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Determinants of Credit Cycle – Case of Croatia

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CROATIAN NATIONAL BANK

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ABSTRACT

Bank credit to private sector is a main channel of financial intermediation that supports economic growth in emerging markets, but can also be a source of significant systemic risks. Therefore, the appropriate understanding of its main drivers is vital for policy makers responsible for safeguarding the stability of financial system. We use macroeconomic and bank-specific data over 18 year to assess determinates of credit to private sector in Croatian economy. Our findings confirm that macroeconomic developments play a significant role in explaining credit growth evolution. Next, we find that high level of private sector indebtedness constitutes significant constraint for recovery of credit activity and that macroprudential actions of policy makers also influence the lending to private sector, primarily of foreign banks. Furthermore, our findings emphasize that the banks' soundness is decisive for further lending activity and that banks in Croatia. We provide evidence that weakening of banks' balance sheet can seriously hamper credit activity. The results strongly support the assumption that foreign and domestic banks have different business models regarding the lending to private sector. We also find evidence of shift in banks behaviour after the onset of global financial crisis as macroeconomic environment became less important determinant of credit growth with bank specific characteristics becoming its main driver. From policy makers perspective this paper provides potential evidence on the importance of monitoring both supply and demand side factors of bank lending.

Keywords: credit growth, financial stability, indebtedness, macroprudential actions, private sector, soundness

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All errors, opinions stated and conclusions contained in paper are solely those of the authors and do not necessarily represent the official views of the Croatian National Bank.

1 INTRODUCTION

The evolution of credit cycle is closely related to progression of economic cycle as orderly credit intermediation is essential for sustainable economic growth. Claessens et al. (2011) support existence of strong linkages between different phases of business and financial cycles and argue that output cycles are highly synchronized with cycles in credit and house prices. Furthermore, global financial crisis showed that financial frictions could lead to impaired financial stability, which if not timely and adequately addressed, can have serious economic and social costs.

Empirical literature notes that strong increases in credit can be a signal of systemic risk build-up (Borio and Lowe, 2002; Drehman et al., 2011; Drehmann et al., 2012; Lund-Jensen, 2012). On the other hand, Dell'Ariccia et al. (2012) note that not all credit booms lead to busts and if they are backed by good fundamentals, they can contribute to healthy financial deepening. Therefore, it is necessary to understand the underlying drivers of credit cycle, in order to make right policy actions aimed at limiting its negative externalities. This is especially the case in emerging market economies with bank-centric financial systems, such as Croatia, where banks account for around 70% of total financial system.

Following the growing body of literature that recognizes both the importance of credit flows for the smooth functioning of the economy and its potential for major disruptions if proven to be unsustainable, numerous central banks introduced the preservation of financial stability among their main goals. In that respect, vast majority of macroprudential measures conducted in the pre-crisis period were oriented at controlling and in some cases limiting rapid and unsustainable credit growth. However, these measures are a rather new phenomenon and their capacity to achieve their goal is still unknown and under-researched (Claessens et al., 2011).

Croatia, i.e. the Croatian national bank (CNB) is one of just a few central banks during the last two decades that heavily relied on the use of countercyclical macroprudential policy in order to smooth out the financial cycle and safeguard the stability of the banking system (Lim et al., 2011; Dumičić, 2017; Budnik and Kleibl, 2018). Moreover, it relied on a broad set of different macroprudential measures in order to limit rapid credit growth even in the years preceding the global financial crisis. Therefore, Croatia stands as the perfect case study candidate for analysing how macroprudential policies can affect credit growth. In that respect, we constructed a simple CNB's macroprudential policy stance index and included it in the model as one of the determinants of credit dynamics in Croatia. We found that CNB's macroprudential actions were statistically significant in slowing down the buoyant credit growth in years that preceded the crisis, especially for foreign banks.

Furthermore, this research contributes to the literature by evaluating other fundamental drivers of credit growth which can also serve as a guidance for future policy actions. They are modelled by panel regression on highly granular supervisory data collected by Croatian national bank on quarterly basis, spanning across 18 years and 31 banks. Panel regression allows us to examine the effect of certain bank characteristics on credit growth, while also controlling for its unobserved heterogeneity.

Differences in business practices of foreign and domestic banks are well documented in the literature (Claessens et al., 2001; Kraft, 2002; De Haas and Lelyveld, 2006; Arakelyan, 2018), motivating us to differentiate the analysis on these two subsamples of banks. We also look for the shift in banks' behaviour during the crisis by separately looking at pre-crisis and crisis period. We find strong evidence that foreign and domestic banks operate in different market environments and therefore have different business models regarding the lending to real sector. We also find evidence of shift in banks behaviour after the onset of global financial crisis as macroeconomic environment became less important, while bank specific characteristics became dominant determinant of credit growth.

The rest of the paper is organized as follows: section 2 provides brief literature overview in the area of bank credit growth determinants. Section 3 depicts the developments of credit intermediation in Croatia. Section 4 describes dataset and methodology used in empirical analysis. In section 5 main results are presented and finally section 6 concludes.

2 LITERATURE OVERVIEW

The literature devoted to the credit growth is extensive and became even more widespread since the outbreak of the global financial crisis, especially in the case of emerging markets. In the empirical studies, usual determinants of credit growth are considered to be demand-side or supply-side factors. While some studies try to distinguish effects of these factors on credit growth in separate models, others combine them in one model estimation. Furthermore, some studies focus on a country-level and others on bank-level approach where usually several types of banks are differentiated (foreign-owned, state-owned and/or domestic private-owned banks).

Firstly, the vast share of empirical papers is dealing with relationship of credit growth and macroeconomic and microeconomic variables. Hoffman (2001) by applying a cointegrating VAR for 16 industrialized countries finds significant positive relation of real credit to GDP and property prices, and a negative relation to real interest rates. Calza et al. (2001) apply a Vector Error Correction Mechanism (VECM) to model the factors that affect the demand for credit in the euro area and find that in the long run, credit is positively related to real GDP growth and negatively to short term and long term real interest rates. Cotarelli et al. (2003) for a panel of Central and East European (CEE) countries and the Balkans find that balance sheets in most of these countries seem to have expanded in line with GDP. Other than that, they stress that inflation above a certain threshold negatively affects lending, while greater financial liberalization and transparency in accounting standards led to higher bank credit to GDP ratio. In addition, they find there is an evidence of a crowding out effect of private and public sectors' lending. Igan and Tamirisa's (2009) analysis of credit growth in the Baltics and CEE countries reveals that bank profitability, expressed in terms of net interest margins, was a significant driver of private sector credit expansion. Guo and Stepanyan (2011) examine changes in bank credit across wide range of emerging market economies and find that domestic deposits and non-residents liabilities contribute positively and symmetrically to credit growth. They also stress that loose monetary conditions result in higher credit growth rates and that a banking sector with a healthy balance sheet and lower NPLs is beneficial for credit growth. Similarly, using bank-level data in 90 countries, Igan and Pinheiro (2011) investigate the relationship between credit growth and bank soundness considering the potential two-way causality. Their empirical findings reveal that while sounder banks tend to grow faster at moderate growth periods, credit growth becomes less dependent on soundness during booms. IMF (2015) notes that recoveries in many CESEE countries following the global financial crisis were held back by weak corporate and household balance sheets as they remained overindebted years after the crisis.

Other strand of the literature dealing with emerging markets is usually trying to assess the impact of foreign-owned banks on the host country's banking sector and overall economy. This strand can broadly be divided into several areas. First, relationship between foreign banks and private sector credit growth is analysed. De Haas and Lelyveld (2006) in their study for case of five CEE countries conclude that this relationship is positive. Second, the impact of foreign banks on competition and efficiency is investigated. Looking at the pre-crisis period, literature consensually shows that foreign banks bring capital and know-how, helping to boost efficiency and putting pressure on domestic banks to increase their competitiveness (Claessens et al., 2001; Bayraktar and Wang, 2004; Lensink and Hermes, 2004; Micco et al., 2004; Bonin et al., 2005). Jeon et al. (2011) reveals that the efficiency-enhancing effect of foreign-owned banks depends crucially on the mode of entry into local markets, differentiating between greenfields and take-overs. Havrylychuk and Jurzyk (2011) also examine the

role the mode of entry plays for foreign-owned banks in Central, Eastern and Southeastern European countries (CESEE). They find that greenfield banks show higher profitability due to greater cost efficiency compared with local banks but this does not hold for takeover banks where the foreign bank inherits the cost structure and staff from the original bank. Third, the impact of foreign banks on access to finance is not unanimously determined. Foreign banks can borrow from their parent banks and from other banks by relying on the reputation of its parent bank. Detragiache and Gupta (2006) discuss that the relative ease of raising funds from international markets would allow foreign banks to sustain credit growth during a period of financial distress. Aydin (2008) shows that the CEE countries depend on foreign banks and these foreign banks depend on interbank funding. On the other hand, some researches discuss the problem of “soft information” that domestic banks might have in contrast to foreign ones (Detragiache et al. 2008). Recently, researches are trying to understand the role of foreign banks on financial stability and transmission channels of shocks. Papers focusing on period prior to crisis find evidence of a stabilizing role of foreign banks as they are a source of diversification and act as a shock absorbent in times of local crises (De Haas and van Lelyveld, 2006; Arena et al., 2007; Havrylchuk and Jurzyk, 2011; Cull et al., 2017). In the post-crisis studies, foreign ownership of banks showed a different face. Authors find supporting evidence for the view that foreign banks can act as a source of contagion, increase volatility and import economic or financial shocks from home countries to their host countries (Cull and Martinez Peria, 2013; Cull et al., 2017). Arakelyan (2018) adds to this strand of literature by using data on 16 CESEE economies and stresses the importance of monitoring the health of foreign parent banks as well as the potential regulatory changes in their home jurisdictions.

For the case of Croatia, several papers have considered various aspects of credit growth analysis. Čeh et al. (2011) identify credit market disequilibrium periods. Their model indicates three characteristic sub-periods, differentiated by sources of bank credit activity dynamics. The first period (2000-2002) was marked by equilibrium between credit supply and demand. In the second period (end 2002- mid 2009), supported by strong foreign capital inflows, banks were ready to supply more credit than demanded. According to the model estimation results, in the third period (Q3 2008-Q1 2010) an abrupt halt in credit activity was the consequence of a credit supply shortage. Dumičić and Ljubaj (2017) broaden this research by separating analysis for non-financial corporations and households and accounting for insights from the bank lending survey (BLS). They show that both supply and demand-side factors limit the possibility of intensified household and corporate credit activity, although subdued demand seems to be a heavier burden, due to the unfavourable domestic macroeconomic environment. Pintarić (2016) explores qualitative information from the BLS and bank-level data on loan quantities and prices to determine the effects of lending standards and loan demand on credit growth in Croatia for the period 2012-2014. His results highlight that credit growth reacts faster to changes in credit demand, whereas changes in credit standards affect credit activity with a somewhat greater lag. Other than that, some papers also discuss the role of policy makers on credit growth. Dumičić's (2017) estimation shows that macroprudential policies in CEE countries, including Croatia, were more effective in slowing credit to households than credit to the non-financial corporate (NFC) sector. This can be attributed to fact that NFC sector had access to non-bank and cross-border credit in addition to domestic bank credit.

Although the issue of credit growth determinants in Croatia is not new in the literature, we re-examine it by conducting an extensive analysis. We also introduce a novel variable, namely the macroprudential stance due to rich history of use of these measures by CNB. Additionally, we differentiate between foreign and domestically owned banks and divide sample to prior and crisis period to find out whether there are any differences.

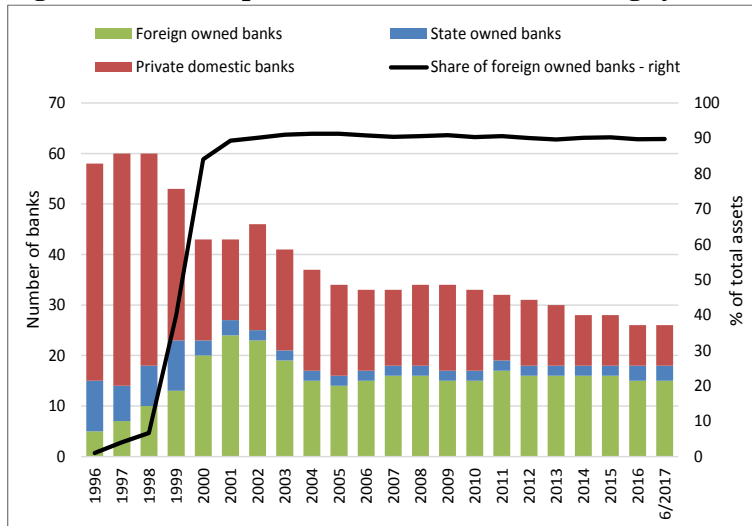
3 CROATIAN CREDIT STORY-STYLIZED FACTS

The gradual reformation process of commercial banking in Croatia, aimed at transitioning toward a market economy began in mid-1980s, as new laws and other regulations have been passed. Until then, commercial banks in Croatia were under the control of their founding enterprises and their basic function was to approve the cheapest possible credit to their founders (Jankov, 2000). Author also states that bad bank credits were more the rule than the exception because profitability and risk analysis were not the basic parameters for conducting bank credit policies. Legacy issues concerning bad loans came to full light at the beginning of 1990s, when majority of the banks in the banking system had problems with the settlement of claims (CNB, 1991). In late 1991, majority of banks' bad loans were written off, although it was not followed by measures that would change their operations, therefore banks continued lending to founding enterprises.

Soon after Croatia gained independence, liberalization of financial system started. Croatian authorities lowered the barrier to entrance, which resulted in rapid increase in number of banks, while credit activity was hampered by the war that lasted until 1995. It was not long before new problems concerning bank solvency started, as the government rehabilitated three out of the four largest banks in 1996 (Kraft and Jankov, 2005). According to authors, first lending boom phase in Croatia started as rehabilitation of disconcerted banks brought interbank market interest rates down and therefore limited quick earning opportunities for banks. This, combined with booming economy resulted in rapid credit growth to both households and non-financial corporations. Although GDP growth was rapid and inflation relatively low, the current account deficit was increasing and CNB tried monetary tightening to curb lending and import booms, but with little success. At the beginning of 1998 another crisis struck as the fifth largest bank at that time failed and was subsequently rehabilitated, followed by failures in a number of small and middle sized banks. Overall, 16 banks representing 16.2% of total banking assets failed, which marked the end of the first lending boom phase in Croatia (Kraft and Jankov, 2005). Rehabilitation process that followed was more comprehensive and it entailed the transfer of bad credits to a special agency, recapitalization and changes in both bank management and ownership. Jankov (2000) estimates total fiscal expenditures regarding the rehabilitation of banks in 1991-1998 period to be around 31% of GDP, which places banking crises in Croatia among the ones with the highest fiscal expenditures observed at that time.

Following the rehabilitation of distressed banks in late 1990s, government decided to privatize rehabilitated banks and four largest banks were sold to foreign strategic investors by the end of 2000. Consequently, the share of foreign owned banks in total assets rose from 6.7% in 1998 to around 90% in 2001 and it remained at this level since (Figure 1). According to Kraft (2002), foreign banks' primary motivation for entering the Croatian market were high interest margins and the untapped credit potential of Croatian households and businesses. Similar patterns were observed in other CESEE countries' banking. According to Arakelyan (2018) this can mainly be attributed to CESEE governments' efforts to privatize their banking sectors, increase efficiency, boost competition and benefit from knowledge transfer.

Figure 1 Ownership structure of Croatian banking system

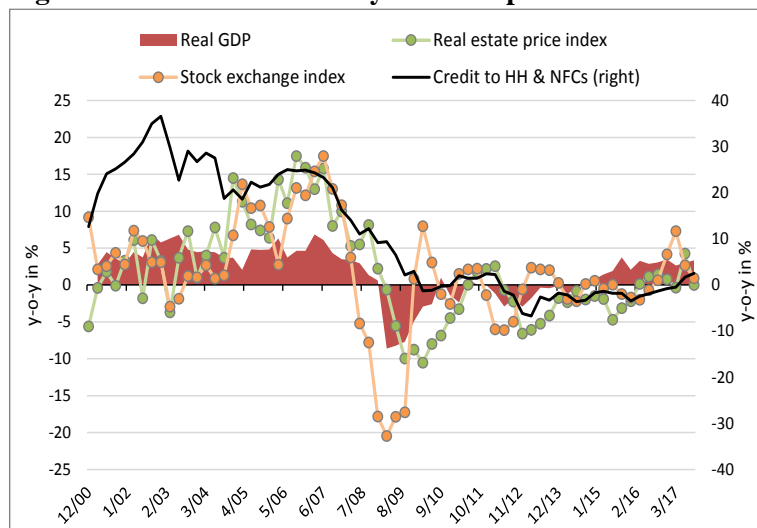


Source: CNB

Beginning of 2000s in Croatia was marked by rapid credit growth, which lasted until 2008. According to Rohatinski (2015), previous CNBs' successful efforts regarding the slowing down of inflation and stabilization of exchange rate lowered the risk perception of Croatian economy and therefore positively contributed to credit growth that followed. Simultaneously, EU experienced economic stagnation accompanied by interest rates decline, which widened the gap between expected return on investment in Croatia and EU. Moreover, competition between banks for new clients became fiercer, as Croatia was seen as a country with big financial deepening potential. On the demand side, tendency towards spending and consumption was rapidly growing in both public and private sectors. Therefore, all the preconditions were met for rapid credit expansion that followed. In 2000-2003 period, according to CNB data, bank credit grew on average by 23.7% on yearly basis, which was mainly financed by foreign capital inflows. Loan growth was further stimulated by deposit inflows caused by the Euro changeover process in 2000-2001, which streamlined around 13% of 2001 GDP worth of deposits towards banks (Kraft and Jankov, 2005).

In 2003, it was obvious that lending boom is underway in Croatia and what is more, it was followed by increasing asset prices, implying the creation of "vicious cycle" between financial and macroeconomic aggregates. Specifically, credit expansion leads to increased asset prices, which encourages investors and raises the value of collateral, which furthermore fuels credit growth (Figure 2). Additionally, as credit growth was mainly driven by capital inflows, the current account position was eroding, which caused foreign debt to increase above 60% of GDP in 2003.

Figure 2 Real and financial cycle development



Source: CNB

With images of banking crises from 1990s and their enormous fiscal costs still very vivid in memory, central bank decided to act in 2003 with broad set of relatively unconventional measures, which in that time were not even known as "macroprudential", in order to curb booming credit growth. There were several reasons for the use of macroprudential measures instead of more conventional monetary tightening measures. The inherent characteristics of domestic economy regarding the size, openness, high euroization level, strong capital inflows and relatively high foreign indebtedness were heavily limiting the scope for conventional monetary policy. This was additionally boosted by global developments characterized with financial liberalization, convergence process of emerging markets, high global liquidity and low risk aversion. In order to address these issues, different measures were implemented. Their scope varied between increased capital requirements, different reserve requirements, and even loan growth caps. For more details about the macroprudential policy of the CNB in the pre-crisis period refer to Galac and Kraft (2008), Dumičić and Šošić (2014), Dumičić (2015) and Vujčić and Dumičić (2016).

These measures were able to partially slow down the accumulation of systemic risk and to strengthen banks resiliency through build-up of liquidity and capital buffers. It should also be noted that the efficiency was partially reduced due to their circumvention through the less regulated parts of financial system or by transferring operations from daughter banks to parent banks and that these measures motivated banks to raise capital rather than borrow abroad (Galac and Kraft, 2008; Vujčić and Dumičić, 2016). Nonetheless, as a result of all these efforts, Croatian banking system did not experience the fate of some other banking systems, as it remained sound, resilient and without major bank failures throughout the Global financial crisis. After the onset of the global financial crisis, CNB gradually released the system reserves accumulated in the preceding period and credit growth restrictions were removed.

Despite the fact that Croatia sidestepped financial crisis in 2008, the economy experienced longest recession of all EU countries, which lasted for six years until 2015. On the other hand, the credit growth has only recently showed signs of recovery. This crisis had all characteristics of balance sheet recession as banks were burdened by high levels of NPLs, while all of its clients (households, non-financial corporations and government) found themselves not only over indebted but also paying relatively high interest rates on accumulated debt. Rohatinski (2015) argues that crisis in Croatia, unlike USA and some other EU countries, was not generated by problems in financial system, but was rather caused by the collapse of the entire economic growth model, which was based on the inflow of foreign capital that stopped with global financial crisis and exposed economies' structural vulnerabilities.

4 DATA AND METHODOLOGY

Our empirical analysis is based on quarterly supervisory data reported by banks operating in Croatia at the unconsolidated level. The use of unconsolidated data enables us to solely explore developments in domestic market which is in the focus of this paper. This data is highly granular and it allows us to use a wide number of variables to control for a various factors of the banking activity. Other than that, we use different macroeconomic variables, which are reported by different institutions such as CBS, EC, CNB, etc.

This analysis focuses on 18 year-period (December 1999 to September 2017) by using a panel dataset covering 31 banks. We impose restriction that bank must have been present in the market for at least half of the observed time period to enter into the sample. As not all banks were active during the overall observed period, the resulting panel is unbalanced. Furthermore, simple outlier treatment to dataset is applied. We eliminate outliers from the sample across banks and time periods if the value of the annual credit growth to private sector (dependent variable) exceeds 100%.

In order to capture potential differences between domestic and foreign owned banks, we split sample into two subsamples based on the domicile of their majority owner. The possible shift in banks behaviour in crisis¹ period, relative to pre-crisis period is also examined in this paper. We use the December 2008 as a cutoff date.

We use panel regressions with fixed effects, since fixed effects estimation allows for arbitrary correlation between the unobserved bank specifics and the observed explanatory variables (Wooldridge, 2002). Furthermore, under the assumption of strict exogeneity, it also takes into account bank-specific differences. The static panel data model with fixed effects can be specified as:

$$C_{i,t} = \alpha + \beta_{i,t}X_{i,t-1} + \gamma_t Z_t + u_i + \varepsilon_{i,t}, \quad (1)$$

where the subscripts i and t are indices for bank and time, $C_{i,t}$ denotes the dependent variable (credit growth on annual basis), α is the intercept, $X_{i,t}$ is a vector of bank specific variables, Z_t is a vector of macro variables, u_i is bank fixed effect that enables us to control for unobserved bank-level characteristic and $\varepsilon_{i,t}$ is the idiosyncratic error term.

In order to check for any unspecified macro effect, time specific fixed effects are included in complementary specifications instead of vector of macro variables:

$$C_{i,t} = \alpha + \beta_{i,t}X_{i,t-1} + u_i + \lambda_t + \varepsilon_{i,t}, \quad (2)$$

where, along other variables mentioned above, λ_t captures time fixed effects.

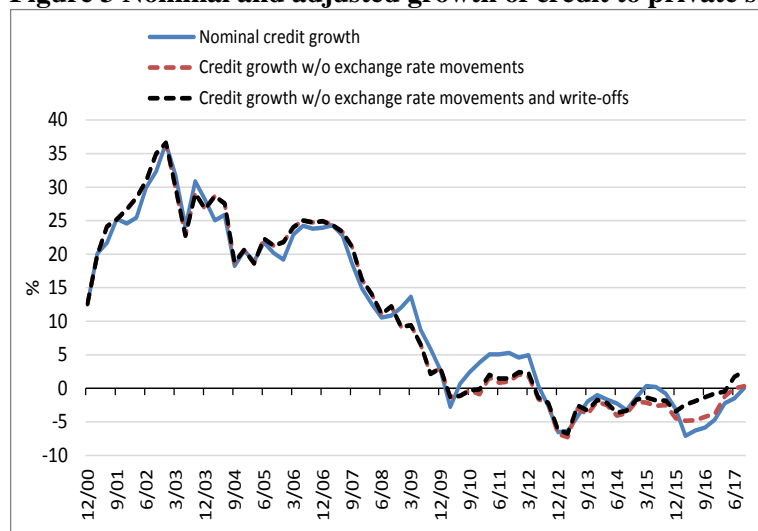
Depending on the model specification, the exact choice of control variables differs. We chose a static model over dynamic model due to relatively low correlation between current and lagged values of credit growth. In order to minimize any endogeneity problems between explanatory bank specific variables and the dependent variable, we lag all bank specific variables by four quarters. Macro variables were not lagged as it is considered that they cannot be largely influenced by any single bank, no matter how big that bank is. To control for possible multicollinearity issues between regressors, we include highly correlated variables in separate model specifications. We use bank-level clustered, robust standard errors to correct for heteroscedasticity.

The dependent variable of interest is year on year credit growth to private sector which consists of households and non-financial corporations sectors. The nominal growth rate of credit to private sector

¹ We refer to whole period from 2009Q1 to 2017Q3 as crisis period, although not all this period can be considered as crisis. Recession in Croatia lasted until 2015 and credit activity has been showing signs of recovery since 2017 (only on transactional basis).

calculated from balance sheet stocks can be highly influenced by non-performing loans write-offs and, in the case of banking system that characterized by high share of foreign currency lending such as Croatian by sudden changes in exchange rates. Therefore, in order to capture "pure credit growth", data on nominal credit growth was cleansed from these effects.

Figure 3 Nominal and adjusted growth of credit to private sector



Source: CNB

The explanatory variables can be divided into two groups: macroeconomic variables and bank-specific variables. Descriptive statistics of bank-specific variables for the whole and two bank sub-samples is represented in Table 1.

Macroeconomic variables

GDP growth. Annual growth rate of quarterly real GDP serves as a proxy for demand factors in economy. Higher GDP growth should be translated into higher demand for credit. Moreover, we were looking into subcomponents of GDP growth, particularly focusing on private *Consumption growth*.

Macro factor. Although real GDP growth is relatively suitable proxy of economic development, it can also be described by other variables such as asset prices growth, unemployment dynamics and growth in wages (as can be seen in Figure 2). Unfortunately, these variables are highly correlated one to another and therefore cannot be simultaneously included into model. In order to capture the effect of real cycle on credit growth as accurately as possible, we estimated a latent variable Macro factor that captures dynamics of the real cycle. Macro factor was estimated by means of time series factor analysis on following variables: GDP growth, real estate price growth, stock exchange index growth (CROBEX) and wages growth.

Inflation. Annual growth rate of the prices level, measured by consumer price index (CPI). The expected sign of relation between inflation and credit growth is positive as higher inflation is a signal of heating up of the economy, which should be related to higher credit growth.

FDI. The net foreign direct investment (FDI) inflows are expressed as ratio of four-quarter sum of FDI² to GDP. We find important to study the effects of FDI on credit growth as large part of the foreign equity investments in the observed period went to financial service sector i.e. credit institutions thus affecting directly the level of crediting in the country. In addition, as foreign-owned banks were

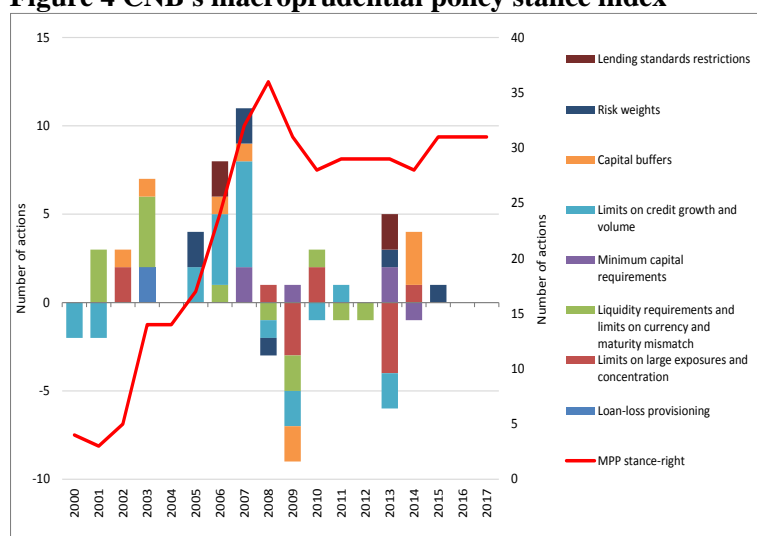
² The effects of round tripping transactions are excluded from FDI data.

making profits from their activity in Croatia, this added to the build-up of retained earnings part of FDI, also fostering credit activity. Expected sign is positive, especially for foreign banks.

Private debt. The private sector debt includes liabilities arising from debt securities and loans of private non-financial corporates, households and of non-profit institutions and is expressed in percentage of GDP. Expected sign is negative while higher indebtedness of private sector might be a significant demand side constraint for the credit activity recovery.

MPP stance. This variable represents the CNB's macroprudential policy stance (MPP stance) index. We constructed a simple index taking into account the cumulative number of conducted policies of macroprudential nature and their type (tightening/loosening). The increase in the constructed index signals tightening while decline signals loosening of macroprudential stance (Figure 4). The data used are also available in ECB's Macroprudential Policies Evaluation Database (MaPPED³). It is expected that tightening of MPP stance should limit the credit growth and therefore expected sign is negative.

Figure 4 CNB's macroprudential policy stance index



Note: Data include all policy actions implemented or in force during 1999-2017 for Croatia. Data of all eight categories in the figure represents net number (tightening minus loosening) of actions per category introduced in that year. MPP stance represents a cumulative net value across years. Source: CNB; ECB (MaPPED).

Bank-specific variables

Liquid Asset. The share of liquid assets in total assets represents the size of credit institutions' liquidity conditions. Higher levels of liquidity in previous period should translate into elevated lending activity in the following period. Nonetheless, this might also reflect banks' willingness to take on risk or its lack off.

TCR. The bank total capital ratio represents a ratio between banks' own funds and total risk exposure. Banks with higher levels of TCR have higher credit potential as they are able to increase their credit exposure and still meet their regulatory capital requirement without needs for recapitalization. Therefore the expected sign of relation is positive. Furthermore, we also look into relation between banks' excess total capital ratio (*Exs TCR*) that is calculated as capital ratio above the minimum capital requirements (excl. Pillar II) set by Croatian national bank.

³ More details about MaPPED available at: <http://www.ecb.europa.eu/pub/research/working-papers/html/mapped.en.html> and Budnik and Kleibl (2018).

Market Share. Share of assets in total banking sector assets is a measure of a bank's size. Market share is, in a way, a measure of bank's inertia as it is much harder for larger banks to obtain high rates of credit growth than it is for smaller banks. Therefore, we expect a negative effect on credit growth.

LT Liabilities. The ratio of long-term liabilities to total liabilities, where liabilities are considered long-term if their initial maturity is longer than one year, is a measure of banks' funds stability. Furthermore, variable *Other Liabilities* represents the share of liabilities excluding deposits from domestic private sectors in total liabilities. Other liabilities serves as a proxy for wholesale funding in our empirical exercise. We expect positive contribution of long term liabilities and wholesale funding to credit growth.

RIIR on Liabilities. The real implicit interest rate on liabilities is calculated as ratio of interest rate expenditures in bank's total asset. It is anticipated that higher cost of funding sources would have negative effect on credit growth.

Substitutes. Year on year change in loans and debt securities to sectors other than HH's and NFC's, normalized by banks' total asset in previous year. This variable is used to test for the existence of crowding-out effect that occurs when lending to government and other financial institutions reduces lending to private sector. This effect could be especially pronounced in crisis period, which may explain still subdued credit activity of banks towards private sector. If the crowding-out effect is present, the expected sign is negative.

NPLR. The non-performing loans ratio is a share of partly recoverable and fully irrecoverable loans in total bank loans presenting a measure of banks' loan quality. Increased share of distressed loans on banks' balance sheet is expected to hamper future loan growth as they employ resources that could alternatively be used for granting new loans, so the expected sign is negative. In order to fully capture the effect of asset quality on the future loan growth the provisioned part of NPLs (*Coverage*), should also be taken into account. Expected sign is positive as, conditional to certain level of NPLR, NPLs with higher coverage ratio have smaller negative effect on bank capitalization and consequently on lending activity. Moreover, we also include and *Net NPLR* that represent the share of unprovisioned NPLs in total loans and the higher values of this variable should negatively affect credit activity.

ROA. The return on assets is a measure of banks profitability, defined as ratio of income before taxes and total bank assets. The expected sign is positive as banks with better profitability can use their retained earnings to fund future loan expansion.

Table 1: Descriptive statistics of Bank-specific variables

Sample/Statistics:	Liquid Asset	TCR	Exs TCR	Market Share	LT Liabilities	RIIR on Liabilities	Substitutes	NPLR	Coverage	Net NPLR	ROA	Other Liabilities	
Domestic	mean	31.4	19.5	8.6	0.7	31	1.9	1	17.8	49.4	9.3	-0.1	19.7
	p25	24	13.4	2	0.2	17.3	0.7	-2	7.5	35.3	3.4	0	11.7
	median	29.2	16.5	5.2	0.4	28.9	2	1	14.1	46.1	7.7	0.5	18.7
	p75	35.8	24.1	13.9	0.6	44.4	3.1	4.9	24	62.5	12.7	1.3	27.6
Foreign	mean	33.4	21.9	10.9	5.5	36.4	1.6	7.8	11.8	58.8	5.2	0.8	24.6
	p25	25	14.8	3.6	0.3	25.4	0.4	-1.1	5.7	44.6	1.7	0.3	11.5
	median	31.3	17.4	6.1	0.9	36.5	1.4	1.6	10.3	58.6	3.9	1.1	22.3
	p75	39.5	22.2	10.7	8.2	45.3	2.5	5.3	15.8	72	7.2	1.8	35.4
Total	mean	32.5	20.8	9.9	3.4	34	1.8	4.8	14.5	54.6	7	0.4	22.4
	p25	24.4	14.1	3	0.3	20.5	0.5	-1.4	6.4	39.1	2.2	0.1	11.6
	median	30.5	17	5.9	0.5	34.4	1.7	1.4	11.6	53.6	5.2	0.8	20.6
	p75	37.5	22.9	12	3.2	45.1	2.8	5.2	19.1	67.9	9.5	1.6	31.3

Source: Author's calculations based on CNB data.

5 RESULTS

As explained above, we applied a fixed effect linear model to estimate effect of different determinants on credit growth in Croatia. The data used in analysis is unbalanced panel that spans across 18 years and 31 banks. In order to check for robustness of the results and to evaluate the effect of the global financial crisis we split the sample to pre-crisis (1999Q4-2008Q4) and crisis period (2009Q1-2017Q3). Furthermore, as broad body of literature points to differences in business practices of foreign and domestic banks, we differentiate the analysis on these two subsamples. The results presented bellow (Table 2 and 3) broadly confirm importance of macroeconomic and bank-specific characteristics for bank's credit growth to private sector.

Table 2: Credit growth determinants – all banks

Sample:	TOTAL					Pre-crisis	Crisis	
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5			
Macro variables	GDP growth	1.043*** (0.265)				1.126* (0.651)	-0.138 (0.642)	
	Consumption growth		1.128*** (0.252)					
	Macro factor			1.085*** (0.233)				
	Inflation	0.434 (0.375)	0.377 (0.379)			0.516 (0.562)	-0.352 (0.491)	
	FDI	0.700 (0.492)		0.736 (0.596)		1.537* (0.896)	-0.142 (0.468)	
	Private debt				-0.247*** (0.0380)			
	MPP stance	-0.334** (0.149)	-0.272* (0.149)	-0.554*** (0.140)			-0.290 (0.198)	-0.449 (0.597)
Bank variables	Liquid asset	0.403*** (0.0895)	0.399*** (0.0899)			0.371*** (0.0886)	0.472*** (0.126)	0.205 (0.125)
	TCR			-0.0940 (0.104)				
	EXS TCR				-0.0454 (0.0978)			
	Market share	-1.653 (1.042)	-1.632 (1.017)	-1.643* (0.854)	-1.731* (0.898)	-1.792 (1.057)	-2.308 (1.458)	-1.990* (1.082)
	Substitutes	0.0217 (0.0131)	0.0209 (0.0132)	0.347*** (0.0889)	0.365*** (0.0902)	0.0267** (0.0105)	0.0147 (0.0100)	0.276** (0.104)
	NPLR	-0.357*** (0.0903)	-0.351*** (0.0910)			-0.277** (0.103)	-0.334** (0.134)	-0.117 (0.213)
	Coverage	0.0931** (0.0387)	0.0889** (0.0411)			0.0844** (0.0374)	0.0945** (0.0375)	0.0582 (0.0790)
	Net NPLR			-0.670*** (0.172)	-0.433** (0.201)			
	RIIR on liabilities	-1.617*** (0.422)	-1.766*** (0.433)	-1.620*** (0.342)	-1.110*** (0.334)	-1.092** (0.481)	-1.364** (0.627)	-0.312 (0.868)
	LT liabilities	0.249** (0.101)	0.246** (0.101)	0.210** (0.0848)	0.240*** (0.0828)	0.260** (0.105)	0.220 (0.146)	0.0601 (0.126)
	ROA	0.377 (0.316)	0.417 (0.308)			0.366 (0.317)	0.747* (0.427)	0.397 (0.556)
	Other liabilities	0.139 (0.136)	0.138 (0.140)			0.131 (0.130)	-0.0739 (0.185)	-0.0947 (0.220)
	Constant	-1.541 (8.795)	-0.748 (8.919)	27.52*** (6.356)	40.95*** (5.692)	-11.64 (8.527)	-0.934 (15.08)	17.65 (15.83)
Observations	1,917	1,917	1,820	1,844	1,941	925	992	
R-squared	0.295	0.292	0.279	0.276	0.306	0.174	0.065	
Number of Bank	31	31	31	31	31	31	31	
Bank FE	YES	YES	YES	YES	YES	YES	YES	
Year FE	NO	NO	NO	NO	YES	NO	NO	

Note: All bank characteristics are lagged one year. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations.

Table 3: Credit growth determinants for foreign and domestic credit institutions

Sample: VARIABLES	FOREIGN					DOMESTIC					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5	
<i>Macro variables</i>	<i>GDP growth</i>	1.237*** (0.412)					0.615 (0.395)				
	<i>Consumption growth</i>		1.419*** (0.421)					0.646** (0.246)			
	<i>Macro factor</i>			1.282*** (0.387)					0.727** (0.299)		
	<i>Inflation</i>	1.029* (0.560)	1.030* (0.523)				0.553 (0.536)	0.537 (0.539)			
	<i>FDI</i>	1.019 (0.848)		1.121 (1.016)			0.259 (0.474)				
	<i>Private debt</i>				-0.371*** (0.0428)					-0.0473 (0.0375)	
	<i>MPP stance</i>	-0.760*** (0.146)	-0.667*** (0.158)	-0.883*** (0.136)			-0.0674 (0.162)	-0.0356 (0.163)	0.0315 (0.171)		
<i>Bank variables</i>	<i>Liquid asset</i>	0.210** (0.0754)	0.168* (0.0838)			0.145 (0.0866)	0.520*** (0.153)	0.512*** (0.142)		0.513*** (0.127)	
	<i>TCR</i>			-0.208 (0.119)					0.392** (0.148)		
	<i>EXS TCR</i>				-0.0937 (0.110)					0.314* (0.156)	
	<i>Market share</i>	-1.653** (0.777)	-1.599** (0.707)	-1.547*** (0.506)	-1.825** (0.657)	-2.036** (0.797)	-4.607 (2.912)	-4.406 (3.331)	-9.968** (4.410)	-9.908* (4.768)	-2.966 (2.551)
	<i>Substitutes</i>	0.00130 (0.0102)	0.000315 (0.0110)	0.322** (0.147)	0.336** (0.146)	0.00514 (0.00744)	0.264** (0.102)	0.271** (0.0995)	0.291** (0.123)		0.375*** (0.0903)
	<i>NPLR</i>	-0.262 (0.238)	-0.220 (0.228)			0.0530 (0.319)	-0.312*** (0.0581)	-0.309*** (0.0564)			-0.246*** (0.0678)
	<i>Coverage</i>	0.0833 (0.0510)	0.0559 (0.0644)			0.0672 (0.0472)	0.0944** (0.0327)	0.0904** (0.0317)			0.0941*** (0.0302)
	<i>Net NPLR</i>			-0.552 (0.410)	0.135 (0.452)				-0.571*** (0.167)	-0.580*** (0.168)	
	<i>RIIR on liabilities</i>	-2.207*** (0.617)	-2.622*** (0.752)	-1.913*** (0.540)	-1.245** (0.500)	-1.221** (0.502)	-0.618 (0.562)	-0.716 (0.565)	-0.900* (0.435)	-0.760 (0.475)	0.0471 (0.635)
	<i>LT liabilities</i>	0.243* (0.138)	0.250* (0.134)	0.158* (0.0857)	0.197** (0.0836)	0.246* (0.140)	0.271* (0.140)	0.268* (0.139)	0.272 (0.177)	0.233 (0.173)	0.305** (0.128)
	<i>ROA</i>	-0.478 (0.636)				-0.540 (0.620)	0.858*** (0.200)	0.863*** (0.176)	0.643*** (0.170)	0.785*** (0.168)	0.939*** (0.212)
	<i>Other liabilities</i>	0.114 (0.138)				0.136 (0.129)	0.0434 (0.267)				-0.0661 (0.239)
	<i>Constant</i>	18.31** (8.276)	23.47* (11.64)	41.86*** (7.385)	59.15*** (6.956)	4.426 (8.056)	-13.84 (12.77)	-12.55 (9.732)	3.145 (8.370)	17.23*** (4.998)	-15.24 (12.61)
	<i>Observations</i>	1,058	1,058	1,010	1,024	1,069	859	859	810	820	872
<i>R-squared</i>	0.364	0.358	0.360	0.367	0.393	0.303	0.305	0.281	0.242	0.345	
<i>Number of Bank</i>	17	17	17	17	17	14	14	14	14	14	
<i>Bank FE</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
<i>Year FE</i>	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	

Note: All bank characteristics are lagged one year. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculations.

Macroeconomic variables

Banks' loan growth to private sector is highly influenced by developments in real cycle while higher economic growth increases both loan demand and supply as clients' appetite and creditworthiness improve. According to results, a real GDP growth of 1 percent translates approximately into loan growth of 1 percentage point (p.p.). Moreover, when looking into different subcomponents of GDP, the only consistent driver of loan growth is private consumption as other subcomponents proved to be insignificant. Additionally, when accounting for other indicators of real cycle, such as asset prices growth, unemployment dynamics and growth in wages, through latent variable Macro factor, we find relatively similar results. Separating banks by ownership, aforementioned results still hold with notion that foreign banks' loan activity is more influenced by developments in real cycle than domestic banks' loan activity, according to the size of estimated parameters. This is expected, as foreign banks are mainly larger banks with relatively broad base of customers, while domestic banks are mainly smaller banks operating in specific niches that do not necessarily correlate to macroeconomic movements. However, relation between macroeconomic developments and credit growth is present only in the boom phase of economic cycle and it breaks down in crisis period, implying that banks' lending in crisis period is determined only by bank characteristics and not by macro factors.

The impact of inflation on credit growth is only positively significant for foreign banks. For the rest of the specified models, the effect of inflation seems to be insignificant, which is expected due to the fact that inflation in Croatia was relatively stable throughout the observed period. The impact of FDI was significant only for the boom period until 2008, which is not surprising given the fact that foreign banks heavily relied on the inflow of foreign funds only in period before the crisis. This can also be explained as a reaction to central banks' measures, which constrained foreign borrowing and at the same time potentially induced more foreign equity financing.

One of the major structural impediments of loan growth from the demand side seems to be relatively high indebtedness of private sector as an increase in private sector debt of 1 p.p. reduces loan growth by 25 basis points. This relation is even more pronounced for foreign banks.

On top of real macroeconomic developments, one of the major factors influencing loan growth in Croatia was regulatory environment. Tightening of CNB's macroprudential stance on average slowed down credit growth between 0.3 and 0.6 p.p. The estimation results show that CNB's macroprudential policy actions did not have impact on credit activity of domestic banks, while the impact on foreign banks was significant. Therefore, the CNB's macroprudential policy mix aimed at slowing down the buoyant credit growth can be rated as relatively effective only for foreign, mainly larger banks with systemic importance, which is in line with the objective of macroprudential measures, i.e. preserving the stability of financial system.

Bank-specific variables

In order to extend credit, banks need to have sufficient liquidity and capital buffers and our results broadly support that notion. Liquidity has significant and positive impact on credit activity as increase in share of liquid assets in total assets of 1 p.p. results in increase in credit growth of 0.4 p.p., and this is even more pronounced for domestic banks. This was expected, because foreign banks can always turn to their parent banks when in need of funding, while domestic banks, on the other side, can increase credit supply only if they have sufficient liquidity reserves. The impact of liquidity on credit growth is significant only in pre-crisis period, whilst it breaks down in crisis period. This result is in line with the perceived lack of transformation of CNB's loosening monetary policy into strengthened lending by banks. Measures of capitalization, such as total capital ratio and excess total capital ratio, have similar effect on credit growth as liquidity, albeit they are only significant in case of domestic banks. This can be explained by persistently high capitalization of foreign banks throughout the observed period, hence it didn't influence credit growth.

As expected, the further increase in credit institutions' market share would have negative effect on credit growth and it is significant in majority of specification. That signals that bigger banks have less capacity to further expand their credit portfolios, in relative terms.

As mentioned earlier, there were certain concerns that a substitution effect between loans to private sector and placements to other sectors was present in Croatia. We don't observe "crowding out" effect while in specifications where this relation is significant it is positive, suggesting to "crowding in" effect. What is more, this relation is not significant for pre-crisis, but is significant for crisis period, implying that banks' exposures to private and other sectors increased and/or contracted in synchronized fashion.

In this empirical exercise, we also examined how various funding sources affect banks' lending activity. Firstly, we tested for possible relation between the degree of reliance on wholesale funding and credit growth, but it proved to be insignificant across specifications, implying that banks in Croatia predominantly rely on traditional sources such as retail and firms' deposits when looking to expand credit to private sector. Secondly, we tested the possible impact of stable funding, measured as share of long-term liabilities in total liabilities. This relation was significant and robust in almost all

specifications as increase in the share of long-term liabilities by 1 p.p. translates into increase in credit growth of approximately 0.2 p.p. Moreover, in addition to the availability of sufficient funding sources, their price can also influence both banks' willingness and potential for supplying credit to private sector. As expected, price of banks' funding sources has negative effect on credit growth. This relation was not significant for domestic banks, which is somewhat surprising due to the fact that domestic banks payed higher interest on their liabilities than foreign banks. This result can be explained by notion that relatively small domestic banks are valuing their relationships with clients more highly and are looking to extend a loan to that client despite higher cost of its funding.

Aside from relying on liabilities, banks can also rely on their capital in order to fund their credit expansion. If a certain bank is profitable, than the accumulation of retained earnings can be one of the main channels of capital formation. Therefore, we tested how profitability is affecting credit growth and found out that higher profitability is one of the main prerequisites to credit expansion of domestic banks. The results show that an increase in profitability of 1 p.p. is transferred into credit growth of between 0.6 and 1 p.p. for domestic banks, depending on specification. Profitability proves to be insignificant in case of foreign banks, which is not surprising because they can rely on their parent bank support, either by means of increasing liabilities or recapitalization.

Asset quality, as documented by many studies in literature, can have limiting effect on credit growth. This was also confirmed for banks in Croatia, as increase in non-performing loan ratio of 1 p.p. reduces credit growth by 0.3 p.p. on average. Results show that conditional on the certain level of NPLR, an increase in coverage of NPLs results in higher credit growth, implying that prudent and timely provisioning of NPLs supports lending to private sector. The robustness of these findings was further verified by testing the relation between net NPLRs and credit growth, which yielded similar results. What is interesting is the fact that only domestic banks are constrained by the quality of their credit portfolio, while this result is not statistically significant for foreign banks. This is in line with our finding that the level of capitalization impacts lending only in case of domestic banks as domestic banks have on average somewhat lower levels of regulatory capital and need to watch out for possible impact of non-performing loan on their capital reserves.

6 CONCLUSION

According to estimation results, macroeconomic developments play a significant role in explaining credit growth. This is confirmed across different model specifications, with improved economic developments leading to higher credit growth. However, when splitting the sample into two sub-periods, relationship between real cycle and lending to private sector holds only in the pre-crisis period. What is more, domestic banks' loan activity is less influenced by macroeconomic environment and is predominantly determined by banks' funding outlook and its lending potential. Inflow of foreign investments was important determinant of credit growth, but also only in the pre-crisis period. Furthermore, our empirical model confirms that high level of private sector indebtedness constitutes significant constraint for recovery of credit activity. We also find that macroprudential actions of policy makers were successful at influencing the Croatian banks' lending to private sector, whereby they primarily influenced foreign banks' lending with limited effect on domestic banks. However, these measures were primarily aimed at the supply side of lending and were not able to fully address the excessive borrowing demand from the private sector, which induced stronger activity in other lending sources, outside of Croatian banking sector. As a result, private sector incurred relatively high debt levels and this poses one of the main hurdles that needs to be resolved for new lending cycle to be set in motion. Therefore, the scope and set of macroprudential policy instruments should be widened and rely on different borrower-based measures as well.

Our results have also confirmed, in line with majority of existing literature, that legacy issues of deteriorated asset quality can seriously hamper credit activity, which once more emphasize the need of

timely resolution of impaired loans. The testing of crowding-out effect shows that this effect was not present in Croatian case, while results indicate that along with increased lending to private sector, lending to government and other financial institutions also increases. We find that banks in Croatia are fairly traditional with regards to their funding as stability of funding sources is important determinant of their lending decisions. The results also signal that robust profitability is important for domestic banks as it serves them as important source of funding. Lastly, sufficient liquidity and capital buffers seem to influence lending only in case of domestic banks as foreign banks have incurred relatively high capital and liquidity reserves. This leads to conclusion that foreign banks' lending is currently only constrained by their clients demand for credit and their risk outlook.

To conclude, our results indicate that supply factors are key determinants of domestic banks' credit activity. Foreign banks' lending on the other hand largely depends on demand side factors and CNB's policy actions. Therefore, the future developments regarding the lending in Croatia will depend of the interplay of both supply and demand factors. At the moment, the main impediments that resulted in subdued credit activity even eight years after the onset of crisis seem to be on the demand side, as banks' lending potential is ample. Namely, private sector is still constrained by accumulated debt, which might influence both their credit potential and creditworthiness from banks' perspective. Therefore, when new lending cycle is to be set in motion, policy makers should actively monitor supply and demand side of financial intermediation.

7 REFERENCES

- Arakelyan M. (2018): *Foreign Banks and Credit Dynamics in CESEE*, IMF Working Paper (WP/18/3).
- Arena, M., Reinhart C., and F. Vazquez (2007): *The lending channel in Emerging economics: Are foreign banks different?*, IMF Working Paper (WP/07/48).
- Aydin, B. (2008): *Banking Structure and Credit Growth in Central and Eastern European Countries*, IMF Working Paper (WP/08/215).
- Bayraktar, N. and Y. Wang (2004): *Foreign Bank Entry, Performance of Domestic Banks and the Sequence of Financial Liberalization*, Policy Research Working Paper Series 3416, World Bank.
- Bonin, J. P., Hasan, I. and P. Wachtel (2005): *Bank performance, efficiency and ownership in transition countries*, Journal of Banking & Finance, 29 pp. 31–53.
- Borio, C. and P. Lowe (2002): *Asset Prices, Financial and Monetary Stability: Exploring the nexus*, BIS Working Papers (114).
- Budnik, K. and J. Kleibl (2018): *Macroprudential regulation in the European Union in 1995-2014: introducing a new data set on policy actions of a macroprudential nature*, ECB working paper (2123).
- Calza, A., Gartner, C. and J. Sousa (2001): *Modelling the demand for loans to the private sector in the Euro area*, ECB Working Paper Series (55).
- Claessens, S., Demirguc-Kunt, A. and H. Huizinga (2001): *How does foreign entry affect domestic banking markets?*, Journal of Banking & Finance, 25(5), pp.891–911.
- Claessens, S., Kose, M. A. and M. E. Terrones (2011): *How Do Business and Financial Cycles Interact?*, IMF Working Paper (WP/11/88).
- CNB (1991): *Annual Report*.
- Cottarelli, C., Dell’Ariccia, G. and I. Vladkova-Hollar, (2003): *Early Birds, Late Risers, and Sleeping Beauties: Bank Credit Growth to the Private Sector in Central and Eastern Europe and the Balkans*, IMF Working Paper (WP/03/213).
- Cull, R. and M.S. Martínez Pería (2013): *Bank ownership and lending patterns during the 2008-2009 financial crisis: Evidence from Latin America and Eastern Europe*, Journal of Banking and Finance, 37(12), pp.4861–4878.
- Cull, R., Martínez Pería, M.S. and J. Verrier (2017): *Bank Ownership: Trends and Implications*, IMF Working Paper (WP/17/60).
- Čeh, A., Dumičić, M. and I. Krznar (2011): *A Credit Market Disequilibrium Model and Periods of Credit Crunch*, CNB Working Paper (W-28).
- De Haas, R. and I. van Lelyveld (2006): *Foreign banks and credit stability in Central and Eastern Europe. A panel data analysis*, Journal of Financial Intermediation, 30(7), pp.1927–1952.
- Dell’Ariccia, G., Igan, D., Laeven, L., Tong, H., Bakker, B. and J. Vandenbussche (2012): *Policies for Macroeconomic Stability: How to Deal with Credit Booms*, IMF Staff Discussion Note 12/06.
- Detragiache, E., and P. Gupta (2006): *Foreign banks in emerging market crises: Evidence from Malaysia*, Journal of Financial Stability 2(3), 217-242.

- Detragiache, E., Tressel, T. and P. Gupta (2008): *Foreign banks in poor countries: theory and evidence*, The Journal of Finance 63(5), 2123-2160.
- Drehmann, M., Borio, C. and K. Tsatsaronis (2011): *Anchoring Countercyclical Capital Buffers: The Role of Credit Aggregates*, International Journal of Central Banking, Vol. 7, No. 4.
- Drehmann, M., and M. Juselius (2012): *Do Debt Service Costs Affect Macroeconomic and Financial Stability?*, BIS Quarterly Review, September.
- Dumičić, M. and V. Šošić (2014): *Credit cycles and central bank policy in Croatia: lessons from the 2000s*, chapter 7 in Nowotny, E., Ritzberger-Grünwald, D. and P. Backé (eds): *Financial Cycles and the Real Economy: Lessons for CESEE Countries*, pp 96–113, Edward Elgar, Cheltenham, UK, Northampton, MA, October.
- Dumičić, M. (2014): *Učinkovitost makroprudencijalne politike u Hrvatskoj i drugim zemljama Srednje i Istočne Europe*, doktorska disertacija obranjena u listopadu 2014. na Ekonomskom fakultetu Sveučilišta u Splitu.
- Dumičić, M (2015): *Financial stability indicators - the case of Croatia*, Journal of Central Banking Theory and Practice, vol 5(1), pp 113–140.
- Dumičić, M. (2017): *Effectiveness of Macroprudential Policies in Central and Eastern European Countries*, CNB Working Paper (W-48).
- Dumičić, M. and I. Ljubaj (2017): *Delayed Credit Recovery in Croatia: Supply or Demand Driven?*, CNB Working Paper (W-45).
- Guo, K., and V. Stepanayan (2011): *Determinants of Bank Credit in Emerging Market Economies*, IMF Working Paper (WP/11/51).
- Havrylychuk, O. and P.E. Jurzyk (2011): *Profitability of foreign and domestic banks in Central and Eastern Europe: Does the mode of entry matter?*, Economics of Transition 19 (2011), 443-472.
- Hofmann, B. (2001): *The determinants of private sector credit in industrialized countries: do property prices matter?*, BIS Working Papers (108).
- Igan, D. and N. Tamirisa (2009): *Credit Growth and Bank Soundness: Evidence from Emerging Europe*, The Thirteenth Dubrovnik Economic Conference.
- IMF (2015): *Global Financial Stability Report - International Banking After the Crisis: Increasingly local and safer?*, April, pp.55–91.
- Igan, D. and M. Pinheiro (2011): *Credit Growth and Bank Soundness: Fast and Furious?*, IMF Working Paper (WP/11/278).
- Jankov, Lj. (2000): *Banking Sectors Problems: Causes, Solutions and Consequences*, CNB Survey (S-2).
- Jeon, B. N., Olivero, M. P., and J. Wu (2011): *Do foreign banks increase competition? Evidence from emerging Asian and Latin American banking markets*, Journal of Banking & Finance 35(4), 856-875.
- Kraft, E. (2002): *Foreign Banks in Croatia: Another Look*, CNB Working Paper (W-10).
- Kraft, E. and Lj. Jankov (2005): *Does speed kill? Lending booms and their consequences in Croatia*, Journal of banking and finance 29 (2005), 105-121.
- Kraft, E. and T. Galac (2011): *Macroprudential Regulation of Credit Booms and Busts The Case of Croatia*, World bank Policy Research Working Paper (5772).

Lensink, R. and N. Hermes (2004): *The short-term effects of foreign bank entry on domestic bank behaviour: Does economic development matter?*, Journal of Banking & Finance, 2004, vol. 28, issue 3, 553-568.

Lim, C., Columba, F., Costa, A., Kongsamut, A., Otani, A., Saiyid, M., Wezel, T. and Wu, X. (2011): *Macroprudential policy: what instruments and how to use them? Lessons from country experiences*, IMF Working Paper (WP/11/238).

Lund-Jensen, K. (2012): *Monitoring Systemic Risk Based on Dynamic Thresholds*, IMF Working Paper (WP/12/159).

Micco, A., Panizza, U. and M. Yañez (2004): *Bank Ownership and Performance*, IADB Working Paper (518).

Pintarić, M. (2016): *What is the Effect of Credit Standards and Credit Demand on Loan Growth? Evidence from the Croatian Bank Lending Survey*, Comparative Economic Studies, 58(3), pp. 335-358.

Rohatinski, Ž. (2015): *Ogledi u realnom vremenu*, EPH Media, Zagreb.

Vujčić, B. and M. Dumičić (2016): *Managing systemic risks in the Croatian economy*, BIS Paper (86).

Wooldridge, J. (2002): *Econometric Analysis of Cross Section and Panel Data*, MIT Press.