Global Crisis and Credit Euroisation in Croatia

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Abstract

Macroeconomic policy makers in Croatia need to decide whether they want to continue to accept an extremely high level of credit euroisation in the country and limit the related currency-induced credit risk by nominal exchange rate stabilisation and additional capital buffers of banks or whether they want to take active measures to reduce credit euroisation in the country. An analysis of the causes of the high level of credit euroisation is the first step in selecting the potentially most effective measures for its reduction. This paper analyses the evolution of credit euroisation in Croatia from 1995 to early 2010 to identify its possible causes. Based on the analysis made and a review of the recent literature, also discussed are possible measures to encourage credit de-euroisation in the country. In contrast to the prevailing opinion, it is not concluded that the main cause of the high level of credit euroisation in the country is the firmly entrenched deposit euroisation in combination with the legal obligation of banks to limit their exposure to direct currency risk by continuously adjusting the currency structure of their assets and liabilities. Quite the opposite, the causes of the high level of credit euroisation, at least in the period after 2003, should be sought in the firm entrenchment of credit euroisation itself due to historical, political and economic factors, while the high level of deposit euroisation reflects the banks' need to meet the logical legal requirement to match the currency structure of their liabilities and assets.

The analysis does not exclude the possibility that the global financial and economic crisis halted the several-year downward trend in credit and deposit euroisation, which would have continued otherwise. Analysed also are central bank measures over the last seven years to determine which of them contributed to partial de-euroisation from 2006 to 2007. Based on this analysis, if economic policy makers decide to encourage de-euroisation actively and assuming that the existing monetary policy framework and financial sector regulations are maintained, it is recommended that the emphasis be put on the following from a series of measures cited in the economic literature: 1) the public sector should increase its borrowing in the domestic currency, if possible, and it should borrow more frequently, in smaller amounts and with maturity periods as different as possible, so as to establish the benchmark local currency yield curve; 2) a levy should be introduced on the interest paid on non-kuna loans to encourage a gradual substitution of foreign currency-denominated loans by kuna loans; and 3) various reserve requirement or remuneration rates should be applied to kuna and non-kuna deposits to encourage deposit de-euroisation. In the design and implementation of these measures, special attention should be paid to limiting their possible side-effects. This can be aided by the central bank's experience in implementing monetary and prudential measures over the last decade.

Contents

1 Introduction

The global financial and economic crisis of 2008-2010 led to the sharpest economic downturn in a large number of countries in the last fifty years. The causes and consequences of the crisis have been studied extensively in the economic literature. Still, more time will be needed to make a final assessment as global economic activity has only begun to recover, while the repair of the damage caused by the crisis, above all that related to a fall in living standards due to a sharp increase in long-term unemployment, lower income and funding that is less readily available and more expensive, is yet to begin.

Against this background, more subtle consequences of the global financial crisis are sometimes less noticeable, although their long-term impact on the economy may be significant. One such consequence is re-euroisation in Central and Eastern Europe, i.e. renewed growth in the share of foreign currency-denominated loans in total loans in most countries of the region after the outbreak of the global crisis. At the same time, the crisis actually shed light on the overall riskiness of such loans, which has until recently been discussed only hypothetically, at least for countries in the region. The debt and debt service burden of some Central and Eastern European countries strongly increased in late 2008 and early 2009, when the global crisis caused a significant depreciation of local currencies relative to the euro and other currencies in which loans had been granted, above all the US dollar, Swiss franc and yen (EBRD, 2010).

The depreciation added to extremely rapid growth in non-performing loans in the region (see Rainer and Haiss, 2010, p. 4). In addition, the high level of credit euroisation[1] reduced manoeuvring space of economic policy makers in these countries to respond to the crisis by counter-cyclical monetary measures as they were forced to stabilise the nominal exchange rate of the local currencies by restrictive monetary policy to maintain financial stability. This is why the EBRD has recently announced an initiative to provide a macroeconomic and institutional framework to encourage "de-euroisation", i.e. a decrease in the share of foreign currency-denominated assets and liabilities of economic entities in the region.

This motivated the paper by Zettelmeyer et al. (2010), which considers the prospects for decreasing credit euroisation depending on characteristics of the countries in the region. The paper provides a survey of the theoretical and empirical literature and operational experience of the EBRD itself related to the causes, consequences and effective measures used to ameliorate credit euroisation in the past. The IMF has also recently published a similar paper. It analyses the prospects for de-euroisation based on positive past experience (Kokenyne et al., 2010). Its main conclusion is that macroeconomic stabilisation alone is not sufficient to encourage de-euroisation, though it is a basic precondition. In addition to standard monetary policy measures, prudential regulations and unconventional monetary policy measures are sometimes also required, particularly if euroisation is firmly entrenched in the economy.

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[1] "Credit euroisation (dollarisation)" is the term most often used in the economic literature to denote a well-known phenomenon when a portion of financial sector assets (liabilities of the non-financial sector) in some, usually smaller and politically or economically less stable and/or developed countries is denominated in foreign currency, most often the euro (US dollar). The term "deposit euroisation (dollarisation)" is defined analogously. Furthermore, "financial euroisation (dollarisation)" is most often used as an umbrella term to denote credit and/or deposit euroisation (dollarisation), while the term "currency substitution" is used to describe the practice of using foreign cash as a means of payment or safekeeping value. Finally, the general term "euroisation (dollarisation)" is used as a non-specific term that may refer to either of these forms of using foreign currency. For more details, see, for example, Ize and Yeyati (2003).

This paper summarises the main findings of the above mentioned papers, as well as of two other papers on euroisation in the region (Rainer and Haiss, 2010; Scheiber and Stix, 2010), and provides independent research into the quantitative and qualitative characteristics of the Croatian economy, which are important to be able to position Croatia in the sample of countries surveyed in these papers. This allows the paper to provide an initial design of measures that economic policy makers should take if they want to encourage de-euroisation in the country.

The starting assumption is that the extremely high level of euroisation in Croatia makes a change in the exchange rate regime an extremely risky enterprise, as indicated by Kraft (2003) and Kraft and Šošić (2006). This paper accordingly discusses possible de-euroisation measures exclusively in the context of the existing rigid exchange rate regime, in which the euro is the reference currency, while the relative stability of the nominal exchange rate of the kuna against the euro provides an indicator of macroeconomic stability and an anchor for the expectations of economic entities in the country. Consequently, the paper does not consider the symmetric flexibilisation of the exchange rate regime, which both Zettelmeyer et al. (2010) and Kokenyne et al. (2010) recommend as a starting point for an active de-euroisation policy.

The results obtained within the framework established herein indicate that if macroeconomic policy makers in Croatia decide to take active measures to reduce the current high level of euroisation in the country, they should bear in mind the high risk of such measures proving to be ineffective, in view of the firmly entrenched euroisation in the society as well as the possibility of their producing, through the regulatory arbitrage mechanism, some undesirable side-effects, such as the lower availability of loans to some segments of borrowers.

Two groups of measures seem particularly promising in the current institutional and market environment. The first group comprises measures to develop money and capital market instruments denominated in the domestic currency, the most important among them being the establishment of the kuna yield curve by more regular government borrowing in the domestic currency and the creation of institutional investors' demand for this type of debt. The second group includes measures to raise the price of non-kuna funding or the price of non-kuna loans. Experience would tend to suggest that uncertainty regarding effectiveness is lower for the latter group of measures.

The remainder of this paper is organised as follows. The following section provides a summary review of the four mentioned papers on euroisation (de-euroisation) in the region and the main conclusions of some exemplary papers providing an overview of the main theoretical and empirical results relevant for this research. The third section presents the evolution of credit euroisation and the related deposit euroisation in Croatia from 1995 to 2010. The fourth section analyses the impact of the interest rate policy of banks on the evolution of euroisation in the country and the fifth section provides an econometric analysis of all determinants of euroisation in Croatia. Using the results of the analysis, the sixth section discusses the options available to economic policy makers in Croatia should they decide to pursue an active de-euroisation policy. Finally, the last, seventh, section gathers together the main findings of the research, in terms of both the causes and consequences of the high level of euroisation of the Croatian economy and of possible measures for their reduction or elimination.

2 De-euroisation in theory and practice

Causes and consequences of unofficial euroisation in an economy have been analysed in detail in the economic literature (exemplary recent papers are Ize and Levy-Yeyati, 2003 and Levy-Yeyati, 2006). The literature clearly suggests that one of the consequences of a high level of credit euroisation is that it exposes a country's financial system to a specific type of systemic risk – the increase in aggregate credit risk due to the weakening of the domestic currency against the basket of currencies in which foreign currency-denominated loans are granted. This risk is particularly pronounced in loans to households and small enterprises, which usually do not generate foreign currency income and lack easy access to currency risk hedging instruments. Furthermore, this risk is often materialised in periods of cyclical slowdowns or strong financial and economic disturbances; hence, its emergence itself acts pro-cyclically. At the same time, the materialisation of this risk mostly encourages economic policy makers in countries with rigid exchange rate regimes to take measures to protect the exchange rate of the domestic currency, which are also necessarily pro-cyclical.

It is concluded that in countries where credit euroisation is significant, economic policy makers should, where possible, encourage de-euroisation. On the other hand, judging from the literature, measures like a complete or widespread ban on foreign currency lending should be avoided in de-euroisation efforts, particularly in countries where it would evidently produce a socially suboptimal credit growth path because of a strong disinclination on the supply and/or demand side of domestic currency-denominated loans. Therefore, should economic policy makers conclude that it is desirable to resort to measures to encourage credit de-euroisation, they must first establish the causes of credit euroisation in the country, make a list of possible measures to suppress this phenomenon and finally, depending on the economic and financial structure, select market-oriented measures capable of producing the best effect in the future.

Based on the literature and their own econometric estimates, Zettelmeyer et al. (2010) conclude that the main causes and/or catalysts of credit euroisation are as follows: 1) the lack of credibility of economic policy makers or the general institutional weaknesses of a country, especially if regular cyclical fluctuations often resulted in economic crises in the past; 2) history of volatile inflation; 3) lower cost of foreign currency loans relative to domestic currency-denominated loans combined with a perceived state guarantee for domestic currency stability and/or socialisation of losses in case of instability; 4) a *de facto* rigid exchange rate regime regardless of the *de iure* setup; 5) a highly developed financial system; 6) accessible and cheap foreign funding, regardless of the share of foreign ownership in the domestic banking sector; and 7) absence of a developed market for (derivative) currency risk hedging instruments, combined with a high level of deposit euroisation and regulations limiting financial institutions' exposure to direct currency risk.

Obviously, some of these determinants act exclusively on the supply or demand side of foreign currency loans in a country, while some act on both sides. In addition, determinants 1), 2) and 7) link credit euroisation with the phenomenon of deposit euroisation. Scheiber and Stix (2009) made their own analysis of deposit euroisation based on data collected in a household survey conducted in eleven countries in the region, which enabled an analysis deeper than that based on aggregate macroeconomic indicators. They make a distinction between deposit euroisation and currency substitution on the side of household sector assets. This is particularly important when assessing the impact of monetary policy and financial regulations, which will be more effective if the share of foreign currency cash in circulation is smaller than that of domestic currency (for a detailed explanation of this issue in Croatia before 2000 see Feige et al., 2002).

In addition to determinants 1) and 2), the analysis by Scheiber and Stix introduces three new factors contributing to currency substitution: 1) lack of confidence in banking institutions due to past banking crises that resulted in either forced conversion of foreign currency deposits into domestic currency deposits or temporarily restricted access to these deposits; 2) lower availability of banking services to households (under-banking); and 3) higher frequency of payment transactions in foreign currency. With regard to deposit euroisation, the authors find that a history of high or volatile inflation and a history of devaluations play no role when taking account of the current quality of institutions. However, a history of problems in the banking sector plays its part,

so that once confidence in the banking system starts to rebound, households begin to return their foreign currency cash to banks, but in the form of foreign currency deposits. This automatically increases pure deposit euroisation (though it reduces currency substitution). With regard to inflation, Scheiber and Stix find that it does have an impact on deposit euroisation, but through a more complex mechanism (known in the theoretical literature as the *minimum variance portfolio dollarization ratio* after the paper by Ize and Yeyati, 2003), which predicts that the higher the inflation volatility in relation to that of the real exchange rate, the higher the deposit euroisation.

Rainer and Haiss (2010) analyse the phenomenon of credit euroisation in the region and link the literature overview to their own econometric analysis of the sample of 13 countries in the region. Their findings put forward the already described causes and catalysts of credit euroisation, particularly the fact that when foreign sources are easier to access, credit euroisation becomes more significant, regardless of whether the banks channel these sources in domestic or foreign ownership. In addition, they observe separately foreign currency lending to households and enterprises and find indicators that growth in resident foreign currency deposits is positively correlated with foreign currency loans to households, while the rise in foreign funding is more strongly correlated with foreign currency loans to enterprises. Based on their findings, Rainer and Haiss conclude that central banks should encourage deposit de-euroisation if they want to reduce credit euroisation. This conclusion is consistent with the findings of the previous two studies, although they suggest that a reduction of deposit euroisation might sometimes be hard to achieve in practice, particularly in countries where it is firmly entrenched due to past experience and structural factors.

In their paper, Zettelmeyer et al. also propose specific measures that authorities of the countries in the region could take to suppress credit euroisation. Their recommendations take into account the fact that determinants of credit euroisation vary across countries and draw on the positive experience of Latin American countries, most of which de-dollarised successively in the last 20 years. These measures may be roughly divided into measures to: 1) reform macroeconomic policies and institutions; 2) develop money and capital market instruments denominated in the domestic currency; 3) raise the price of foreign funding and/or foreign currency denominated loans; and 4) build adequate foreign currency reserve buffers of the government sector in line with foreign liabilities of the private sector ("self-insurance policy").

The authors state that among measures from the first category that proved most successful in Latin

Illustration 1 Causes of euroisation
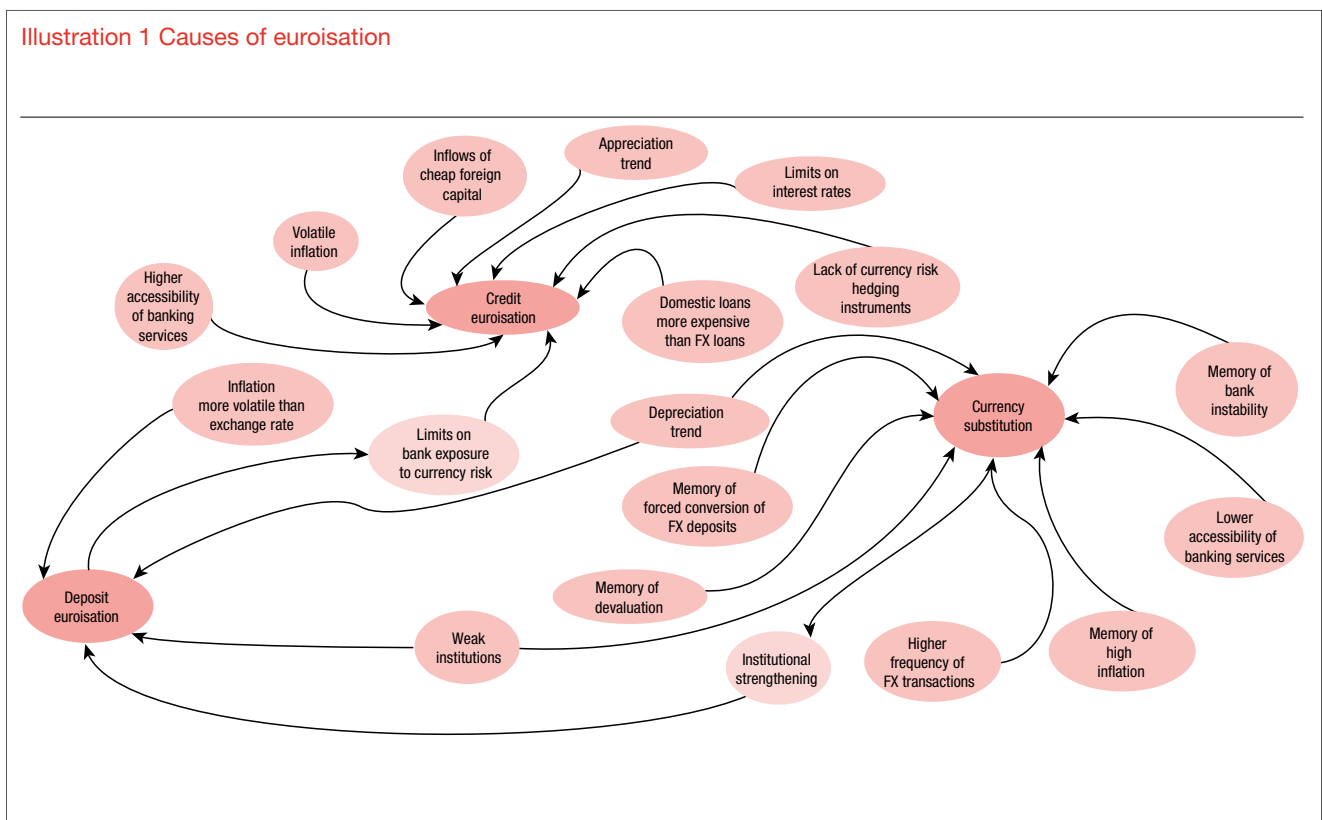
America was *de facto* flexibilisation of the exchange rate regime in conjunction with a shift to an inflation-targeting regime, aided by increased central bank independence and fiscal responsibility of government authorities. Among the measures from the second category, the authors point out the need for the government to start borrowing in the domestic currency at different maturities in order to establish an initial local currency yield curve. In the second step, this would enable banks to obtain more domestic currency funding. The authors argue that measures from the third group (regulations) did not prove to be instrumental in Latin America. However, in some countries of the region Croatia belongs to, they could be more successful if coordinated with the home countries of banks whose subsidiaries play an important role in the domestic financial market, so as to prevent regulatory arbitrage. Finally, the authors say that measures of the fourth type involve high costs, which can make them socially suboptimal. This may be alleviated by contingency lines pre-arranged with international financial institutions like the IMF and, for EU members, the ECB.

The authors conclude that measures from the first category probably make no sense for countries having a strong intention to join the EMU, such as Bulgaria and the Baltics. Croatia is seen in the grey zone of countries that first have to decide whether they want to continue to improve the existing institutions and availability of financial market instruments denominated in the local currency, and adopt a flexible exchange rate regime, or whether they want to accept the existing level of credit euroisation as an inevitable consequence of historical circumstances, including a history of a *de facto* rigid exchange rate regime, and continue to manage the related risks until they join the monetary union. In both cases, the authors state that these countries should not limit themselves only to regulations that would raise the price of foreign currency borrowing, but should continue to build institutional credibility and develop markets for financial instruments denominated in the local currency, provided that this is economically sensible in view of the country size. The authors also suggest that these countries should attempt to build up optimal foreign currency reserve buffers for periods of crises (self-insurance policy), including arranging contingency lines with the IMF and/or ECB to be used only in cases of speculative currency attacks.

Kokenyne et al. *(*2010) also address the issue of active encouragement of financial de-euroisation by economic policy makers. The authors reviewed the existing literature and carried out their own empirical analysis to establish which measures, and under what conditions, proved to be more effective than others. The authors conclude that low inflation and nominal exchange

Illustration 2 Measures to encourage de-euroisation
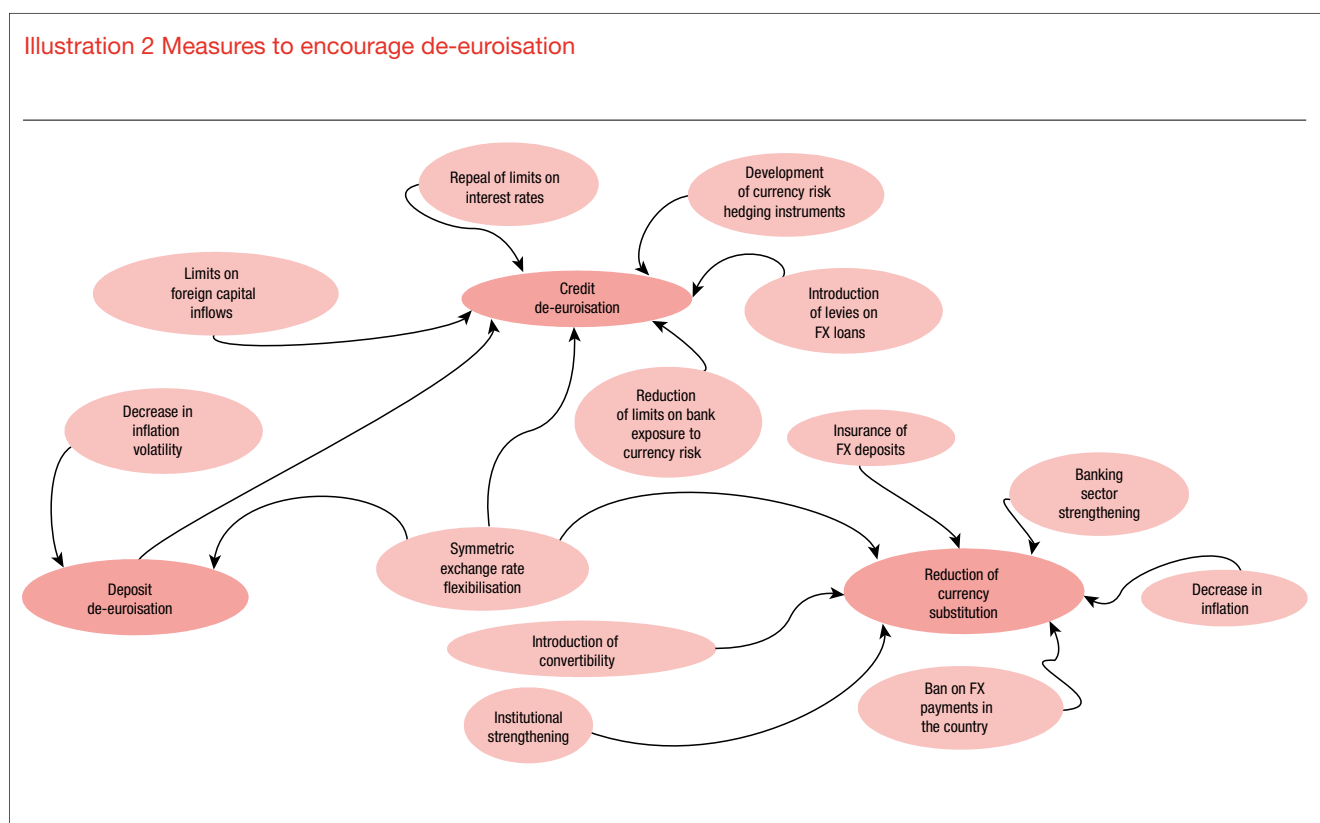
rate flexibility are the keys to successful de-euroisation, but that the set of de-euroisation measures must contain both prudential and financial regulations. These measures may be temporary, to enhance initially the attractiveness of the local currency versus the foreign currency, which would end the entrenchment of the current level of financial euroisation. The authors explain why measures to force de-euroisation did not prove successful in practice, at least in the long run, when they often become counterproductive due to the loss of general confidence in government authorities.

Kokenyne et al. stress the importance of a credible exchange rate regime for countries with more rigid exchange rates, such as Croatia. The key to successful de-euroisation in these countries is the authorities' ability to prevent the entrenchment of the expectation of continuous appreciation/depreciation, as it fosters credit/deposit euroisation. However, the authors stress that, both in theory and practice, an active de-euroisation policy is more likely to succeed if flexibility of the nominal exchange rate is greater and symmetrical.

In addition to exchange rate flexibility, the authors recommend: 1) introduction of regular open market operations by monetary authorities in order to stabilise interest rates for the short-term segment of the domestic yield curve; 2) active public debt management and payment by fiscal authorities, aimed at borrowing and paying in the local currency; 3) introduction of a tax and payment system as well as a system of monetary and prudential measures that are either neutral with respect to or discriminate in favour of the local currency; 4) development of inflation-indexed financial instruments (to replace the use of currency indexation); 5) development of financial instruments to hedge against direct currency risk; 6) freeing banks from administrative controls on the determination of interest rates; 7) withdrawal of the legal tender status from foreign currency; and 8) continuous availability of domestic currency in denominations that are sufficiently large for the performance of typical payment transactions.

3 Economic and political environment and euroisation in Croatia

This section of the paper analyses the evolution of euroisation in Croatia from an angle that best enables the evaluation of which of the recommended active de-euroisation measures would be most effective in Croatia. For that purpose use is made of quarterly data on the currency structure of loans granted and deposits received from bank statistical reports for the period from the third quarter of 1999 to the third quarter of 2010. More frequent but less detailed monthly data on the currency structure of deposits from consolidated balance sheets of monetary institutions are taken to analyse some phenomena over a longer time period, from July 1995 to September 2010. Also considered are monthly data on lending and deposit rates of banks applied to new arrangements from July 1995 to September 2010.

The longer time series do not enable a breakdown of kuna deposits within liabilities and kuna loans within assets of monetary institutions into those with a currency clause and those without it. However, as foreign currency-indexed kuna deposits were used sporadically only at a later stage of banking system development,

deposit euroisation in Croatia may also be viewed in the light of the ratio between kuna (with and without a currency clause) and foreign currency deposits with monetary institutions (Figure 1). Based on this, one may put forward a hypothesis that trends in deposit euroisation (and de-euroisation) in Croatia over the last 15 years are a product of several important events.

First, the strong growth in foreign currency deposits and a parallel stagnation in kuna deposits in the immediate post-war period of 1995-1999 are probably attributable to the post-war repatriation of household savings, which was spurred by the stabilisation of security and political conditions in the country and the absence of stronger economic growth. The rise in foreign currency deposits was briefly interrupted during a brief but significant episode of deposit withdrawal in spring 1999, i.e. at the height of the post-war turmoil in the banking sector, accompanied by a recession. It was followed by an even faster increase in foreign currency deposits, which peaked with the conversion of cash denominated in the former currencies of EMU members into the euro

in late 2001 and early 2002.[2]

In the entire period before 2002, euroisation of non-financial sector assets was widespread and not limited to the banking sector alone. For example, the establishment of housing savings banks received almost no interest from households until the introduction of currency indexation (Tepuš, 2006). It was similar with the development of the life insurance market in Croatia (Stipić et al., 2009). With regard to credit euroisation, it may be observed that the government itself established foreign currency borrowing as a norm; up until 2000, it borrowed from domestic banks largely in foreign currencies (Figure 7), while later it mostly borrowed large amounts by issuing foreign currency-denominated bonds in the foreign market.

However, strong growth in kuna savings and demand deposits first began in early 2000, most likely due to faster economic growth, which the Croatian National Bank (CNB) supported by a much faster increase in kuna liquidity than in the preceding period. Viewed from the opposite angle, that same year also saw the beginning of a several-year cycle of economic growth based on abundant foreign capital inflows, which the monetary authorities had to sterilise to mitigate appreciation pressures on the domestic currency. The thus created kuna liquidity began to be channelled through rapid domestic bank lending, which peaked in 2002 and continued over the next five years, i.e. until the outbreak of the global crisis. Therefore, there almost certainly was no one-way cause-and-effect relationship between foreign capital inflows, heightened domestic economic activity and the rise in the share of kuna deposits in total deposits with banks in the 2002-2007 period.

Notwithstanding the increase in kuna deposits, one may notice that, with occasional fluctuations, foreign currency deposits continued to dominate the structure of bank liabilities for most of that period (Figure 2). Only after the CNB tightened sharply the marginal reserve requirement (hereinafter: MRR) measure in late 2005, supported it by prudential measures in mid-2006 (which were made more stringent in late 2007) and closed the "gap" in the foreign currency liquidity requirement (official term is "the minimum required amount of foreign currency claims, hereinafter: FCLR) in the second half of that year was there a significant reversal of the trend

in bank liabilities – the share of capital and "pure" kuna and foreign currency deposits increased, while the share of bank foreign liabilities and foreign currency-indexed kuna deposits decreased; by early 2010 the latter had stopped being an important form of savings. All this indicates the firm entrenchment of deposit euroisation in the society throughout the entire 1995-2010 period.[3]
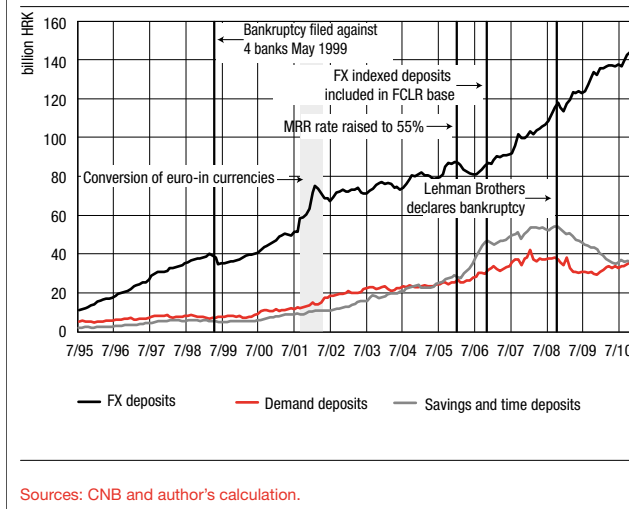
The most recent event that marked a reversal of deposit euroisation trends in Croatia was the peak of the global financial crisis, which is symbolised by the collapse of the Lehman Brothers investment bank in September 2008. Soon after, serious disruptions of financial flows occurred around the world; in small and open economies like Iceland and Ireland they took an extreme form in that same month. Their authorities resorted immediately to drastic measures, primarily by increasing substantially the general liquidity of the financial system and the scope of deposit insurance coverage in efforts to avoid a currency and/or banking sector crisis. Monitoring these events and their impact on domestic developments, the CNB repealed the marginal reserve requirement as early as October 2008. In the following month, it lowered the general reserve requirement rate and expanded the list of acceptable collateral for emergency liquidity loans to ensure sufficient kuna and foreign currency liquidity and encourage fresh capital inflows into the banking system. The amount of savings and transaction deposits with deposit institutions covered by the state guarantee scheme was also increased.

These measures clearly helped to establish confidence in the domestic financial system, so that deposits with monetary institutions dropped only briefly in October and November 2008, after which they continued to grow vigorously. Rapid growth in bank capital also continued, while foreign liabilities of banks increased sharply; in January 2009 they exceeded the historical high recorded in mid-2006, i.e. prior to the massive recapitalisation of banks. Still, downward pressures on the kuna mounted in early 2009 (Figure 3) due to the real economic slowdown and the uncertainty surrounding increasingly less favourable revisions of economic forecasts and the country's credit rating. This was the reason for withdrawals of instable foreign capital from the country and sudden stops in new capital inflows needed

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2 For a more detailed analysis of euroisation in Croatia prior to 2002 and an estimate of the impact of the euro conversion on developments in household foreign currency deposits with banks, see Kraft (2003) and Kraft and Šošić (2006).

3 Its existence in numerous countries has been empirically proven in previous research. For the period prior to 2002, it was confirmed econometrically for Croatia in Kraft (2003).

Figure 1 Deposit euroisation in the Republic of Croatia
1995 – 2010

Sources: CNB and author's calculation.

Figure 2 Structure of bank liabilities in the Republic of Croatia
1999 – 2010

Sources: CNB and author's calculation.

to finance the country's large external deficit. Against this background, in January and February 2009, the CNB resorted to new measures to reduce kuna liquidity and increase foreign currency liquidity in the financial system so as to preserve the stability of the nominal HRK/EUR exchange rate.

The main elements of CNB crisis measures stayed the same from the peak of the crisis in Croatia to late 2009 and early 2010, when the CNB cut the general reserve requirement rate to support the government's financial programme for overcoming liquidity problems in the economy. Although CNB crisis measures initially increased bank demand for kuna, as evident in the larger spread between interest rates on kuna and foreign currency deposits with banks in early 2009, the economic slowdown gradually weakened that demand in the remainder of 2009. This probably prompted banks to discourage inflows of kuna deposits by narrowing the interest rate spread in the second half of 2009 and in 2010 (Figure 6). Together with the high volatility of the nominal exchange rate of the kuna, this interest rate policy probably added to re-euroisation in Croatia in that period (Figure 4).

The second potential driver of re-euroisation trends in the structure of bank deposits could be the withdrawal of funds from risky forms of the non-financial sector's assets, such as equity investment funds. Their net assets came close to HRK 16 billion in October 2007, but dropped to only HRK 2.5 billion in February 2009. However, it is difficult to estimate to what extent this was due to the fall in the value of their portfolio and to what extent it could be credited to withdrawal from these funds. In any case, the ratio of non-kuna deposits
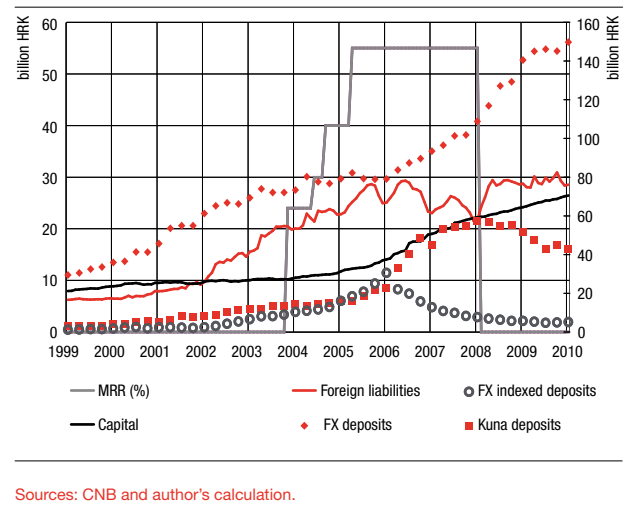
(foreign currency deposits and indexed kuna deposits) to total household deposits grew from its lowest level of 81% in June 2008 to 87% in December 2009. This reversal was even more pronounced in other sectors where this ratio went up from 46% in September 2008 to 65% in March 2010. These two ratios stayed almost the same until end-2010 (Figure 4).

The described trends in deposit euroisation in Croatia, though important by themselves, are here observed in the context of credit euroisation and the risks it entails, i.e. only to the extent deposit euroisation contributes to credit euroisation. Their correlation should be guaranteed in systems where regulations restrict direct exposure of banks to currency risk, while the degree of correlation also depends on whether kuna loans (deposits) indexed to foreign currency are observed as kuna assets (liabilities) in applying this restriction in practice. Croatian regulations limit the open foreign exchange position of a bank to 30% of its own funds (20% in the 2003-2009 period). In the context of this regulation, from April 2003, all currency-indexed instruments are considered foreign currency instruments. Hence, the degree of "coverage" of non-kuna liabilities by non-kuna assets of banks is expected to be relatively high in the Croatian banking sector, i.e. deposit re-euroisation (or de-euroisation) must run parallel to credit re-euroisation (de-euroisation).

Statistical data seem to confirm this expectation throughout the period from 2000 to 2010 (Figure 5). Towards the end of that period, in late September 2010, foreign currency deposits accounted for nearly 80% of deposits with monetary institutions, the highest since February 2004, while 73% of household loans and 70%

of loans to other enterprises were accounted for by non-kuna loans. This approximately corresponds to the level of credit euroisation last recorded in mid-2006 for enterprises and in mid-2007 for households.

In addition to deposit euroisation, the literature mentions a high share of foreign currency debt in total government debt as an important factor that indirectly contributes to credit euroisation, apart from its direct impact through the share of foreign currency claims in total financial sector claims on the government. This is the result of an unreliable ("non-risky") yield curve for the domestic currency in a situation in which the government issues domestic currency-denominated debt securities only sporadically and/or in small amounts.

With regard to the establishment of the kuna yield curve, it is well known that the Croatian government has made efforts in that direction only since late 2005, by issuing significantly more kuna denominated bonds than before. However, the culmination of the crisis put an abrupt stop to that practice (Croatian government, 2010). There are currently only five kuna-denominated bonds outstanding, maturing in 2.5-9.5 years (the most recent bond was issued at the time of the writing of this paper). Still, two (out of five) kuna bonds were issued in 2010, one of them maturing in ten years. This indicates that the government understands the importance of establishing the kuna yield curve. It is particularly important that ten-year kuna bonds are issued regularly. In the context of Croatia's accession to the EU, this would enable monitoring of the fulfilment of the Maastricht criteria on long-term interest rates.
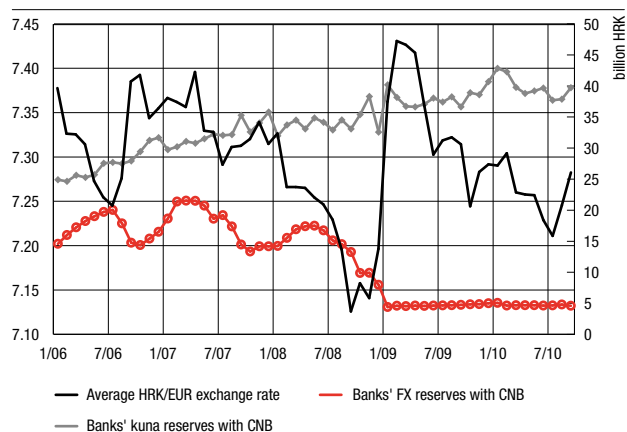
However, data show that the share of non-kuna loans in total bank loans to the government was persistently high throughout the period under review and that the level of credit euroisation was sometimes even higher for the government sector than for other sectors (Figure 5). This means that there is still much room for the government's active participation in measures directly to encourage credit de-euroisation in the future.

Finally, another factor that could explain the evolution of credit euroisation in Croatia is the proactive policy pursued by the central bank over the last decade, i.e. the monetary and prudential measures the CNB implemented to restrain credit growth based on abundant foreign funding. However, while the nature of the correlation between the level of euroisation and CNB measures (MRR and FCLR, which raise foreign funding costs for banks) is assumed to be relatively simple with regard to deposits, such an assumption cannot be made with regard to loans. More specifically, the measure requiring banks to purchase obligatory CNB bills in proportion to excess credit growth (hereinafter: credit growth reserve or CGR), which was in force in 2003 and again in 2007-2009, but with some modifications, did not make a distinction between kuna and non-kuna bank loans.

Therefore, if the CGR measure affected the evolution of credit euroisation in Croatia, its impact was probably indirect, through the change in the maturity or sectoral structure of credit growth. As a rule, banks grant short-term kuna loans more often than long-term kuna loans. Also, as regards household loans, whose growth slowed down much less than that of corporate loans over the two periods when the CGR measure was in force, it should be noted that the share of short-term

Figure 3 Exchange rate, bank reserves and the global financial crisis

Average HRK/EUR exchange rate
Banks' FX reserves with CNB
Banks' kuna reserves with CNB

Sources: CNB and author's calculation.

Figure 4 Euroisation in Croatia
1999 – 2009

○ Share of non-kuna loans in total loans to other enterprises, in %
■ Share of non-kuna deposits in total non-household deposits, in %
◇ Share of non-kuna loans in total household loans, in %
● Share of non-kuna deposits in total household deposits, in %
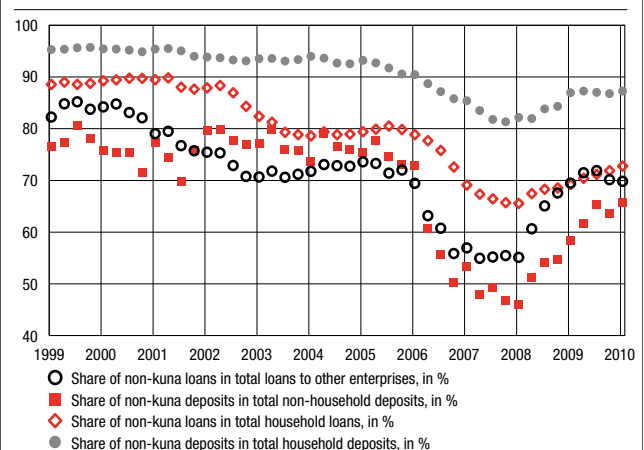
Sources: CNB and author's calculation.

loans in total loans was much smaller compared with the corporate sector. If there was substitution of bank loans by foreign loans in the period of the CGR application and if that did not leave the existing maturity and sectoral structure intact (e.g. substitution could have been concentrated in the segment of long-term corporate loans), the CGR measure might have had an indirect negative effect on the level of credit euroisation at the time it was in force.

By contrast, one may expect that the prudential measure that raised the capital requirement for banks' exposure to currency-induced credit risk (CICR), applied from mid-2006 and additionally tightened at the beginning of 2008, contributed directly to growth in the supply of kuna loans. Still, using quarterly data alone, one can hardly isolate the impact of these measures from the effect of other important CNB measures introduced at that time, such as the inclusion of foreign currency-indexed deposits into the FCLR calculation base early in the third quarter of 2006, or the increase in the CGR for excess credit growth at the beginning of 2008. For this

reason, the fifth section of this paper provides an econometric analysis based on monthly data in an effort to separate the simultaneous effects of central bank measures on euroisation in the country.

Figure 5 Credit euroisation
1999 – 2010

Share of non-kuna loans in total loans to the government, in %
Share of non-kuna loans in total loans to other enterprises, in %
Share of non-kuna loans in total loans to public enterprises, in %
Share of non-kuna loans in total household loans, in %

Sources: CNB and author's calculation.

4 Interest rate policy of banks and euroisation in Croatia

To describe more precisely the market mechanism through which political and economic conditions, as well as monetary policy and the banks' adjustment to that policy influence the level of deposit euroisation, it is necessary also to examine trends in deposit rates, i.e. the yields that savers earn on their deposits with banks. As short-term household deposits account for the bulk of all deposits with banks, it is reasonable to limit the analysis to three deposit rates related with that part of bank li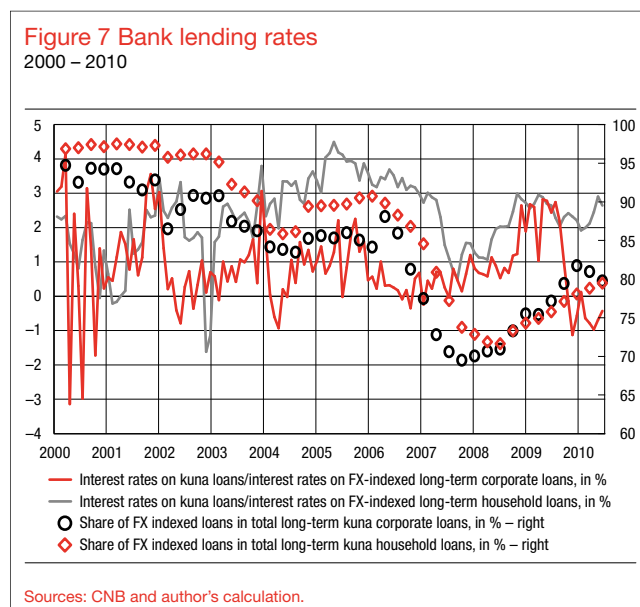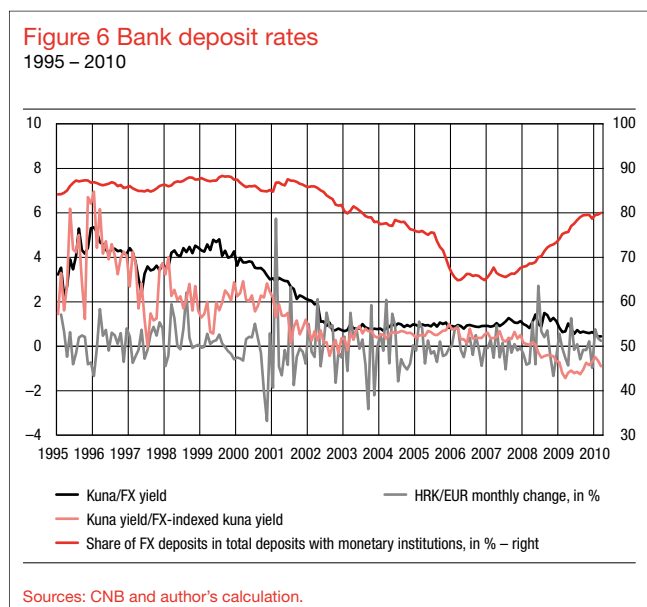abilities (one for pure foreign currency deposits, one for pure kuna deposits and one for indexed kuna deposits). The spread between these three interest rates (preferably, reduced by the premium for currency and liquidity risks), i.e. its movements should indicate the relative attractiveness of one type of deposits as against others, ceteris paribus. Ignoring the risk premium for currency and liquidity risks, the data show that bank interest rates mostly move in line with that assumption (Figure 6).

Historical events dominate in the first sub-period of high euroisation (1995-2001), when the positive and growing spread between kuna and foreign currency yields failed to attract more kuna deposits into banks (this observation was proved econometrically by Kraft, 2003). On the contrary, it seems that only significant positive steps in the political, economic and financial sphere triggered an increase in demand for kuna deposits towards the end of that period (for a detailed description of these factors, see Kraft, 2003). Initially, this enabled banks to reduce significantly the positive interest rate spread for funding sources in kuna. Immediately after, i.e. since the beginning of 2003, banks began to pursue a more active deposit rate policy to stimulate inflows of those funds that received a more favourable regulatory treatment. This primarily refers to foreign currency-indexed kuna deposits up to September 2006 and pure kuna deposits from October 2006 to the end of 2007. However, as early as the beginning of 2008, and particularly since September onward, this trend reversed in favour of renewed stimulation of pure foreign currency deposits.

Hence, it follows that the banks themselves contributed to deposit re-euroisation in 2009, when they lowered interest rate spreads on both types of kuna deposits relative to corresponding foreign currency deposits. Such a policy on the part of banks may probably be attributed to higher household and corporate demand for foreign exchange and a parallel decline in demand for kuna due to the rapid escalation of the global financial and economic crisis and the subsequent recession.

Observing bank lending rates, it is possible to examine in a similar way how banks directly influenced the credit euroisation level. Relevant lending rates are those on long-term loans, which account for the bulk of loans. With regard to non-kuna lending, importance attaches to interest rates on foreign currency-indexed loans, which also account for a much larger share than pure foreign currency loans. Data on lending rates (Figure 7)

Figure 6 Bank deposit rates
1995 – 2010

Kuna/FX yield
Kuna yield/FX-indexed kuna yield
Share of FX deposits in total deposits with monetary institutions, in % – right
HRK/EUR monthly change, in %

Sources: CNB and author's calculation.

Figure 7 Bank lending rates
2000 – 2010

Interest rates on kuna loans/interest rates on FX-indexed long-term corporate loans, in %
Interest rates on kuna loans/interest rates on FX-indexed long-term household loans, in %
Share of FX indexed loans in total long-term kuna corporate loans, in % – right
Share of FX indexed loans in total long-term kuna household loans, in % – right

Sources: CNB and author's calculation.

show the expected positive correlation between waves of re-euroisation (de-euroisation) and the rise (fall) in the spread between interest rates on pure kuna loans and kuna loans indexed to foreign currency, at least from 2004 on.

Observed also is another characteristic that relates to almost the entire period under review – the interest rate spread is always positive, sometimes significantly so, and is mostly larger for household loans than for corporate loans. This definitely contributed to the fact that, despite partial de-euroisation from 2006 to 2007, the share of currency-indexed loans in total long-term kuna loans to households stayed above 85% for most of the period after 2003.

Similar trends are observed in bank loans to other sectors, including the government, where it probably reflects the need to use the funds raised for the repayment of external foreign currency liabilities falling due. Furthermore, it seems that the interest rate spread in late September 2010 still discouraged household borrowing in kuna, while the interest rate spread for loans to other enterprises narrowed sharply after the launching of the government's economic recovery programme. The deposit rate spread at the end of the third quarter of 2010 still did not stimulate kuna savings and its downward trend continued.

5 Econometric analysis of determinants of euroisation in Croatia

The statistical significance of observations made in the previous sections was tested for the period from January 2004 to September 2009 in the context of several empirical models of euroisation in Croatia.[4] The initial concept was the structural model of credit/deposit euroisation based on the uncovered interest parity (UIP) principle. This principle says that from the perspective of the non-financial sector, the ratio between the supply of kuna deposits and total deposits (demand for kuna loans in total loans) displays a positive (negative) correlation with the difference between the spread between interest rates on kuna deposits (loans) and interest rates on non-kuna deposits (loans) and the expected change in the euro's value in terms of the kuna. Also, exchange or interest rate rigidity, as well as the perception of insufficient premium for inflation risk in interest rates on the domestic currency may result in a situation where inflation expectations become a relevant factor on the relative supply side of kuna deposits and the demand side of kuna loans.

Of course, the expected correlations have the opposite sign in models that define relative demand for kuna deposits and supply of kuna loans. In addition, from the banking sector's perspective, relative demand for kuna deposits (supply of kuna loans) depends also on their regulatory costs relative to the costs of their non-kuna substitutes.

Several difficulties arise when attempting to estimate parameters of the structural model of credit/deposit euroisation. First, an underdeveloped financial market most often lacks financial instruments whose prices could be used to derive implicit expectations of exchange rate or inflation developments for a period ahead. For that reason, it is sometimes assumed in practice that exchange rate or inflation expectations are based on recent past trends combined with the lagged value of the dependent variable in the model, which "carries the information" about relevant expectations from the preceding period.

Second, there is the problem of simultaneity between the level of euroisation and the relevant interest rate spread as well as the possibility that banks affect the currency composition of the non-financial sector's demand for loans (deposit supply) by using non-price

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4   For the period up to 2000, there are no data that distinguish indexed loans (deposits) from other kuna (foreign currency) deposits, while for the 2000-2003 period, there are only quarterly data that take into consideration currency indexation. Monthly data from January 2004 to September 2010 used herein also take into consideration currency indexation, but only for the broadest aggregate. This means that the definition of deposits (loans) in this section of the paper is broader than the one applied to data in the descriptive section of the paper and includes transaction, government and non-resident deposits, which do not have features of domestic savings. On the other hand, an advantage of these data is that they contain a larger number of observations (up to 80) than quarterly data used in the descriptive part (up to 43 observations).

signals. Examples of relevant non-price signals in the context of credit euroisation refer to the discrimination according to the loan currency when determining fees and commissions, the number of guarantors, the loan-to-mortgage ratio, the loan payment to regular income ratio, the range of maturities allowed and loan purpose. Examples of variables relevant for deposit euroisation are above all the degree of liquidity of deposits (the option for early withdrawal or change in interest rates, etc) and their cross-selling features, i.e. benefits that deposit holders get for using other bank services. In this paper, this problem was solved by replacing the interest rate spread on the right-hand side of the equation by independent variables (expectations and regulatory costs) that should affect that interest rate spread.

Due to all of the above, model parameters that include both demand- and supply-side determinants as explanatory variables are the most often estimated in practice. This approach is also used in this paper. In the context of Croatia, previous such works were Kraft (2003) and Kokenyne (2010). A significant difference between the econometric analysis in this paper and Kokenyne (2010) relative to Kraft (2003) is that the latter relates to a different period. This analysis takes into account a more detailed set of data and a larger number of models than both earlier papers to check more accurately the sensitivity of the results to the implicit assumptions of the models.

Bearing in mind the hypotheses about credit euroisation determinants from the previous sections and the limitations of empirical analysis, four models of credit euroisation were estimated in this paper (Table 1).[5] The dependent variable in all four models is the monthly percentage change in the level of credit euroisation (CRED_EUR),[6] approximated as the logarithm of the CRED_EUR ratio at the end of month t and the end of month t-1. Independent variables, the set of which depends on an individual model, are divided into auxiliary, expectation and regulatory cost variables. Auxiliary variables are the constant "C"; "outlier = 1" for March 2005, which contains an unexplained value of the dependent variable in that month; and lagged percentage changes in variables CRED_EUR and DEP_EUR, which serve to model that part of the dependent variable variation that

is not well explained by expectation and regulatory cost variables. Expectation variables are lagged values of the one-, two- and three-year trend in the "HRK/EUR exchange rate" and "CPI" inflation in models 1 and 1b, and monthly changes in the "HRK/EUR exchange rate" and "CPI" inflation in months t-1, t-2 and t-3 in models 2 and 2b.

Regulatory cost variables relate to monetary and prudential measures of the CNB. Indicator "CGR > = 50" or "CGR = 75" measures the impact on the model equation constant of the CNB measure to limit bank credit growth, which was in force in two forms from January 2007 to November 2009. Indicator "RW_CICR > = 25" or "RW_CICR = 50" measures the impact on the model equation constant of the CNB measure to raise the cost of foreign currency-denominated bank placements to clients without foreign currency income, the two forms of which were in force from June 2006 to March 2010. Indicator "crisis=1" measures the impact on the model equation constant of all factors that may be united under the common denominator of changed expectations after the peak of the global crisis, which is symbolised by the collapse of the Lehman Brothers investment bank in the US in September 2008.

Estimated coefficients with independent variables in Model 1 show the exceptionally strong statistical significance of CNB prudential measures (RW_CICR) to reduce credit euroisation, particularly in the period after their introduction (RW_CICR = 25), and before their additional tightening in January 2008 (RW_CICR = 50). Model 1 also suggests that the depreciation of the kuna is positively correlated with the rise in credit euroisation in the short run, while this correlation is negative over longer periods. This could mean that possible extrapolation of historical (HRK/EUR) exchange rate trends is more important for the currency structure of loan supply than for loan demand.

The correlation between credit euroisation and the CNB monetary measure (CGR), and the correlation between credit euroisation and past inflation trends (CPI) are not statistically relevant in Model 1. Also statistically insignificant is the crisis indicator (crisis = 1), probably because other variables in the model measure the possible impact of the crisis on credit euroisation better. One

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5   Independent variables were selected based on the preceding discussion so that they measure all potentially relevant determinants of credit euroisation. Prediction errors (residuals) in all four models estimated pass autocorrelation, conditional heteroskedasticity and normal distribution tests. The data used are public and available on request.

6   CRED_EUR is defined as the ratio of foreign currency-denominated or indexed loans to total bank loans, while variable DEP_EUR is defined as the ratio of foreign currency-denominated or indexed deposits to total deposits with banks.

such variable could be the trend in the kuna exchange rate over the preceding 12 months, and another the indicator of the tightened measure to limit bank credit growth, which had the value of one in the period from January 2008 to October 2009, i.e. the period that is often considered the financial component of the global crisis.

Model 1b is obtained by eliminating from Model 1 all independent variables for which the probability that coefficients next to them are equal to zero is estimated to be greater than 25%. The model's main characteristic is that under all information criteria it provides a better description of the data in the observed period and that coefficients next to independent variables are estimated more precisely than in Model 1 (lower p-value). In addition, estimated values of all the remaining coefficients are very close to those in Model 1, while in the conventional sense (p-value greater than 0.1), the statistically insignificant positive impact of deposit euroisation (DEP_EUR) from the preceding month on credit euroisation in Model 1 becomes statistically significant in Model 1b. Overall, Model 1b confirms the conclusions based on the analysis of Model 1, but also indicates a possible correlation between deposit and credit euroisation.

Model 2 was estimated as an additional robustness check on Models 1 and 1b as the latter models use several-month and overlapping measures of exchange rate and inflation trends, which are often not stationary (in practice, it is considered that time series of such variables have a unit root). This is why in Model 2 these measures were replaced by percentage changes in the exchange rate and inflation in the preceding three months. As shown in Table 1, this replacement does not much influence the values and statistical significance of the estimated coefficients related to other variables in Models 1 and 1b. The main difference relative to Models 1 and 1b is that the trend (change) in the exchange rate is no longer a statistically significant variable.

Model 2b is obtained by eliminating from Model 2 all independent variables for which the probability that coefficients next to them are equal to zero is estimated to be greater than 25%. Under all information criteria this model describes the data in the observed period

better than Model 2 and most coefficients next to independent variables are estimated more precisely than in Model 1 (lower p-value). In addition, the value of most coefficients estimated is very close to the value of those in Model 1b, except the coefficient next to the measure of change in deposit euroisation (DEP_EUR) in the preceding month, which in Model 2b again becomes marginally insignificant[7] in conventional statistical terms. The second difference relative to Model 1b is that the crisis indicator becomes statistically significant in the conventional sense.

Overall, based on the analysis conducted, one cannot reject the hypothesis that trends in the level of credit euroisation in Croatia in the 2004-2010 period were strongly affected by the CNB measure to raise the price of foreign currency-denominated loans to bank clients that do not generate foreign currency income. In addition, it is possible that the long-term exchange-rate trend had the expected impact on supply of kuna loans in that period. Neither can the impact of the global crisis be neglected, but its identification is hampered by the presence of other variables in the model. A possible cause may be that the Lehman Brothers collapse was not the most important moment of the crisis in the context of credit euroisation, which means that the indicator variable for the crisis period should be redefined. Finally, there are slight indications that there is the expected positive correlation between deposit and credit euroisation in the following month. By contrast, the analysis does not confirm the possible impact of long-term inflation trends and the measure to limit bank credit growth on changes in the euroisation level in the period under review.

Four models of deposit euroisation (Table 2)[8] were estimated in the analysis below in a way similar to that used for credit euroisation. The dependent variable is the monthly percentage change in the level of deposit euroisation (DEP_EUR). Auxiliary independent variables are the model constant "C"; the change in the ratio of blocked deposits in special bank accounts to free deposits with banks (BL_DEP_KUN/DEP_EF), which well describes unusual values of the dependent variable due to the withdrawal of deposits that were later used in public share offerings of big corporations; indicators

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7   As the reasonable value of this coefficient is non-negative, the p-value in Table 1 may be divided by factor two to obtain its statistical significance based on the one-tailed t-test. Then this coefficient becomes statistically significant at the 10% level of significance as the new p-value becomes lower than 0.1.

8   Independent variables were selected based on the preceding discussion so that they measure all potentially relevant determinants of deposit euroisation. Prediction errors (residuals) in all four models estimated pass autocorrelation, conditional heteroskedasticity and normal distribution tests. The data are available on request.

Table 1 Models of credit euroisation in Croatia, 2004 – 2010

Dependent variable: share of FX denominated and indexed loans in total bank loans (*CRED_EUR*), monthly percentage change								
OLS method with HAC standard errors and covariance								
	Model 1:\n2004M05-2010M09\nN = 77		Model 1b:\n2004M05-2010M09\nN = 77		Model 2:\n2004M05-2010M09\nN = 77		Model 2b:\n2004M05-2010M09\nN = 77	
Variable:	Coefficient:	P-value:	Coefficient:	P-value:	Coefficient:	P-value:	Coefficient:	P-value:
C	0.0185	0.9411	–0.0365	0.7126	–0.0008	0.5997	–0.0008	0.5547
outlier = 1, March 2005	0.0404	0.0000	0.0407	0.0000	0.0427	0.0000	0.0392	0.0000
$\ln(CRED\_EUR_{t-1}/CRED\_EUR_{t-2})$	–0.1829	0.1203	–0.1387	0.1446	–0.2097	0.1003	–0.1596	0.1040
$\ln(CRED\_EUR_{t-2}/CRED\_EUR_{t-3})$	–0.2237	0.0278	–0.1687	0.1179	–0.2162	0.0290	–0.2081	0.0303
$\ln(CRED\_EUR_{t-3}/CRED\_EUR_{t-4})$	0.2210	0.0665	0.2672	0.0052	0.1866	0.0526	0.2166	0.0110
$\ln(DEP\_EUR_{t-1}/DEP\_EUR_{t-2})$	0.2105	0.1353	0.2153	0.0692	0.1514	0.1533	0.1669	0.1221
crisis = 1, from October 2008 on	0.0030	0.3710			0.0046	0.1019	0.0043	0.0925
$RW\_CICR \geq 25$	–0.0158	0.0027	–0.0162	0.0005	–0.0109	0.0105	–0.0115	0.0016
$RW\_CICR = 50$	0.0149	0.0064	0.0184	0.0000	0.0117	0.0192	0.0125	0.0059
$CGR \geq 50$	–0.0026	0.6762			–0.0030	0.6026		
$CGR = 75$	0.0052	0.4178			0.0078	0.2310	0.0042	0.1389
$HRK\_EUR_{t-1}/HRK\_EUR_{t-13}$	0.2040	0.0954	0.2007	0.0414				
$HRK\_EUR_{t-1}/HRK\_EUR_{t-25}$	–0.0342	0.6281						
$HRK\_EUR_{t-1}/HRK\_EUR_{t-37}$	–0.1327	0.0763	–0.1625	0.0105				
CPI_{t-1}/CPI_{t-13}	–0.1423	0.4263						
CPI_{t-1}/CPI_{t-25}	–0.0483	0.8345						
CPI_{t-1}/CPI_{t-37}	0.1365	0.5201						
$\ln(HRK\_EUR_{t-1}/HRK\_EUR_{t-2})$					0.1187	0.3820		
$\ln(HRK\_EUR_{t-1}/HRK\_EUR_{t-3})$					0.0887	0.5275		
$\ln(HRK\_EUR_{t-1}/HRK\_EUR_{t-4})$					–0.0806	0.5391		
$\ln(CPI_{t-1}/CPI_{t-2})$					–0.0609	0.8186		
$\ln(CPI_{t-1}/CPI_{t-3})$					0.0964	0.6658		
$\ln(CPI_{t-1}/CPI_{t-4})$					–0.0326	0.8878		
R^2	0.6527		0.6381		0.6274		0.6162	
Adjusted R^2	0.5601		0.5895		0.5281		0.5646	
Log likelihood	268.3873		266.8039		265.6840		264.5401	
AIC	–6.5295		–6.6702		–6.4593		–6.6114	
BIC (SIC)	–6.0121		–6.3658		–5.9419		–6.3070	
HQC	–6.3226		–6.5485		–6.2523		–6.4897	
DW	2.1769		2.1821		2.3005		2.2367	

CRED_EUR = share of FX denominated and indexed loans in total bank loans
DEP_EUR = share of FX denominated and indexed deposits in total deposits with banks
HRK/EUR = CNB midpoint exchange rate at month-end, as HRK/1 EUR
CPI = consumer price inflation, yoy, index
CGR = credit growth reserve, the obligation of banks to purchase CNB bills in proportion to excess credit growth
RW_CICR = additional risk weights for bank placements to clients exposed to currency risk

for some months in which dependent variables have unusually high or low values, of which all but two may be explained as adjustments to new CNB measures; and lagged percentage changes in variables CRED_EUR and DEP_EUR, which serve to model that part of the dependent variable variation that is not well explained by expectation and regulatory cost variables.

Expectation variables are lagged values of the one-, two- and three-year trend in the "HRK/EUR" exchange rate and "CPI" inflation in Models 1 and 1b, and monthly changes in the "HRK/EUR" exchange rate and "CPI" inflation in months t-1, t-2 and t-3 in Models 2 and 2b. The main difference from models of credit euroisation is the appearance of the contemporaneous monthly percentage change in the level of credit euroisation (CRED_EUR). It is assumed that the currency structure of credit multiplication has a contemporaneous and one-way impact on deposit euroisation.

Regulatory cost variables refer only to those monetary and prudential CNB measures that data in the previous sections indicate to perhaps be related to the waves of deposit de-euroisation and re-euroisation. This modelled the period in which additional risk weight for non-kuna loans to clients that do not generate foreign currency income was different from zero (RW_CICR>=25); the period in which the marginal reserve requirement rate was the highest (MRR = 55); and indicator "CI_FCLR = 1" for the period after the inclusion of banks' foreign currency-indexed kuna liabilities into the FCLR base. Indicator "crisis = 1" was defined as in credit euroisation models.

As in credit euroisation models, most estimated coefficients with independent variables in models of deposit euroisation have the expected sign when they are statistically significant, and the models describe well the data in the sample and pass all standard diagnostic tests. The coefficient next to the crisis indicator (crisis = 1) has a statistically insignificant value in all four models, so that the impact of the crisis is probably explained through the influence of other variables on the dependent variable. All coefficients next to indicators with unusual values of the dependent variable (seven) are statistically highly significant in all models. Where they signify the impact of bank adjustment to CNB measures (five of them), they also have the expected (explicable) sign.

In the context of this paper, most interesting were estimated coefficients with indicators for the periods of application of CNB measures that may be assumed to have had a direct impact on the level of deposit euroisation. In that sense, the least ambiguous coefficient in all four models was the insignificant coefficient next to the indicator for the period after the inclusion of banks' foreign currency-indexed kuna liabilities into the base for (CI_FCLR = 1). A possible explanation is that the bulk of the impact of this important measure was exerted in the first two months of its implementation (the negative and highly statistically significant coefficient with indicators "1st month CI_FCLR" = 1 and "2nd month CI_FCLR" = 1) by the forceful adjustment of banks, when the growth rate of deposit euroisation was much lower than in preceding and following months.

The coefficient with the indicator for the period when an additional risk weight was applied to non-kuna loans to clients without foreign currency income (RW_CICR> = 25) has an explicable and statistically significant positive coefficient in Model 1 (the same as the coefficients with indicators "2nd month RW_CICR" = 1 and "3rd month RW_CICR" = 1). As the main effect of these measures in practice was the start of the bank recapitalisation cycle, the logical explanation is that relative bank demand for kuna deposits was lower in that period (ceteris paribus) since, by definition, capital is also a kuna liability and is therefore a close substitute for kuna deposits in the structure of bank liabilities.

However, in the other three models, this coefficient is not statistically significant, although it has the same positive sign. It may be because only one part of the possible impact of this measure on deposit euroisation is expected to be positive (that related to bank recapitalisation), while its parallel negative impact on deposit euroisation is expected to come from credit euroisation. More specifically, the immediate and lagged changes in credit euroisation in all four models have a positive and statistically significant correlation with the change in deposit euroisation as a dependent variable, while in credit euroisation models this prudential measure is negatively correlated with the change in credit euroisation as a dependent variable (see Table 1).

With regard to the marginal reserve requirement, coefficients next to the indicator for the period when the MRR rate was raised to 55% are statistically insignificant and with varying signs in the four estimated models. Hence, it is not likely that this measure could directly influence deposit euroisation in the country. The situation is similar with regard to the exchange rate trend, which has a significant but unexpected negative sign only for the one-year horizon and only in Models 1 and 1b. This makes it impossible to make a conclusion

Table 2 Models of deposit euroisation in Croatia, 2004 – 2010

Dependent variable: share of FX denominated and indexed deposits in total deposits with banks (*DEP_EUR*), monthly percentage change

OLS method with HAC standard errors and covariance

Variable:	Model 1: 2004M05-2010M09 N = 77 Coefficient:	P-value:	Model 1b: 2004M03-2010M09 N = 79 Coefficient:	P-value:	Model 2: 2004M05-2010M09 N = 77 Coefficient:	P-value:	Model 2b: 2004M03-2010M09 N = 79 Coefficient:	P-value:
C	0.1714	0.5057	0.2577	0.0192	0.0000	0.9956	–0.0005	0.7776
ln ($CRED\_EUR_t/CRED\_EUR_{t-1}$)	0.2847	0.0004	0.2769	0.0030	0.2284	0.0286	0.2066	0.0243
ln ($CRED\_EUR_{t-1}/CRED\_EUR_{t-2}$)	0.1928	0.0048	0.1797	0.0182	0.1840	0.0382	0.1850	0.0221
ln ($DEP\_EUR_{t-1}/DEP\_EUR_{t-2}$)	–0.1383	0.0435	–0.0992	0.1103	–0.1061	0.2297		
ln ($DEP\_EUR_{t-2}/DEP\_EUR_{t-3}$)	0.0804	0.3056			0.1279	0.1837		
ln ($DEP\_EUR_{t-3}/DEP\_EUR_{t-4}$)	–0.0879	0.3456			–0.0048	0.9653		
January 2005 = 1	–0.0207	0.0000	–0.0206	0.0000	–0.0088	0.0277	–0.0110	0.0000
April 2008 = 1	–0.0206	0.0003	–0.0200	0.0000	–0.0244	0.0000	–0.0212	0.0000
crisis = 1, from October 2008 on	0.0036	0.4419	0.0034	0.4058	0.0000	0.9971		
D(*BL_DEP_KUN/DEP_EF*)	0.5764	0.0000	0.5595	0.0000	0.5649	0.0000	0.5781	0.0000
2nd month *RW_CICR* = 25	0.0321	0.0000	0.0374	0.0000	0.0251	0.0000	0.0286	0.0000
3rd month *RW_CICR* = 25	0.0214	0.0001	0.0218	0.0000	0.0216	0.0030	0.0142	0.0000
1st month *FCLR* = 20	0.0334	0.0000	0.0307	0.0000	0.0362	0.0000	0.0344	0.0000
1st month *CI_FCLR* = 1	–0.0233	0.0000	–0.0238	0.0000	–0.0228	0.0000	–0.0218	0.0000
2nd month *CI_FCLR* = 1	–0.0407	0.0000	–0.0409	0.0000	–0.0379	0.0000	–0.0348	0.0000
RW_CICR >= 25	0.0053	0.0749	0.0021	0.4103	0.0026	0.3071	0.0033	0.1312
MRR = 55	0.0032	0.3375	0.0045	0.1436	–0.0032	0.4209	–0.0039	0.2268
CI_FCLR = 1	–0.0035	0.3244	–0.0022	0.5606	–0.0007	0.8666	–0.0006	0.7559
$HRK\_EUR_{t-1}/HRK\_EUR_{t-13}$	–0.1711	0.1194						
$HRK\_EUR_{t-1}/HRK\_EUR_{t-25}$	0.1033	0.0337						
$HRK\_EUR_{t-1}/HRK\_EUR_{t-37}$	0.2257	0.0072	0.2518	0.0006				
CPI_{t-1}/CPI_{t-13}	–0.5166	0.0024	–0.5098	0.0000				
CPI_{t-1}/CPI_{t-25}	–0.0941	0.6713						
CPI_{t-1}/CPI_{t-37}	0.2803	0.2191						
ln ($HRK\_EUR_{t-1}/HRK\_EUR_{t-2}$)					0.0547	0.6520		
ln ($HRK\_EUR_{t-1}/HRK\_EUR_{t-3}$)					0.0299	0.8550		
ln ($HRK\_EUR_{t-1}/HRK\_EUR_{t-4}$)					0.1175	0.2978		
ln (CPI_{t-1}/CPI_{t-2})					–0.4102	0.0719	–0.4230	0.0300
ln (CPI_{t-1}/CPI_{t-3})					–0.5206	0.0420	–0.3739	0.0879
ln (CPI_{t-1}/CPI_{t-4})					–0.4729	0.0196	–0.3915	0.0148
R^2	0.8192		0.7908				0.7673	
Adjusted R^2	0.7407		0.7325				0.6664	
Log likelihood	291.6414		294.4520				281.9342	

AIC	–6.9517	–6.9988	–6.6996
BIC (SIC)	–6.2212	–6.4589	–5.9691
HQC	–6.6595	–6.7825	–6.4074
DW	2.0680	2.0189	1.7999

DEP_EUR = share of FX denominated and indexed deposits in total deposits with banks
CRED_EUR = share of FX denominated and indexed loans in total bank loans
BL_DEP_KUN/DEP_EF = ratio of blocked deposits in special bank accounts to effective (free) deposits with banks
CI_FCLR = measure under which the "FCLR" base was since October 2006 on expanded to include FX indexed kuna liabilities in addition to FX liabilities
RW_CICR = additional risks weights for bank placements to clients exposed to currency risk
MRR = external liquidity buffers of banks, official term "marginal reserve requirement"
FCLR = foreign currency liquidity reserve of banks or "minimum required amount of foreign currency claims"
HRK/EUR = CNB midpoint exchange rate at month-end, as HRK/1 EUR
CPI = consumer price inflation, yoy, index

about the correlation between the exchange rate trend and changes in the deposit euroisation level in the analysed period.

By contrast, the coefficient with several measures of the inflation trend is highly statistically significant in all four models. However, this coefficient has an unexpected negative sign. This could indicate that the correlation between inflation and deposit euroisation reflects only the fact that the time series of data used to calculate the dependent variable was not deflated and not the impact of expected future inflation on relative demand for kuna deposits with banks. Alternatively, it is possible that inflation shocks were offset in the reviewed period by even larger shocks from the interest rate spread on deposits, which is not used as the model variable.

Finally, the coefficient with the contemporaneous change in credit euroisation (CRED_EUR) has the expected positive and statistically significant sign in all four models. Also, in all four models, the coefficient next to the lagged value of changes in CRED_EUR was statistically significant and positive. This could imply a two-fold impact of changes in the level of credit euroisation on the change in the level of deposit euroisation. First, the currency structure of credit multiplication (credit growth) affects the change in the level of deposit euroisation immediately and as expected. In the next month, banks further adjust their open foreign exchange position by attracting relatively more kuna/non-kuna deposits, depending on whether the share of kuna loans in total bank loans increases or decreases in a given month.

The last section of the analysis verifies the assumption implicit in eight estimated models that the change in the level of deposit euroisation may affect credit euroisation only in the following month, while the change in the level of credit euroisation may influence deposit euroisation in the same and the following month. If that assumption is correct, the values and statistical significance of coefficients assessed in the models of credit and deposit euroisation should stay mostly unchanged

when estimated by the three-step least squares (3SLS) method in a model of euroisation defined by a system of stochastic equations that, for example, includes equations from Model 2b in Table 1 and Model 2b in Table 2, with an addition on the right-hand side of changes in variables CRED_EUR and DEP_EUR with the time lags that were excluded from the original equations in these models.

Added in the equation for the change in CRED_EUR was the change in DEP_EUR in that month, while in the equation for the change in DEP_EUR changes in DEP_EUR in months t-1, t-2 and t-3 were added. The union of sets of independent variables from two equations was then used as instruments, excluding (contemporaneous) changes in DEP_EUR and CRED_EUR.

The estimated coefficients in the system of stochastic equations are shown in columns 1 and 3 of Table 3, while columns 2 and 4 show their estimates from Tables 1 and 2 respectively, for easier comparison. The obtained estimates of coefficients in the system of equations confirm the hypothesis on the time-lagged cross-correlation between credit and deposit euroisation – at all conventional levels of statistical significance, the contemporaneous impact of deposit euroisation in the credit euroisation model may be rejected, while the contemporaneous impact of credit euroisation in the deposit euroisation model cannot. At the same time, no other significant conclusion of the preceding analysis is changed, except that the expected positive lagged impact of deposit euroisation on credit euroisation becomes much more statistically significant in the system of equations than it was in Model 2b of credit euroisation.

Overall, the regression analyses conducted in this paper suggest that one cannot reject the hypothesis that some CNB measures considerably contributed to a partial reduction in deposit and credit euroisation in the country in the period prior to the outbreak of the global financial crisis. The measure that is most strongly

Table 3 System of stochastic equations from Model 2b – comparison of coefficient estimates

Dependent variables: *CRED_EUR and DEP_EUR,* monthly percentage changes 3SLS metoda, 2004M05-2010M09, N = 77								
	for ln (KRED_EURt/KRED_EUR$_{t-1}$) Equation 1		Model 2b		for ln (DEP_EURt/DEP_EUR$_{t-1}$) Equation 2		Model 2b	
Variable:	Coefficient:	P-value:	Coefficient:	P-value:	Coefficient:	P-value:	Coefficient:	P-value:
C	–0.0007	0.6553	–0.0008	0.5547	–0.0005	0.7526	–0.0005	0.7776
ln (CRED_EUR$_t$/CRED_EUR$_{t-1}$)					0.4032	0.0002	0.2066	0.0243
ln (CRED_EUR$_{t-1}$/CRED_EUR$_{t-2}$)	–0.1680	0.0623	–0.1596	0.1040	0.1856	0.0151	0.1850	0.0221
ln (CRED_EUR$_{t-2}$/CRED_EUR$_{t-3}$)	–0.2113	0.0170	–0.2081	0.0303				
ln (CRED_EUR$_{t-3}$/CRED_EUR$_{t-4}$)	0.2276	0.0082	0.2166	0.0110				
ln (DEP_EUR$_t$/DEP_EUR$_{t-1}$)	–0.0130	0.8961						
ln (DEP_EUR$_{t-1}$/DEP_EUR$_{t-2}$)	0.1620	0.0479	0.1669	0.1221	–0.1553	0.0555		
ln (DEP_EUR$_{t-2}$/DEP_EUR$_{t-3}$)					0.1220	0.0825		
ln (DEP_EUR$_{t-3}$/DEP_EUR$_{t-4}$)					–0.0253	0.7396		
outlier = 1, March 2005	0.0364	0.0000	0.0392	0.0000				
January 2005 = 1					–0.0080	0.2469	–0.0110	0.0000
April 2008 = 1					–0.0262	0.0004	–0.0212	0.0000
crisis = 1, from October 2008 on	0.0039	0.1265	0.0043	0.0925				
D(BL_DEP_KUN/DEP_EF)					0.5921	0.0000	0.5781	0.0000
2nd month RW_CICR = 25					0.0226	0.0044	0.0286	0.0000
3rd month RW_CICR = 25					0.0179	0.0146	0.0142	0.0000
1st month FCLR = 20					0.0369	0.0000	0.0344	0.0000
1st month CI_FCLR = 1					–0.0213	0.0015	–0.0218	0.0000
2nd month CI_FCLR = 1					–0.0360	0.0000	–0.0348	0.0000
RW_CICR ≥ 25	–0.0121	0.0006	–0.0115	0.0016	0.0037	0.1372	0.0033	0.1312
RW_CICR = 50	0.0134	0.0186	0.0125	0.0059				
CGR = 75	0.0043	0.3137	0.0042	0.1389				
MRR = 55					–0.0024	0.3110	–0.0039	0.2268
CI_FCLR = 1					–0.0017	0.4580	–0.0006	0.7559
ln (CPI$_{t-1}$/CPI$_{t-2}$)					–0.3805	0.0258	–0.4230	0.0300
ln (CPI$_{t-1}$/CPI$_{t-3}$)					–0.4218	0.0113	–0.3739	0.0879
ln (CPI$_{t-1}$/CPI$_{t-4}$)					–0.4122	0.0113	–0.3915	0.0148
R²	0.6148				0.7416			
Adjusted R²	0.5565				0.6555			
Standard regression error	0.0084				0.0076			
DW	2.2118				1.8170			
Dependent variable mean	–0.0003				–0.0006			
Dependent variable standard deviation	0.0127				0.0130			
Sum of regression errors	0.0047				0.0033			

DEP_EUR = share of FX denominated and indexed deposits in total deposits with banks
CRED_EUR = share of FX denominated and indexed loans in total bank loans
BL_DEP_KUN/DEP_EF = ratio of blocked deposits in special bank accounts to effective (free) deposits with banks
CI_FCLR = measure under which the "FCLR" base was since October 2006 on expanded to include FX indexed kuna liabilities in addition to FX liabilities
RW_CICR = additional risk weights for bank placements to clients exposed to currency risk
MRR = external liquidity buffers of banks, official term "marginal reserve requirement"
FCLR = foreign currency liquidity reserve of banks or "minimum required amount of foreign currency claims"
CGR = credit growth reserve, the obligation of banks to purchase CNB bills in proportion to excess credit growth
HRK/EUR = CNB midpoint exchange rate at month-end, as HRK/1 EUR
CPI = consumer price inflation, yoy, index

correlated with credit de-euroisation is additional risk weight on loans to clients exposed to direct currency risk (CICR), while deposit de-euroisation was most attributable to the measure that required the inclusion of banks' foreign currency-indexed kuna liabilities into the FCLR base, but only for a short period after its introduction. For the rest of the period of deposit de-euroisation, there are strong indications that it only reflected stronger demand for kuna deposits, which banks needed to close their foreign exchange positions in conditions of credit de-euroisation. The analysis also shows that one cannot reject the hypothesis that the onset of the global crisis contributed to re-euroisation in the period after 2007.

6 Prospects for de-euroisation in Croatia

The analysis conducted generally indicates that credit euroisation and, in particular, the related deposit re-euroisation in Croatia could continue. Some indicators leave room for the hypothesis that credit euroisation has reached its peak, which could lead to stabilisation of the current (high) level of euroisation in the country. Furthermore, according to Scheiber and Stix, the level of pure deposit euroisation in comparable countries is higher only in Serbia, while, according to Zettelmeyer et al., the level of credit euroisation is higher only in Latvia, Estonia, Albania and Serbia. Together with the above considerations, this yields a conclusion that euroisation in Croatia is firmly entrenched and on an upward trend. This lowers the probability of its spontaneous disappearance, and diminishes prospects for its rapid and considerable reduction by economic policy measures. The degrees of freedom of economic policy makers are further reduced by obligations assumed on Croatia's accession path to the EU and later on to the EMU. Therefore, the choice of active measures to suppress euroisation is much narrower than the broad range of measures recommended by the authors of the studies reviewed in this paper.

Therefore, assuming that the CNB retains the same basic framework of monetary policy and financial sector regulation, it follows from the literature survey and the descriptive part of this paper that the measures which could be used in attempts to encourage de-euroisation may be divided into two groups: 1) developing money and capital market instruments denominated in the domestic currency; and 2) raising the price of funds from foreign sources and/or the price of foreign currency loans. As regards the first group, it is often pointed out that the first measure should be that the public sector borrows as much as possible in the domestic currency, if possible, more frequently and in smaller amounts and with maturity periods as different as possible so as to establish the benchmark yield curve for the local currency.

To encourage demand for public sector debt instruments in the local currency at the same time, it is necessary to re-examine financial regulations that limit the investment structure of institutional investors, as well as the motives of banks and the government to retain the extremely high level of euroisation in recently granted loans to the government. Once the kuna yield curve is established, one should explore the possibilities of encouraging monetary and other financial institutions to obtain funds by issuing kuna denominated bonds as, theoretically, the most stable and safest form of financing, which *de facto* currently does not exist (only one bank issued kuna bonds in the domestic market eight years ago). The deepening of the market for kuna bonds of financial institutions should increase the availability of long-term kuna funding of banks and ease the reduction of credit euroisation, particularly in the segment where it is most prominent – long-term loans.

Within the second group of measures, it is possible to apply various reserve requirement or remuneration rates on kuna and non-kuna deposits to encourage deposit de-euroisation by means of price signals. Similarly, a direct impact on credit euroisation could be made by introducing levies on the interest paid on non-kuna loans, which would reduce the effective spread between interest rates on kuna and non-kuna loans and thereby encourage credit de-euroisation. The econometric analysis in this paper indicates that in "normal times" the level of deposit euroisation and the level of credit euroisation respond to price signals of monetary authorities in line with expectations. A further analysis should be made to

examine in detail possible negative side-effects of these measures, i.e. to determine whether the reduction of the level of credit euroisation due to these measures would primarily be a result of changes in the maturity and sectoral structure of bank loans or whether the temporary reduction in the level of deposit euroisation in the recent past was enabled only by the strong increase in the volume of synthetic currency clauses (through swap arrangements)[9] contracted between domestic banks and their foreign creditors.

Among specific measures to reduce the relative price of non-financial sector borrowing in kuna relative to its non-kuna borrowing, the most simple would be an (unremunerated) reserve requirement on non-kuna bank loans. However, past experience has shown that such CNB measures are easily circumvented and, as a rule, lead to a dead heat in which the CNB follows banks' activities to avoid its measures by responding with new measures to close the "gaps" in previous ones. This measure would certainly create a new wave of disintermediation and its application would probably hit harder those segments of the society that are more dependent on bank loans. This could have extremely adverse effects in the current macroeconomic environment. Therefore, even if this measure is introduced, its application should be postponed until the normalisation of the economic situation in the country.

On the liability side, a higher reserve requirement rate on non-kuna deposits coupled with, as necessary, a temporary increase in the permitted bank exposure to direct currency risk could be effective in encouraging credit de-euroisation indirectly through deposit de-euroisation. As with measures on the asset side, the only way to circumvent such a measure would be to contract a synthetic currency clause. This should be taken into consideration if such or a similar measure is implemented. Furthermore, the larger open foreign exchange position would expose banks to direct currency risk more than before. This means that this strategy is by its nature limited to the degree of risk the monetary and financial

authorities would be willing to tolerate.

From the perspective of political economy, a higher reserve requirement rate on non-kuna deposits could be introduced without any particular preparation as it does not target directly specific interest groups, and banks have recently proven their ability to encourage the rise in pure kuna deposits in the system. However, one may argue that this measure should be introduced gradually, as this would allow easier statistical monitoring of its impact on loan prices through the interest rate margin. This is particularly important in the current economic environment, where, due to market price volatility, it is more difficult than usual to estimate by how much banks should increase the relative yield on pure kuna deposits to encourage their growth. The effectiveness of this measure in the long run would depend on whether banks' foreign funding would again become available in larger quantities, and if so when. Until then, it would certainly be important to establish a control mechanism for synthetic currency clauses, which are much more cost-efficient for large deposits (which usually come from abroad) than for small deposits, and for loans in the case measures are introduced on the banks' asset side.

As regards other active de-euroisation measures mentioned in the overview section of this paper, one may notice that most of them refer to countries at a lower level of economic and financial development than Croatia, in particular those with incompletely liberalised financial systems. However, it should be stressed that some of these measures remain relevant in the context of possible de-euroisation attempts in Croatia. This primarily refers to further improvements in the availability of hedging instruments for non-financial sector participants in the financial market, including the development of inflation-indexed instruments, and the ongoing strengthening of credibility of the existing exchange rate regime by preventing the entrenchment of appreciation or depreciation expectations, accumulation of official foreign currency reserves, and integration into European support mechanisms to prevent speculative currency attacks.

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9   A synthetic currency clause is the term used in the professional jargon to denote a practice where currency risk of a balance sheet item is offset by contracting a corresponding off-balance sheet item with the opposite sign. For example, on day t when the HRK/EUR exchange rate equals S, bank A places with bank B a kuna deposit in the amount X for the term T and bearing an interest rate K payable on the day t+T, while at the same time it concludes a forward agreement with bank B that on the day t+T it will exchange the amount of X+K kuna for the euro at the exchange rate S. Neglecting transaction costs of the foreign currency conversion, from the perspective of currency risk, this is for both banks (!) the same as if a kuna deposit indexed to the euro was placed with bank B. Still, in the bank B's balance sheet this is recorded as pure kuna deposit, and not a currency-indexed deposit. If the regulatory cost of holding a currency-indexed deposit is higher than for holding pure kuna deposits, then bank B made a saving.

7 Conclusion

It appears that credit euroisation in Croatia is a product of a set of historical events in the political, economic and financial sphere, combined with CNB monetary and prudential measures and banks' attempts to minimise their overall financing costs by regulatory arbitrage. Within this complex, it is possible to identify at least three separate periods over the fifteen post-war years: the period of relatively stable and high euroisation up to 2001; the period of partial de-euroisation from 2002 to the end of 2007 (particularly after 2005); and the period of re-euroisation, which began in early 2008 and has continued to the present.

Overall, the level of credit and deposit euroisation in Croatia was high over the entire 15-year period from 1995 to 2010. If current trends continue, credit euroisation could reach the level it was at before the sharp reduction in 2006-2007. By contrast, the recent halt in the upward trend of the interest rate spread between pure and indexed kuna loans suggests that re-euroisation could soon loose speed or come to a stop. In any case, the analysis confirms that the high level of euroisation is firmly entrenched in the society.

The identified waves of partial de-euroisation and re-euroisation are not connected with explicit efforts of macroeconomic policy makers to encourage de-euroisation in the country. Still, they seem to be related with central bank and government measures, which aimed at reducing the growth dynamics of loans and foreign liabilities of the banking sector from 2003 to 2007, and which from 2008 on focused on removing the uncertainties regarding exchange rate expectations and financial system stability in the context of the crisis. Therefore, the central bank's experience with the implementation of monetary measures in the last decade could be useful in designing and implementing effective de-euroisation measures should there be future targeted attempts to encourage a reduction in the level of credit or deposit euroisation in the country.

Hence, macroeconomic policy makers in Croatia must again decide whether they want to accept an extremely high level of euroisation in the country and limit the related risks by accumulating foreign currency reserves (self-insurance policy), as they did in the past. If not, it may be decided that active measures should be taken to lower the current high level of euroisation, but bearing in mind the risk that these measures prove to be ineffective in case of new exogenous shocks such as the onset of the global crisis in 2008. Also, in designing these measures, account should be taken of the firm entrenchment of euroisation in the society, as well as of the boost the measures could give to regulatory arbitrage, which may not only diminish their effectiveness but also produce some undesired side-effects, in particular, financial disintermediation or reduced access to funding for some segments of the society.

Should macroeconomic policy makers decide actively to encourage credit de-euroisation in the country, and assuming there are no changes to the exchange rate regime, they have two groups of measures at their disposal. The first group comprises measures to develop money and capital market instruments denominated in the domestic currency. The most important among them are the establishment of the kuna yield curve by more regular government borrowing in the domestic currency and the creation of institutional investors' demand for this type of debt.

The second group includes measures to raise the price of non-kuna funding for banks and the price of non-kuna bank loans to the economy, both of which are in practice exposed to the risk of regulatory arbitrage. The former would not lead to financial disintermediation directly, and hence appears acceptable. However, the conducted analysis does not show clearly that deposit euroisation has had a direct impact on credit euroisation in the country over the past seven years, which gives advantage to measures on the banks' asset side. Also, the effectiveness of measures on the liability side in the long run would depend on whether banks' foreign funding would again become available in larger quantities, and if so, when.

Based on all of the above, it seems desirable to test in practice the impact of de-euroisation measures on both the banks' asset and liability sides so as to produce their optimal combination, sufficiently flexible to be used in the new economic and political circumstances Croatia will face on its path to economic recovery and accession to the European Union.

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A single line spacing and A4 paper size should be used. The text must not be formatted, apart from applying bold and italic script to certain parts of the text. Titles must be numerated and separated from the text by double-line spacing, without formatting.

Tables, figures and charts that are a constituent part of the paper must be well laid out, containing: number, title, units of measurement, legend, data source, and footnotes. The footnotes referring to tables, figures and charts should be indicated by lower-case letters (a,b,c…) placed right below. When the tables, figures and charts are subsequently submitted, it is necessary to mark the places in the text where they should be inserted. They should be numbered in the same sequence as in the text and should be referred to in accordance with that numeration. If the tables and charts were previously inserted in the text from other programs, these databases in the Excel format should also be submitted (charts must contain the corresponding data series).

The preferred formats for illustrations are EPS or TIFF with explanations in 8 point Helvetica (Ariel, Swiss). The scanned illustration must have 300 dpi resolution for grey scale and full colour illustration, and 600 dpi for lineart (line drawings, diagrams, charts).

Formulae must be legible. Indices and superscript must be explicable. The symbols' meaning must be given following the equation where they are used for the first time. The equations in the text referred to by the author should be marked by a serial number in brackets closer to the right margin.

Notes at the foot of the page (footnotes) should by indicated by Arabic numerals in superscript. They should be brief and written in a smaller font than the rest of the text.

References cited in the text are listed at the last page of the manuscript in the alphabetical order, according to the authors' last names. References should also include data on the publisher, city and year of publishing.

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