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INFLUENCE OF EURIBOR ON INTEREST RATES ON NEW LOANS GRANTED TO CORPORATES AND HOUSEHOLDS: THE CASE OF SERBIA

Uticaj Euribora na kamatne stope na nove bankarske kredite odobrene privredi i stanovništvu – slučaj Srbije

Abstract

The paper deals with the impact of the Euribor and risk premium on interest rates on foreign currency loans and FX-indexed loans that are approved to the corporate sector and the household sector in Serbia. Total new loans granted to corporates, total new loans granted to households, new investment loans granted to corporates and new housing loans granted to households are observed. The observed period is from September 2010 to August 2020. The main goal is to determine whether there is a long-run relation between Euribor and risk premium and the given interest rates, and what is the strength of the given relation. Empirical estimates show that there is a statistically significant impact of Euribor, as well as country risk premium, on lending rates on new households as well as corporate investment FX and FX-indexed loans, with high pass-through coefficients. For the total new corporate FX and FX-indexed loans we also included nonperforming loans as explaining variable which is shown to be statistically significant and whose fall also influenced the fall of lending rates on these loans.

Keywords: *Euribor, risk premium, NPL, interest rates, corporate loans, retail loans*

Sažetak

Rad se bavi uticajem Euribora i premije rizika na kretanje kamatnih stopa na devizne kredite i kredite indeksirane u evrima koji su odobreni sektoru privrede i sektoru stanovništva u Srbiji. Posmatraju se ukupni krediti odobreni privredi, ukupni krediti odobreni stanovništvu, investicioni krediti odobreni privredi i stambeni krediti odobreni stanovništvu. Posmatra se period od septembra 2010. do avgusta 2020. Osnovni cilj je da se utvrdi da li postoji dugoročna veza između Euribora i premije rizika i datih kamatnih stopa i koja je jačina date veze. Empirijska ocena je pokazala da je uticaj Euribora, kao i premije rizika zemlje, na kamatne stope na nove devizne i devizno-indeksirane kredite odobrene stanovništvu, kao i investicione kredite privredi, statistički značajan, sa visokim koeficijentom prenosa. Kada je reč o ukupnim novim deviznim i devizno-indeksiranim kreditima privredi, u analizu su kao objašnjavajuća varijabla uključeni i problematični krediti, za koje je pokazano da su statistički značajni i da je njihov pad doprineo padu kamatnih stopa na ove kredite.

Ključne reči: *Euribor, premija rizika, NPL, kamatne stope, krediti privredi, krediti stanovništvu*

Introduction

Bank loans are the most important external source of financing for companies in Serbia. The financing of the SME sector with bank loans is specifically important. Commercial banks are the backbone of the financial system in Serbia. The banking sector in Serbia represents more than 90% of the assets of the financial sector. This sector is highly liquid and profitable. Foreign banks are dominant, while the participation of pension funds and leasing companies is quite small. According to the data of National Bank of Serbia, twenty-six commercial banks currently operate in Serbia. According to the data of the National Bank of Serbia for the period 1.1.2019-31.3.2020, the five commercial banks in Serbia with the highest net business assets are: Banca Intesa, UniCredit Bank, Komercijalna Banka, OTP Banka and Raiffeisen Banka.

The corporate sector in Serbia - micro, small, medium and large enterprises are financed predominantly by foreign currency loans and dinar loans indexed in euros (see Figure 1). Investment loans are used by companies to finance the purchase of equipment, machineries, plants, the construction or purchase of business or production space. As interest rates in these contracts are linked to Euribor interest rates, mostly of 3- and 6-month maturity, it is to be expected that fall of Euribor rates is transmitted to lending rates, though this does not have to be the case, from various reasons ranging from level of competition

among banks, asymmetric information, macroeconomic environment etc. That motivated us to empirically estimate the size and significance of pass-through of Euribor to lending rates on new corporate loans.

We will also investigate influence of Euribor on interest rates on new household loans in Serbia, where the level of euroisation, though declining, is still significant (Figure 2). As well as for corporate loans, we will, naturally, take into consideration only households FX loans and FX-indexed loans.

The Euribor rates are based on the average interest rates at which a huge number of European banks borrow funds from each other. The Euribor rates are considered to be the most significant reference rates in the European money market. The interest rates do provide the basis for the price and interest rates of all kinds of financial products. There are different maturities of Euribor, ranging from one week to one year. In our paper we will use Euribor rates for the period from September 2010 until August 2020, by using maturity of three months and six months.

Given the high euroization of the domestic credit market (more than 60% of domestic loans are indexed in foreign currency), interest rates on the European money market (Euribor) directly affect interest rates on euro-indexed loans to businesses and households. Besides direct influence of Euribor on variable interest rates on FX and FX-indexed loans, it also affects fixed interest rates, as it

Figure 1: Bank claims on corporate sector by contracted hedge and currency structure, outstanding amount (in billion dinars, end-of-period)
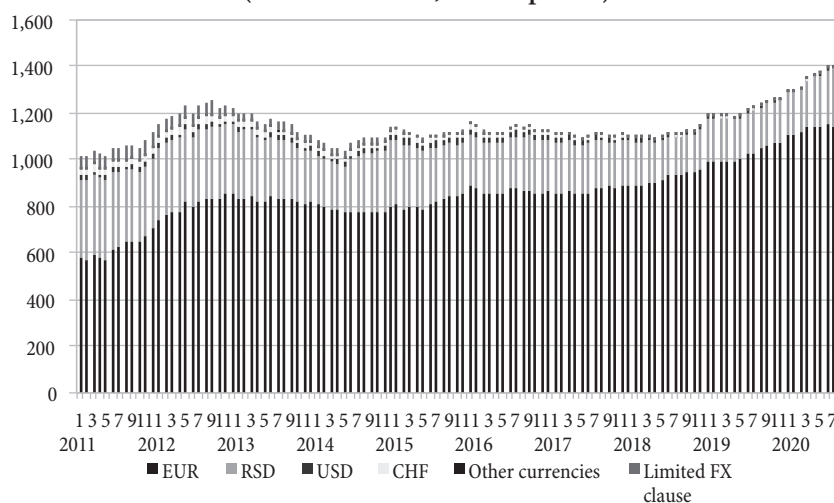
Source: National Bank of Serbia

alters costs of sources of financing (when Euribor falls it lowers costs of sources of financing).

EMBI (Emerging market bond index) is the risk premium indicator. EMBI which is based on dollar-denominated debt and calculated by the American financial institution J.P. Morgan, is no longer to be calculated and published for Serbia from August 2020. Since 2019, new benchmark data became available on the EMBI risk premium for Serbia based on euro-denominated debt. In this paper we will use US-dollar EMBI risk premium data calculated as the weighted spread between yield rates on eurobonds of emerging economies and yield rates on US bonds of comparable maturity.

Euroisation in Serbia has its main cause in a previous history of monetary instability of a country. Extreme inflations occurring during the last decade of XX century has undermined trust in the local currency - dinar and discouraged dinar savings. At the same time, large supply of foreign capital inflows has provided easy access to foreign currency lending at low interest rates, which caused loans in a foreign currency to be more desirable than dinar loans. Due to a high level and significance of euroisation in Serbia, in our paper we will focus on foreign currency loans and FX-indexed loans of different types.

The subject of this paper is the impact of the movement of Euribor and EMBI on the movement of interest rates on total bank loans granted to the corporates and households, as well as investment and housing loans, whereby foreign currency loans and dinar loans indexed in euros are observed. The significance of the paper is in estimating the connection between Euribor and EMBI and interest rates on bank loans to the corporate sector and households in Serbia and the strength of this relationship. Thus, we will conclude whether the fall in Euribor and the country's risk premium makes loans cheaper for companies and households in Serbia. In this paper, we will apply econometric analysis using the two-step procedure of Engle and Granger. We will use monthly data and examine the movement of the interest rates, Euribor and EMBI during the period September, 2010 – August, 2020.

In the rest of the paper we will examine the previous research of different authors of Euribor influence on interest rates. After that, we will present the methodology we will use in our paper considering Engle and Granger two-step procedure. In the next part of the paper we will provide the full description of the used data. We will provide presentation of our empirical results and make a final conclusion. At the end of paper, we will list literature we have used for this paper.

Review of the previous relevant research

The impact of Euribor on interest rates and the volume of loans to corporates and households has been the subject of research by numerous authors, who have primarily focused on the Eurozone. Different researchers observed different

Figure 2: Bank claims on households by contracted hedge and currency structure, outstanding amount (in billion dinars, end-of-period)
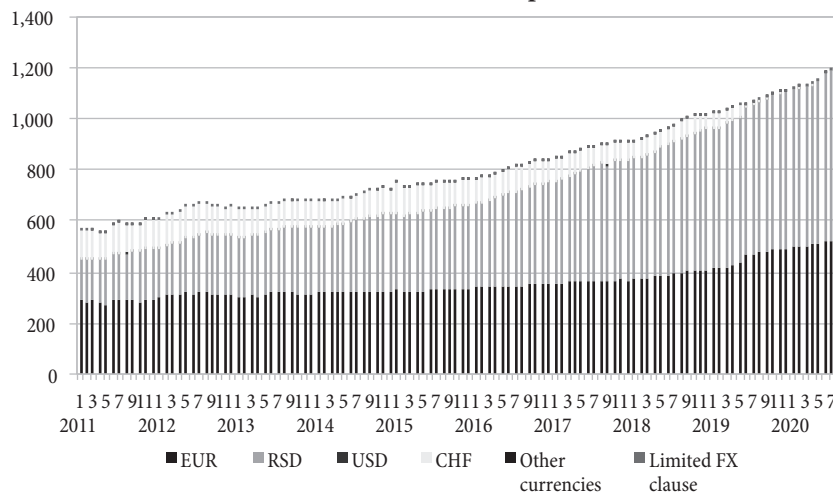
Source: National Bank of Serbia

types of loans, some focused on business loans, some on household loans, etc. Likewise, authors have observed different periods, some focused on the long term, while others observed short-term developments. The majority of researchers have observed movements of the interest rates during the crisis period that began in 2008.

Many authors have been investigating the relation between the stock of nonperforming loans and interest rates on bank's loans. Some authors were focused on euro zone, while others were focused on specific countries. Likewise, some researchers focused on the impact NPLs have on credit supply of the banks, while other investigated the impact on interest rates on new loans.

According to research by Gallo [12], the impact of Euribor movements on interest rate movements is much more pronounced in the corporate sector than in the household sector. The given research also showed the existence of a positive correlation between Euribor and interest rates in the euro area during the period 2003-2010, whereby the relation was found to be weak.

Bredin, Fitzpatrick & O Reilly [6] investigate retail interest rate pass-through in Irish economy in period 1980-2001. They found that the pass-through from the money market rate to lending rates is incomplete, and that the speed of adjustment varies considerable between different types of lending rates.

Jobst & Kwapil [15] analyzed interest rate movements in Austria. According to their research, interest rates on loans with a maturity of less than a year fully follow the trend of the three-month Euribor. Likewise, the research of these authors discovered that in the case of interest rates on loans with a maturity of more than one year, interest rates follow the movement of the three-month Euribor and interest rates on government bonds.

Kazaziova [16] investigated the movement of interest rates in The Czech Republic in the period 2004-2010. According to the given research, interest rates on loans granted to households follow changes in Pribor (Prague interbank offered interest rate) more than Euribor.

Kregždė & Murauskas [17] studied the impact of Euribor on interest rate movements in Lithuania. According to their research, the relation is strong if a long term is observed. Their research showed that if Euribor changes by 100 basis points, the interest rate on mortgage loans in Lithuania will change by 72 basis points. However, in this research, no relation was detected in the short term.

According to research by Graeve et al. [14], the relation exists in the long run but it is not 1:1, but weaker. As per their research, the relation is absent in the short run. Moreover, the authors noticed that in the case of loans granted to business entities, the competition of banks is stronger compared to loans granted to households.

Golitsis et al. [13] were investigating how shocks in Euribor affect domestic interest rates, real effective exchange rates, foreign exchange reserves and industrial production. They were analyzing data for several countries: Bulgaria, Croatia, Greece, North Macedonia, Romania and Slovenia. Their results show that a negative Euribor shock has a positive effect on industrial production while there is limited evidence regarding the effects of Euribor on foreign reserves, interest rates, and the real effective exchange rate.

Cifarelli and Paladino's research [9] examined the relationship between Euribor and a long-run interest rates, on loans to non-financial corporations. They were examining eight countries from euro zone. The authors have concluded that for some countries the spread between domestic and German long-term bond interest rate has an important role in changes of the bank's cost of funding.

Mihaylov [19] examined the process of loan interest rate formation in Bulgaria using Euribor as a reference rate. The author has used both standard and asymmetric VECM. The author has concluded that the pass-through of loan interest rates in Bulgaria has decreased during the crisis and that there are differences across the individual segments of the credit market.

Landini et al. [18] analyzed fixed and adjustable rate mortgages dynamics and the relations between FRMs and ARMs markets. Research of these authors showed the effects of the European Central Bank control on the Euribor transmit to the movement of interest rates term structure as well as to interest rates of contracts involved in the mortgage markets in Italy.

Bernoth & Hagen [4] were investigating different aspects of the predictability of money market rates in the European Monetary Union. The aspects these authors

were investigating were: efficiency of the three-month Euribor interest rate futures market, effect of European Central Bank policy announcements on the volatility of Euribor futures rates and effect of European Central Bank policy announcements on the prediction error contained in Euribor futures rates. Their main results showed that the new Euro money markets were able to predict short-term rates successfully.

Bredl [7] was investigating the relation between stock of nonperforming loans in the Eurozone and lending rates on new loans. The results of his research showed that there is no clear relation between NPLs and lending rates. However, the author concludes that after dividing the gross NPL stock into net NPLs and loan loss reserves, a high stock of NPLs will be associated with higher lending rates, if it is not sufficiently covered by loan loss reserves.

Accornero et al. [1] were investigating the relation between non-performing loans and credit supply of the banks in Italy. The results of these authors showed that, although exogenous shocks to NPLs can cause a decline in credit supply, the correlation between NPLs and credit supply is mostly driven by demand-side effects. The authors concluded that due to demand-side effects, NPL ratios have no significant influence on banks' lending strategies.

Bahruddin & Mansur [3] were analyzing the impact NPLs have on banks' interest rates in Malaysia. The authors have used NARDL approach to test the non-linear asymmetric relationships between lending interest rate and NPLs. The main result of this research was that lending interest rate and NPLs has an asymmetric relationship in the short-run and symmetric relationship in the long run.

Albertazzi et al. [2] were investigating an impact of NPLs on lending rates. The results of these authors suggest that this relation is shown in the form of a higher mark-up on lending rates and is significantly independent from the monetary policy stance.

In National Bank of Serbia's November 2020 Inflation Report [21], the effectiveness of transmission of the NBS one-week repo rate to interest rates in the interbank money market and their transmission to retail dinar rates has been analyzed. This study relies on equilibrium error correction model and estimates both the long-run and short-run relationship of the repo rate on interest rates

in the interbank money market – BELIBOR rates with the maturity from one week to six months. It concludes that the pass-through of the main instrument to interest rates in the interbank money market is complete in all cases. Then the pass-through of BELIBOR to dinar lending rates (on total household loans, cash loans, total corporate loans and working capital corporate loans) is analyzed and results suggested that there is also a complete pass-through of BELIBOR on lending rates. Besides BELIBOR, in the equations representing transmission of BELIBOR to lending rates, measure of country risk premium (EMBI) is included and is shown to be statistically significant, and thus contributed to the fall in lending rates. Primarily guided by this analysis, we wanted to assess whether the impact of the Euribor interest rates on EUR and EUR-indexed lending rates in Serbia is also significant and whether the pass-through is complete or not. As in the above-mentioned analysis, we also include country risk premium (EMBI) in our research. Additionally, we test for the nonperforming loans influence on different types of FX and FX-indexed rates.

Methodology

As many economic variables tend to be non-stationary, before conducting the analysis, we tested for the existence of unit roots. As all observed variables had a unit root, based on Augmented Dickey-Fuller test statistic, hence are non-stationary i.e. I(1) variables, further we tested for cointegration. Cointegration means that, even though variables are non-stationary, there exists a linear combination of such variables that is stationary. An alternative approach of dealing with I(1) variables means analyzing differences of those series (which are I(0)), but it would describe only short-run, but not long-run relationship which we are mainly interested in, and which is why we opted for cointegration approach.

It is important to distinguish between spurious and cointegrating relationships, as some unrelated time series may appear to be related when conventional testing procedures are used. Hence we applied various cointegration tests (Trace, Maximum Eigenvalue) and based on them concluded that there is one cointegration

relationship between interest rates on total FX loans and loans indexed to FX, Euribor and risk premium in the case of total loans to households (for Euribor maturity of both 3 and 6 months), housing loans (for Euribor maturity of 6 months), and corporate investment loans (for 3- and 6-month maturities). In the case of total corporate loans (for 3- and 6-month maturities) there is more than one cointegration relationship as well as in the case of housing loans in the case of Euribor maturity of 3 months. As Johansen-Granger Representation Theorem suggests, when a set of variables are cointegrated, then they can be represented by equilibrium error correction model (ECM). That means if there is a long run relationship between I(1) variables, there is a force that pulls back error term to zero. Engle and Granger [11] formulated a following two-step procedure: first we estimate long-run (equilibrium) relationship between non-stationary variables, which in our case is:

$$i_t^c = \beta_0 + \beta_1\, euribor_t^m + \beta_2 rp_t + v_t \qquad (1)$$

Where i_t^c represents interest rates on new FX loans for the cases where there exist one cointegration relationship – total households, housing loans, and investment corporate loans; m is the maturity of Euribor rates (3 months and 6 months) and rp_t is the risk premium, in our case represented by Emerging Market Risk Premium (EMBI) for Serbia. The OLS residuals (v_t) from (1) are the measure of deviation from long-run equilibrium ($Y_t = \beta_0 + \beta X_t$). Testing for cointegration is actually testing whether these residuals are stationary, which in practice means using ADF tests with the MacKinnon critical values adjusted for the number of variables. If series are cointegrated, residuals have to be stationary and *vice versa*. If there is cointegration, the OLS estimates are cointegration estimates and are said to be super-consistent. The second step consists of estimating short-run relationship:

$$\Delta i_t^c = \gamma_0 + \alpha v_{t-1} + \gamma_1 \Delta i_{t-1}^c + \gamma_2 \Delta euribor_t^m + \gamma_3 \Delta rp_t + e_t \quad (2)$$

where α measures the speed of adjustment to long-run relationship. While long-run relationship is based on the level of the variables, the short-run relationship is based on the changes (first differences) of variables. Here we measure how big impact on the change in lending rates

have change in lending interest rates from previous period, change in Euribor rates, change in risk premium and deviation from the long-run equilibrium from the previous period. The adjustment coefficient α must be negative. This equation explains how observed variables behave in the short run, in a way that is consistent with a long-run cointegration relationship.

As nonperforming loans (NPLs) to a great extent influence banks' readiness to borrow, we also included them in the analysis and, as we found one cointegration relationship in the case of corporate loans and investment loans in the case when 3-month Euribor rate is used, together with risk premium, we also reported these results in our analysis. The long run relationship in this case takes the following form:

$$i_t^c = \beta_0 + \beta_1\, euribor_t^m + \beta_2 rp_t + \beta_3 npl_t + v_t \qquad (3)$$

Where npl_t represents the share of nonperforming loans in observed category of loans – in our case in total corporate loans and in loans to companies (for the investment loans).

Short-term relationship is represented by:

$$\Delta i_t^c = \gamma_0 + \alpha v_{t-1} + \gamma_1 \Delta i_{t-1}^c + \\ + \gamma_2 \Delta euribor_t^m + \gamma_3 \Delta rp_t + \gamma_4 \Delta npl_t + e_t \qquad (4)$$

Where, as before, α measures the speed of adjustment to long-run relationship and in addition to change in lending interest rates from previous period, change in Euribor rates, change in risk premium and deviation from the long-run equilibrium from the previous period, we also measure how the change in the share of NPLs influences change in lending rates.

Data description

Our sample encompasses period between September 2010, since comparable data on per annum average lending interest rates are available, and August 2020, when EMBI data for Serbia ceased to exist (just to become available again at the very end of 2020, with the issuance of new dollar Eurobond which once again enabled its calculation). For lending rates on new loans we use National Bank of Serbia data, specifically FX interest rates on total new corporate loans, investment loans, total household loans and housing loans. Around

80% of new corporate loans are FX or FX-indexed, and though their share in new loans to households is declining, it still accounts for somewhat above 40% (Figures 1 and 2). We conduct separately the analysis of influence of Euribor and risk premium on interest rates on housing household loans, as almost all of new housing loans are FX-indexed, and interest rates on new investment corporate loans as above 90% of these loans are FX or FX-indexed. As measure of risk premium we used Emerging Market Risk Premium (EMBI) for Serbia, which is no longer published as of the last day of August 2020, as time to maturity of the only dollar Serbian eurobond at that moment was less than 13 months, and this is when, according to J.P. Morgan's criteria, the bond is excluded from the index calculation. For Euribor we use European Money Markets Institute (EMMI) data, for maturities of 3 and 6 months, as those are the most common maturities to which banks tie FX-lending rates in loan agreements. Besides its prudential aspect, as a tool which is used to regulate banks' liquidity, reserve requirement ratio is also used as a supportive instrument of monetary policy of National Bank of Serbia, i.e. a tool

to enhance lending activity and thus influence economic activity and inflation. Standard economic theory suggests that lower reserve requirement leads to higher loan supply and results in higher economic activity and inflation. Not found only in theory, but, as noted by Palic & Tasic [23], this approach was also implemented by many central banks during the 80s and 90s of XX century in order to influence lending rates. Hence, we corrected Euribor rates for effective FX reserve requirement rate. This is achieved through dividing Euribor rates by (1-effective FX reserve requirement rate).

In Figures 3-6 we represented comovements of Euribor, EMBI and interest rates on selected new EUR and EUR-indexed loans – in Figure 3 total households loans, Figure 4 only housing loans to households, Figure 5 total loans to corporates, and Figure 6 only investment loans to corporates. The reduction of Euribor should be reflected in the lower cost of new borrowing in euros, as it contributes to lower funding costs for these loans. What is interesting is that the fall in interest rates on loans in euros was more pronounced than the fall in Euribor which is

Figure 3: EURIBOR, EMBI and interest rates on EUR and EUR-indexed loans to households, new business, three-month averages (%)
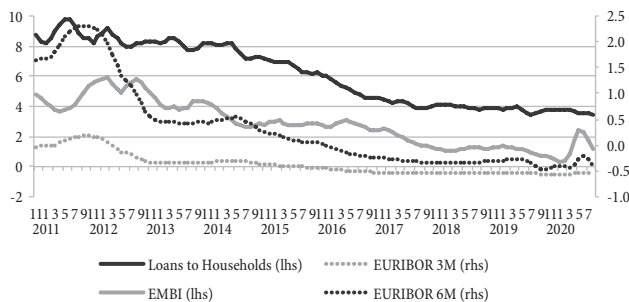

Figure 4: EURIBOR, EMBI and interest rates on EUR and EUR-indexed housing loans, new business, three-month averages (%)
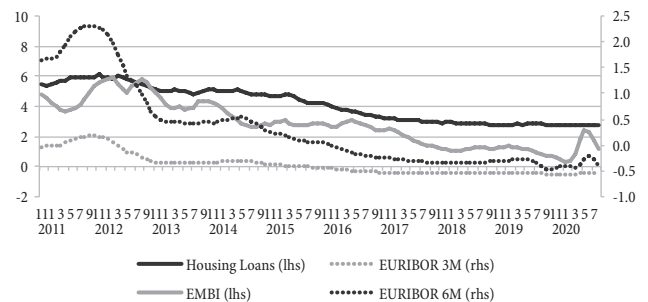

Figure 5: EURIBOR, EMBI and interest rates on EUR and EUR-indexed loans to corporates, new business, three-month averages (%)
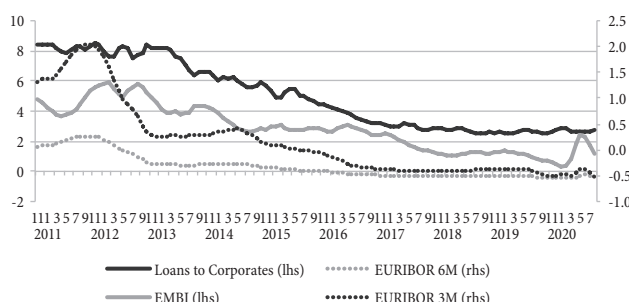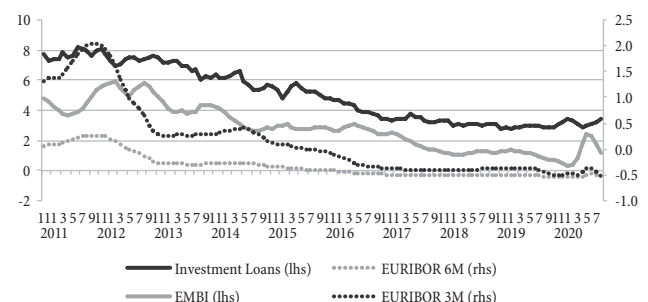

Figure 6: EURIBOR, EMBI and interest rates on EUR and EUR-indexed investment loans, new business, three-month averages (%)

Source: National Bank of Serbia, European Money Markets Institute, JPMorgan.

why we introduced EMBI, as a measure of risk premium that presumably enhanced the fall in new lending interest rates. All of the observed variables experienced a notable fall in the observed period, with Euribor rates going into negative territory. EMBI risk premium has also recorded a significant fall, with mild rise near the end of period, due to the corona virus pandemic outbreak at the beginning of 2020. Figures show the similar pattern in movements of those variables and we further empirically estimate the existence and significance of relationship among them.

Empirical results

As mentioned above, first we tested for existence of unit root in observed variables, and concluded that they are I(1) variables. Test results are given in the Table 1.

Table 1: Augmented Dickey-Fuller unit root test results

	Test statistic	p-value
Total Loans to Corporates	-1.19	0.68
Investment Loans	-1.14	0.70
Total Loans to Households	-0.51	0.88
Housing Loans	-0.46	0.89
Euribor 3M[1]	-1.77	0.39
Euribor 6M[1]	-1.62	0.47
EMBI	-1.26	0.65
NPL Total Loans to Corporates	1.22	0.99
NPL Loans to Companies	1.23	0.99

[1] adjusted for effective FX reserve requirement rate.

Then we test for optimal number of lags, using different lag length criteria, where we opted for two lags, according to Schwarz and Hannan-Quinn criteria, and thus using one lag when testing for cointegration (see Table 2). After testing for cointegration (Trace, Maximum Eigenvalue tests) we concluded that in certain cases there is one cointegration relationship between variables we

Table 2: Johansen procedure - number of cointegration equations

"Lending Rates on New Loans"	3 months Euribor		6 months Euribor	
	Max Eigen-value Test	Trace Test	Max Eigen-value Test	Trace Test
Total Loans to Corporates*	1	1	2	2
Investment Loans	1	2	1	2
Investment Loans*	1	1	2	2
Total Loans to Households	1	1	1	1
Housing Loans	2	2	1	1

*Besides Euribor and EMBI, NPL also included as explanatory variable.

observe - interest rates on various types of FX loans and loans indexed to FX, Euribor and risk premium, as well as NPL. In those cases, we were able to further apply the two-step Engle and Granger procedure to estimate long and short-run relationship.

In comparison to the research of Gallo [12], we were investigating data for Serbia only and for period 2010-2020. We did not find that the relation between Euribor and interest rates on corporate loans is much stronger than relation between Euribor and interest rates on household loans. In comparison with the research of Jobst & Kwapil [15], we are analyzing both three-month and six-month Euribor movements. Similar to the results of Graeve et al. [14], in our research we found the long-term relationship to be strong, while short term relationship is not significant. In comparison with the method that Mihaylov [19] used in his research which is standard and asymmetric VECM, in our research used two-step procedure by Engle and Granger.

Results shown in Table 3 indicate that in the long run there is a complete pass-through of Euribor rates on euro and euro-indexed bank lending rates on total new corporate loans, as well as loans to households, for both 3- and 6-month maturities (coefficient for Euribor 3 months and 6 months ranging between 1.01-1.30). Looking only at investment loans to corporates there is almost complete pass through of Euribor 6 months and full pass through of Euribor 3-month rates, as well complete pass through of 3-month Euribor rates when NPL is included. Somewhat weaker relationship in the long run exists in the case of housing loans for Euribor of 6-month maturity (0.66). Actually, in all of the observed cases, it seems that there is a somewhat higher pass-through of 3-month than 6-month Euribor rates. What is conspicuous is that coefficients for Euribor in case of both total loans to corporates and loans to households (both for 3- and 6-month Euribor maturities), as well as 3-month Euribor in case of investment loans are greater than 1, indicating an excessive sensitivity of those lending rates to change in Euribor, which could be explained by fierce competition among banks in the observed period which, in attempt to retain old and gain clients lowered their interest rates even more than the fall in Euribor would suggest.

Table 3: Estimation results for interest rates on various types of new EUR and EUR-indexed loans

	Total Loans to Corporates		Investment Loans			Total Loans to Households		Housing Loans
Maturity of Euribor	3m	6m	3m	3m	6m	3m	6m	6m
Long-term relationship								
Euribor[1]	1.30***	1.22***	1.11***	1.07***	0.98***	1.13***	1.01***	0.66***
EMBI	0.68***	0.63***	0.46***	0.68***	0.66***	0.77***	0.76***	0.41***
Constant	2.16***	2.07***	2.68***	2.94***	2.86***	3.74***	3.63***	2.76***
NPL	0.04***	0.04***	0.05***					
R2	0.88	0.88	0.87	0.84	0.84	0.83	0.83	0.89
Short-term relationship								
Lag of Δ of interest rate on loans	-0.30***	-0.30***	-0.31***	-0.34***	-0.34***	-0.11	-0.11	-0.34***
Δ Euribor[1]	0.41	0.03	0.48	0.85	0.37	0.4	0.72	0.35*
Speed of adjustment	-0.14***	-0.14***	-0.34***	-0.29***	-0.27***	-0.09**	-0.09**	-0.07**
Δ EMBI	-0.24**	-0.22**	-0.13	-0.17	-0.15	0.08	0.07	-0.05
Δ NPL	0.11**	0.12**	0.22***					
R²	0.23	0.23	0.36	0.31	0.31	0.07	0.08	0.19

[1] adjusted for effective FX reserve requirement rate.
*p-value < 0.1; **p-value < 0.05; ***p-value < 0.01.

Though in the short run there seems not to be a significant relationship in most cases among observed variables (except for lags of interest rates which is in most cases significant), it is important that α, the speed of adjustment to long-run relationship, is in each and every case significant and negative. Though, it is more significant in the case of loans to corporates, both total and investment loans (at 1%), than in the case of total loans to households and housing loans (at 5%). Also, the speed of adjustment is highest in the case of investment loans then total loans to corporates, followed by total loans to households and housing loans. In models where we included NPL, it seems it is also significant in the short-run equation (at 5%), with highest coefficient in the case of investment loans, followed by total corporate loans for Euribor maturity of 6 months, and smallest in the case of total corporate loans for Euribor maturity of 3 months.

Conclusion

In the paper we were examining the impact that Euribor has on interest rates on FX loans and loans indexed to FX. We were investigating four types of loans: total new loans granted to the corporates, total new loans granted to the households, total new housing loans and total new investment loans. In addition, we were observing the impact of risk premium (EMBI) on the given interest rates, as well as influence of nonperforming loans' level. We were observing the case of Republic of Serbia and the period from September 2010 until August 2020. Using the econometric approach, specifically Engle and Granger procedure, we made final conclusions.

In our research we found that there is a strong long-run relationship between Euribor and the interest rates on total new corporate loans, total new household loans and new investment loans. The long-run relationship between total new housing loans and Euribor is also significant, but somewhat weaker. Regarding relationship between risk premium and given interest rates, we found a significant influence in all cases, with stronger connection with interest rates on new lending rates on total corporate loans and weaker connection with interest rates on total household loans and total investment loans. In models where NPLs is included, it showed significant, with fall in NPLs helping reduce the lending interest rates. Regarding short-term relationships, we found most of them not to be significant, with the exception of NPLs which are significant in all models where they were included. Finally, we found that the speed of adjustment to long-run relationship is significant and negative for all observed models.

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