 2003 from the analysis in order to obtain a balanced panel. Data formed the so-called classic panel, because the number of data structures (N) significantly exceeds the number of time series data (T).

Panel data enable a significant increase in the sample, greater variability and higher efficiency of evaluation. In this paper, we apply the fixed effects model

(Table 1) and the random effects model (Table 2). The first model was evaluated by the covariance method and the other by the Generalized Least Squares method. The choice of method was determined by the relationship between the individual variance and the random error variance, i.e. the value of the parameter ρ , which evaluates the relative importance of the individual effects. Note that in the case of the random effects model individual variance is included in the random error. In this model, when the individual variance is positive, the ordinary least squares method does not give an effective estimate.

The first model does not take into account variations between groups, in this case the states. Also, the influence of individual variables included in the model cannot be identified (Dragutinovic Mitrovic, 2005). Common to both models is that the states are used as a group variable. Please note that all variables, except the reference rate of the European Central Bank, vary by group.

In interpreting the results, we give the advantage to the random effects model, because this model enables the identification of the influence of individual variables included in the model, and because the higher value of diagnostics parameters (e.g., coefficient of determination) favor this model. Also, modern panel econometrics prefers the random effects model.

5.2 Results and Discussion

High inflation is often considered the main cause of euroization. In a highly inflationary environment, costs of use of local currency increase with the erosion of confidence in the domestic currency. High and volatile inflation causes increase in interest rates on domestic currency and foreign currency borrowing becomes superior alternative, which results in a growth of loan euroization. On the other hand, high inflation causes the reduction of investment in assets with an uncertain rate of return, such as domestic currency deposits, resulting in higher deposit euroization. In many countries, usually after a period of high inflation and sudden depreciations, banks and their clients spontaneously turn to foreign currency. Savastano (1996) believes that the history of inflation with an inadequate institutional framework led to a dollarization of significant number of economies.

Ize and Levy-Yeyati (2003) believe that the decisions of economic agents to hold domestic versus foreign currency depend on the expected returns on competitive currencies. Assuming that interest rate parity holds, Ize and Parado (2002) believe that interest rate spread neutralizes predictable difference in inflations and equates the expected returns in both currencies. Therefore, they believe that the explanation for euroization lies in the volatility and unpredictability of inflation, rather than its level. As long as the expected volatility of inflation is higher than the expected volatility of the real exchange rate, even at low rates of inflation, foreign currency will be more attractive.

According to this theory, economic agents are turning to foreign currency with inflation rates increase. Can we therefore expect this process to stop, or even reverse, with domestic inflation decrease? Experience of a large number of countries does not confirm this. On the contrary, once euroization occurs, it shows remarkable persistence, and the process is almost impossible to reverse. The persistence of euroization is usually explained by a need for a longer period of stability in order to restore the lost confidence and forget the previous bad experience. Another reason is the existence of fixed costs of transferring financial assets from one currency to another. So, until the return to the currency with the lower opportunity cost compensates for the costs associated with switching between currencies, the inflation rate can fluctuate without causing any changes in euroization level. In other words, there is an inflation differential limit beyond which euroization survives because the costs of switching between currencies exceed any incentive for de-euroization due to lower domestic inflation.

Table 1 Fixed-Effects Regression – Dependent Variable FX/total Loans

| Regressor | Estimate | St. Error | <i>t</i> – value | <i>P</i> > <i>t</i> |
|------------------------------------|----------|-----------|------------------|-----------------------|
| CPI (avg.) | 0.714* | 0.406 | 1.76 | 0.086 |
| CPI (eop) | 0.018 | 0.331 | 0.05 | 0.956 |
| ER (avg.) | -0.221* | 0.126 | -1.75 | 0.088 |
| Policy rate (eop) | -35.873 | 24.456 | -1.47 | 0.150 |
| ECB rate (eop) | 36.019 | 24.496 | 1.47 | 0.149 |
| Spread | 35.957 | 24.498 | 1.47 | 0.150 |
| FX/Total liabilities | 0.010 | 0.151 | 0.07 | 0.947 |
| Current account (%GDP) | 0.355* | 0.202 | 1.76 | 0.087 |
| FDI (%GDP) | -0.863** | 0.336 | -2.57 | 0.014 |
| Constant | 81.476 | 9.005 | 9.05 | 0.000 |
| Diagnostics | | | | |
| <i>F</i> (9, 41) | | | | 3.44 |
| <i>Prob</i> > <i>F</i> | | | | 0.003 |
| <i>R</i> -squared (within group) | | | | 0.430 |
| <i>R</i> -squared (between groups) | | | | 0.121 |
| <i>R</i> -squared (overall) | | | | 0.034 |
| <i>rho</i> ¹⁾ | | | | 0.955 |

Notes: *Significant at 10% level; **Significant at 5% level; ¹⁾ fraction of variance due to individual effects.

Analysis based on the sample of neighboring countries does not confirm the statistical significance of inflation as a determinant of euroization of bank loans. Two indicators of inflation were tested: the average annual rate of inflation and inflation at the end of the year. The first indicator is estimated to be significant only in less reliable fixed effects model, and the relation is positive as expected, meaning that rising inflation stimulates the growth of euroisation of the loan portfolio, and the decline in inflation lowers the level of euroisation. However, this effect is absent in a more reliable random effects model, which can be explained in many ways that do not exclude one another. First, in this paper, we used panel regression models to analyze the impact of inflation on the financial euroization, i.e. decisions on the currency structure of financial assets and liabilities of banks and their clients. In all countries in the sample, the level of loan euroization is extremely high and regularly exceeds the half of the total volume of loans. This means that the reserve currency has become the main currency in the financial arrangements in the local markets of the countries in the sample. Even when credit arrangements are in domestic currency, contracts are almost regularly linked to foreign currency (rarely to retail price growth rate). Credit arrangements in the countries in the sample are mostly short and medium term, which is why inflation (in addition to other reasons related to the objectivity of determining variables, frequency of information, and so on) is a less suitable parameter in economic calculations. We assume that economic calculations of the participants in the credit markets are far more based on the so-called open interest rate parity (expected exchange rate changes are factor of equalization of interest rates in different currency areas), than the real interest rate parity (inflation is parameter of equalization of interest rates in different currency areas). If this assumption is correct, the exchange rate will play a far more important role than inflation in shaping the degree of currency substitution on the credit market.

Another reason for the lack of inflation influence may be the asymmetric impact of inflation on euroization, i.e. mentioned persistence of euroization phenomena. In the period covered by the analysis, economies had more or less success in controlling inflation, and euroization level was oscillating, but obviously, the degree of correlation was not at the required level.

The effect of "long memory", i.e. the prolonged influence of inflation could also play a role, and it would be beneficial to evaluate relationship between these two variables through dynamic panel regression models in order to explore the interdependence with varying delays (time lag) and possibly the influence of "traumatic" experiences with hyperinflation from not so distant past.

Beside inflation, exchange rate is also considered as an important determinant of euroization. Negative changes in the value of the domestic currency, i.e. depreciation, should stimulate the euroization process. Large and sudden exchange rate shifts increase costs of borrowing in foreign currency and

reduce the value of residents' deposits in local currency, which should result in a decline in loan euroization and an increase in deposit euroization. However, despite the uncertainty regarding future depreciation, if interest rates on borrowing in local currency are high due to high inflation, foreign currency borrowing will be more attractive, which will cause an increase in the share of loans in foreign currency. Besides that, the role of the exchange rate in the transmission mechanism of monetary policy in euroized economies is usually higher than in less euroized economies, and the impact of exchange rate is therefore more significant.

Table 2. Random-Effects GLS Regression – Dependent Variable FX/Total Loans

| Regressor | Estimate | St. Error | z – value | $P > z $ |
|-------------------------------|-----------|-----------|-------------|-----------|
| CPI (avg.) | 0.777 | 0.624 | 1.25 | 0.213 |
| CPI (eop) | -0.301 | 0.539 | -0.56 | 0.576 |
| ER (avg.) | 0.084** | 0.023 | 3.55 | 0.000 |
| Policy rate (eop) | -99.873** | 40.220 | -2.46 | 0.014 |
| ECB (eop) | 100.342** | 40.230 | 2.49 | 0.013 |
| Spread | 99.245** | 40.307 | 2.46 | 0.014 |
| FX/Total liabilities | 0.220** | 0.068 | 3.22 | 0.001 |
| Current account (%GDP) | -0.084 | 0.326 | -0.26 | 0.795 |
| FDI (%GDP) | -1.003* | 0.543 | -1.85 | 0.065 |
| Constant | 46.764 | 4.292 | 10.89 | 0.000 |
| Diagnostics | | | | |
| Wald χ^2 (9) | | | | 43.67 |
| Prob > χ^2 | | | | 0.000 |
| R -squared (within group) | | | | 0.129 |
| R -squared (between groups) | | | | 0.674 |
| R -squared (overall) | | | | 0.492 |
| Rho ¹⁾ | | | | 0.000 |

Notes: *Significant at 10% level; **Significant at 5% level; ¹⁾ fraction of variance due to individual effects.

The results obtained by the random effects generalized least squares method confirm the assumed influence of the nominal exchange rate on the level of euroization of the credit market. The coefficient (Table 2) is statistically significant even at a very high level of reliability. The positive value of this parameter indicates that the depreciation of the domestic currency encourages euroization. Please note that for all currencies in the sample direct quotation method was applied, i.e. exchange rate is expressed in units of domestic

currency per unit of foreign currency, so the growth of the exchange rate (positive change in the value of the variable) is a depreciation of the domestic currency. The fact that some of the countries in the sample have rigid currency regimes had no influence on statistical significance. Namely, Bosnia and Herzegovina has a currency board (with a fixed value of the domestic currency against the euro), while FYR Macedonia has a fixed exchange rate. Other countries have managed-floating exchange rates. The observed regularity may indicate that banks dominate credit markets, and that they use a stronger negotiating position to favor credits in foreign currency. In other words, the interest rate on loans in domestic currency is higher than the interest rate on foreign currency loans for the amount that significantly exceeds the difference in inflation rates and historical rates of domestic currency depreciation.

Arteta (2002) empirically showed that the impact of the current inflation and depreciation on financial dollarization is relatively modest, but on the other hand, the impact of maximum inflation and depreciation on the dollarization of loans and deposits is significant. He believes that the countries, that have experienced high inflation and the depreciation in the past, are prone to have a greater degree of euroization on the assets as well as on the liabilities side of banks' balance sheets. This is supported by the experience of many countries, which shows that the high euroization often persists and sometimes even increases after achieving stability of macroeconomic fundamentals, because it takes a long time for people to adapt and regain confidence in the domestic currency. Also, when they once endure the costs of conversion to reserve currency they are not willing to re-endure these costs. Thus, high inflation rates and the depreciations of the domestic currency in the past lead to a greater euroization of loans over time if the stabilization of macroeconomic fundamentals is not assessed as credible.

This effect was not analyzed in this study for several reasons. Due to the low data frequency, it was not possible to create indicators of exchange rate variability and test their impact on euroization. Also, in most countries extremely high inflation was not recorded in the period under analysis, and a sharp depreciations of domestic currencies are not visible from the annual data. Certain pops of exchange rates in relation to long-term trends were recorded at the height of the global financial crisis, but the dynamics of the foreign exchange markets calmed down quickly. Hyperinflations, that have certainly shaped the expectations of economic agents, were occurring in the period preceding the period of analysis.

One can see from the previous that the influence of inflation and the exchange rate is worth exploring in parallel with interest rate movements, because only when taken together, these parameters shape the relative attractiveness of the financial arrangements in different currencies. Thus, the difference in interest rates on domestic and foreign currency has also influenced

the preferences of economic agents in terms of the currency structure of their assets and liabilities. Increase in the interest rate differential in favor of the domestic currency should reduce the attractiveness of loans in domestic currency and increase the attractiveness of deposits in local currency, thus increasing loan dollarization and reducing deposit dollarization (Ize and Levy-Yeyati, 2003). Similarly, Catao and Terrones (2000) argue that euroization tends to increase with a decrease in foreign interest rates if the initial level of dollarization is low. The decline in external interest rates leads to increase in borrowing abroad, and banks, in order to protect against foreign exchange risk, grant more loans in foreign currency on the domestic market, which results in an increase in loan euroization. Basso et al. (2007) found that growth in interest rate spread on domestic and foreign currency increases euroization of loans and decreases euroization of liabilities. On the other hand, according to the study conducted by Arteta (2002), interest rate spread has modest impact on currency substitution.

The results of our analysis using the random effects model confirmed positive, statistically significant influence of interest rate spread on the level of euroization. Increase in the spread stimulates capital imports, directly affecting the euroization of the banks financial resources. This indirectly effects euroization of the domestic credit market, because regulations force banks to control the so-called balance sheet exposure to currency risk.

In this paper, we also explore the individual impact of interest rates - the main reference rate of the local monetary authorities (LPR) and the key policy rate of the European Central Bank (ECB). The random effects method indicates that both variables are significant (according to the fixed effects method both variables are close to statistical significance), where the LPR has a negative, and the ECB rate a positive influence on the degree of euroization of the credit market. This can be explained as follows. The growth of the LPR stimulates the growth of interest rates on loans in local currency, but has no influence on the interest rate on loans in the foreign currency, thus favoring foreign currency as a better alternative (of course from the perspective of the borrower) for credit arrangements.

One should bear in mind that countries in the region generally use the so-called classic repo transactions (e.g. Croatia and Serbia), and the repo rate for the banking sector appears as a risk-free alternative to loans to the private sector. The growth of the repo rate leads to liquidity reallocation from the credit portfolio to the repo stock, and can stimulate the euroization of bank loan portfolios.

The positive influence of the ECB repo rate on the level of the loan euroization for analyzed countries of the European periphery could be explained by changes in the attractiveness of the credit market of Southeast Europe in relation to the parent European market. The ECB repo rate had recorded a

growth before the crisis (2007), followed by constant downward trend. As the ECB conducts a so-called reverse repo, this rate is an input in the cost function of the European banks. The growth of this rate, if transferred to interest rates on domestic credits and further to credit demand decline, would stimulate credit capital outflow toward the countries which lending activity is at least partly outside the influence of the ECB. The decline in the ECB repo rate, according to this logic, would result in a reduction of credit exposure to the countries that import credit capital, thus reducing their degree of euroization. Of course, a whole range of factors has influence on the international credit capital flows, but that is outside the scope of this work. Other types of foreign currency inflows and their impact on the degree of currency substitution will be discussed in the sequel.

As already mentioned, in highly euroized economy interest rates transmission channel is not efficient enough, and thus one cannot expect a change in the reference rate to reflect fully on the whole spectrum of market interest rates, primarily credit interest rates, which are a key parameter in making decisions on the currency structure of loans. Therefore, the choice of the official reference rates is not ideal for this type of analysis.

In the literature, one can often find that dollarization of financial resources have an impact on asset dollarization (Naceur and Omran, 2011). Theoretically, it is expected that banks match their currency positions, either because they do not want to bear exchange rate risk, or because they are forced to do so (regulations in most countries impose restrictions on open foreign exchange position, i.e. exchange rate exposure), or both.

In this paper, we analyze the influence of euroization of the banks' financial liabilities on euroization of loans. However, one should bear in mind that deposit and non-deposit bank sources might differ considerably when it comes to deciding on currency structure. Non-deposit sources (loans dominate) in the banking sectors in Southeast European countries, come from the credit market of the European Union. Banks in transition economies and developing countries are mainly subsidiaries of foreign banks. They are able to borrow from parent banks at very favorable rates. These sources, banks used to encourage credit growth in order to take a greater market share in the still underdeveloped, but highly profitable credit markets in developing countries, which were expected to grow significantly. These funds were originally in foreign currency, and the decisions on the currency of credit transactions were made within the banking (financial) group. This resulted in a sharp increase in foreign currency and foreign currency-indexed loans, and the level of loan euroization.

On the other hand, a decision on the currency structure of deposits is made by resident depositors, based on interest rates, expected inflation and expected exchange rate movements. However, if banks match the currency structure of

their assets and liabilities, an increase in euroization of deposits, as a most important financial resource, and other sources, should lead to the rise of euroization of loans. Marinkovic (2009) examined the relationship between euroization of deposits and loans for five SEE countries and found a strong positive correlation. Luca and Petrova (2003) also found that euroization of loans in transition economies depends on banks' decisions in terms of exchange rate risk optimization. Barajas and Morales (2003) believe that the loans in the foreign currency are generally related to deposits in the foreign currency, but with a correlation coefficient of less than one considering the fact that regulations prevent banks to borrow the total amount of funds received. To what extent the currency structure of deposits and total financial liabilities will reflect on the currency structure of loans depends on banks' propensity to currency risk, but also from the reserve requirement policy (inclusion of other sources beside deposits, prescribing different reserve requirement rates for resources in different currencies, and managing the currency structure of the required reserves).

Our analysis conducted by the random effects model confirmed the positive and statistically significant relationship between the degree of euroization of the financial resources and loans of the banking sector. Surprisingly, this relationship was not confirmed by the fixed effects method.

Foreign currency inflows in the form of foreign direct investments or trade balance surplus may have an impact on the level of euroization in the economy. Companies, like banks, tend to match the currency structure of their liabilities and incomes. Luca and Petrova (2003) argue that exporting companies, in order to protect against exchange rate risk, mainly borrow in foreign currency because their income is in foreign currency, which contributes to the increase in euroization of loans. The greater the volume of exports in relation to production and the greater the degree of integration into the world economy (higher share of trade in GDP), the higher the level of euroization in economy. Ize and Parrado (2002) also found a positive relationship between trade openness and dollarization of loans. However, Arteta (2002) found that openness has a negative impact on dollarization.

We found, using the random effects model, that current account balance does not have a statistically significant impact on the dependent variable (although the coefficient is negative). In contrast, this variable shows a direct (positive) and a statistically significant impact when using the fixed effects model. Except Croatia which in the last two years had a positive current account balance, all other countries from the sample recorded current account deficit, which should mean that growth in current account deficit leads to a reduction in the degree of currency substitution. Such regularity is illogical because deficit could create a foreign currency outflow.

Foreign direct investments (measured as FDI in the gross domestic product of the country) have a negative and statistically significant influence on the level of euroization of loans, which was confirmed by both the random effects and the fixed effects method. The relationship between these two variables is very complex and it is difficult to find reliably economic causes for such regularity. Seemingly, foreign currency inflow in the form of foreign direct investments should encourage the use of foreign currency in the inflow country, but foreign direct investments are a partial substitute for cross boarder loans, which have a far more direct impact on the euroization of loans.

6. Conclusion

Widespread financial euroization inevitably causes currency mismatches in the economy and represents a potential threat to financial and macroeconomic stability. In fact, liquidity and solvency crisis in the banking sector seems more likely in the case of high currency substitution, and as the problems spill over quickly to other sectors, macroeconomic stability could be compromised. Additionally, high euroization complicates the conduct of monetary and fiscal policies reducing their efficiency. Therefore, this phenomenon is often a subject of analysis and discussion among professionals.

Analysis performed by different panel regression models confirmed that the nominal exchange rate movements of domestic currency, the difference in key interest rates on local and foreign currency, the degree of euroization of bank financial resources, as well as foreign currency inflows in the form of foreign direct investments have statistically significant impact on the degree of euroization of bank loans in six countries of Southeast Europe in the period from 2003 to 2014. The analysis refuted the impact of current inflation and current account balance.

Note that heteroscedasticity and autocorrelation tests did not precede the panel regression analysis so the results should be interpreted more as an indication of the impact of certain economic variables than the definitive scientifically verified models that can be used in a prediction.

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DETERMINANTE VALUTNE SUPSTITUCIJE U ZEMLJAMA JUGOISTOČNE EVROPE

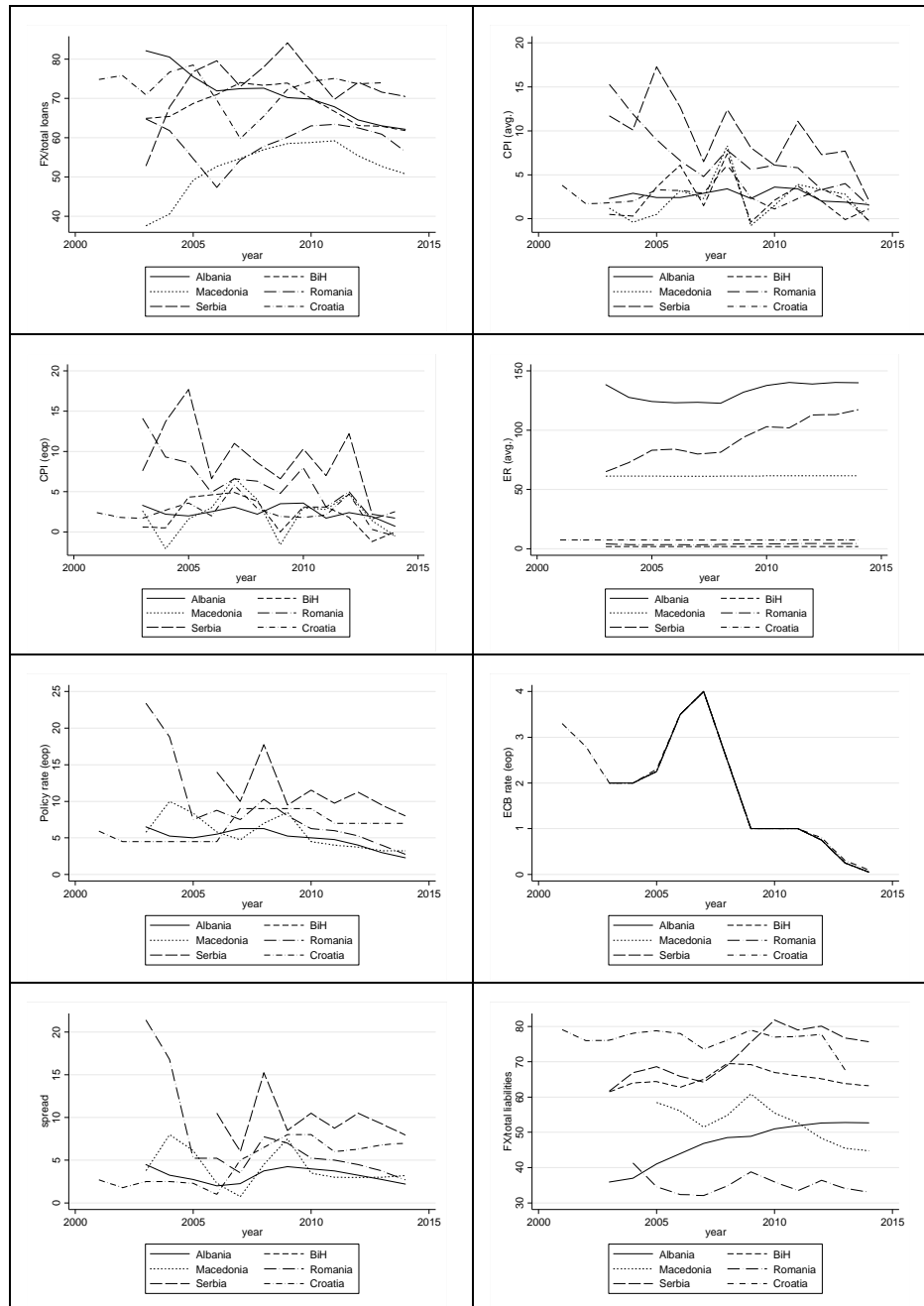
Apstrakt: Valutna supstitucija je široko rasprostranjena među manje razvijenim državama. Pošto povećava finansijsku osetljivost i ograničava efikasnost monetarne politike, često je u žiži interesovanja naučne i stručne javnosti. U radu je analiziran značaj pojedinih determinanti evroizacije u Srbiji i zemljama u okruženju – Albaniji, Bosni i Hercegovini, Makedoniji, Rumuniji i Hrvatskoj, za period 2003-2014 godina. Analizom je sagledan uticaj domicilne inflacije, nominalnog deviznog kursa domaće valute prema evru, raspona u kamatnim stopama na domaću i stranu valutu, priliva strane valute po osnovu stranih direktnih investicija i izvoza, kao i evroizacije finansijskih izvora banaka na stepen evroizacije kredita. Rezultati dobijeni višestrukom panel regresijom potvrđuju statističku značajnost i pretpostavljeni smer uticaja svih analiziranih varijabli izuzev inflacije i salda računa tekućih transakcija.

Ključne reči: valutna supstitucija, finansijska osetljivost, inflacija, deprecijacija domaće valute, priliv kapitala.

Appendix**Table A1. Variable definition**

| Variable | Definition |
|------------------------|---|
| FX/total loans | Foreign currency denominated loans to total loans (in percentage); for B&H, BJR Macedonia and Croatia the numerator also includes foreign currency indexed loans; for Romania the denominator includes only non-governmental loans. |
| CPI (avg.) | Consumer price index (average for the year); simple mean of twelve monthly inflation rates. Monthly rates are computed as a month to the same month previous year. |
| CPI (eop) | Consumer price index (end of period). |
| ER (avg.) | Nominal official exchange rate of national currency vis-à-vis euro, i.e. direct quotation (average for the year). |
| Policy rate (eop) | Local policy rate (end of period); for Albania one-week repo rate for open market operations, for B&H omitted; for Romania before 2006 open market operations deposit facility interest rate, afterwards repo rate for various maturities; for Serbia open market two-weeks repo rate before 2012, afterwards one-week repo rate; for Croatia official discount rate. |
| ECB (eop) | European Central Bank policy rate (end of period); Main refinancing operations one-week (reverse) repo rate, before 2007 variable rate tenders – minimum bid rate, afterwards fixed rate tenders – fixed rate. |
| Spread | Difference between the local and the foreign policy rate. |
| FX/Total liabilities | Foreign currency denominated (or indexed) to total liabilities (in percentage), except for BJR Macedonia where the figures includes solely deposits. |
| Current account (%GDP) | Current account balance to Gross Domestic Product (in percentage). |
| FDI (%GDP) | Foreign Direct Investments to Gross Domestic Product (in percentage). |

Table A2. Time series of variables



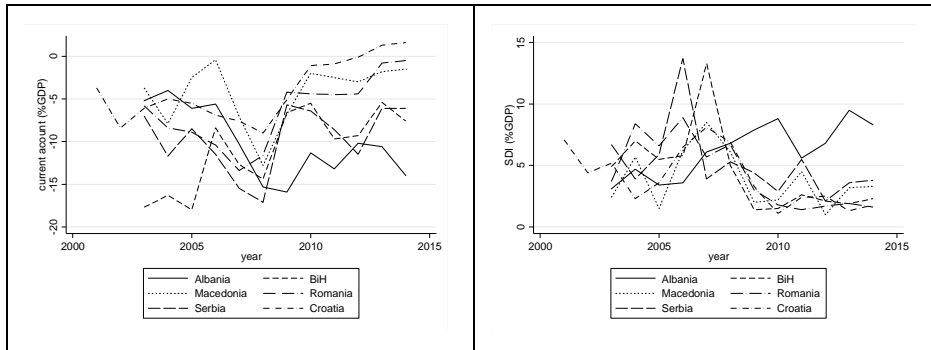


Table A3. Scatter plots for variables

