Post-Crisis Credit Slowdown in South-East Europe – Return to Normality? [1]

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Abstract

What explains the post-crisis slowdown in bank credit to private sector in the South-East European economies? We try to answer this question, by comparing the actual credit growth to the fundamental and equilibrium growths. The fundamental growth is defined as the growth justified by the fundamentals, the equilibrium growth – as the growth consistent with the economy being in medium-term equilibrium. Results suggest that the slowdown reflects both return of the credit activity to its fundamental value, and return of the fundamental values to their equilibrium levels, after years of excessiveness during the pre-crisis period. Rapid credit growth, as in the pre-crisis period, should not be expected in the near future.

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I. INTRODUCTION

The role of credit for economic growth has been discussed many times (see Goldsmith, 1969, McKinnon, 1973, King and Levine, 1993, Rousseau and Wachtel, 1998). Although it may be hard to say that the literature has reached a consensus, it seems that most of the studies would agree that credit has a positive effect on growth. Yet, excessive credit growth has been often found to lead to financial crises, with a prolonged slowdown in credit activity afterwards (see Barajas, Dell'Ariccia and Levchenko, 2009, Jordà, Schularick and Taylor, 2011, Babecky et al, 2013). Therefore, it is important for central bankers to ensure that credit grows at the right pace – not too slow, but not too fast either.

Recent developments in South-East Europe (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia and Turkey) have illustrated these points. Before the global financial crisis of 2008-2009 (crisis, henceforth), South-East European countries were growing at rather high rates. The average annual growth in GDP PPP per capita during 2004-2008 was approximately 6 percent, fueled by the rapid growth of credit to the private sector[2], which averaged approximately 30 percent per annum (in real terms). After the crisis, credit growth slowed down substantially in these countries, averaging 4 percent during 2010-2012 (in real terms). This coincided with a significant deceleration in the pace of GDP growth, which reached 1.7 percent per year.

The literature has tried to answer the question about the "correct" level of private credit by comparing the actual level of credit with the long-run *equilibrium* level. The equilibrium level is usually obtained as a fitted value from a regression of credit on standard fundamentals, like GDP, interest rates and so on (Cottarelli, Dell'Ariccia and Vladkova-Hollar, 2005, Kiss, Nagy and Vonnák, 2006, Égert, Backé and Zumer, 2006, Coudert and Pouvelle, 2010). Most of the studies on transition economies use the "out-of-sample" approach, meaning that they estimate the regression on a set of developed countries (because estimations for the transition countries yield unstable or unreliable estimates), and then multiply the regression coefficients with the actual values of the explanatory variables for the transition countries, to get an equilibrium level of credit.

In this study, we evaluate if the post-crisis credit activity in the South-East European (SEE) countries is excessively subdued or not, following this approach. Differently from the existing literature, however, we distinguish between a *fundamental* and an *equilibrium* level of credit. We define the *fundamental* level of credit as a level justified by the fundamentals, and the *equilibrium* level as a level that would occur if the economy was in medium-term equilibrium. We believe that this distinction is important, especially from a policy perspective. Deviation of credit from its *fundamental* level indicates that credit activity is too high (or too low), but does not imply a need for a policy action, since the fundamental level may change substantially in a short period of time, because the fundamentals change (think about GDP growth, brought by privatizations). Policy action is required when credit deviates from its *equilibrium* level for prolonged periods of time, since the equilibrium levels of the fundamentals change much more slowly (think about potential output). Furthermore, policy makers do not observe the fundamental and equilibrium levels in real time, but only with a lag. As equilibrium levels fluctuate much less than fundamental levels, the time lag is another reason why policy makers should rely more on the former.

The analysis is done for eight SEE countries[3] - Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia and Turkey, for the period 2000-2013, using quarterly data. Unlike the existing studies, we use an "in-sample" approach - we estimate the regressions on data for the analyzed

[2] When we talk about credit to private sector, we have in mind credit from domestic banks.
[3] Due to data limitations, two countries from the region, Montenegro and Kosovo, are not included in the analysis.

countries. The estimations are done using dynamic heterogeneous panel techniques (i.e. panel cointegration techniques). We make a careful robustness analysis and compare our coefficients to those from other studies to ensure that the results are stable and reliable and can be used for calculating the fundamental and equilibrium levels. The *fundamental* credit levels are then calculated as fitted values from the regressions. The *equilibrium* levels are calculated when medium-term equilibrium values for the fundamentals are multiplied with the long-run regression coefficients.

Several findings emerge from the analysis. First, all SEE countries were experiencing prolonged periods of excessive credit activity before the crisis, during which credit growth was much higher than both the fundamental and equilibrium growth. The same period was characterized by higher fundamental than equilibrium growth, implying that the excessive actual credit growth was partly due to excessive fundamentals. Given all that, the post-crisis slowdown in credit in these countries does not come as a surprise. Second, the post-crisis credit growth in the SEE countries seems to be very similar to the fundamental and equilibrium growth, which implies that the recent slowdown more likely represent a return to normality than excessive undershooting. Third, the equilibrium credit growth in the SEE countries is likely to remain well below the pre-crisis rates in the next five years.

II. OVERVIEW OF CREDIT ACTIVITY IN SEE

SEE countries share many similarities with respect to their banking sectors development and setup. Aside from Turkey, these countries went through a comprehensive restructuring of their economies as they moved from centrally-planned to market economies in the beginning of the 1990s. Banking sector transformation was an important element in the overall transition process. This included massive clean-up of banks' balance sheets, thorough reforms in the regulatory and supervisory frameworks, banks' consolidation schemes, recapitalization and large-scale privatization to foreign strategic investors. Turkey, on the other hand, experienced a severe financial crisis in 2000-2001, which initiated major reforming and restructuring agenda as to address fundamental fragilities in the banking sector. As a result of these processes, by early to mid-2000s, SEE countries managed to establish sound, healthy and well-performing banking sectors, ready to operate as true financial intermediaries.

The similarities between the SEE countries' banking systems can be seen in Table 1. To begin with, all countries have low to moderate shares of private credit to GDP. Furthermore, they all experienced sizeable increase in this ratio during 2000s. Banking sector remains at the core of the financial industry in SEE, as can be seen from the low share of non-bank financial institutions[4]. Banking sectors in all these countries went through important structural changes during 2000s, which can be summarized as increase in the share of foreign owned banks, increase in the competition (i.e. decline in the concentration ratio), improvement in the operating efficiency (i.e. decline in the operating costs) and decline in the importance of the non-lending activities (i.e. decline in the non-interest income).

Table 1 - Banking sector characteristics in SEE countries

Indicator	Year	Albania	B&H	Bulgaria	Croatia	Macedonia	Romania	Serbia	Turkey
Private credit to GDP (%)	2000	17*	55.9***	11.4	31.9	15.5	8.3	15***	14.4
	2013	46.4**	60.6	69.6	75.1	46.8	36	52.6	59.7
Non-bank financial institutions assets to GDP (%)	last available	NA	29	NA	NA	NA	10.6	NA	1.1
Share of foreign banks (%)	2000	75	28	44	30	36	57	24****	19****
	2011	83	57	67	43	71	81	63.6	43
Concentration ratio (share of assets of 3 biggest banks %)	2000	100	52.8	77.5	57.8	79.7	67.5	68.7	77.7
	2011	69	51.7	53.6	56.6	71	68.1	38.9	46.3
Operating costs to total assets (%)	2000	2.5	6.5	4.7	3.9	4.8	6.5	8.1	3.9
	2011	2.1	3.3	2.3	2.1	3	3.1	16.8	2.3
Non-interest income to total income (%)	2000	34.9	50.3	38.8	40.9	43	35.9	76.2	15.2****
	2011	14.1	34.9	26.6	25.2	32.3	31.3	78	33.7

* refers to 2005; **refers to 2011; *** refers to 2008; **** refers to 2002; NA = not available
Source: Cihak et al (2012) and central banks' websites.

[4] For comparison, in the United States, the typical country with non-bank dominated financial sector, the share of non-bank financial institutions' assets in GDP is approximately 300 percent of the GDP, while the share of the deposit money bank assets is 64 percent of GDP.

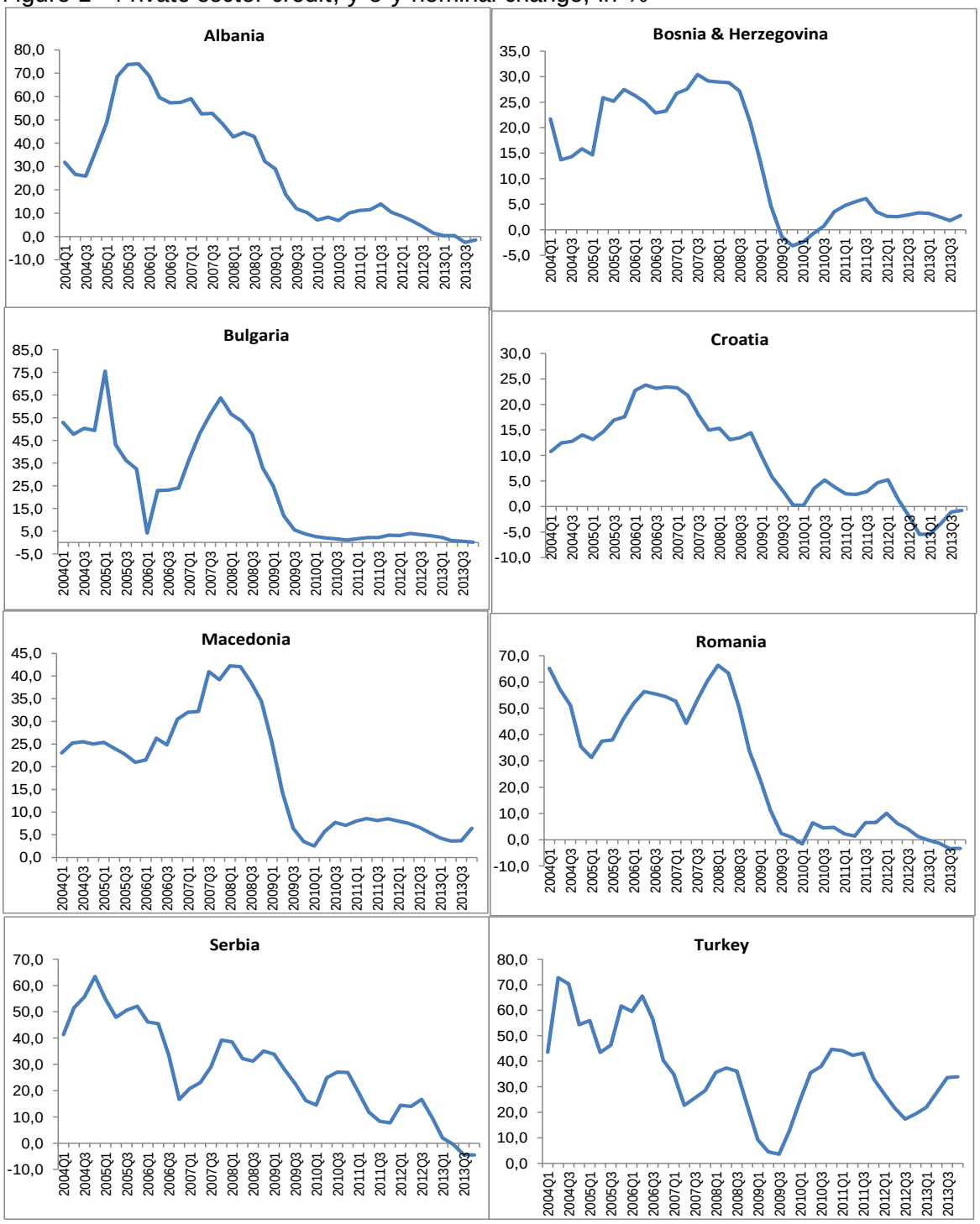
Looking closely at the evolution of bank lending in SEE, one can notice important similarities, but still varying differences with respect to credit developments and pace of financial deepening across countries. Between 2004 and 2008[5], the region as a whole enjoyed a dynamic growth of credit to the private sector with nominal credit growth averaging around 40% year-on-year (y-o-y). However, the "boom" phase in credit activity in SEE set in at different points in time continued to progress at different pace in different countries. As displayed in Figure 1, one group of countries, including Romania, Bulgaria, Turkey and Serbia, was experiencing very high credit growth (between 40% and 65% y-o-y) at the very beginning of our sample period in 2004. Credit growth in these countries remained fast and persistent throughout most of the years up to 2008. In another group of countries, including Macedonia, Bosnia & Herzegovina and Albania, credit was expanding at somewhat slower pace in 2004, ranging between 20-30%. Albania converged quite quickly to the first group of countries, reporting a credit growth of above 60% already in 2005, while Macedonia and Bosnia & Herzegovina followed a pattern of a gradual acceleration, with credit growth reaching its peak in 2007-2008 with rates ranging between 30-45%. Croatia stands outside these two groups of countries. It is a country that reported the lowest credit growth in 2004, of around 10% and continued to record steady growth rates of below 25% in the following years. The lower credit growth in Croatia, to some extent can be attributed to the notion that much of the private sector borrowing went through leasing companies and other non-banking institutions.

To some extent, the credit boom in SEE before the crisis can be attributed to the catching-up process that spurred from the low level of financial development in the region. The successfully completed macroeconomic stabilization and the restored confidence in the financial system contributed to credit expansion, too. On the supply side, growing credibility in policy frameworks and reduced uncertainty promoted private savings, and the increased deposits may have led to a credit expansion. On the demand side, macroeconomic stabilization lead to higher credit, mainly through the lower interest rates, due to the lower inflation. Additional factor was the benign external environment. With continuing financial liberalization, foreign borrowing increasingly gained in importance as additional source of financing credit activity in some countries. Furthermore, many foreign banks expanded their activities in these countries, which led to increased competition, stimulating development of new products and narrowing the interest rate spreads.

The credit boom urged for action by policy makers. Policy responses were undertaken in most of these countries in the period from 2006 to 2008. They consisted of a broad set of policy instruments varying from monetary policy instruments (reserve requirements mostly) to micro and macro prudential and supervisory measures including credit ceilings and capital controls. However, the result was only slight moderation in lending activity with credit expansion continuing to persist in most of the countries.

[5] The discussion in this section from this point onwards will refer to the period 2004-2013, on which we have consistent data set for all countries.

Figure 1 - Private sector credit, y-o-y nominal change, in %



Source: Authors' calculations based on data from Central banks websites.

This phase of high credit growth in SEE countries was abruptly ended with the escalation of the global financial crisis in late 2008 - early 2009. Credit growth was suppressed suddenly and even downsized in some countries. The channel through which the crisis transmitted was indirect. The direct repercussions were limited, due to the general soundness of the banking sectors, their robust capital structures and the absence of global exposure to "toxic" assets. However, the banking sector was hit severely via the

economic and confidence channel. Rapidly worsening economic conditions initiated credit defaults setting the NPLs on a rising path. Banks responded by tightening credit standards and curtailing credit supply. On the back of deteriorating creditworthiness and gloomy economic perspectives there was downsizing in credit demand as well. Credit growth slumped to single-digit numbers in 2009 and even turned negative in some countries (e.g. Bosnia & Herzegovina).

Speaking in terms of general economic performance, SEE countries weathered the crisis quite well with their economies starting to recover in 2010, pulled by the improving global environment. These developments brought some improvement on the credit market with credit growth starting to pick up moderately. However, the optimism was short-lived as the European debt crisis initiated another wave of contagion. Along with the economic slowdown, the Euro area crisis spilled over through the financial channel, with western parent banks transferring some of the deleveraging pressures on their branches in SEE with simultaneous withdrawal of funds. This was probably the turning point when credit growth in the region essentially ground to a halt. Looking at different countries, Croatia was among the countries that were most severely hit. Given the prolonged recession and seized foreign financing, credit growth turned negative in 2012 and the country continued to experience further deleveraging throughout the whole of 2013. Credit stock was also contracted in Romania, Serbia and more recently in Albania. Macedonia, Bulgaria and Bosnia & Herzegovina performed slightly better. Credit continued to grow in these countries, though at a very low rate. Macedonia was the country with the fastest credit growth during 2012-2013, with growth of around 5%, which is still modest, compared to the growth of 40% in the period before the crisis. Turkey, on the other hand, had quite unique experience. Thanks to the rapid recovery of the economy and the resilient banking sector, Turkey experienced a sort of a “mini credit boom” in the years following the acute phase of the crisis. Large capital inflows accommodated by ample global liquidity spurred dynamic credit growth boosting domestic demand and exerting pressures on the current account deficit. In order to caution against macro-financial risks, Turkish authorities undertook measures to tame credit growth and accommodate volatile capital inflows, but credit continued to grow dynamically, though at a somewhat decelerated pace.

To sum up, the global crisis had severe negative repercussions on the SEE credit markets unleashing prolonged period of credit rationing and even credit deleveraging in some countries. Aside from Turkey, which outperformed the region in terms of economic and credit market revival, credit growth in SEE countries has remained weak for a prolonged period of time. On the other hand, the economic recovery in most of the SEE countries has been quite strong and persistent, despite the significantly subdued credit activity. Such developments raise questions on the nature and durability of this post-crisis adjustment in the credit market. Are the post-crisis developments in SEE credit markets a true reflection of banks’ potentials and countries’ fundamentals? Have the credit markets reached a new, much lower, equilibrium, compared to the boom years preceding the crisis, or are banks too cautious with extending credit, as a result of the global crisis? What are the credit market perspectives for the future? Is it plausible to expect the pre-crisis boom to repeat again in some near future, or has it gone for good with the crisis? These are the questions that we try to answer with this research.

III. OVERVIEW OF RELATED LITERATURE

The role of finance for economic growth has attracted researchers' attention at least since Schumpeter (1912). There was a revival in the interest in this issue in the mid-twentieth century, with the works of Gurley and Shaw (1955), Goldsmith (1969) and McKinnon (1973), but the literature virtually bloomed during the 1990s, when many studies reemphasized the positive role of credit on economic activity. Greenwood and Jovanovic (1990), King and Levine (1993) and Rousseau and Wachtel (1998) represent some of the most notable contributions, while Levine (2005) provides a comprehensive overview of the literature. Hence, although Lucas (1988) described the role of finance for growth as "very badly overstressed in popular and even much professional discussion" (p. 6), it could be safely said that there is a broad agreement among economists nowadays that finance has a positive effect on economic growth.

Turning to the Eastern European countries, Coricelli and Masten (2004) find that financial market development, measured through rising credit-to-GDP ratios, can affect GDP growth positively while helping reduce output volatility. Drakos and Konstantinou (2005) reports empirical evidence for a positive link between the degree of competition in the banking sector and economic growth, while Koivu (2002) finds that changes in interest rate margins (representing financial development in qualitative terms) is positively associated with GDP growth.

The notion that credit affects growth positively does not imply that more credit always leads to more growth, though. Empirical studies have also argued that excessive credit growth often leads to, or is an indicator of, future problems in the financial sector and the real economy (Gourinchas et al, 2001, Barajas, Dell'Ariccia and Levchenko, 2009, Jordà, Schularick and Taylor, 2011, Babecky et al, 2013). Hence, policymakers should ensure that credit grows at the right pace.

Still, it is very difficult to assess the excessiveness of the credit growth because the theoretical and empirical literature has been facing a challenge in providing an unanimous definition of what can be considered as an "equilibrium" level of credit growth in an economy. In addition to that, in the case of the Eastern European countries, another reason makes it difficult to identify the equilibrium credit/GDP levels. Namely, the strong credit growth that was observed in these countries in the past decade or two can be interpreted as a part of a normal catching-up process to the average of the EU member states.

To identify whether a credit growth is a result of the convergence process or simply a credit boom, a group of authors uses a *purely statistical approach*, based on deviations of credit series from their long-term trend (Gourinchas et al., 2001, Tornell and Westermann, 2002, IMF, 2004, Sa, 2006, Coudert and Pouvelle, 2010). This is done by comparing time series with their long-term trend by decomposing the time series into its long-run and short-run components by a filtering method; the most widely used being the two-sided linear Hodrick-Prescott (1980) filter. In the case of credit, if a credit indicator significantly exceeds its long-term trend at a certain date, this can be considered as a signal of a credit boom.

Geršl and Seidler (2011) argue that the HP filter calculation is not necessarily a suitable indicator of excessive credit growth for converging countries, and that it is better to use *econometric methods* for that purpose. According to this second, econometric approach, first a regression for the credit level is estimated. Then, this regression is used to see if credit growth has been excessive or not.

The earliest study to apply this method to the Eastern European countries, at least to our knowledge, is Cottarelli et al. (2005). They analyze excessiveness of credit growth in 15 Central and Eastern European (CEE) countries. They first estimate a random-effects panel regression for determinants of private credit,

on a sample of non-transition countries, included as explanatory variables: public debt, GDP per capita, inflation, banking sector variables and a variable for the legal origin of the country (from La Porta et al., 1999). Then, they use this regression to calculate equilibrium levels of credit to private sector for the CEE countries, multiplying the regression coefficients with the CEE variables. Finally, they compare actual credit to the equilibrium credit, in order to assess if the observed credit growth is excessive or not. They find that in a vast majority of analyzed countries, actual credit levels are below the equilibrium levels.

The same approach is used by Boissay et al. (2006), Kiss et al. (2006), Égert et al.(2006), Coudert and Pouvelle (2010), Geršl and Seidler (2011). The only differences are in the terms of countries and time period analyzed, the estimation technique used, the sample of countries on which the regression is estimated, and the variables included. These studies are summarized in Table 2.

The present paper offers several contributions to the existing literature. First, to the best of our knowledge, and as can be seen from Table 2, no study has focused exclusively on the SEE countries. To be sure, certain studies have included the SEE countries alongside other Eastern European countries (Cottarelli et al., 2005, Boissay et al., 2006, Coudert and Pouvelle, 2010), but they have not focused on them. We believe it is important to analyse the SEE countries separately, not just because they constitute a separate geographic region, but also because they are in some way laggards, compared to the Central European and the Baltic countries, both in terms of the integration with the EU economy and in terms of the financial and overall economic development. Second, existing literature estimates the regression for the determinants of credit on a sample of countries that are different from the countries that are analyzed (the "out-of-sample" approach). This is done because it is often difficult to obtain reliable estimates using data on the countries of interest – Eastern European countries went through substantial reforms during the past 20 years, which means that their data are troubled with structural breaks. In addition, they may be converging to the equilibrium, not fluctuating around it, which may imply that the obtained coefficients are imprecisely estimated. The "out-of-sample" approach, however, assumes that the regression coefficients are same for the countries that are used in the estimations (advanced countries) and the countries that are analyzed (developing countries). This, we believe, is a rather strong assumption, because the structures of their economies are obviously different. In addition, the "out-of-sample" approach has the problem of finding appropriate values for the regression constants, which are country-specific, and can affect the results to a great extent. Because of that, we will use an "in-sample" approach, i.e. we will estimate the regressions on the sample of countries that are analyzed. We will provide a rich set of robustness checks and we will compare our coefficients to those obtained by other studies, as a support that our estimates are reliable. Third, differently from the abovementioned literature, in this paper we distinguish between *fundamental* and *equilibrium* level of credit, the first one being defined as the level justified by the fundamentals, the second one as the level that would occur if the economy was in medium-term equilibrium. As was already mentioned, and will be elaborated more in the next sections, this distinction is important from a policy perspective, because only prolonged deviations of credit from its equilibrium level may require policy interventions.

Table 2 – Summary of selected papers on the same topic

Paper	Time period of estimation	Countries of estimation	Countries of analysis	Time period of analysis	Techniques	Variables
Cottarelli, Dell'Ariccia and Vladkova-Hollar (2005)	1973-1996	24 developed and emerging, excluding transition countries	Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Serbia and Montenegro, Slovakia, Slovenia.	2002	Random effects panel estimation	PPP-GDP per capita, public debt, inflation, financial liberalization, entry restrictions to the banking sector, accounting standards and legal origin
Boissay, Calvo-Gonzales and Kozluk (2006)	1960-1996	11 developed countries	Latvia, Bulgaria, Croatia, Hungary, Estonia, Lithuania, Slovenia, Romania, Poland, Czech R., Slovakia	1996-2004	ECM for individual countries and fixed effects OLS panel estimation	GDP, real interest rate
Kiss et al (2006)	1980-2002	Euro area countries	Estonia, Latvia, Lithuania, Hungary, Slovenia, Poland, Slovakia, Czech Republic	2004-2005	Panel - Pooled Mean Group Estimator	PPP-GDP per capita, real interest rate, inflation
Égert, Backé and Zumer (2006)	1975-2004 for the OECD countries, 1980-2004 for the emerging market economies	Small open OECD, Asian and Latin-American emerging countries	Estonia, Latvia, Lithuania, Czech Republic, Hungary, Poland, Slovakia, Slovenia, Bulgaria, Croatia and Romania.	1990 - 2004	Panel - Fixed effects OLS, Dynamic OLS, Mean group estimator	PPP-GDP per capita, credit to public sector, short and long interest rate, inflation, house price, financial liberalization, credit registries
Coudert and Pouvelle (2010)	1980-2008	52 countries: 21 developed countries, 17 emerging + 14 Central and Eastern European	Czech Republic, Hungary, Poland, Slovakia, Estonia, Latvia, Lithuania, Bulgaria, Romania, Albania, Croatia, Macedonia, Serbia	2006-2008	Panel - Fully-Modified OLS	PPP-GDP per capita, real interest rate, net capital inflows/GDP, stock capitalization/GDP, exchange rate regime, legal origin
Geršl and Seidler (2011)	1980–2010	Advanced EU countries	Bulgaria, Czech Republic, Slovakia, Estonia, Latvia, Hungary, Lithuania, Slovenia, Poland, Romania	2000-2010	Panel - Pooled Mean Group Estimator	GDP per capita, aggregate household consumption, government debt, short-term interest rates, unemployment, inflation

IV. ECONOMETRIC ANALYSIS

IV.A. METHODOLOGY

The model used in the analysis is of the form:

$$y_{i,t} = \sum_{j=1}^{p} \lambda_{i,j} y_{i,t-j} + \sum_{j=0}^{q} \delta_{i,j} X_{i,t-j} + \mu_i + \varepsilon_{i,t} \quad (1)$$

It is an autoregressive distributed lag (ARDL) model, with p lags of the dependent variable y (credit to private sector) and q lags of the independent variables X, where i indexes the countries, t the time, μ_i are the fixed effects (i.e. the country-specific constants) and $\varepsilon_{i,t}$ is the error term.

Equation (1) can be rewritten in its error-correction form as:

$$\Delta y_{i,t} = \gamma_i \left(y_{i,t-1} - \theta X_{i,t} \right) + \sum_{j=1}^{p-1} \lambda_{i,j}^{*} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{i,j}^{*} \Delta X_{i,t-j} + \mu_i + \varepsilon_{i,t} \quad (2)$$

The first part of (2), $\gamma_i \left(y_{i,t-1} - \theta X_{i,t} \right)$, gives the long-run relationship between the variables, while the remaining part gives the short-run relationship. More precisely, the matrix of coefficient θ gives the long-run coefficients on the explanatory variables, γ_i gives the error-correction terms, $\lambda_{i,j}^{*}$ gives the coefficients on the differenced-lags of the dependent variable and $\delta_{i,j}^{*}$ gives the coefficients on the differenced explanatory variables. It should be noted that all these matrices, except θ have a subscript i, which means that the short-run coefficients will be different for different countries, while the long-run coefficients will be same.

The analysis consists of several steps. **In the first step,** equation (2) is estimated. Related literature usually estimates equation (2) for a set of developed countries, due to the difficulties with obtaining stable and reliable results using data for developing countries. We depart from this practice and estimate the regressions on data for the SEE countries, as previously explained. In accordance with the literature (see Table 1), we consider the following variables to be candidate explanatory variables for credit to private sector:

a) GDP per capita, adjusted for purchasing power parity – the more developed the country is, the higher its credit level (as a share of GDP) is likely to be;

b) Credit to the government (as a share of GDP) – more credit to government should result in less credit to the private sector, due to crowding out;

c) Real interest rates – the lower the interest rates are, the higher the level of credit to private sector is likely to be;

d) GDP growth – the higher the economic growth is, the higher the credit activity is likely to be;

e) Inflation – higher inflation creates uncertainty, hence may inhibit credit activity;

In addition to these *macroeconomic variables*, measuring the demand for credit, we also consider a set of variables that capture certain *characteristics of the banking sector*, and, hence, represent effects coming from the supply of credit:

f) Non-interest income, as a share of total income of the banking sector – if banks receive higher income from non-lending activities, they may be less likely to supply credit. Banks are profit

institutions. Their profit can be separated into profit from lending activities (i.e. interest) and profit from non-lending activities (i.e. non-interest). If a bank's objective function is meeting a certain profit target, higher income from non-lending activities will imply a lower incentive for supplying credit, *ceteris paribus*.

g) Percentage of foreign banks among total banks – the higher the share of foreign banks is, the higher the credit to private sector is likely to be. Foreign banks in SEE countries usually come from the EU countries. Since EU banks are more developed than the domestic SEE banks, in terms of technology and working practices, higher share of foreign banks is likely to lead to a higher credit activity. However, a severe global crisis like the one in 2007-2009, may impair this relation as intragroup relations between large international parent banks and their branches, and subsidiaries may serve as an important channel for international transmission of liquidity shocks in the host countries thus suppressing the credit growth.

h) Operating expenses, as a share of total assets – banks with higher operating efficiency (i.e. lower operating costs) are likely to provide more credit.

i) Concentration ratio (share of assets of three largest banks) – higher concentration implies lower competition and possibly higher collusion, which are both likely to lead to lower credit activity.

The regressions are estimated using dynamic heterogeneous panels techniques, also known as panel cointegration techniques (see Pesaran and Smith, 1995, and Pesaran, Shin and Smith, 1999). These techniques are appropriate for non-stationary panels, such as ours, because in those cases the regression coefficients are likely to differ between countries. More precisely, the pooled mean group (PMG) estimator of Pesaran, Shin and Smith (1999) is used. The PMG estimator imposes that the long-run coefficients are same across countries, but allows the short-run coefficients to differ. Data seemed to prefer this estimator, because the hypothesis that the long-run coefficients are same across countries could be rejected in only one of the specifications[6]. For consistency, we opted to use the PMG even in that instance.

Variables that seem to be non-stationary are included both in the long-run cointegration equation and in the short-run, while variables that seem to be stationary are included only in the short-run equation. The banking sector variables are included one by one, because they measure the same thing (the supply of credit).

In the second step of the analysis, after estimates of equation (2) are obtained, the fundamental and equilibrium values for credit are calculated. Existing related literature does not distinguish between these two concepts, but we believe that it is important to do so. *We define the fundamental level of credit as the level of credit justified by the fundamentals, and the equilibrium level of credit as the level of credit that would materialize if the economy was in medium-term equilibrium.* This distinction is similar to the distinction between the behavioural equilibrium exchange rate (BEER) and the fundamental equilibrium exchange rate (FEER), from the equilibrium exchange rates literature (see MacDonald and Stein, 1998, or Jovanovic, 2007). BEER, developed by Clark and MacDonald (1998), is a short-run equilibrium exchange rate concept, which defines the equilibrium exchange rate as the one that is explained by determinants/fundamentals. FEER, developed by Williamson (1983) is a medium-term concept, which defines the equilibrium exchange rate as one that corresponds to the economy being in a medium-term

[6] These results will not be reported, to conserve space, but are available upon request.

equilibrium. Hence, our fundamental credit would correspond to the idea of BEER, while the equilibrium credit would correspond to the idea of FEER. The distinction between the two is important because a deviation of actual credit from the fundamental and from the equilibrium level of credit implies different things. If actual credit is higher than the level justified by the fundamentals, this just means that some non-fundamental factors make credit above the level that is required by the fundamentals. For example, adverse shocks to output may lower the level of GDP, which would bring about lower fundamental level of credit, making actual (already extended) credits higher than the fundamental level. This does not imply a need for a policy intervention, through prudential measures, for instance, because the fundamentals may change soon enough, making the misalignment to disappear. For example, if GDP was low due to unfavorable weather conditions, it is very likely that it will soon return to normal levels. If authorities restrict credit growth in such a case, they may unnecessarily push the economy into a recession. Deviation of actual credit from the equilibrium level, on the other hand, may imply a need for a policy intervention, because it signifies that the economy is in disequilibrium. If the deviation is prolonged, a correction should be expected, because the disequilibrium state cannot go on forever. Policymakers may want to undertake certain micro- or macro-prudential measures in such a case, in order to avoid any more costly self-correction. Another reason why policymakers should be more wary about deviations from equilibrium credit is related to time lags. Policymakers do not observe the fundamental and equilibrium credit in real time, but only with a lag, and equilibrium credit fluctuates much less than fundamental credit. Because of that, they should pay more attention to deviations of credit from the equilibrium level.

The fundamental level of credit is calculated as fitted values from the regressions estimated in the first step. The equilibrium level of credit is calculated when the long-run coefficients from the regressions are multiplied with values for the fundamentals that would occur if the economy was in medium-term equilibrium.

The medium-term equilibrium values for the fundamentals are not straightforward. Ideally, one would like to obtain them in a consistent way, using a model incorporating all the fundamentals. The fundamentals could be expressed as sums of trends (equilibrium values) and cycles, which could then be calculated using the Kalman filter algorithm. While technically feasible, this approach is problematic because it is very difficult to posit such a model that would be parsimonious. There are likely to be many underlying determinants, and omission of some of them may give wrong results. Hence, a more practical approach would be to resort to statistical filters for obtaining the equilibrium values. Indeed, for the main fundamental of credit, the GDP per capita, there are already many filters with satisfactory properties, such as the Hodrick-Prescott (HP) filter, first proposed by Whittaker (1923) and popularized by Hodrick and Prescott (1980). Hence, for the GDP per capita, we will use the HP filter. Application of this filter requires only the setting of the smoothing factor, which controls how close the extracted trend is to the original series. The factor can range from zero to infinity, with high values making the trend close to a linear trend, while low values make the trend close to the original series. Many different values for the smoothing factor have been proposed in the literature, but the originally proposed value by Hodrick and Prescott (1980) of 1600 is considered to perform satisfactorily for quarterly GDP data. Thus, for the GDP per capita data, we will use this value. To deal with the end-of-sample problem of the HP filter, the filter is applied on GDP series until 2019. GDP data until 2019 are taken from the April 2014 edition of the IMF's World Economic Outlook.[7]

[7] Alternatively, we could calculate the potential output using a production function approach. However, data on capital stock, which are required for this calculation, are not readily available for these countries and may be costly to collect. Furthermore, Jovanovic

For the other fundamentals, we could choose between the HP filter or some other available filters, such as those proposed by Christiano and Fitzgerald (1999) or Baxter and King (1995). We opt against the latter two, because they discard a certain number of initial and end observations. Hence, we are left with the HP filter, and we need only to choose a proper smoothing parameter. We first started with the originally proposed value of 1600, but it seemed to produce a non-stationary cyclical component in most of the cases. Therefore, we used the logic of Hodrick and Prescott (1980) and compared the standard deviation of the extracted cycle with the standard deviation of the extracted trend in order to choose the smoothing factor. More precisely, we chose a smoothing factor that produced similar values for the ratio between the standard deviation of the cycle and the standard deviation of the trend, as the one given by the smoothing factor of 1600 for the GDP per capita. More details are presented in the next section, suffice it to say that the finally chosen smoothing factor for the other fundamentals was 10.

Finally**, in the third step,** the deviations of the actual value of credit from the fundamental and equilibrium levels are calculated and analyzed.

IV.B. DATA

The variables used in the analysis are shown in Table 3. The table also shows data used for the construction of the variables. *Quarterly* data are used. Variables with seasonal effects (i.e. GDP and inflation) are seasonally-adjusted using the Census X-12 method, assuming a multiplicative season. The banking sector variables are interpolated from annual data, assuming constant quarterly growth rates during the year. The period of analysis is 2000-2013, subject to data availability. The panel is unbalanced. Plots of the variables are available upon request.

Table 3 – Variables and data sources

Variable name	Variable description	Data source
cred_ps_gdp	Credit to private sector, as a share of nominal GDP. In percent.	National banks' websites.
cred_gov_gdp	Credit to government sector, as a share of nominal GDP. In percent.	National banks' websites.
lgdp_pc_ppp	GDP per capita, PPP, in 2005 international dollars. Calculated as the nominal GDP, divided by the PPP conversion factor, and then by the population. In natural logarithms.	Nominal GDP is from IFS*, except for Albania and Bosnia, for which the data are from the national statistical offices. PPP conversion factors are from WDI**. Population is from IFS*.
ir_real	Real interest rate, in percent. The nominal interest rate is the short-term interest rate (policy rate/money market rate). Inflation is the quarter-on-quarter annualized CPI inflation.	Central banks' websites.

and Kabashi (2011) have found that for Macedonia the HP filter and the production function approach yield similar estimates for the potential GDP. Hence, we consider it safe to proceed with the HP filter.

gdp_qoq_ann	Quarter-on-quarter annualized real GDP growth.	IFS* for all countries, except for Albania and Bosnia, which are from the national statistical offices.
cpi_qoq_ann	Quarter-on-quarter annualized CPI inflation.	IFS*
non_int_income	Bank's income that has been generated by non-interest related activities as a percentage of total income (net-interest income plus non-interest income).	GFDD***
share_for_banks	Percentage of the number of foreign owned banks to the number of the total banks in an economy.	GFDD***
oper	Operating expenses of a bank as a share of the value of total assets held.	GFDD***
cr3	Assets of three largest commercial banks as a share of total commercial banking assets.	GFDD***

*IFS stands for the International Monetary Fund's International Financial Statistics.
**WDI stands for the World Bank's World Development Indicators.
***GFDD stands for the Global Financial Development Database of Beck et al. (2000), Beck et al. (2009) and Cihak et al. (2012)

Table 4 presents the unit root tests of the variables. Four tests are used – the Im, Pesaran and Shin (2002) test (IPS), two Fisher-type Dickey-Fuller and Phillips-Perron tests proposed by Choi (2001) (Fisher DF and Fisher PP) and the cross-sectionally augmented Dickey-Fuller test of Pesaran (2007) (CADF). The p-values of the tests are presented in the table below. The null hypothesis of the tests is that **all panels** have unit roots, while the alternative is that **some panels** are stationary. Hence, if just some panels are stationary, the tests are likely to reject the null hypothesis (i.e. to produce p-value below 0.1). On the other hand, p-value above 0.1 indicates that all the panels are non-stationary. Because of that, we will treat as non-stationary variables which have p-values above 0.1 in any of the tests.[8]

Table 4 – Unit root tests

	IPS	Fisher DF	Fisher PP	CADF	Decision
cred_ps_gdp	0.99	0.82	0.53	0.77	Non-stationary
cred_gov_gdp	1.00	1.00	0.99	1.00	Non-stationary
lgdp_pc_ppp	0.78	0.45	0.17	0.00	Non-stationary
ir_real	0.00	0.00	0.00	0.00	Stationary
gdp_qoq_ann	0.00	0.00	0.00	0.00	Stationary
cpi_qoq_ann	0.00	0.00	0.00	0.00	Stationary
non_int_income	0.19	0.06	0.08	0.06	Non-stationary
share_for_banks	0.01	0.30	0.00	0.00	Non-stationary
Oper	1.00	0.16	0.95	0.76	Non-stationary
cr3	0.21	0.00	0.00	0.00	Non-stationary

[8] The choice of the level of significance does not affect the results. Even if we chose level of 1% or 5%, instead of 10%, the conclusions would be the same, as can be seen from Table 4.

As can be seen from Table 4, only the interest rate, the GDP growth and the inflation seem to be stationary. Plots of the variables, presented in the Appendix, seem to accord with the unit root tests.[9]

Cointegration of the variables will be assessed on the grounds of the significance of the error correction mechanism in the regressions (see Pesaran et al. 1999, p. 7).

The summary statistics of the variables are shown in Table 5.

Table 5 – Summary statistics of the variables

Stats	cred_ps_gdp	lgdp_pc_ppp	cred_gov_gdp	non_int_income	share_for_banks	Oper	cr3	ir_real	gdp_qoq_ann	cpi_qoq_ann
Mean	37.75	9.38	6.75	37.56	54.45	4.66	64.37	3.90	3.13	7.73
Max	79.25	10.13	31.69	79.07	85.00	16.84	100.00	118.38	55.74	177.35
Min	8.18	8.25	0.00	12.21	19.00	0.57	35.20	-14.47	-34.21	-6.00
St. dev.	19.55	0.42	7.68	14.05	18.11	2.88	15.35	8.01	8.82	13.52
25th perc.	19.90	9.07	1.43	29.53	43.00	2.76	53.53	0.36	-0.91	1.73
75th perc.	52.84	9.74	9.68	42.30	70.00	5.46	74.06	6.68	7.19	9.39
Interquartile range	32.9	0.7	8.3	12.8	27.0	2.7	20.5	6.3	8.1	7.7
N	372	584	364	373	370	381	384	383	377	423

The correlation between the variables is shown in Tables 6 and 7. Table 6 shows the correlation between the original variables, while Table 7 – the correlation when the fixed effects are purged out (i.e. the variables are demeaned by countries). It can be seen that multicollinearity should not be a problem – in Table 6, only one correlation coefficient is above 0.7, while in Table 7, three.

[9] All unit root tests on the first-differenced variables (available upon request) produce p-values below 1 percent.

Table 6 – Correlation matrix of the original variables

	cred_ps_gdp	lgdp_pc_ppp	cred_gov_gdp	non_int_income	share_for_banks	oper	cr3	ir_real	gdp_qoq_ann	cpi_qoq_ann
cred_ps_gdp	1									
lgdp_pc_ppp	0.19	1								
cred_gov_gdp	0.61	-0.12	1							
non_int_income	-0.23	-0.13	-0.21	1						
share_for_banks	-0.25	-0.02	-0.11	-0.05	1					
Oper	-0.34	-0.32	-0.08	-0.30	0.04	1				
cr3	-0.17	-0.49	-0.25	0.07	0.03	0.18	1			
ir_real	0.14	0.38	-0.13	-0.23	-0.06	-0.15	-0.27	1		
gdp_qoq_ann	-0.21	-0.29	-0.42	0.12	0.05	0.32	**0.82**	-0.11	1	
cpi_qoq_ann	-0.52	0.18	-0.30	0.27	0.10	-0.07	-0.31	0.00	-0.35	1

Table 7 – Correlation matrix of the demeaned variables

	cred_ps_gdp	lgdp_pc_ppp	cred_gov_gdp	non_int_income	share_for_banks	oper	cr3	ir_real	gdp_qoq_ann	cpi_qoq_ann
cred_ps_gdp	1									
lgdp_pc_ppp	0.32	1								
cred_gov_gdp	**0.90**	0.30	1							
non_int_income	-0.17	-0.11	-0.28	1						
share_for_banks	-0.25	-0.14	-0.18	-0.04	1					
oper	-0.20	-0.13	-0.26	-0.33	-0.02	1				
cr3	-0.26	0.06	-0.30	-0.04	0.10	-0.12	1			
ir_real	**0.74**	0.20	**0.80**	-0.21	-0.16	-0.18	-0.37	1		
gdp_qoq_ann	-0.27	0.04	-0.37	0.20	0.09	-0.03	0.58	-0.38	1	
cpi_qoq_ann	-0.42	-0.06	-0.43	0.29	0.09	0.17	0.11	-0.47	0.03	1

IV.C. RESULTS

The regression results are presented in Table 8. As stated in section IV.A, the non-stationary variables are included in both the long-run and the short-run equations (credits to government, GDP per capita, non-interest income, share of foreign banks, operational costs and concentration ratio), while the stationary variables are included only in the short-run equation (interest rate, GDP growth and inflation).

We include only one lag of the differenced variables in the short-run equation. Inclusion of more lags caused convergence problems. We begin with a specification that includes only the GDP per capita, then we add to this specification the government credit, and then we add the variables for the banking sector characteristics one by one. We opt to include the banking sector variables one by one, and not together, because they measure a similar thing.

The specification that includes only the GDP per capita in the long-run equation is shown in the first column. The long-run coefficient of **GDP per capita** is highly significant, pointing out that the level of economic development is an important determinant of the credit to the private sector. Its magnitude implies that as GDP per capita increases by 1%, the private credit-to-GDP ratio increases by 0.4 percentage points, on average, *ceteris paribus*. This coefficient remains virtually identical when government credit is added to the specification (second column). The long-run coefficient on **government credit** is highly significant and negative, pointing out that credit to the government crowds out private credit. The crowding-out is incomplete, though – increase in credit to the government (as a share of GDP) by 1 percentage point leads to a fall in the credit to the private sector (as a share of GDP) by 0.8 percentage points. In the next four columns, we add the banking sector variables one by one. **Non-interest income** is added first, in the third column. It is highly significant, but its magnitude suggests only a modest effect – decline in non-interest income by 13 percentage points (the interquartile range of the variable; see Table 5) leads to an increase in private credit-to-GDP ratio of only 2 percentage points (12.8 * -0.162 = -2). In the specification shown in the fourth column the non-interest income is replaced by the share of foreign banks. The **share of foreign banks** is also highly significant and with a sizeable effect – increase in the share of foreign-owned banks by 30 percentage points (the interquartile range of the variable) leads to an increase in the credit to private sector by 8 percentage points (as a share of GDP). In the fifth column, we replace the share of foreign banks with the operational efficiency. **Operating costs** are, however, found to be insignificant, both statistically and economically. The same applies when the **concentration ratio** enters regression (sixth column).

It is worth noting that the coefficient on the GDP per capita changes very little in the specifications with the banking sector variables, while the coefficient of government credit remains highly significant, but with a slightly smaller magnitude.

Another thing worth noting is that the error correction term from the short-run regression is always significant and negative, implying that there is a cointegration between the variables. Its magnitude is around 0.15, meaning that it would take around a year-and-a-half to restore equilibrium. Analyzing **short-run coefficients,** GDP per capita is always significant and negative. This may seem a bit strange at first sight. It can be explained by the notion that the dependent variable is defined as a share to GDP. Increase in GDP then leads to an immediate increase in the denominator, and if the numerator (credit activity) needs some time to rise, it is plausible to see that increase in GDP translates in slower credit/GDP ratio, in the short-run. The short-run coefficients of inflation and the real interest rate are significant in some of the specifications, but never on the 1% level, and therefore, we will not interpret them.

Table 8 – Regression results

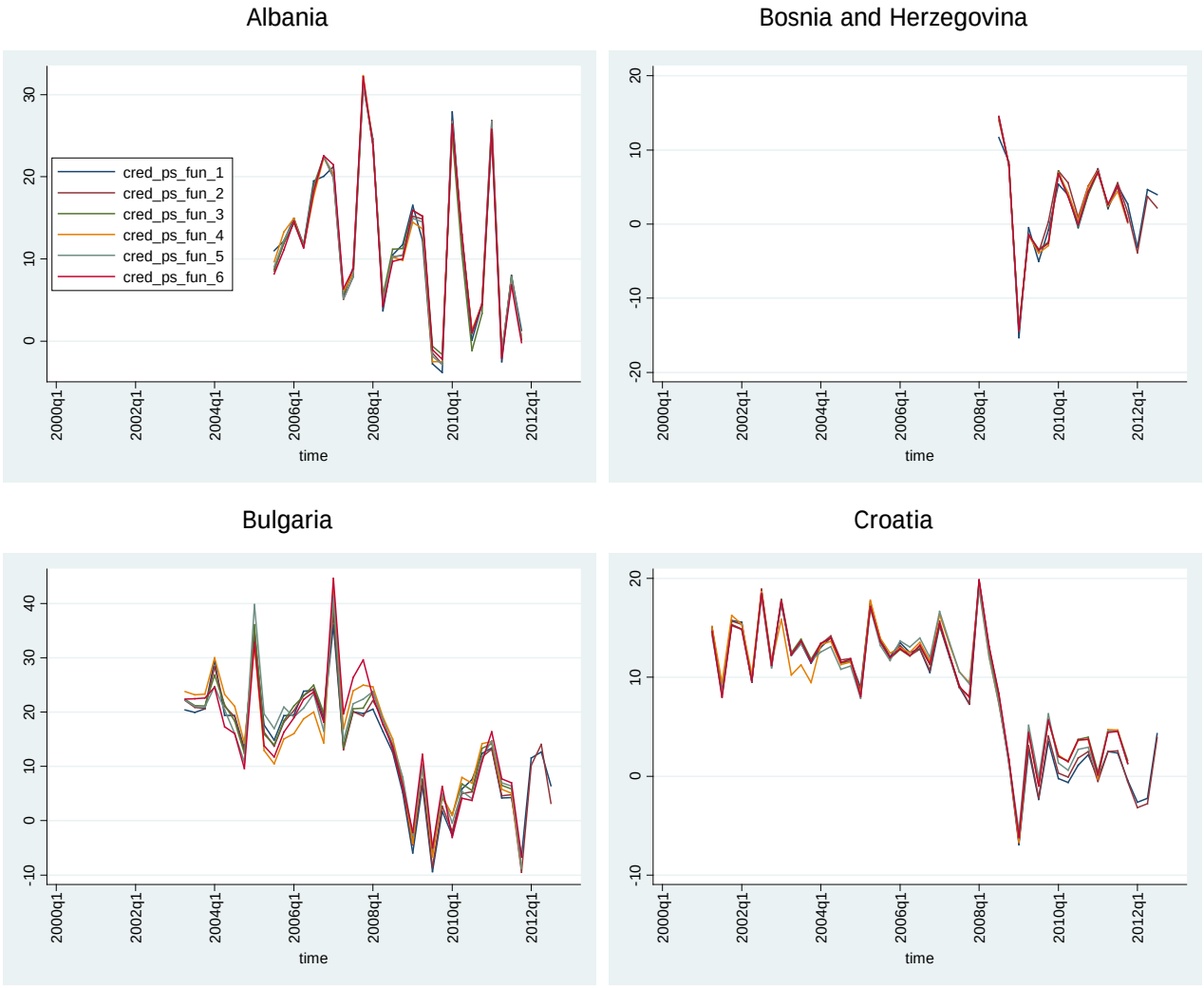
	-1-	-2-	-3-	-4-	-5-	-6-
			Long-run equation			
lgdp_pc_ppp	42.736***	43.249***	40.419***	29.882***	41.828***	43.445***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
cred_gov_gdp		-0.770***	-0.445***	-0.183	-0.590***	-0.610***
		(0.000)	(0.001)	(0.431)	(0.007)	(0.008)
non_int_income			-0.162***			
			(0.006)			
share_for_banks				0.282***		
				(0.001)		
Oper					-0.333	
					(0.669)	
cr3						0.033
						(0.713)
			Short-run equation			
ec	-0.113***	-0.135***	-0.180**	-0.174***	-0.151***	-0.153***
	(0.002)	(0.002)	(0.011)	(0.007)	(0.009)	(0.008)
D.lgdp_pc_ppp	-14.378***	-14.664**	-15.626***	-16.342***	-16.054**	-15.134***
	(0.006)	(0.014)	(0.008)	(0.003)	(0.014)	(0.008)
D.gdp_qoq_ann	-0.012***	-0.006	0.002	-0.001	0.002	0.003
	(0.001)	(0.319)	(0.811)	(0.947)	(0.836)	(0.732)
D.cpi_qoq_ann	0.025	0.079*	0.090**	0.019	0.077*	0.042
	(0.348)	(0.093)	(0.047)	(0.545)	(0.063)	(0.196)
D.ir_real	0.042	0.094*	0.111**	0.039	0.096**	0.056
	(0.198)	(0.067)	(0.025)	(0.129)	(0.032)	(0.102)
D.cred_gov_gdp		0.307	-0.152	0.098	0.032	0.108
		(0.447)	(0.616)	(0.751)	(0.942)	(0.784)
D.non_int_income			-0.061			
			(0.481)			
D.share_for_banks				0.034		
				(0.782)		
D.oper					-0.632	
					(0.507)	
D.cr3						0.088
						(0.162)
Constant	-37.670***	-45.528***	-56.291**	-41.602***	-49.274**	-52.518**
	(0.003)	(0.004)	(0.015)	(0.008)	(0.012)	(0.010)
Observations	333	325	271	278	278	278
Number of countries	8	8	8	8	8	8

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

After the regressions have been estimated, we can easily calculate the **fundamental values** for credit to private sector, as simple fits from the regressions. These fits will give the quarter-on-quarter changes in the private credit-to-GDP ratio. Because these are not very informative, we will transform them in a

more sensible figure – the annualized rate of growth of private credit. These annualized growth rates of the fundamental level of private credit, given by six different specifications, are presented in Figure 2. Each line shows the results obtained from one of the specifications from Table 4. The suffix after the name of the series denotes the specification that is used (i.e. cred_ps_fun_1 is obtained using the specification from the first column of Table 5). It can be seen that the different specifications give very similar results for the fundamental credit growth.

Figure 2 – Fundamental levels of credit to private sector, annualized rates of growth (%)



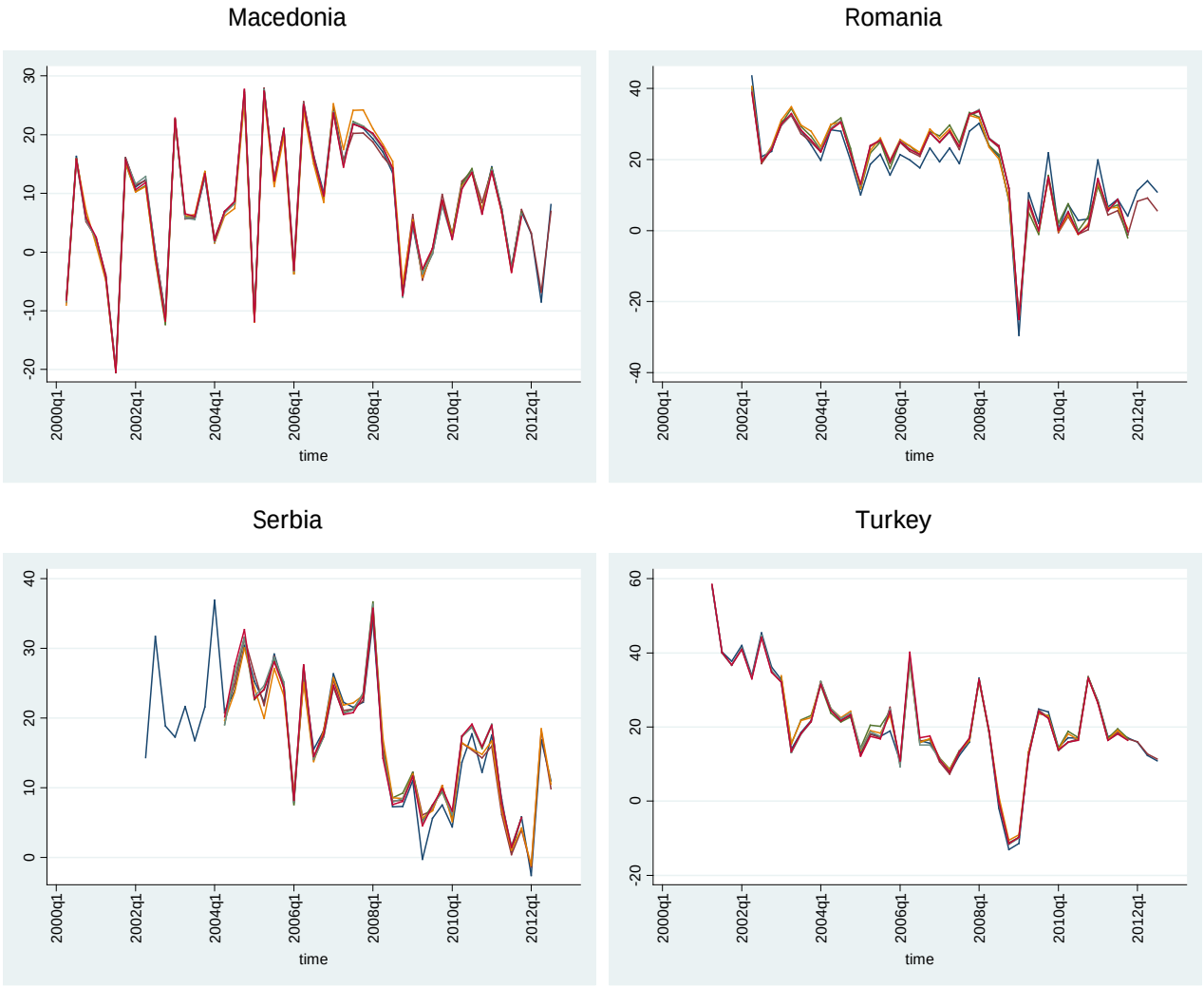
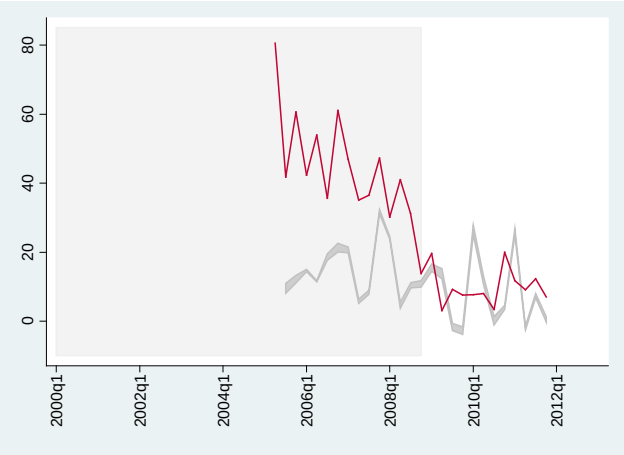


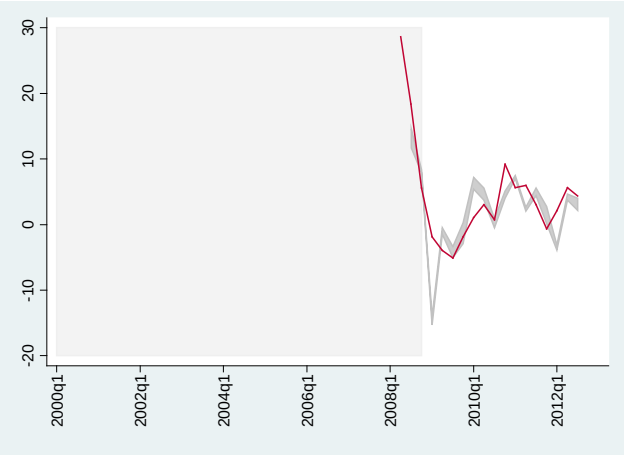
Figure 3 compares these fundamental values of credit growth with the actual values. For clarity, the fundamental values are presented as ranges between the highest and lowest of the six fundamental values (the gray areas). The pre-crisis period, i.e. the period before 2009, is shaded in the figures. *It can be observed that in all countries (except, perhaps, Bosnia and Herzegovina), during the pre-crisis period, the actual credit growth (red line) is well above the fundamental credit growth (gray areas), implying excessive credit growth.* For Albania, credit growth was excessive since 2005, for Bulgaria, since 2007, for Croatia, between 2005 and 2007, for Macedonia – since 2006, for Romania – since 2005, for Serbia – since 2007 and 2009 and for Turkey – since 2003. *After the crisis, the red line starts to fluctuate around the gray area for all countries, except maybe for Turkey, suggesting that credit growth returned to the level justified with the fundamentals with the emergence of the crisis.* Hence, the observed slowdown in credit activity in these countries after the global financial crisis seems to be a return to normality, after years of excessive credit growth.

Figure 3 – Credit to private sector, fundamental (gray areas) vs. actual (red lines) annualized rates of growth (%). The shaded area marks the pre-crisis period (i.e. before 2009).

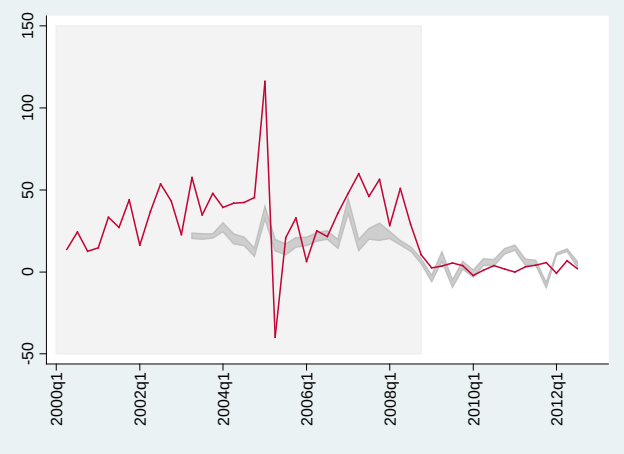
Albania



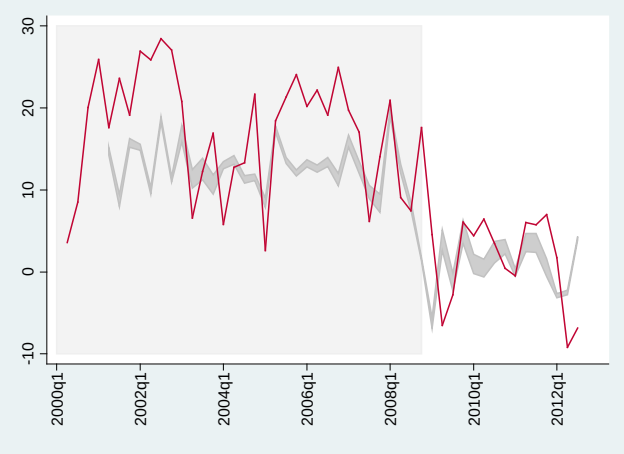
Bosnia and Herzegovina



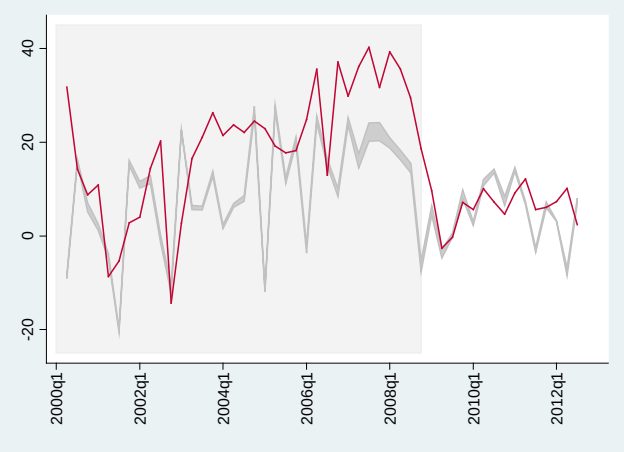
Bulgaria



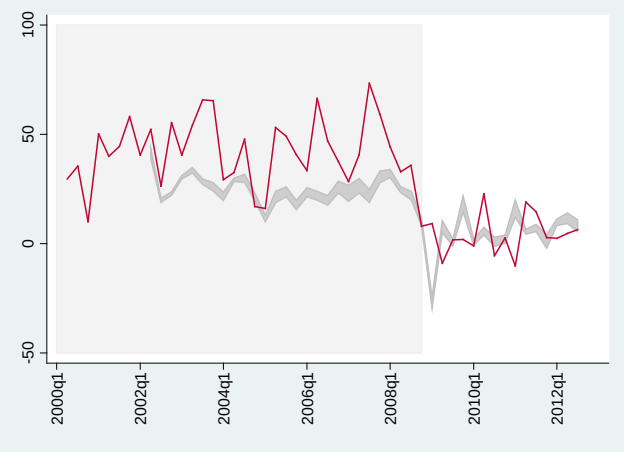
Croatia



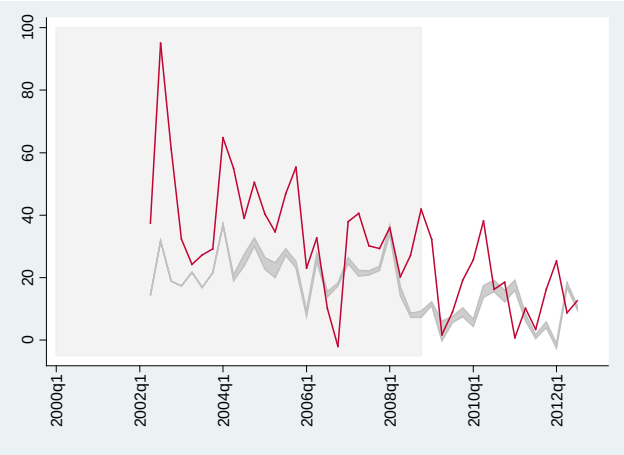
Macedonia



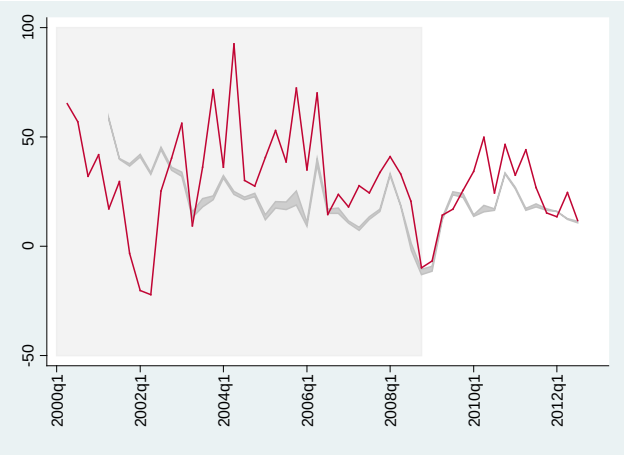
Romania



Serbia



Turkey

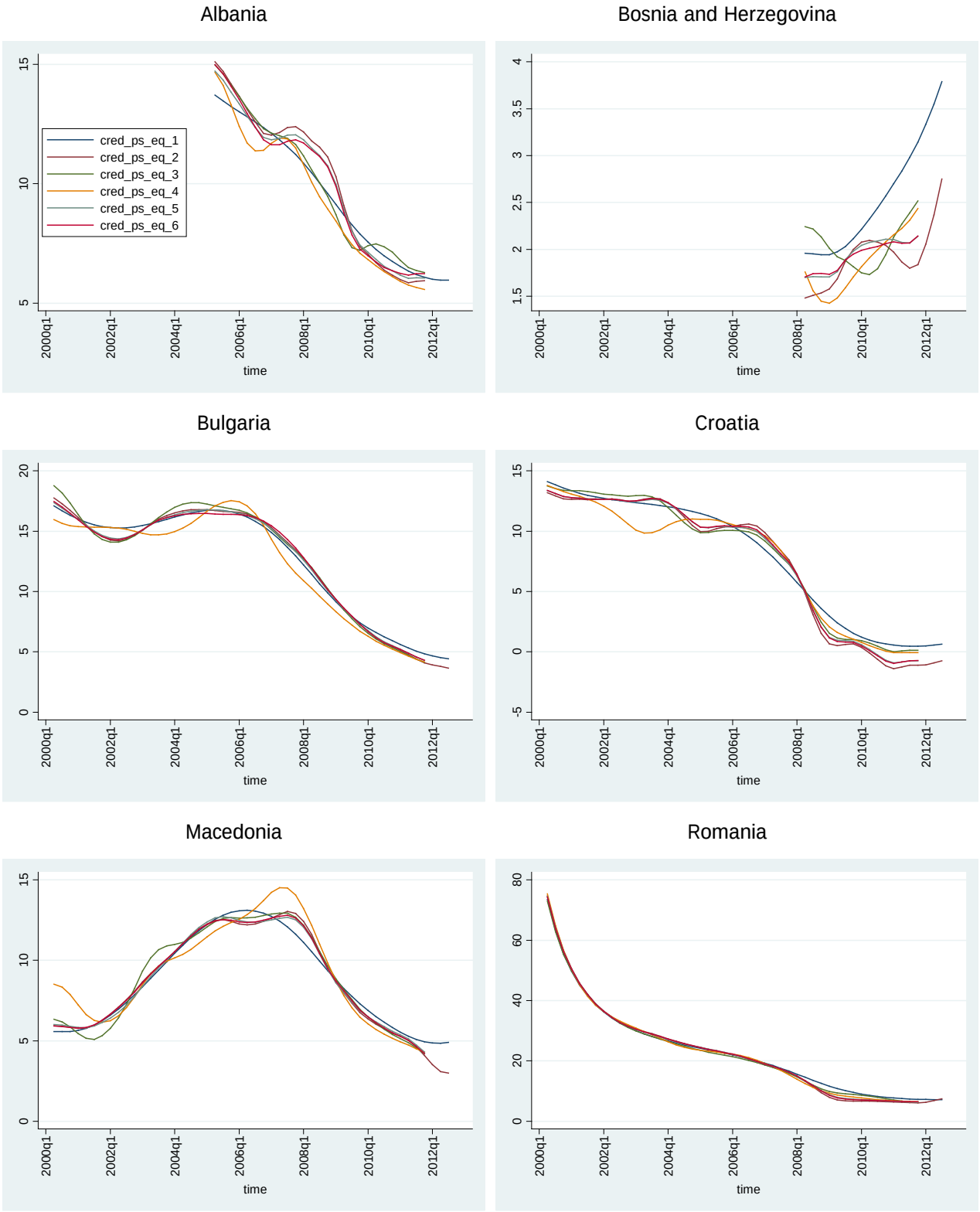


Next, we calculate the **equilibrium levels** of credit to private sector. The equilibrium levels are calculated by multiplying long-run regression coefficients with equilibrium levels of the variables that enter the long-run regressions (GDP per capita, credit to government, non-interest income, share of foreign banks, operational costs and concentration ratio). The equilibrium levels of the variables are obtained using the HP filter, as explained in the previous section. The filter is applied on the series in levels. Smoothing factor of 1600 is used for GDP, as usually in the literature. For the other five variables, smoothing factor of 10 is used, because this factor produced similar ratio between the standard deviation of the cycle and the standard deviation of the trend, as the one given by a factor of 1600 for the GDP per capita (see Table 9). To deal with the end of sample problem of the HP filter, i.e. the exaggerated influence of the last data points on the trend, the filter is applied on GDP series until 2019. The data until 2019 are taken from the April 2014 edition of the IMF's World Economic Outlook database. Figure A1 in the appendix shows the actual and the equilibrium values for the fundamentals, while Figure 4 below shows the annualized rates of growth of the equilibrium levels of credit.

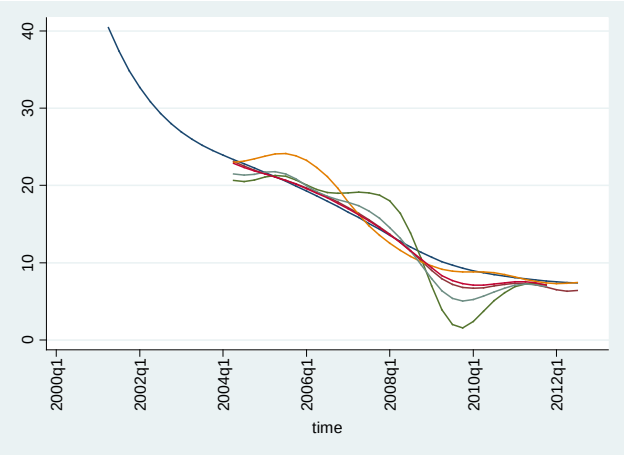
Table 9 – Standard deviation of cycle/standard deviation from trend for the fundamentals

Variable	Mean	Minimum	Maximum
lgdp_pc_ppp	0.10	0.06	0.13
cred_gov_gdp	0.21	0.09	0.52
non_int_income	0.17	0.07	0.36
share_for_banks	0.07	0.04	0.19
Oper	0.17	0.03	0.41
cr3	0.22	0.07	0.65

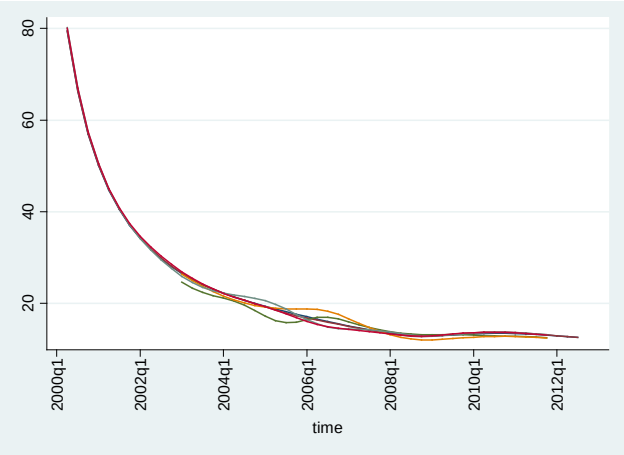
Figure 4 – Equilibrium levels of credit to private sector, annualized rates of growth (%)



Serbia

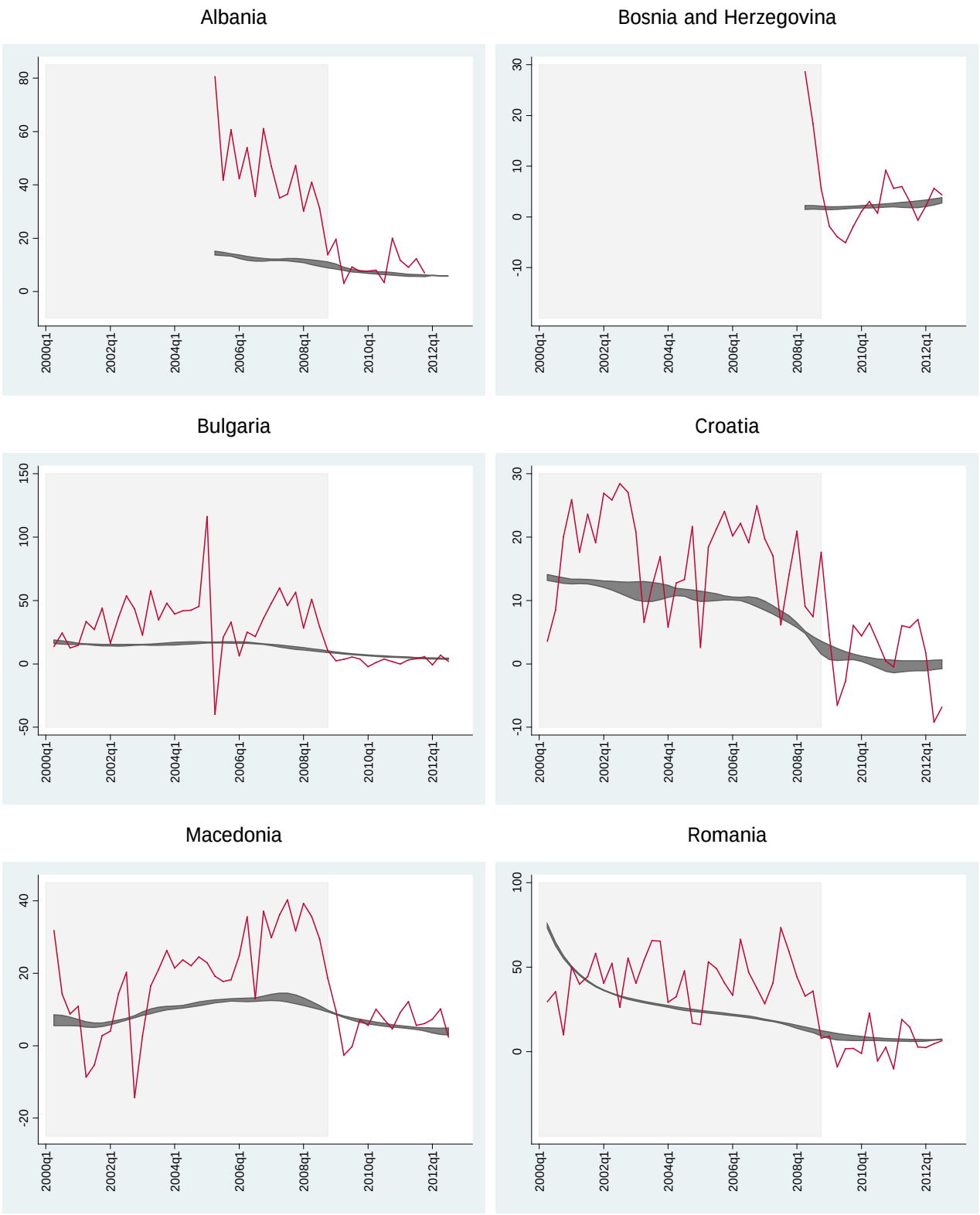


Turkey



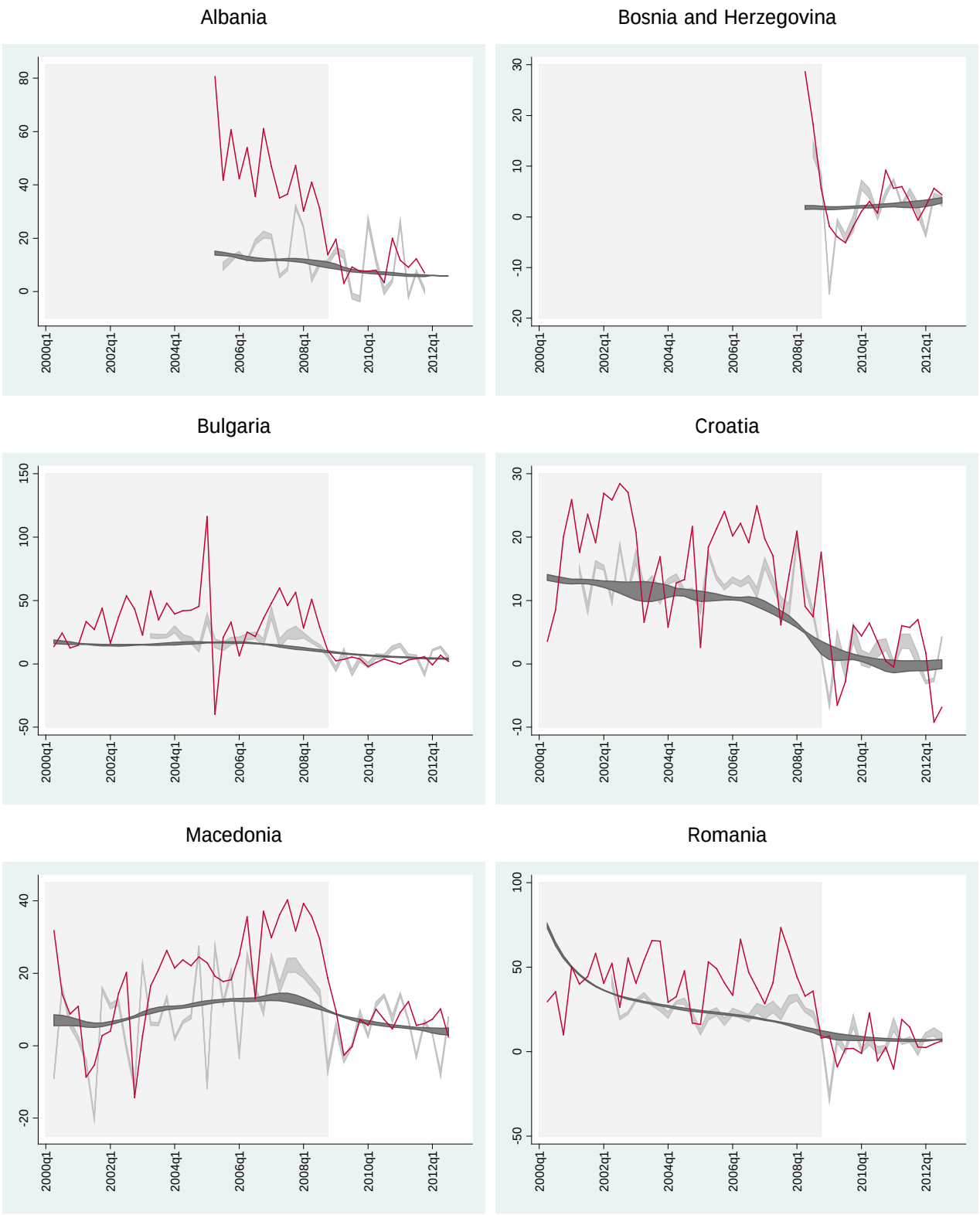
The six different equilibrium values of the private credit exhibit similar patterns, a sign of a robust estimation. The comparisons between the equilibrium credit growth and the actual credit growth are shown in Figure 5 below. The equilibrium growth, again, is shown as a gray area marking the range between the highest and the lowest of the six equilibrium values, the actual credit growth is shown as a red line, while the pre-crisis period is marked by the shaded area. Similar to the fundamental credit growth, *the equilibrium credit growth is well below the actual growth for the pre-crisis period, for prolonged period of time, for all countries (including Bosnia and Herzegovina)*. The periods of excessiveness are now longer than in the fundamental credit growth case. For Bulgaria, for instance, the excessiveness starts in 2001, while for Macedonia - in 2003. *Hence, the high pre-crisis credit growth in these countries seems to have been a disequilibrium phenomenon, and it would not have been unjustified if policymakers had intervened, in order to curb the growth and prevent costly correction. The correction is also visible from the graphs, since after the crisis actual, credit growth fell below the equilibrium growth for several quarters for seven of the analyzed countries (Serbia is an exception).* The size of the post-crisis undershooting, however, seems much smaller than the size of the pre-crisis overshooting. If the welfare effects of credit growth are proportional to the credit growth, the smaller cumulative post-crisis undershooting than the cumulative pre-crisis overshooting in credit implies that authorities were correct not to “lean against the wind” before the crisis. However, it is hard to judge whether the welfare effects of credit growth are really proportional to the credit growth. Credit can also affect the productive potential of an economy, so it may happen that the slowdown in potential GDP in these countries after the crisis (evident from Figure A1 in the appendix) is due to the slowdown in the post-crisis credit activity. Hence, in order to say whether authorities should have intervened before the crisis, in order to slow down credit growth, one needs to assess the effects of the post-crisis credit slowdown on the potential output, which is out of the scope of this paper.

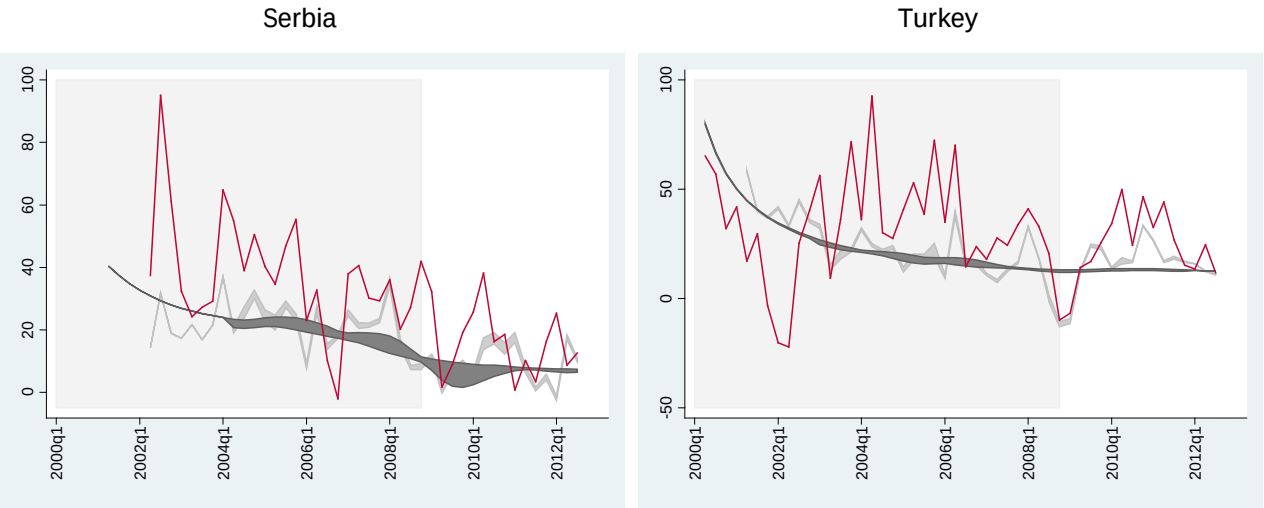
Figure 5 – Credit to private sector, equilibrium (gray areas) vs. actual (red lines) annualized rates of growth (%). The shaded area marks the pre-crisis period (i.e. before 2009).



Finally, Figure 6 below shows the actual, the fundamental and the equilibrium credit growths next to each other. *What is interesting to note here is that for all countries, except Turkey, during the pre-crisis period there are some deviations of the fundamental credit growth from the equilibrium one, meaning that the excessive pre-crisis credit growth can be partly attributed to deviations of the fundamentals from their equilibrium levels.* However, the deviations of the actual growth from the fundamental are far higher in all the countries (except Bosnia and Herzegovina). Another thing to note from this figure is that the deviations of the actual credit growth from the fundamental and the equilibrium growths are very similar qualitatively, but different quantitatively. More precisely, there are very few cases when the actual credit growth deviates from the equilibrium credit growth but does not deviate from the fundamental growth (Bosnia and Herzegovina during 2009, Croatia during 2007, Macedonia during 2004-2005, Turkey during 2011). However, the deviations from the equilibrium credit growth are often much more pronounced than the deviations from the fundamental growth. So, even if one was to use only the deviations from the fundamental credit as a measure of excessiveness, one would correctly conclude whether the credit growth is excessive or not, most of the time. Still, comparison only to the fundamental credit would underestimate the degree of excessiveness, most of the time. Hence, the distinction between the equilibrium and the fundamental credit that we propose does not seem to be unjustified.

Figure 6 – Actual (red line), fundamental (light gray) and equilibrium (dark gray) credit, annualized rates of growth (%). The shaded area marks the pre-crisis period (before 2009).





IV.D. COMPARISON WITH OTHER STUDIES AND ROBUSTNESS

Because the SEE economies during the analyzed period may have been converging to the equilibrium rather than fluctuating around it, the resulting coefficients may be imprecisely estimated (biased upwards). To check the above, we compare our estimates for the variable that drives the results, the GDP per capita, with the estimates obtained by other studies. These comparisons are presented in Table 10. Comparative studies are those presented in Table 2. Geršl and Seidler (2011) are omitted, because their definition of the GDP per capita is not in logs, but in absolute values. Due to differences in the measurement of credit variable, our coefficient needs to be divided by 100 so as to be comparable with the other studies. It can be seen that our estimate of the GDP per capita coefficient, of 0.43, is very similar to the coefficients obtained by four of the studies (Egert et al., 2006, Boissay et al., 2006, Kiss et al., 2006, and Coudert and Pouvelle, 2010). Only Cottarelli et al. (2005) have a far lower value, for unknown reasons. Hence, we may say that our estimates do not seem to be imprecisely estimated.

Table 10 – Comparison of our estimates with other papers

Study	**Coefficient**	**Note**
Our coefficient, Table 6	0.30-0.43	
Egert et al (2006), Table 3	0.39 - 0.42	Large OECD
	0.48 - 0.64	Small OECD
	0.49-0.71	Emerging economies
Boissay et al (2006), Table 2	0.53	
Kiss et al (2006), Table 1	0.51	
Coudert and Pouvelle (2010), Table 7	0.24-0.54	
Cottarelli et al (2005), Table 12	0.08	

This comparison also shows another thing, that the SEE countries do not seem to differ a lot from the other countries in terms of the sensitivity of credit activity to economic activity. If one accepts this, it

would imply that the low level of financial development in the SEE countries is primarily due to the low level of economic development.

Next, we conduct a few robustness checks. First, we estimate the regressions using a different estimation techniques (system GMM and Dynamic OLS). Then we estimate the regressions on a shortened sample, followed by the regressions eliminating the countries one by one. We again focus on the GDP per capita variable, the variable that drives the results.

We first present the results obtained with the system GMM technique, developed by Blundell and Bond (1998), which is based on the Generalized Method of Moments (GMM)[10]. Since GMM alleviates endogeneity issues, these results can also serve as informal checks for the severity of the endogeneity, which is likely to be present in our case because credit activity can also affect the explanatory variables (e.g. higher credit may lead to higher GDP). Given the many interconnections between finance and economic activity, documented well in the literature on finance and growth (see Levine, 2005), it is clear that we cannot completely rule out endogeneity. Even if it were possible to do so (by using instrumental variables, for instance), it would not be desirable for our analysis, because in that way we would focus only on the exogenous variation in economic activity, while we also want to analyse the endogenous variation, stemming from the various interactions between economic and credit activity. Therefore, what is important is that our results are not severely biased by endogeneity, and we can be confident that they are not if the alternative estimation techniques that we apply produce similar results, which are not very different from those established in the existing literature.

The results of the system GMM estimations are shown in Table 11.[11] The coefficients that are reported are the long-run coefficients[12]. In our judgment, they are not very different from the previous results. For example, the average value for the GDP per capita (the most important variable for the dynamics of the credits in our model) from the six-system GMM specification is 48, while previously it was 40. Hence, we interpret these findings as a further indication of robustness of our results.

[10] The system GMM estimator has been designed for small T, large N panels, which means that it is not entirely appropriate for our case. As a matter of fact, for this reason we have not used it as our main estimator. Still, since we use it only for robustness checks, it should do well.

[11] To prevent instrument proliferation, the number of lags for the instruments has been limited to 2. The instruments have also been collapsed. Orthogonal transformations of variables, instead of first-differences, are used. The Windmeijer (2005) correction for the standard errors is applied, as suggested by Roodman (2009).

[12] Obtained when the regression coefficients are divided by one, minus the coefficient on the lag of the dependent variable.

Table 11 – Results obtained using system GMM

	-1-	-2-	-3-	-4-	-5-	-6-
lgdp_pc_ppp	52.580***	46.708***	57.083***	20.538***	53.870***	61.857***
	(0.000)	(0.000)	(0.000)	(0.614)	(0.000)	(0.000)
cred_gov_gdp		0.754	-0.608	-0.196	1.396	0.362
		(0.544)	(0.804)	(0.881)	(0.251)	(0.767)
non_int_income			-0.062			
			(0.793)			
share_for_banks				1.060		
				(0.260)		
Oper					2.009***	
					(0.003)	
cr3						0.256
						(0.230)
Number of instruments	4	7	10	10	10	10
AB AR(1) test (p. val.)	0.050	0.052	0.062	0.052	0.068	0.060
AB AR(2) test (p val.)	0.138	0.142	0.178	0.143	0.178	0.184
Sargan test (p val.)	0.751	0.769	0.283	0.009	0.275	0.418
Hansen test (p val.)	0.784	0.138	0.466	0.256	0.518	0.927
Number of observations	364	357	299	306	309	309
Number of countries	8	8	8	8	8	8

AB AR(1) and AB AR(2) tests are the Arellano-Bond tests for first and second order serial correlation in the residuals. Sargan and Hansen tests are test of validity of the overidentifying restrictions.

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Next we estimate the regressions using Kao and Chiang (2000) Dynamic OLS for cointegrated panel data with homogeneous long-run covariance structure across cross-sectional units. As Kao and Chiang (2000) show, this Dynamic OLS outperforms both OLS and Fully-Modified OLS in finite samples. These results are presented in Table 12 below. Two lags and one lead of the variables are included. As a result, the sample is reduced somewhat. Still, the results are very similar to the previous results. The average value for the GDP per capita is 40, which is the same as with the PMG.

Table 12 – Results obtained using dynamic OLS

	-1-	-2-	-3-	-4-	-5-	-6-
lgdp_pc_ppp	47.305***	36.947***	42.864***	61.617***	16.180***	30.422***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)	(0.000)
cred_gov_gdp		1.653***	-0.060	-1.642***	1.538***	1.614***
		(0.000)	(0.888)	(0.000)	(0.000)	(0.000)
non_int_income			-0.634***			
			(0.001)			
share_for_banks				-0.315*		
				(0.078)		
oper					-7.790***	
					(0.000)	
cr3						-0.278***
						(0.001)
R-squared	0.548	0.426	0.807	0.715	0.658	0.509
Number of observations	204	204	176	176	220	220
Number of countries	4	4	4	4	5	5

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

We then estimate the regressions on a shortened sample, i.e. for the period before 2010, which roughly correspond to the pre-crisis period.[13] Bosnia and Herzegovina is excluded from these estimations, due to insufficient observations on credit to private sector, which is available only since 2008. These results are presented in Table 13. As can be seen, the number of observations in these estimations drops by 30-40%. As a result, only two of the six specifications could be estimated, due to convergence problems. Nevertheless, the coefficients on GDP per capita from these estimations are again similar to those obtained previously.

[13] It was impossible to estimate the regressions for the period before 2009, due to insufficient observations.

Table 13 – Results from the shortened sample

	(2)	(3)
	Long-run equation	
lgdp_pc_ppp	67.195***	44.053***
	(0.000)	(0.000)
cred_gov_gdp	-4.649***	5.174***
	(0.001)	(0.006)
non_int_income		-1.759***
		(0.002)
	Short-run equation	
ec	-0.061	-0.030
	(0.142)	(0.329)
D.lgdp_pc_ppp	-11.735**	-13.648***
	(0.019)	(0.007)
D.gdp_qoq_ann	-0.004	-0.009
	(0.589)	(0.290)
D.cpi_qoq_ann	0.034	0.003
	(0.628)	(0.971)
D.ir_real	0.012	-0.015
	(0.830)	(0.837)
D.cred_gov_gdp	0.012	-0.195
	(0.980)	(0.671)
D.non_int_income		0.132
		(0.490)
Constant	-35.150	-11.785
	(0.113)	(0.368)
Observations	208	201
Countries	7	7

P values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Finally, we estimate the six specifications excluding the countries one by one, to see if the results are likely to be driven by some influential country. These results are shown in the Appendix, in Table A1-A6 below. Once again, the results appear very similar to those obtained previously, which we consider as another sign of stability.

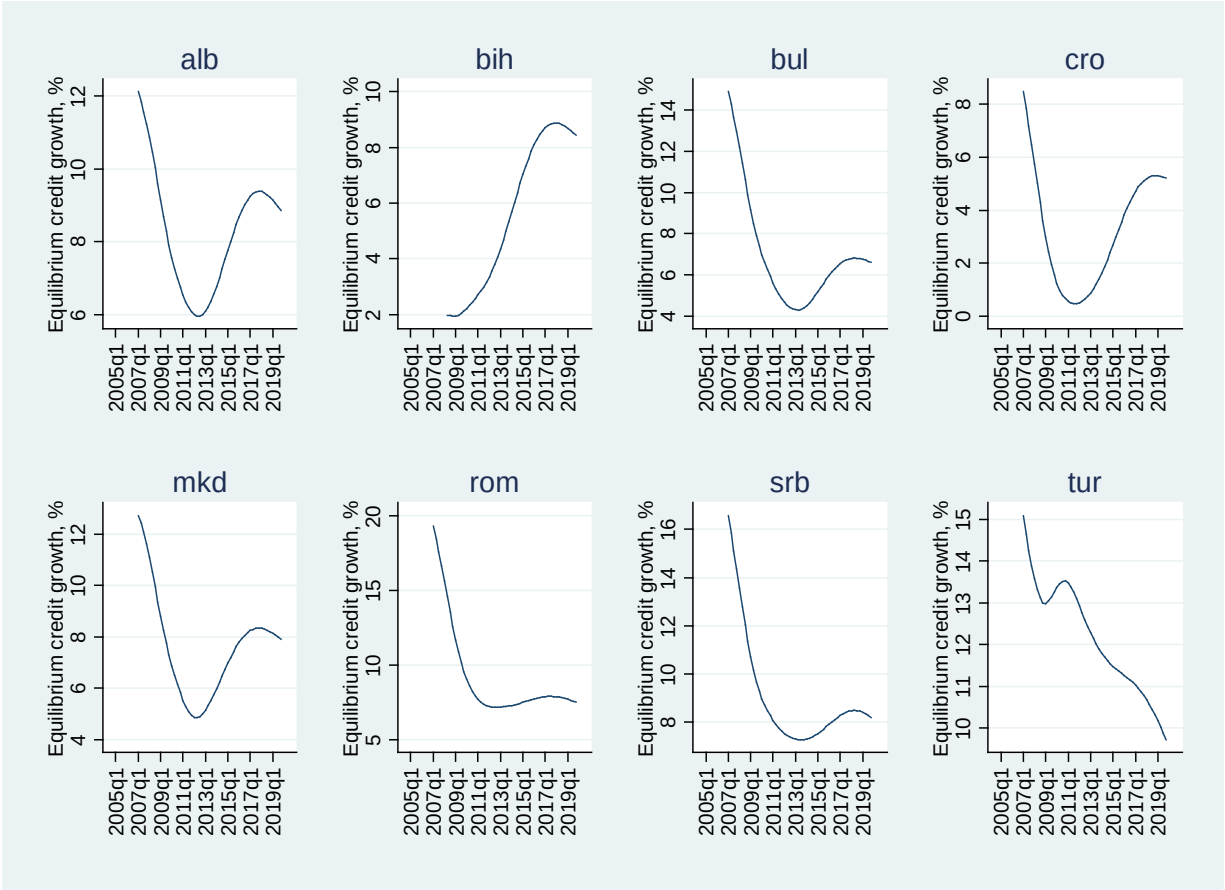
IV.E. FORECASTS OF FUTURE EQUILIBRIUM CREDIT GROWTH

We finish the analysis by presenting forecasts for the future equilibrium credit growth in the SEE countries, as an indication of what our analysis implies for the future credit growth. The forecasts are made until 2019, using the first specification (the one that includes only GDP per capita as an explanatory variable for credit activity). We use only this specification, since the forecasts for credit activity require forecasts for the explanatory variables, and it is very hard to come up with credible forecasts for variables

such as government credit, share of foreign banks etc. Forecasts for future GDP, on the other hand, are readily available through the World Economic Outlook database, for instance[14].

The forecasts are shown on Figure 7 below. As can be seen, the forecasted future growth rates of equilibrium credit vary by countries. The equilibrium credit growth is highest for Turkey (around 10-11%), followed by Albania and Bosnia and Herzegovina (around 9%). For Macedonia, Serbia and Romania, it is around 8%, for Bulgaria – around 7%, and for Croatia, it is around 5%. It can also be seen that the forecasted future equilibrium credit growth is lower than the past equilibrium credit growth, which can be read as a sign that high credit growth rates, such as those from the period before the global financial crisis, should not be expected in the future.

Figure 7 – Forecasts for the future growth of equilibrium credit



[14] We use the forecasts from the April 2014 World Economic Outlook.

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

Over the last decade or so, the SEE countries experienced a boom-bust cycle in their credit activity. The period up to 2008 was marked with dynamic credit growth going up as high as 60% per year, boosted by successfully completed macroeconomic stabilization, strengthened and thoroughly reformed banking sectors and stimulating global environment. This was also a period of rapid economic convergence towards the EU, in terms of GDP per capita. When the economic boom turned to bust following the Lehman Brothers collapse in early autumn 2008, credit growth slumped sharply to single-digit levels even initiating a deleveraging process in some countries. Six years later, credit markets seem to be still struggling to recover with credit growth remaining considerably subdued in most of the SEE countries.

In this study we analyze credit growth in eight SEE countries, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia and Turkey, during 2000-2013. Our primary aim is to assess whether the rapid credit growth before the crisis was excessive, and whether the post-crisis credit slowdown is justified. Towards that end, we calculate the fundamental and equilibrium levels of credit growth. The fundamental growth is defined as the growth justified by the fundamentals, while the equilibrium growth mirrors the growth consistent with the economy being in medium-term equilibrium. Both of these indicators analyze credit in a broader macroeconomic context. However, we believe that recognizing the distinction between the two of them is important, particularly when it comes to policy lessons and recommendations. In this context, we find the equilibrium level as more superior benchmark for assessing credit developments as it evaluates credit with respect to its medium-term equilibria. Fundamental level, on the other hand, may be influenced by temporary or one-off shocks in country's fundamentals, suggesting that not all deviations from the fundamental level should be treated as a signal for policy reaction.

Our findings suggest that during the boom years preceding the global crisis, credit markets in SEE had experienced several years of disequilibria with overperforming credit growth. Rapid credit growth in this period was well above its fundamental level in most of the countries, considerably overshooting the equilibrium level as well. Our results explain the post-crisis slowdown in credit as a return to normality, since credit growth moved in line with the fundamental and the equilibrium credit levels, with only short undershootings in the immediate aftermath of the crisis. Our forecasts of the future equilibrium credit growth suggest a modest downward adjustment compared to the pre-crisis level, indicating that credit booms of similar scale and intensity as in the years preceding the crisis are not something to be expected in SEE in near to medium-term.

Turning to policy actions, our paper points to proper reaction by SEE authorities for smoothing the boom-bust cycle in credit activity over the last decade or so. Authorities responded properly when they implemented measures for curbing credit growth in the pre-crisis period as they were shielding against the macroeconomic and financial risks emerging from excessive credit growth. They were also right to accommodate monetary policy in response to the crisis, due to the below-equilibrium credit growth in the immediate aftermath of the crisis. Our research also urges policy makers to carefully assess the forces behind the credit developments when taking policy decisions, as they are crucial in designing appropriate policy stance that will assure sustainable development of the credit market.

The main limitation of our study, especially regarding the assessment of the future movements in credit markets in SEE countries, refers to the notion that it is based on extrapolation of past trends, which assumes absence of major structural changes in the analyzed economies. Hence, the forecasts about the

future equilibrium levels of credit growth are based on the assumption that the structure of economy will remain unchanged, as a result of which, the relationship between GDP and credit will also remain as in the past. This may seem a strong assumption in countries such as ours, which are going through a process of convergence to the EU countries. Certain technological and institutional changes, for instance, may increase the sensitivity of credit activity to economic activity, which would raise the equilibrium credit growth. Our results would, therefore, not hold if such “jumps” to higher equilibria occur.

Another limitation of our study is that it focuses only on domestic credit, leaving cross-border credit aside, and that it does not distinguish between different types of credit, such as credit to households and credit to companies. These limitations may be worthwhile investigating in the future.

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Appendix

Table A1 – Results of the first specification excluding the countries one by one

	No Albania	No B&H	No Bulgaria	No Croatia	No Macedonia	No Romania	No Serbia	No Romania
				Long-run equation				
L.lgdp_pc_ppp	42.665***	43.140***	42.680***	42.562***	28.250***	43.374***	42.647***	43.273***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
				Short-run equation				
Ec	-0.109**	-0.089***	-0.112***	-0.117***	-0.129**	-0.117***	-0.119***	-0.138***
	(0.011)	(0.009)	(0.009)	(0.006)	(0.045)	(0.005)	(0.005)	(0.000)
D.lgdp_pc_ppp	-14.753**	-12.287**	-11.201**	-13.556**	-16.808***	-14.259**	-15.490***	-17.980***
	(0.013)	(0.025)	(0.018)	(0.022)	(0.005)	(0.017)	(0.008)	(0.000)
D.gdp_qoq_ann	-0.013***	-0.014***	-0.014***	-0.009***	-0.010	-0.012***	-0.011***	-0.013***
	(0.004)	(0.000)	(0.001)	(0.000)	(0.115)	(0.007)	(0.009)	(0.003)
D.cpi_qoq_ann	0.006	0.036	0.019	0.034	0.103**	0.016	0.033	0.020
	(0.778)	(0.197)	(0.532)	(0.243)	(0.015)	(0.586)	(0.261)	(0.508)
D.ir_real	0.019	0.049	0.034	0.044	0.113**	0.037	0.065**	0.040
	(0.475)	(0.177)	(0.348)	(0.243)	(0.025)	(0.329)	(0.017)	(0.288)
Constant	-36.342**	-30.225**	-37.347**	-38.864***	-25.853**	-39.560***	-39.925***	-47.439***
	(0.014)	(0.014)	(0.012)	(0.009)	(0.050)	(0.008)	(0.006)	(0.000)
Observations	307	312	291	283	279	288	287	284
Countries	7	7	7	7	7	7	7	7

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2 – Results of the second specification excluding the countries one by one

	No B&H	No Bulgaria	No Croatia	No Macedonia	No Romania	No Serbia	No Turkey
				Long-run equation			
L.lgdp_pc_ppp	43.823***	43.076***	43.010***	37.649***	43.812***	43.185***	43.708***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.cred_gov_gdp	-0.946***	-0.747***	-0.743***	-0.475***	-0.450**	-0.759***	-0.797***
	(0.000)	(0.000)	(0.000)	(0.010)	(0.017)	(0.000)	(0.000)
				Short-run equation			
Ec	-0.103***	-0.138***	-0.145***	-0.138**	-0.133**	-0.144***	-0.166***
	(0.008)	(0.007)	(0.004)	(0.017)	(0.016)	(0.004)	(0.000)
D.lgdp_pc_ppp	-12.691**	-10.666**	-13.717**	-15.930**	-14.406**	-15.571**	-18.660***
	(0.048)	(0.038)	(0.044)	(0.019)	(0.035)	(0.022)	(0.000)
D.gdp_qoq_ann	-0.009	-0.005	-0.003	-0.006	-0.010	-0.005	-0.006
	(0.173)	(0.533)	(0.673)	(0.506)	(0.140)	(0.478)	(0.387)
D.cpi_qoq_ann	0.082	0.073	0.103**	0.093***	0.046	0.088*	0.085
	(0.210)	(0.161)	(0.018)	(0.008)	(0.216)	(0.092)	(0.135)
D.ir_real	0.093	0.087	0.111**	0.104***	0.066	0.116**	0.102*
	(0.183)	(0.127)	(0.038)	(0.009)	(0.116)	(0.026)	(0.097)
D.cred_gov_gdp	0.419	0.533	0.360	0.342	0.268	0.230	-0.030
	(0.344)	(0.168)	(0.435)	(0.462)	(0.574)	(0.615)	(0.907)
Constant	-35.430**	-46.709**	-48.872***	-39.607**	-44.746**	-48.634***	-57.456***
	(0.015)	(0.011)	(0.006)	(0.024)	(0.021)	(0.007)	(0.000)
Observations	304	283	275	271	280	287	276
Countries	7	7	7	7	7	7	7

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A3 – Results of the third specification excluding the countries one by one

	No Albania	No B&H	No Bulgaria	No Croatia	No Macedonia	No Romania	No Turkey
				Long-run equation			
L.lgdp_pc_ppp	40.738***	40.363***	40.346***	40.349***	40.770***	36.698***	40.624***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.non_int_income	-0.143**	-0.174***	-0.157***	-0.168***	-0.184	-0.310**	-0.151**
	(0.018)	(0.003)	(0.007)	(0.005)	(0.237)	(0.031)	(0.012)
L.cred_gov_gdp	-0.472***	-0.431***	-0.436***	-0.451***	-0.475*	-0.701	-0.447***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.089)	(0.199)	(0.001)
				Short-run equation			
Ec	-0.182**	-0.136**	-0.190**	-0.198**	-0.178**	-0.155*	-0.213***
	(0.022)	(0.035)	(0.019)	(0.012)	(0.029)	(0.066)	(0.003)
D.lgdp_pc_ppp	-16.429**	-13.801**	-11.210**	-14.266**	-17.053***	-16.074**	-18.937***
	(0.015)	(0.035)	(0.013)	(0.032)	(0.009)	(0.014)	(0.001)
D.non_int_income	-0.090	-0.049	-0.088	-0.068	-0.062	0.009	-0.081
	(0.323)	(0.628)	(0.356)	(0.497)	(0.541)	(0.865)	(0.402)
D.gdp_qoq_ann	0.002	-0.004	0.003	0.007	0.004	-0.004	0.003
	(0.801)	(0.613)	(0.723)	(0.366)	(0.651)	(0.544)	(0.768)
D.cpi_qoq_ann	0.052*	0.095*	0.080	0.112**	0.102**	0.084*	0.095*
	(0.085)	(0.054)	(0.117)	(0.013)	(0.033)	(0.052)	(0.075)
D.ir_real	0.067**	0.116**	0.100*	0.126**	0.118**	0.099**	0.115**
	(0.022)	(0.032)	(0.073)	(0.018)	(0.029)	(0.038)	(0.048)
D.cred_gov_gdp	-0.217	-0.011	0.076	-0.153	-0.158	-0.196	-0.274
	(0.527)	(0.971)	(0.746)	(0.661)	(0.647)	(0.519)	(0.394)
Constant	-58.007**	-43.448*	-59.752**	-62.041**	-55.991**	-40.207*	-67.713***
	(0.026)	(0.051)	(0.023)	(0.016)	(0.037)	(0.073)	(0.003)
Observations	307	312	291	283	279	288	287
Countries	7	7	7	7	7	7	7

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A4 – Results of the fourth specification excluding the countries one by one

	No Albania	No B&H	No Bulgaria	No Croatia	No Macedonia	No Romania	No Serbia	No Turkey
				Long-run equation				
lgdp_pc_ppp	30.510***	31.79***	29.438***	29.663***	38.004***	5.370	27.755***	30.717***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.743)	(0.000)	(0.000)
non_int_income	0.271***	0.247***	0.289***	0.285***	0.111	0.207	0.324***	0.269***
	(0.002)	(0.004)	(0.001)	(0.001)	(0.570)	(0.503)	(0.000)	(0.002)
cred_gov_gdp	-0.255	-0.151	-0.168	-0.197	-0.281	0.171	-0.105	-0.198
	(0.317)	(0.478)	(0.467)	(0.415)	(0.272)	(0.883)	(0.642)	(0.395)
				Short-run equation				
Ec	-0.180**	-0.125***	-0.185**	-0.191***	-0.162**	-0.150	-0.188**	-0.204***
	(0.015)	(0.006)	(0.013)	(0.008)	(0.013)	(0.214)	(0.014)	(0.001)
D.lgdp_pc_ppp	-17.463***	-14.269**	-12.864***	-14.722**	-17.366***	-15.156**	-17.624***	-19.721***
	(0.005)	(0.017)	(0.009)	(0.015)	(0.005)	(0.024)	(0.004)	(0.000)
D.non_int_income	0.027	-0.011	0.146**	0.007	-0.088	0.400	0.068	0.041
	(0.844)	(0.933)	(0.026)	(0.957)	(0.523)	(0.394)	(0.653)	(0.762)
D.gdp_qoq_ann	0.000	-0.006	-0.001	0.004	0.003	-0.011	0.001	-0.000
	(0.986)	(0.356)	(0.929)	(0.626)	(0.737)	(0.105)	(0.876)	(0.972)
D.cpi_qoq_ann	0.023	0.025	0.008	0.039	0.022	-0.001	0.013	0.014
	(0.510)	(0.435)	(0.817)	(0.159)	(0.512)	(0.987)	(0.721)	(0.684)
D.ir_real	0.039	0.045*	0.028	0.051*	0.040	0.027	0.047	0.034
	(0.190)	(0.088)	(0.307)	(0.058)	(0.184)	(0.629)	(0.102)	(0.234)
D.cred_gov_gdp	0.057	0.242	0.300	0.133	0.058	0.152	0.000	-0.078
	(0.870)	(0.440)	(0.268)	(0.707)	(0.873)	(0.669)	(1.000)	(0.793)
Constant	-43.923**	-32.841**	-43.856**	-45.573***	-48.748**	0.265	-42.068**	-50.612***
	(0.015)	(0.012)	(0.013)	(0.008)	(0.016)	(0.688)	(0.014)	(0.001)
Observations	252	264	243	235	231	239	240	242
Countries	7	7	7	7	7	7	7	7

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A5 – Results of the fifth specification excluding the countries one by one

	No Albania	No B&H	No Bulgaria	No Croatia	No Macedonia	No Romania	No Serbia	No Turkey
				Long-run equation				
lgdp_pc_ppp	11.146	41.904***	41.688***	41.896***	21.713***	18.074	42.727***	41.540***
	(0.564)	(0.000)	(0.000)	(0.000)	(0.000)	(0.190)	(0.000)	(0.000)
Oper	-1.429	-0.271	-0.341	-0.306	-3.943***	-0.508	-0.012	-0.593
	(0.262)	(0.724)	(0.661)	(0.695)	(0.000)	(0.695)	(0.989)	(0.563)
cred_gov_gdp	2.768	-0.516**	-0.576***	-0.604***	-0.168	-0.565	-0.564**	-0.639***
	(0.108)	(0.011)	(0.008)	(0.008)	(0.208)	(0.595)	(0.011)	(0.007)
				Short-run equation				
Ec	-0.043	-0.111**	-0.161**	-0.164**	-0.195*	-0.122	-0.166***	-0.183***
	(0.370)	(0.019)	(0.016)	(0.012)	(0.067)	(0.220)	(0.009)	(0.001)
D.lgdp_pc_ppp	-18.427**	-13.889*	-11.608**	-14.617**	-17.664**	-15.472**	-17.327**	-20.209***
	(0.021)	(0.052)	(0.036)	(0.046)	(0.015)	(0.046)	(0.019)	(0.001)
D.oper	-1.244	-0.470	0.181	-1.182	-1.034	-1.006	-0.703	-0.714
	(0.241)	(0.663)	(0.752)	(0.188)	(0.404)	(0.395)	(0.519)	(0.517)
D.gdp_qoq_ann	-0.006	-0.004	0.004	0.006	0.000	-0.011*	0.002	0.002
	(0.629)	(0.611)	(0.709)	(0.449)	(0.980)	(0.090)	(0.868)	(0.803)
D.cpi_qoq_ann	0.069	0.079*	0.054	0.102***	0.112***	0.103**	0.076*	0.085*
	(0.356)	(0.074)	(0.172)	(0.009)	(0.006)	(0.043)	(0.099)	(0.095)
D.ir_real	0.114	0.098**	0.069*	0.114**	0.122**	0.119**	0.110**	0.106*
	(0.127)	(0.041)	(0.091)	(0.020)	(0.025)	(0.042)	(0.017)	(0.052)
D.cred_gov_gdp	-0.152	0.202	0.308	0.056	0.145	0.133	-0.069	-0.315
	(0.783)	(0.673)	(0.451)	(0.914)	(0.772)	(0.786)	(0.891)	(0.346)
Constant	-0.373	-36.980**	-52.394**	-53.477**	-25.642*	-11.453	-55.703**	-59.479***
	(0.880)	(0.030)	(0.019)	(0.015)	(0.077)	(0.276)	(0.011)	(0.001)
Observations	252	264	243	235	231	239	247	235
Countries	7	7	7	7	7	7	7	7

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

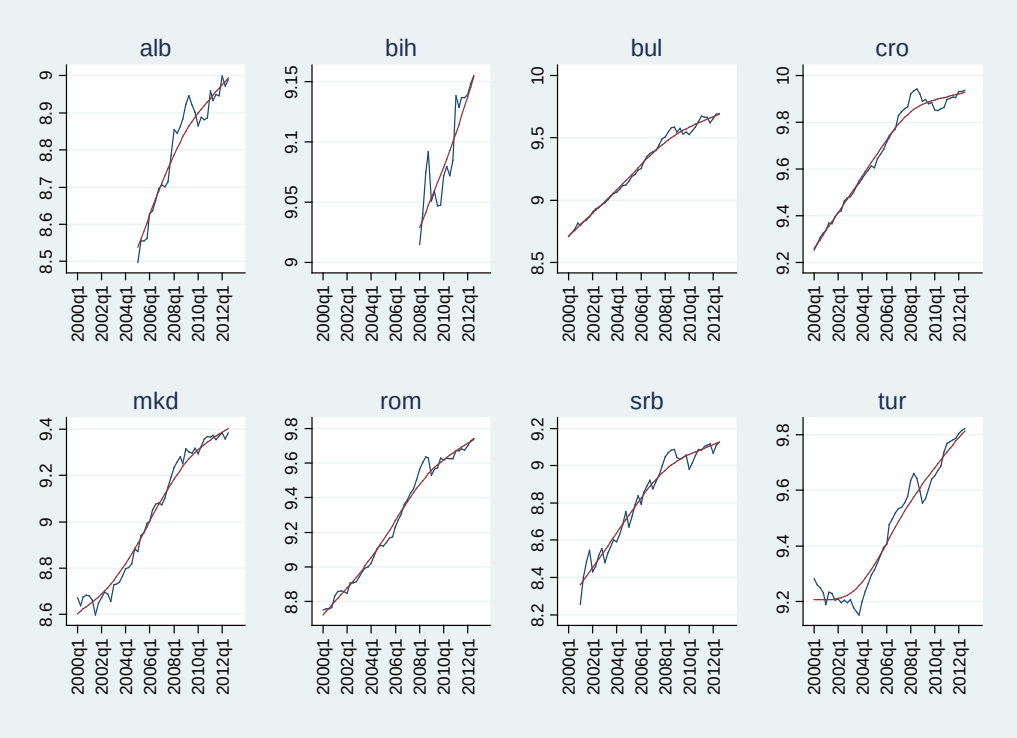
Table A6 – Results of the sixth specification excluding the countries one by one

	No Albania	No B&H	No Bulgaria	No Croatia	No Macedonia	No Romania	No Serbia	No Turkey
				Long-run equation				
lgdp_pc_ppp	43.73***	43.43***	43.31***	38.625***	35.223***	-26.975	43.409***	43.150***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.347)	(0.000)	(0.000)
cr3	0.030	0.039	0.026	-0.559***	0.258**	-0.455**	0.032	-0.029
	(0.745)	(0.677)	(0.764)	(0.001)	(0.028)	(0.016)	(0.715)	(0.822)
cred_gov_gdp	-0.725***	-0.539**	-0.591***	-2.295***	0.011	1.017	-0.607***	-0.568**
	(0.006)	(0.011)	(0.008)	(0.001)	(0.943)	(0.549)	(0.008)	(0.013)
				Short-run equation				
Ec	-0.154**	-0.112**	-0.159**	-0.080	-0.182**	-0.089	-0.168***	-0.185***
	(0.021)	(0.015)	(0.016)	(0.156)	(0.047)	(0.268)	(0.009)	(0.000)
D.lgdp_pc_ppp	-16.235**	-12.988**	-11.695**	-15.995**	-14.936**	-17.838**	-16.225**	-19.083***
	(0.013)	(0.035)	(0.027)	(0.035)	(0.014)	(0.037)	(0.013)	(0.000)
D.cr3	0.113*	0.085	0.040	0.079	0.068	-0.011	0.113*	0.100
	(0.093)	(0.242)	(0.407)	(0.223)	(0.338)	(0.915)	(0.089)	(0.164)
D.gdp_qoq_ann	0.004	-0.003	0.003	0.001	0.005	-0.007	0.003	0.005
	(0.677)	(0.720)	(0.735)	(0.945)	(0.634)	(0.473)	(0.791)	(0.638)
D.cpi_qoq_ann	0.019	0.037	0.045	0.017	0.069***	-0.034	0.041	0.039
	(0.458)	(0.282)	(0.219)	(0.699)	(0.006)	(0.609)	(0.273)	(0.318)
D.ir_real	0.026	0.050	0.058	0.019	0.075***	0.001	0.068*	0.056
	(0.160)	(0.161)	(0.134)	(0.605)	(0.003)	(0.992)	(0.063)	(0.156)
D.cred_gov_gdp	0.084	0.288	0.284	0.060	0.282	0.057	0.037	-0.229
	(0.852)	(0.475)	(0.484)	(0.895)	(0.486)	(0.872)	(0.933)	(0.398)
Constant	-53.310**	-39.321**	-54.610**	-22.106	-52.404*	29.677	-57.971**	-63.004***
	(0.023)	(0.024)	(0.019)	(0.110)	(0.052)	(0.252)	(0.011)	(0.000)
Observations	252	264	243	235	231	239	247	235
Countries	7	7	7	7	7	7	7	7

p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure A1 – Actual values of variables (blue lines) and equilibrium values (red lines)

GDP per capita



Credit to government

Non-interest income

Share of foreign banks

Operational costs

3 largest banks concentration ratio