
IMPACT OF MACROECONOMIC STABILITY ON PRIVATE FIXED INVESTMENTS IN SELECTED COUNTRIES OF CENTRAL AND SOUTHEAST EUROPE

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Impact of macroeconomic stability on private fixed investments in selected countries of Central and Southeast Europe

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Abstract: The paper explores cause-and-effect relationship between macroeconomic stability and private fixed investments in the 2001–2019 period in Central and Southeast European countries applying inflation targeting regime in their monetary policies. Change in the inflation rate, share of the current account deficit in GDP and change in the share of fiscal deficit in GDP are used to proxy macroeconomic stability. For the purpose of the analysis, a fixed effects panel model has been estimated, with simultaneous control for standard investment determinants (quality of institutions, external demand, relative price of capital goods, real interest rate, openness of the economy and financial market development). The results show that improved indicators of macroeconomic stability have a positive impact on the share of private fixed investments in GDP, boosting the outlook for economic growth. The estimated model confirms that both improved quality of institutions and other standard private investment determinants enhance the share of private fixed investments in GDP. The analysis also indicates robustness both when applying the fixed or random effects panel and different control variables.

Key words: private investments, inflation, current account deficit, fiscal deficit, quality of institutions, real interest rate, relative price of capital goods, external demand, openness of the economy, financial market development.

JEL Code: E22, E3, E52, E61.

Non-Technical Summary

The motivation for this research came primarily from the results that Serbia recorded in terms of private investment and GDP growth after achieving price and financial stability and implementing fiscal consolidation. In years before the pandemic, in 2018 and 2019, GDP growth in Serbia accelerated to 4.5% and 4.2%, respectively. During two years of the pandemic, Serbia recorded cumulative GDP growth of 6.4%. At the same time, share of total fixed investments in GDP is closing to the desired level of 25%. In addition, the impetus stems from the theoretical role that macroeconomic stability should play in terms of increasing economic activity, as well as from the fact that, unlike developed countries, Central and Southeast European countries have received much less attention on this issue. Having in mind a number of specifics, periods of pronounced macroeconomic instability and the transition process they have gone through, these countries become excellent candidates for such an analysis.

Paper does not use foreign direct investment as a dependent variable, which is the most common case in the available literature, but private fixed investment instead. By using fixed investments in general, investment activity is viewed in a more comprehensive way, whereby observing only their private component largely excludes the discretionary influence of the government on investment growth. At the time of writing this paper, and in accordance with the information available to the author, this is the only research paper that uses private fixed investment as a dependent variable in the analysis of the impact of macroeconomic stability on investment, while using Serbia in the sample.

The results of the research show that achieving and preserving macroeconomic stability is a key factor of private fixed investments growth and thus crucial for overall economic growth. In addition, the results of the analysis suggest that external demand, interest rates, relative cost of capital and economic openness have a significant impact on the growth of private investment.

From the point of view of monetary policy, results of the analysis support the inflation targeting regime led by selected Central and Southeast European countries, with the focus on achieving and maintaining low and stable inflation. In addition, the analysis confirms that the real interest rate is one of the key determinants of private fixed investment. The contribution of this paper is also reflected in the fact that it provides additional insight into issues related to monetary policy, coordination of monetary and fiscal policy, as well as the issue of European integration of countries in the region.

Regarding fiscal policy, the analysis shows that an increase in the fiscal deficit itself does not necessarily lead to a reduction in investment, but still points to the conclusion that it is desirable for countries to encourage investment at the expense of current spending and by adopting adequate tax policy. Given that lower interest rates have a positive effect on investment growth, the results suggest that fiscal discipline is needed in the observed countries, in order to open additional space for central banks to reduce their key policy rates to the lowest possible level without compromising their main goal of price stability.

When it comes to structural policies, it has been shown that the quality of institutions also acts as one of the key factors of investment growth, which is encouraged and coordinated through the EU accession process, supporting the observed countries' decision to make EU accession a foreign policy priority. In order to further stimulate export growth and economic openness (faster growth of foreign trade compared to GDP), the analysis shows the importance of implementing policies that stimulate industrial production and other export-oriented sectors in the field of goods and services.

The results of the analysis also show that private investment is significantly influenced by external demand, which, from the point of view of economic policy management, suggests that the observed countries, should seriously consider prospects for global growth, especially growth in the eurozone, when making economic policy decisions.

For the purpose of the analysis, the panel model was estimated, with macroeconomic stability being approximated by the change in the annual inflation rate, the share of the current account deficit in GDP and the change in the share of the fiscal deficit in GDP. By simultaneously controlling for standard determinants of investments found in the literature, the paper investigates whether and how private fixed investments are affected primarily by the quality of institutions, but also external demand, interest rates, relative cost of capital, economic openness and financial market development.

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1 Introduction

Macroeconomic instability is increasingly viewed as a major economic risk and there are numerous papers addressing this topic, suggesting a significant impact of volatility of macroeconomic indicators on investments and economic growth. The key reason behind such thinking is the fact that the nature of investment expenditures is such that they are generally high as well as multiannual, a portion of them can never be recouped, they are subject to deferral and as such, rather sensitive to uncertainty over future yields, which, on the other hand, depend largely on inflation level, risk premium, internal and external imbalances, changes in the exchange rate and other macroeconomic indicators.

If a country's economic policy is aimed at stimulating private sector investments, macroeconomic and financial stability, as well as credibility of the overall economic policy, may be more important than interest rate levels or fiscal stimuli. From the perspective of operational economic policy conduct, neglecting the unfavourable effects of macroeconomic instability and economic uncertainty may result in incorrect estimates and overoptimistic macroeconomic and fiscal projections, which is particularly dangerous at times when economic policy makers decide to lower interest and tax rates. In other words, fiscal and other stimuli might have to be very generous in order to have a significant impact on investment confidence, if economic uncertainty is pronounced and economic policy credibility is low. Such an angle implies that the consequence and high price of macroeconomic instability may come in the form an insufficient level of investments, particularly in emerging countries. A body of research also suggests that interest and tax rate levels may be of secondary importance as determinants of total investments, compared to instability of macroeconomic indicators and potential changes in the country's economic policy. This paper attempts at providing empirical evidence for these and similar views.

The impact of macroeconomic stability on various real sector indicators has been a subject of academic debate for decades. One of the most frequent segments of this debate is the influence of exchange rate fluctuations on foreign trade deficit and other macroeconomic indicators, which reflects, *inter alia*, the debate about different monetary policy regimes and their strengths and weaknesses.

There are many variations on this topic. In addition to discussions about exchange rate volatility in the context of economic growth and development, current account deficit and other economic indicators, a body of literature has also been written on a similar subject, such as the impact of inflation on economic growth, while many authors also examine in detail the connection between macroeconomic and financial market volatility.

However, though cause-and-effect relationships between different forms of macroeconomic volatility and real and external sector variables have been studied closely in empirical literature for advanced countries, emerging economies have received much less attention. Macroeconomic instability has been largely present in emerging countries in the last few decades, and at the same time, many of them transitioned from command to capitalist economies, which makes them excellent candidates for this analysis.

This paper examines the impact of macroeconomic stability on private fixed investments in Central and Southeast European countries (hereinafter: CESEE) which apply inflation

targeting as their monetary policy regime. Controlling for standard investment determinants encountered in literature, the paper will explore whether and how private fixed investments are influenced by, first and foremost, the quality of institutions, but also by external demand, interest rates, relative price of capital, economic openness and financial market development. The paper aims to prove the significance and quantify the influence of macroeconomic stability on the rise in the share of private fixed investments in GDP in selected CESEE countries. The main hypothesis of the paper is that the impact is statistically significant and positive, i.e. achieving and preserving macroeconomic stability in inflation targeting CESEE countries boosts the share of private fixed investments in their GDP. Control variables used in the paper are the quality of institutions, external demand, relative price of capital goods, real interest rate, foreign trade openness and financial market development. The research relies mainly on the international databases of the IMF, World Bank, OECD and Eurostat. The impact of macroeconomic stability on private fixed investments was estimated based on the panel analysis of macroeconomic and other data for the five inflation-targeting CESEE countries – the Czech Republic, Poland, Hungary, Romania and Serbia. Econometric analysis spans the 2001–2019 period, while descriptive analysis of macroeconomic trends gives a brief overview of macroeconomic trends in these countries during the 1990s.

Why is this causal relationship examined on the case of CESEE countries? First, during the period of transition from command to capitalist economies, CESEE countries recorded high rates of investment and GDP growth, but at certain periods they also faced both internal and external imbalances and increased macroeconomic instability. In addition, in the last two decades, investments in CESEE countries were higher on average than in developed countries (relative to the size of the economy), but they were also more volatile, with pronounced differences between individual countries' investment levels. Second, in parallel with strong economic growth, CESEE countries underwent major institutional, political, social, and economic changes, and these processes often bring about increased macroeconomic instability, which makes them excellent candidates for this analysis. Here we primarily mean the volatility of inflation rates and exchange rate volatility, but elevated volatility can also manifest through other macroeconomic variables, such as high budget and current account deficits, risk premium, etc. All these characteristics make CESEE countries an excellent sample for exploring the cause-and-effect relationship between macroeconomic (in)stability and economic performance, and such an analysis may contribute to better understanding of the relation between key macroeconomic variables such as inflation, current account and fiscal deficits, exchange rate, investments, overall GDP, etc. Third, Serbia is on the road to becoming a member of the European Union (hereinafter: EU), while all Central European countries are EU members already. As macroeconomic stability, along with stronger institutions, is a precondition for joining the EU, the examination of the relationship between macroeconomic stability and real sector indicators is of special interest. Last, in the long run, these countries should record higher growth rates than the rest of the EU, in order to converge to the most advanced European countries in terms of their income and living standard. Having in mind all the above, the results of this paper may be significant for economic policy conduct and for increasing investment levels, which, in turn, will bring about higher growth rates.

Why does the paper use private fixed investments as a dependent variable? Fixed investments are one of the most significant factors of economic growth. Without their increase,

it would not be possible to continuously achieve high economic growth rates, which are necessary for long-term improvement of the living standard. Equally important, investment growth matters not only from the aspect of the overall GDP growth rate, but also from the aspect of growth structure, i.e. its long-term sustainability, which requires faster investment growth compared to overall GDP growth in the long run. The paper does not seek to prove these assumptions, bearing in mind the core economic logic and consensus among economists regarding this issue. A generally accepted rule in economic policy is that every country should aim for a higher share of investments in GDP at the expense of final consumption, with the optimal level of total fixed investments (both private and government) for long-term development being around 25% of GDP over a longer period. As the level of around 5% of GDP is most frequently quoted as the desirable share of government investments, we may indirectly conclude that the desirable share of private fixed investments in GDP is around 20%.

Why does the paper not analyse total fixed investments, but only their private sector portion? There are several reasons, but they all have in common our wish to exclude the discretionary impact of government on investment growth from the analysis. First, government may decide to increase capital expenditures regardless of other macroeconomic indicators, which does not happen (or happens only rarely) in the private sector. Second, sometimes an increase in government investment is not based on an adequate project cost-benefit analysis, which should not be expected (or at least not often) in case of the private sector. Third, government investments (though more rarely than government final consumption and lack of fiscal discipline) may be the underlying cause of a higher budget deficit, possibly pushing up inflation and interest rates, and producing other side-effects in the economy, including higher macroeconomic volatility and uncertainty. Finally, government capital expenditures comprise different expenditures, such as, for instance, expenditures for procurement of military equipment, which can distort the image of total fixed investments.

2 Impact of macroeconomic stability on different real sector indicators: overview of literature

Uncertainty about inflation, exchange rate, interest rates and other macroeconomic variables may affect numerous decisions in the economy, primarily investment decisions. However, though it is intuitively clear that this is an important cause-and-effect relationship, in principle no eminent papers on this topic have been produced until Okun (1971)¹. Okun explored the correlation between the average inflation rate and inflation volatility in 17 OECD countries in the period between 1951 and 1968 and established a positive and statistically significant relationship between inflation level and its volatility. In his Nobel lecture, Friedman (1977)² also said that higher inflation rates bring uncertainty about what actual inflation will turn out to be in the future, ascribing this to erroneous economic policy responses to upward inflation trends. Friedman went on to show that greater uncertainty about inflation jeopardises the efficiency of the price mechanism in efficient resource allocation and thus drives

¹Okun, A. M. (1971). The mirage of steady inflation. *Brookings Papers on Economic Activity*, 1971(2), 485-498.

²Friedman, M. (1977). Nobel lecture: inflation and unemployment. *Journal of political economy*, 85(3), 451-472.

unemployment up. Following Friedman's Nobel lecture, the effects of various forms of uncertainty on macroeconomic variables attracted considerably greater interest of economists.

Stewart and Venieris (1985)³ established a negative correlation between socio-political uncertainty and domestic savings in less developed countries. Having analysed 47 countries, Kormendi and Meguire (1985)⁴ found out that monetary instability has a significant negative effect on growth, partly through investment channel, and partly through return-on-investment channel. Devarajan and De Melo (1987)⁵ revealed that currency stability, ensured by membership in Africa Franc Zone, fuelled GDP growth rates relative to other countries in Sub-Saharan Africa. Lopez (1989)⁶ explored the effects of trade policies and volatility of the real exchange rate on GDP growth and investments and concluded, inter alia, that volatility of the real exchange rate has a strong and statistically significant negative impact on both investment growth and real GDP. In their 1986 paper, McDonald and Siegel⁷ demonstrated that even moderate uncertainty, associated with large investments in industry, could double the required rate of return for investments.

Using the example of emerging economies, Rodrick (1989)⁸ points out that an economic reform programme may turn out to be successful only if its credibility and reduced uncertainty enable the management of private sector expectations. He also concludes that countries with pronounced macroeconomic instability and uncertainty about the future economic policy are forced to grant disproportionately high subsidies to attract investments. Rodrick's conclusions stand both for individual companies and for aggregate investments. He lists countries with, at the time, persistent high inflation as negative examples, countries such as Argentina or Brasil, as well as Turkey and Mexico, which faced harsh and unenvisaged changes in certain areas of economic policy, such as the exchange rate regime, fiscal and trade policy.

Pindyck and Solimano (1993)⁹ provided evidence for a similar relation. They did not describe investments as such, but the critical value of expected return required for initiating an investment. Their analysis shows that, if volatility intensifies, the critical value of expected return in the future also rises, making the investment process difficult. Authors demonstrate that the net effect of uncertainty in irreversible investments depends on the size of the opportunity cost relative to the increased value of marginal unit of capital. Similarly, Dixit and

³Stewart, D. B., & Venieris, Y. P. (1985). Sociopolitical instability and the behavior of savings in less-developed countries. *The Review of Economics and Statistics*, 557-563.

⁴Kormendi, R. C., & Meguire, P. G. (1985). Macroeconomic determinants of growth: cross-country evidence. *Journal of Monetary economics*, 16(2), 141-163.

⁵Devarajan, S., & De Melo, J. (1987). Evaluating participation in African monetary unions: a statistical analysis of the CFA zones. *World Development*, 15(4), 483-496.

⁶Lopez, R. (1989). Trade Policy, Growth and Investment. *World Bank, Country Economics*.

⁷McDonald, R., & Siegel, D. (1986). The value of waiting to invest. *The quarterly journal of economics*, 101(4), 707-727.

⁸Rodrick, D. (1989). *Policy uncertainty and private investment in developing countries* (No. w2999). National Bureau of Economic Research.

⁹Pindyck, R. S., & Solimano, A. (1993). Economic instability and aggregate investment. *NBER macroeconomics annual*, 8, 259-303

Pindyck (1994)¹⁰ supported the view that investment decisions may be very sensitive to uncertainty about future outcomes of key variables affecting investment decisions. Federer (1993)¹¹ also proved the adverse impact of instability and uncertainty on investments in equipment in the USA. Price (1995)¹² found a negative impact on investments in manufacturing in the UK, while Aizenman and Marion (1995)¹³ demonstrated that there is a negative correlation between different indicators of economic instability and private investments in the study conducted for 50 emerging countries in the period between 1970 and 1993. Dehn (2000)¹⁴ created an aggregate measure of shocks in the prices of primary commodities and tested the correlation between changes in the prices of goods and growth rates for private investments on the sample of 44 emerging countries. He makes the hypothesis that both price shocks and uncertainty about the future prices have a statistically significant impact on the growth rate of private investments. The analysis confirms theoretical predictions that positive shocks in the prices of goods have strong positive effects on the growth rate of private investments in low-income emerging countries, conditioned by the price levels of primary commodities.

Servén (1998)¹⁵ proved a strong correlation between uncertainty and private investments in emerging economies. He constructed measures of volatility of inflation, economic growth, terms of trade, real exchange rate and price of capital goods and examined their correlation with private investments. He added these constructed measures to the standard investment equation estimated by the panel data econometric methods. In another paper on a similar topic, Servén (2003)¹⁶ studied the empirical correlation between real exchange rate volatility and private investments on unbalanced panel data for 61 emerging countries, in the period from 1970 until 1995. Servén used the share of private investments in nominal GDP as a dependent variable, while explanatory variables included volatility of the real exchange rate, real interest rate, openness of financial market and relative price of capital goods. Servén measured the openness of financial market as the flow of private credit relative to nominal GDP, while relative prices of capital goods are measured as the ratio of investment deflator to total GDP deflator. Finally, considering inertia, Servén also used the value of dependent variable from the previous period as an exogenous variable. He created the measure of real exchange rate volatility using GARCH-based method and concluded that it has a strong negative impact on

¹⁰Dixit, A. K., Dixit, R. K., & Pindyck, R. S. (1994). *Investment under uncertainty*. Princeton university press.

¹¹Federer, J. (1993). The impact of uncertainty on aggregate investment spending. *Journal of Money, Credit and Banking*, 25(1), 30-48.

¹²Price, S. (1995). Aggregate uncertainty, capacity utilization and manufacturing investment. *Applied Economics*, 27(2), 147-154.

¹³Aizenman, J., & Marion, N. (1995). *Volatility, investment and disappointment aversion* (No. w5386). National bureau of economic research.

¹⁴Dehn, J., & Centre for the Study of African Economies. (2000). *Private investment in developing countries: The effects of commodity shocks and uncertainty*. University of Oxford, Institute of Economics and Statistics, Centre for the Study of African Economies.

¹⁵Servén, L. (1998). *Macroeconomic uncertainty and private investment in LDCs: an empirical investigation*. WB Policy Research Paper 2035, Development Research Group

¹⁶Servén, L. (2003). Real exchange rate uncertainty and private investment in LDCs. *Review of Economics and Statistics*, 85(1), 212-218

investments. He also concluded that the impact of volatility is not balanced, emphasizing that there are indications of threshold effects, and thus volatility only matters when it exceeds some critical level. In addition, Servén concluded that the negative effect of real exchange rate volatility on investment is significantly larger in economies that are highly open and in economies with less developed financial systems.

When it comes to relatively recent papers which analyse this cause-and-effect relationship in developed countries, Chowdhury and Wheeler (2015)¹⁷ drew a different conclusion on the example of the USA, Canada, the UK, and Germany, demonstrating that macroeconomic volatility has no significant influence on the dynamics of private fixed investments.

As for the CESEE region, considerably lower number of papers have been written on this issue. Papers in the region mainly examine the correlation between inflation and GDP growth and conclude that inflation exerts a negative influence on economic growth. Mladenovic (2007)¹⁸ is an exception in this respect as she explored the relationship between inflation level and inflation uncertainty in the Serbian economy and concluded that high inflation causes inflation volatility, while inflation volatility affects inflation level unfavourably in the long run. Saman (2010)¹⁹ examined the impact of macroeconomic volatility on investments using the case study of Romania and showed that macroeconomic volatility has a non-linear statistically significant influence on investments. Hasanov and Omay (2011) studied the correlation between inflation, inflation volatility, GDP growth and volatility of GDP growth rates for ten CEE countries, estimating a bivariate GARCH model. They concluded that rising inflation induces an increase in the volatility of both inflation and GDP growth rates. On the other hand, they also established that GDP growth reduces macroeconomic volatility. Arratibel, Furceri, Martin, and Zdzenicka (2011)²⁰ analysed the influence of nominal exchange rate volatility on macroeconomic performance, with the following used as dependent variables: real *per capita* GDP growth, lending growth, current account deficit and foreign direct investments. Examining the sample of CEE EU members using data from 1995 until 2008, the authors concluded that lower volatility of the nominal exchange rate boosts GDP growth and investments, on the one hand, and increases the current account deficit and leads to excessive lending, on the other. Audzei and Brázdik (2015)²¹ investigated the impact of exchange rate dynamics on overall macroeconomic volatility in selected CEE countries. They studied the origins of macroeconomic instability, focusing on the contribution of exchange rate shocks to macroeconomic volatility. The authors found the results on principle consistent with economic theory in the sense of the real exchange rate having a shock-absorbing nature.

¹⁷Chowdhury, A. R., & Wheeler, M. (2015). The impact of output and exchange rate volatility on fixed private investment: evidence from selected G7 countries. *Applied Economics*, 47(25), 2628-2641.

¹⁸Mladenovic, Z. L. (2007). Relationship between inflation and inflation uncertainty: The case of Serbia. *Available at SSRN 1096648*.

¹⁹Saman, C. (2010). Macroeconomic uncertainty and investment-empirical analysis for Romania. *Romanian Journal of Economic Forecasting*, 13(2), 155-164.

²⁰Arratibel, O., Furceri, D., Martin, R., & Zdzenicka, A. (2011). The effect of nominal exchange rate volatility on real macroeconomic performance in the CEE countries. *Economic Systems*, 35(2), 261-277.

²¹Audzei, V., & Brázdik, F. (2015). Exchange rate dynamics and their effect on Macroeconomic volatility in selected CEE countries. *Economic Systems*, 42(4), 584-596.

Nevertheless, in their work, the authors concluded that CESEE countries are heterogeneous, due to structural differences and different monetary policy regimes. For instance, the authors concluded that real exchange rate volatility in Bulgaria generates shocks (rather than absorbs them), justifying the fixed exchange rate regime used in Bulgaria. The work of the said authors builds in a way on the work of Farrant and Peersman (2006)²², but the latter drew almost diametrically opposed conclusions. Namely, Farrant and Peersman also raise the question of whether the exchange rate volatility is a shock generator or absorber. Analysing trends in the euro area, the UK, Japan and Canada relative to the USA, applying a structural VAR model, the authors conclude that nominal exchange rate fluctuations are a source rather than an absorber of shocks.

Even more firm conclusions about the unfavourable impact of the nominal exchange rate volatility on overall macroeconomic volatility are drawn by Buiter (2000)²³, who advocates that exchange rate flexibility is dominantly a source of shocks and instability, rather than a mechanism for efficient responses to shocks from the international environment. Buiter concludes that the UK is too small and too open an economy to be an optimal currency area. He points out that the counter-arguments of asymmetric shocks and cyclical divergence are based on the misapprehension that independent national monetary policy and the associated nominal exchange rate flexibility can be used effectively to offset or even neutralize shocks from the international environment. This “fine tuning delusion”, according to the author, is compounded by a failure to understand that, under a high degree of international financial integration, market-determined exchange rates are primarily a source of shocks and instability. Buiter goes so far as to claim that he knows of no evidence that supports such an optimistic view that exchange rate flexibility can reduce shocks under conditions of extremely high international financial capital mobility.

In a BIS working paper, Caballero (2020)²⁴ explores the effect of depreciation on investment when companies hold dominantly foreign currency debt. The paper employs a database of the stock of foreign currency bonds issued by seven thousand companies from emerging economies in the 2000–2015 period. The results indicate that currency depreciation exert a significant negative effect on corporate balance sheets. Caballero proves that a depreciation of 10 percent reduced the ratio of capital expenditure to total assets by 0.3–0.6 percentage points in the year following the depreciation. Caballero’s results are consistent with models with financial frictions, which indicate that currency depreciation can have a negative impact on economic growth, taking into consideration that corporates’ foreign currency exposures are not fully hedged.

²²Farrant, K., &Peersman, G. (2006). Is the exchange rate a shock absorber or a source of shocks? New empiricalevidence. *Journal of Money, Credit and Banking*, 939-961.

²³Buiter, W. H. (2000). *Optimal currency areas: Why does the exchange rate regime matter?(with an Application to UK Membership in EMU)* (No. 462). Centre for Economic Performance, London School of Economics and PoliticalScience.

²⁴Caballero, J. (2020). Corporate dollar debt and depreciations: all’s well that ends well?

3 Macroeconomic developments in CESEE countries

During the 1990s, CESEE countries faced the challenge of implementing comprehensive structural reforms and the need to move from centrally planned to market economy systems, which, among other things, included privatisation, demonopolisation of major industries, liberalisation of domestic prices, as well as liberalisation of foreign trade flows of goods and services, capital, and labour. In parallel, all countries were forced to build different institutions and implement regulations which would be the foundation of a market economy. In the first phase, CESEE countries went through a crisis which lasted in almost all countries from the beginning to mid-1990s. This period was characterised by a sharp decline in GDP and high growth in unemployment. Initially, the crisis resulted in a huge loss of production capacities and human capital, a sharp contraction in domestic demand and disruptions to the previously established chains of production, supply, and final consumption.

At the time when these countries were at the lowest production point²⁵, and compared to 1989, Romania's GDP was lower by 25%, Poland's GDP by around 18%, Hungary's also by around 18%, in the Czech Republic by around 13%, while Serbia's GDP fell by almost 60%²⁶ after the breakup of Yugoslavia, wars and international sanctions. At the same time, the mentioned countries faced high inflation, which in some years amounted to several dozens of percent annually in Hungary and the Czech Republic, then several hundred percent annually in Poland and Romania, all the way to Serbia where in 1993 such inflation was common on a daily basis.

After the end of the first transition phase, CESEE countries began a period of two and a half decades during which, with a few short breaks, they recorded higher GDP growth rates compared to advanced EU economies and during which they converged in income towards advanced EU economies to a greater or smaller extent. However, the models of economic growth differed during this time. Growth in CESEE countries in some periods was based predominantly on investment and net exports, while in other periods it relied mainly on private consumption and government final consumption, which later resulted in the need for fiscal consolidation. The level of private and total fixed investments, although relatively high all the time, was significantly more volatile than overall economic growth. For example, in the early 2000s, the share of total fixed investment in GDP in Romania measured just over 20%, only to reach as much as 37% of GDP in 2008. After the outbreak of the crisis and over the next ten years, the level of total fixed investment in Romania ranged from 21% to 27% of GDP. This dynamics and structure of GDP growth depended largely on global economic growth, as well as fiscal policy, the character of which in most countries of the region during the period was rather volatile – from the lack of control over current expenditure and unsustainable increase in public sector wages and pensions significantly above the economic capacities in

²⁵Hasanov, M., & Omay, T. (2011). The relationship between inflation, output growth, and their uncertainties: Evidence from selected CEE countries. *Emerging Markets Finance and Trade*, 47(sup3), 5-20.

²⁶Author's calculation based on data from the statistical yearbooks and publication "Two Centuries of Serbian Development" of the Statistical Office of the Republic of Serbia.

some countries, through sharp fiscal consolidations, all the way to a sustainable fiscal policy aimed at increasing investment.

When it comes to monetary policy, in the observed period, CESEE countries implemented different monetary policy regimes, which covered the full range of possible solutions, from currency boards to floating exchange rates and inflation targeting. Different monetary policy regimes of CESEE countries and different views on the optimal exchange rate arrangement are not uncommon. Even at the very beginning of the transition process, CESEE countries opted for different exchange rate regimes depending on a number of specificities. In line with the prevailing views at the time, which emphasised the role of the fixed exchange rate as a nominal anchor for macroeconomic stabilisation purposes, most CESEE countries initially opted for some form of a fixed exchange rate regime. On the other hand, contrary to the prevailing view, some countries decided to start with more flexible solutions. As all applied exchange rate regimes, especially in Central European countries, basically functioned well and fulfilled their main task of macroeconomic stabilisation and lowering the inflation rate, one gets the impression that there is no single optimal monetary and exchange rate regime for CESEE countries and that the appropriate exchange rate regime should be adjusted to their specific characteristics, needs and priorities at a given time. The choice of exchange rate regime and monetary policy as a whole in CESEE countries reflected the key aspects of the overall economic policy such as reducing inflation, anchoring inflation expectations, eliminating external imbalances, increasing monetary policy credibility, managing capital flows including a boost to foreign direct investment, etc. An important factor in opting for a certain monetary policy regime was the credibility of fiscal policy, which had to be balanced and very disciplined in case the country wanted some form of a fixed exchange rate. All countries that are the subject of analysis in this paper switched to inflation targeting at some point.

The Czech National Bank switched to inflation targeting with a managed float exchange rate regime in 1998. The target tolerance band for inflation was gradually reduced. In early 2004, for the period starting from January 2006, the inflation target was set at 3%. Later, in early 2007, with the implementation from the start of 2010, the target was set at 2%±1 pp and is still in effect today.

The National Bank of Poland started applying the inflation targeting regime in 1998, although it was still running a basket pegged regime. In April 2000, the National Bank of Poland switched to a floating exchange rate regime, retaining the right to intervene in the foreign exchange market if deemed necessary to achieve the inflation target. As of 2004, the National Bank of Poland set the inflation target at 2.5% with a tolerance band of ±1 pp. The inflation target set in this way is still effective today.

The Hungarian National Bank implemented inflation targeting with a peg to the euro in the range of ±15% from 2001 to early 2008, when it gave up the pegged rate and switched to a managed float exchange rate regime. After being gradually reduced, the inflation target was set at 3% in 2005, with a target tolerance band of ±1 pp as of 2007. The inflation target of the Hungarian National Bank has not changed since.

The National Bank of Romania switched to inflation targeting in mid-2005, combined with a managed float exchange rate regime. The inflation target was gradually reduced until 2013, when it was set at 2.5%, with a ± 1 pp target tolerance band, which is still in effect today.

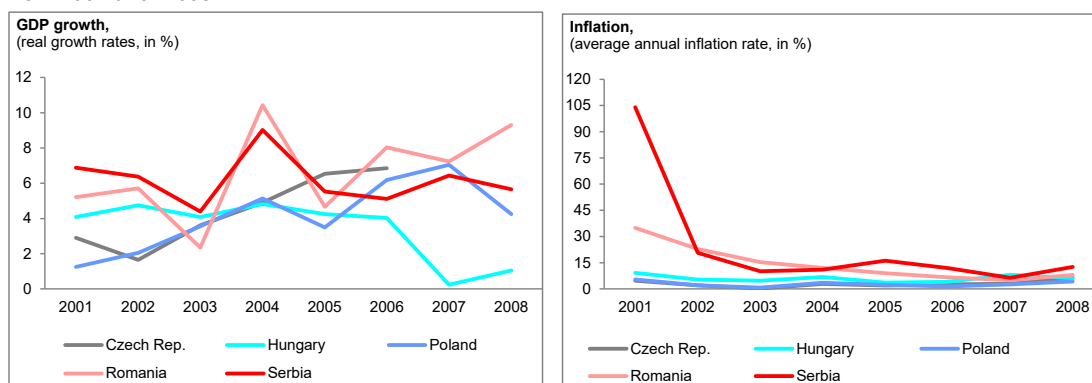
The National Bank of Serbia started to apply the inflation targeting regime unofficially in September 2006, and officially as of 2009. Considering the high degree of euroisation, the exchange rate regime also plays an important role in inflation movements, which is why the National Bank of Serbia applies the managed float exchange rate regime. The inflation target has been reduced over time, only to stand at 3% as of 2017, with a ± 1.5 pp target tolerance band. A slightly higher target relative to other countries reflects the need for convergence towards EU countries, whereas a somewhat wider tolerance band is a consequence of, among other things, more pronounced volatility of food prices in Serbia.

3.1 Macroeconomic developments in the period before the global economic crisis (2001–2008)²⁷

After transition that lasted for most of the 1990s, CESEE countries experienced a period of accelerated economic growth, which lasted until the outbreak of the global financial crisis in late 2008. Growth in this part of Europe was faster than in advanced economies, similar in scale to other emerging economies, but different in structure when looking at individual CESEE countries. During the eight-year period (from 2001 through 2008), the average annual economic growth in the Czech Republic and Poland measured 4.3% and 4.1%, respectively, while the Hungarian economy grew at a slightly lower average rate of 3.4%. In these countries, and above all in the Czech Republic, growth was largely driven by investments and net exports. On the other hand, Romania and Serbia grew at the higher rates of 6.6% and 6.2%, respectively, but with a significantly lower base from the 1990s (above all Serbia) and with notably faster and often unsustainable growth of private and government consumption, which led to large internal and external imbalances, and consequently to a considerable weakening of the domestic currency and high inflation rates over a protracted period.

²⁷Data on GDP, GDP components and current account deficit were taken from the Eurostat database, while fiscal data and data on inflation and exchange rate were taken from the IFS database under the jurisdiction of the IMF. Data on the share of private fixed investments in GDP are the author's calculation made based on data on total fixed investments (source: Eurostat) and government investments (sources: OECD and the Ministry of Finance of the Republic of Serbia).

Charts 1 and 2 **Annual real GDP growth rate and average annual inflation rate in selected CESEE countries from 2001 until 2008**



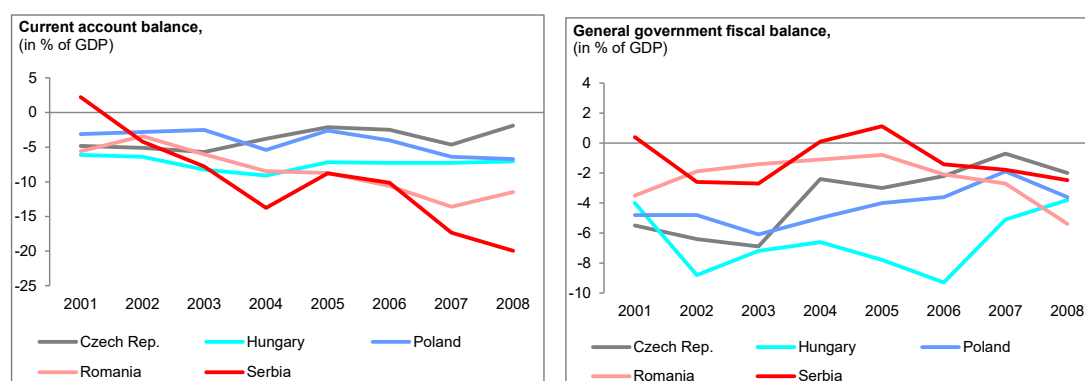
Sources: Eurostat, IMF (IFS database).

The key factors which enabled high economic growth rates in CESEE from 2001 to 2008 were the completion (or at least the completion of the large part) of economic restructuring and transition processes, high global economic growth, and the EU accession process, which also brought about significant financial resources, a considerable reduction in the risk premium and an improvement in the investors' perception of these countries. The Czech Republic, Poland and Hungary became members of the EU in 2004 and Romania in 2007. In the case of the Western Balkans, the prospect of EU accession was offered at the EU summit in Thessaloniki in 2003, facilitating a speedy recovery and encouraging reforms, especially in the areas of trade policy, privatisation and financial sector restructuring. The Republic of Serbia officially became a candidate for membership in 2012, while the European Council adopted the recommendation of the European Commission to open negotiations with Serbia in 2013. In addition to the above factors, the accommodative monetary policy of leading central banks provided the entire global economy with abundant liquidity, part of which ended up in emerging economies, including the CESEE region. On the other hand, in some years an important characteristic of the sources of economic growth financing in most countries of the region was unsustainable fiscal policy and poor management of capital flows, the consequences of which would become apparent after the outbreak of the global financial crisis.

Abundant liquidity also contributed to the buildup of inflationary pressures through several channels, such as the already mentioned capital flows, but also through the growth of global primary commodity prices. In the period from 2001 to 2008 average annual inflation was around 3% in the Czech Republic and Poland, around 6% in Hungary, while in Romania and Serbia it was double-digit²⁸. Other signs of overheated economies included deterioration in the current account deficit, as well as credit expansion and high real estate prices in many countries.

²⁸It should be noted that in the case of Romania, and especially in the case of Serbia, the data on average annual inflation in the period from 2001 to 2008 are greatly influenced by data from 2001, when inflation in Romania measured 34.8%, and in Serbia as much as 104.0%. Excluding data for 2001, average annual inflation in this period was 11.2% in Romania and 12.6% in Serbia.

Charts 3 and 4 **Current account balance and general government fiscal balance in selected CESEE countries from 2001 until 2008**



Sources: Eurostat, IMF (IFS database).

When it comes to investments, the Czech Republic had the best performance in this respect. The average share of private fixed investments in GDP in the observed period was 23.7%, which together with the average share of government investments of 5.2% gave as much as a 28.9% share of total fixed investments in GDP on average. As a result, the Czech Republic more than doubled its exports in the observed period, despite the appreciation of the koruna, achieving an average annual real growth in exports of goods and services of 12.1%. In addition to high investments, the structure of their economic growth was favourable since personal consumption grew more slowly than GDP, which opened additional space for the mentioned investment growth. This structure of economic growth and an economic policy that included inflation targeting and tight control of budget expenditures helped the Czech Republic to have a surplus in foreign trade already in this period, only to achieve a total current account surplus in the first years after the global financial crisis. Favourable trends on the current account, with a high inflow of capital to the financial account resulted in a long-term current account surplus and continuous appreciation of the Czech koruna against the euro. From end-2000 to end-2008, the Czech koruna appreciated over 30%, and the appreciation continued in the years beyond.

Relatively similar trends in terms of economic growth were observed in Poland and Hungary. However, weaker control of fiscal expenditures and the consequently lower share of private investments in GDP have resulted in slower elimination of external imbalances, as well as twice higher average annual inflation rate in Hungary. From end-2000 to end-2008, the Hungarian forint exchange rate against the euro remained relatively unchanged (appreciation of 1.3%), while in the same period the Polish zloty weakened against the euro by 6.5%. The average share of private fixed investments in GDP in this period stood at 19.8% in Hungary and 16.6% in Poland.

Weaker control of fiscal expenditures, growing fiscal deficit and an increase in the current account deficit in this period were also typical of other countries in the region, including Romania and Serbia. In the run-up to the global economic crisis, Romania's current account deficit was between 10% and 15% of GDP, while Serbia's deficit reached 20% of GDP in 2008. In addition, macroeconomic trends in Serbia and pronounced external imbalances led to the dinar losing a third of its value from end-2000 to end-2008, despite frequent and extensive

interventions by the NBS. The average share of private fixed investments in GDP in this period equalled 22.1% in Romania and only 16.4% in Serbia.

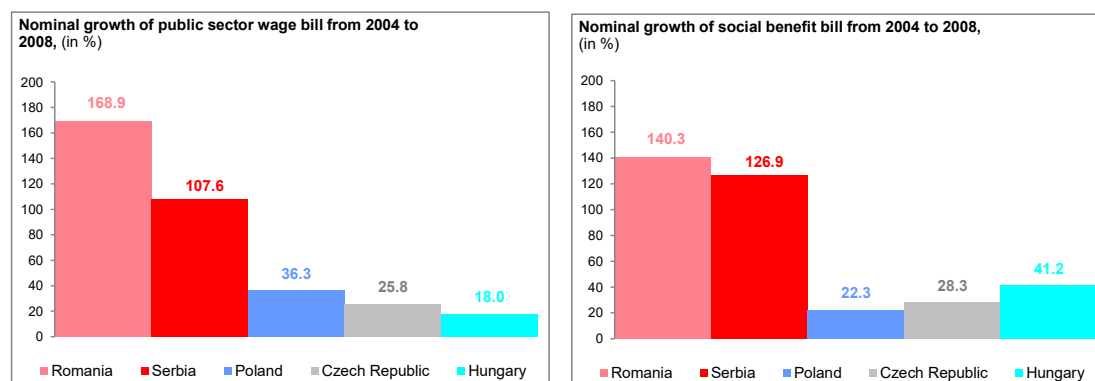
Table 1 **Macroeconomic indicators in selected CESEE countries from 2001 until 2008** (in %)

	Average annual GDP growth	Average share of private fixed investments in GDP	Average annual inflation rate	Foreign exchange rate change (- means depreciation)	Average annual growth of private consumption	Average annual growth of exports of goods and services
Czech Rep.	4.3	23.7	2.9	30.7	3.6	12.1
Poland	4.1	16.6	2.7	-6.5	3.8	8.7
Hungary	3.4	19.8	5.9	1.3	3.4	11.7
Romania	6.6	22.1	14.1	-38.8	10.4	13.7
Serbia	6.2	16.4	24.0	-32.9	6.4	19.1

Sources: Eurostat, IMF (IFS database).

On the eve of the global economic crisis, many CESEE countries increased their internal and external imbalances, thus reducing resilience and becoming vulnerable to potential shocks from the international environment. Fiscal policy was largely aimed at raising the living standard of households, often above the actual economic capacities. The growth of total consolidated budget expenditures of the observed CESEE countries from 2004 to 2008, especially in Serbia and Romania, was to a large degree associated with less productive categories such as public sector wage bill and social benefits. Often, this growth was faster than the nominal GDP growth, leading to an increase in their share in GDP, which was especially the case in Romania (increase in the share from 8.1% to 10.0% of GDP). It was also pronounced in the Baltic countries, as well as in Serbia. The Czech Republic faced the crisis with a low share of wage expenditures in GDP of 8.3%, while their share in Hungary, although reduced in the meantime, stood at 11.3%. The trends were similar with social benefits.

Charts 5 and 6 **Cummulative growth of government wage bill and social benefits bill in selected CESEE countries from 2004 until 2008**



Sources: Eurostat, IMF (IFS database).

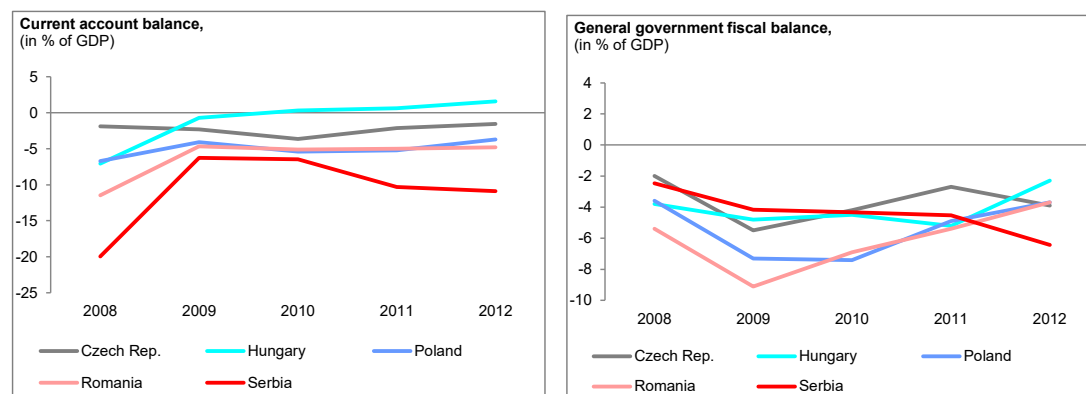
In this way, especially from 2004 to 2008, CESEE countries accumulated fiscal imbalances, which would fully manifest after the outbreak of the global financial and later debt crisis and the consequent slowdown in capital flows towards emerging economies, lower budget revenues and higher costs of borrowing.

3.2 Macroeconomic developments during the global economic and debt crisis (2009-2012)²⁹

Most countries in the region faced the global economic crisis with a growing fiscal deficit and public debt and with a significantly weakened external position and reduced resilience to shocks from the international environment. In late 2008, the region was hit by a global economic crisis that impacted all countries. It affected the economic indicators of all countries in the region, to a greater or lesser extent, depending on the macroeconomic position of each country. In parallel with the slowdown in global growth, fiscal consolidation, which, depending on the country, was implemented with different measures and intensity, also reflected on the overall macroeconomic trends through the decline in domestic demand.

When it comes to responding to the global crisis, due to high fiscal deficits and public debt, the majority of CESEE countries could not afford to act with discretionary measures aimed at boosting economic growth like the world's most advanced economies, but had to rely on automatic stabilisers instead. High deficits and mounting public debt limited the fiscal manoeuvring space for the countries of the region, and many were forced to significantly reduce those unproductive categories of expenditures which they increased in the years of economic expansion in the run-up to the crisis.

Charts 7 and 8 **Current account balance and general government fiscal balance in selected CESEE countries from 2008 until 2012**



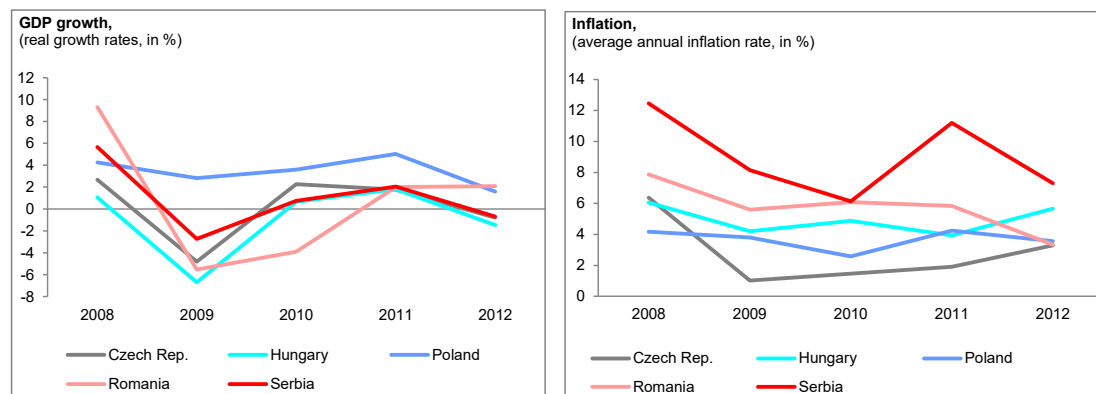
Sources: Eurostat, IMF (IFS database).

Already in 2009, in response to growing economic problems, some countries in the region concluded financial arrangements with the IMF, which involved fiscal consolidation. At the same time, there were relatively significant differences in the fiscal consolidation measures adopted in 2009 by Central European countries, on the one hand, and Southeast European

²⁹Data on GDP, GDP components and current account deficits were taken from the Eurostat database, while fiscal data and data on inflation and exchange rate were taken from the IFS database under the jurisdiction of the IMF. Data on the share of private fixed investments in GDP are the author's calculation made on the basis of data on total fixed investments (source: Eurostat) and government investments (sources: OECD and the Ministry of Finance of the Republic of Serbia).

countries, on the other. CE countries started extensive fiscal adjustment already in 2009, while SEE countries, including Serbia, reacted more leniently and with a delay. An important factor of this response is the fact that the Czech Republic, Hungary, Poland and Romania, as EU members, were subject to the EU decision on the excessive deficit procedure. The procedure explicitly required that the deficit be lowered below the prescribed level of 3% of GDP, and the deadline for doing so was 2011 for Hungary, 2012 for Poland and Romania, and 2013 for the Czech Republic. In addition, EU recommendations contained guidelines on improving national fiscal frameworks, as well as the necessary structural reforms. The implementation of fiscal consolidation in a relatively short timeframe, along with numerous structural reforms, would have a positive impact on economic growth in all these countries in the aftermath of the debt crisis.

Charts 9 and 10 **Annual real GDP growth rate and average annual inflation rate in selected CESEE countries from 2008 until 2012**



Sources: Eurostat, IMF (IFS database).

As a result of the slowdown in global growth and the implementation of fiscal consolidation, from 2009 to 2012 all countries of the region, except Poland, recorded negative economic growth on average. In the year of the greatest impact of the global economic crisis (2009), GDP decreased in real terms by 4.8% in the Czech Republic, by 6.7% in Hungary, by 5.5% in Romania, and by 2.7% in Serbia. Only Poland recorded a 2.8% economic growth in 2009.

On the expenditure side, the slack in economic activity in all countries reflected not only the direct effects of fiscal consolidation on final consumption, but also lower private investments and a slowdown in foreign trade. Consequently, the contribution of domestic demand to economic growth was significantly reduced, creating the need for greater reliance on net exports. However, the debt crisis and the new recession in the euro area a few years later, negatively affected the confidence of consumers and investors from advanced economies, limiting the availability of financing and thus denting the demand for exports from CESEE countries. In Romania and Serbia, due to persisting high external imbalances, the depreciation of the domestic currency continued, sustaining high inflation rates, despite the reduction of both domestic and external demand.

Compared to 2008, as at end-2012, the share of private fixed investments in GDP decreased from 18.4% to 15.1% in Poland, from 20.2% to 15.5% in Hungary and from 30.8% to 22.6% in Romania. The Czech Republic recorded the smallest decrease in the share of

private investments - from 23.7% to 21.7%. The share of private fixed investments in Serbia decreased from 20.1% in 2008 to 16.9% in 2012, bearing in mind that this share in 2012 was influenced by a large Fiat investment, with investment in most of the sophisticated equipment taking place in 2012. A year earlier, as well as a year later, the share of private fixed investments in GDP was only 14.4%, which better reflects the level of private investments in Serbia in that period.

None of the countries that recorded a contraction in economic activity in 2009 managed to reach the pre-crisis level by end-2012, reflecting, among other things, the level of investment. Compared to the pre-crisis level, at end-2012, GDP was lower by around 1% in Serbia, around 2% in the Czech Republic, and around 6% in Romania and Hungary.

On the other hand, the countries of Central Europe practically completed fiscal consolidation during the period 2009–2012, while Serbia would initiate that process at end-2014. The timely initiation of fiscal consolidation, its intensity, and the moment of completion, would largely determine the rates of economic growth in the period 2013–2019.

Table 2 **Macroeconomic indicators in selected CESEE countries from 2009 until 2012** (in %)

	Average annual GDP growth	Average share of private fixed investments in GDP	Average annual inflation rate	Foreign exchange rate change (- means depreciation)	Average annual growth of private consumption	Average annual growth of exports of goods and services
Czech Rep.	-0.4	21.6	1.9	7.1	0.0	4.6
Poland	3.3	15.2	3.5	0.8	2.5	4.9
Hungary	-1.4	16.9	4.7	-10.3	-2.8	1.3
Romania	-1.3	21.2	5.2	-11.0	-2.0	5.8
Serbia	-0.2	15.4	8.2	-23.0	-1.1	3.5

Sources: Eurostat, IMF (IFS database).

3.3 Macroeconomic developments in the period 2013–2019³⁰

After the end of the global economic and debt crises, economic growth in CESEE countries resumed, but at lower rates compared to pre-crisis years. When it comes to growth structure, a positive contribution came mainly from domestic demand, with the occasional positive contribution from net exports. In addition, in the structure of domestic demand growth, the dominant influence, especially since 2015, came again from personal consumption and in most countries from final government consumption. On the other hand, the contribution of investments was mostly positive, albeit lower than in the pre-crisis period.

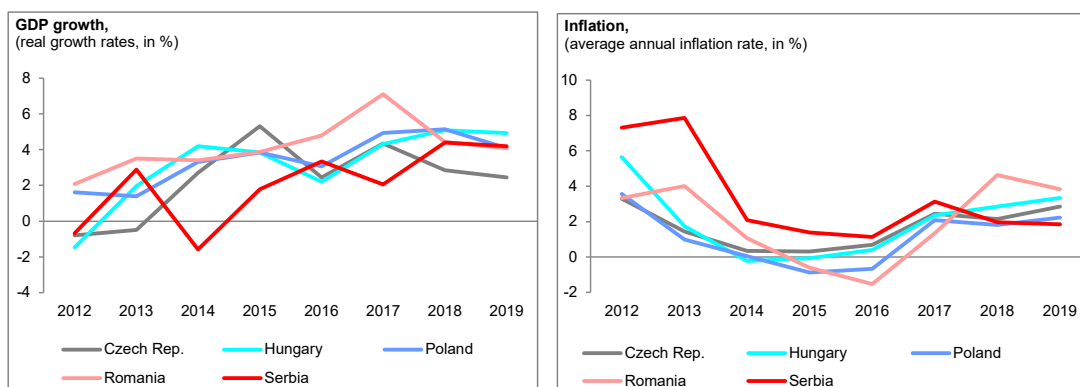
Following their decline between 2009 and 2012, in most CESEE countries private fixed investments never returned to their earlier levels. From 2013 through 2019, the share of private fixed investments in the Czech Republic ranged between 21% and 22% of GDP, while in Romania and Poland their share was lower and averaged 19.7% and only 14.4%, respectively. The two countries in which the share of private fixed investments increased in the observed

³⁰Data on GDP, GDP components and current account deficits were taken from the Eurostat database, while fiscal data and data on inflation and exchange rate were taken from the IFS database under the jurisdiction of the IMF. Data on the share of private fixed investments in GDP are the author's calculation made on the basis of data on total fixed investments (source: Eurostat) and government investments (sources: OECD and the Ministry of Finance of the Republic of Serbia).

period are Hungary and Serbia, but it was still below the levels reached before the outbreak of the global economic crisis. During the observed period, the share of private fixed investments in Hungary increased from 15.5% in 2012 to 22.2% of GDP in 2019, and in Serbia from 14.4% in 2013 to 17.5% of GDP in 2019.

After edging up mildly in the first years after the completion of fiscal consolidation, personal consumption started to rise at significantly higher rates as of 2017, and in some countries as early as of 2016. In some years, especially in Romania, personal consumption again rose faster than total GDP. Serbia was the only exception, as personal consumption rose at a slower pace than total GDP all the time. As a result, the average annual GDP growth in the period 2013–2019 was 2.4% in Serbia, 2.8% in the Czech Republic, 3.7% in Poland, 3.8% in Hungary and 4.5% in Romania. It should be noted that Serbia had only just begun fiscal consolidation in 2013 and 2014, which reflected on economic growth rates in the period 2013–2017, while other countries had already completed fiscal consolidation by 2013. It should be noted in this context that less than one third of the growth in Serbia was led by personal consumption. In Hungary, Poland and the Czech Republic a half of the growth was the result of personal consumption, while in Romania the average contribution of personal consumption exceeded on average the GDP growth rate.

Charts 11 and 12 **Annual real GDP growth rate and average annual inflation rate in selected CESEE countries from 2012 until 2019**



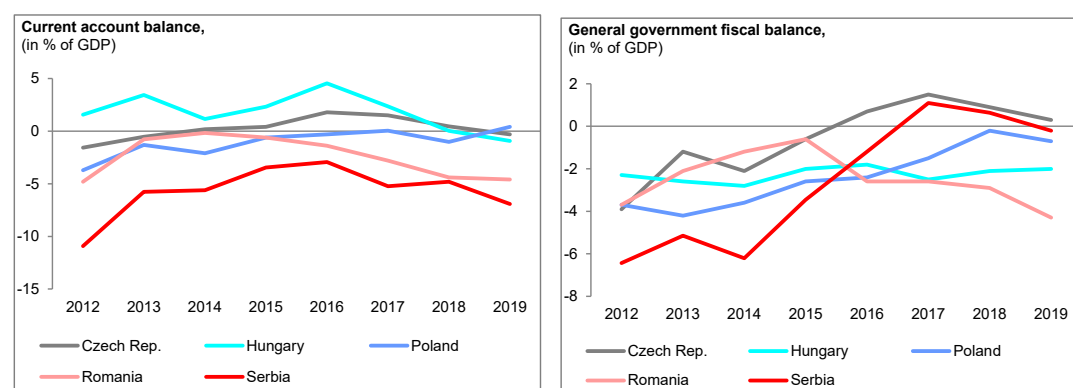
Sources: Eurostat, IMF (IFS database).

Such structure of GDP growth reflected on other macroeconomic indicators as well. In the first years after the crisis, inflation moved at rather low levels, sometimes even in the negative territory, amid falling global oil prices, low global inflation, and the effects of fiscal consolidation on personal consumption. After that, due to significantly faster growth of personal consumption, rising final government consumption, surging global oil prices and higher global inflation, inflation went up in almost all countries of the region. In some cases, it reached close to 4%, or over 4% in Romania, where the growth of personal consumption was the most pronounced (10.0% in 2018 and 7.3% in 2019). This was aided by depreciation pressures which most countries in the region faced during this period. Serbia had the most stable inflation in the observed period (around 2% on average). It embarked on fiscal consolidation at end-2014 and eliminated the fiscal deficit by end-2017. During the observed period, Serbia recorded sustainable growth of personal consumption. In addition, from April 2017 to end-2019, Serbia faced mostly appreciation pressures, due to which the dinar gained

around 5% against the euro despite NBS interventions in which over EUR 5 bn net were bought to prevent excessive strengthening of the dinar. The key cause of appreciation pressures was Serbia's improved perception in the international capital market and the fact that all the time net foreign direct investments were more than enough to fully cover the current account deficit. In parallel, the process of dinarisation of public debt was carried out, during which the emphasis was on refinancing previously issued debt in foreign currency with newly issued dinar securities.

In all observed countries, this structure of GDP growth and the policies behind it reflected, to some extent, on the indicators of internal and external balance. Primarily in Romania, which saw renewed deepening of both the fiscal and current account deficits, driven by unsustainable wage increases. As for Serbia, after falling from around 11% of GDP in 2012 to around 3% of GDP in 2016, the current account deficit again widened, reaching by 2019 6.9% of GDP, but this was primarily due to the increase in investments and imports of equipment.

Charts 13 and 14 **Current account balance and general government fiscal balance in selected CESEE countries from 2012 until 2019**



Sources: Eurostat, IMF (IFS database).

Table 3 **Macroeconomic indicators in selected CESEE countries from 2013 until 2019 (in %)**

	Average annual GDP growth	Average share of private fixed investments in GDP	Average annual inflation rate	Foreign exchange rate change (- means depreciation)	Average annual growth of private consumption	Average annual growth of exports of goods and services
Czech Rep.	2.8	21.3	1.5	-1.1	2.9	4.5
Poland	3.7	14.4	0.8	-4.1	3.2	7.2
Hungary	3.8	17.8	1.5	-12.0	3.7	6.0
Romania	4.5	19.7	1.8	-7.5	6.0	9.6
Serbia	2.4	14.9	2.8	-3.5	1.1	9.8

Sources: Eurostat, IMF (IFS database).

4 Data, statistical transformations and the choice of variables

The bulk of the data used in the paper was taken from international databases of Eurostat, the IMF, World Bank and OECD. Eurostat's data base was used for data in the field of national accounts. Data about the fiscal deficit and balance of payments were taken from Eurostat's database, while data about inflation and exchange rates of national currencies against the euro were taken from the IMF's IFS database. Worldwide Governance Indicators and data about private sector lending were taken from the World Bank's data base. Deviation from the principle of using international databases was applied twice due to non-availability of data. The first time was for the output gap, where in addition to the OECD's database, data of the National Bank of Romania and the National Bank of Serbia were used for Romania and Serbia. The second time was for consolidated capital expenditures of the general government, where data from the OECD's database were used for all countries except Serbia, for which data from the Serbian Ministry of Finance were used.

Below is the description of data used in the paper.

Private fixed investments are a dependent variable in the paper. They were obtained as a difference between total fixed investments in GDP and the share of government investments (general government capital expenditures) in GDP, which is a way in which they are approximated by central banks, as well as by analytical teams of national governments and international financial and other institutions. The calculation was conducted in current prices in the national currency. In order to obtain a stationary series, the change (difference) in the share of private fixed investments in GDP was used in the model as a dependent variable.

Inflation rate. Inflation rate is the first of the three independent variables with which we approximate macroeconomic stability in the paper. Intuitively, in line with economic logic, we expect the rise in inflation rate to increase uncertainty in the economy, reduce the real disposable income of households and corporates, and thus negatively affect private sector investments. This variable was included in the model in the form of a change (difference) in the average annual inflation rate.

Current account deficit. Current account deficit is the second of the three independent variables with which we approximate macroeconomic stability in the paper, as it most often expresses external imbalance of a country. In line with economic logic, we expect the increase in the current account deficit, i.e. increase in a country's external imbalance, to have an adverse effect on investors' risk perception and in turn on private sector investments. However, we should bear in mind that in the short or medium term, such a link need not be necessarily negative, as it often happens that an increase in private fixed investments also leads to increased import of the necessary equipment and intermediate goods, thus increasing the overall import and the current account deficit. This variable was included in the model in the form of the annual share of the current account deficit in GDP.

Fiscal deficit. Fiscal deficit, i.e. deficit in the general government budget, is the last of the three independent variables with which we approximate macroeconomic stability in the paper. Fiscal deficit is often used as a measure of internal imbalances of a country. In principle, we expect the increase in fiscal deficit, through investors' perception of increased risk, to have an adverse effect on private sector investments. However, we should consider the possibility that

in the short or medium term, against the backdrop of a large investment cycle, there could be a simultaneous growth in private investments and growth in fiscal deficit driven by increased government investments. This variable was included in the model in the form of a change (difference) in the share of fiscal deficit in GDP.

Dummy variable for EU entry. Bearing in mind the economic importance of EU accession, the dummy variable, as an independent control variable, was used for the year when each of the countries entered the EU. The Czech Republic, Hungary and Poland became members in 2004, while Romania joined in 2007. Serbia is in the stage of accession talks. This private sector investment determinant should also contain the effect of the significant improvement in the quality of institutions and overall investment environment in the country, bearing in mind the rather strict and thorough process of EU accession, during which a candidate country opens and closes chapters pertaining to the rule of law, various forms of regulations, and numerous economic chapters.

Worldwide Governance Indicators (WGI). Another independent control variable. These indicators are calculated and published by the World Bank. There are six of them in total: (1) Voice and Accountability, (2) Political Stability and Absence of Violence and Terrorism, (3) Government Effectiveness, (4) Regulatory Quality, (5) Rule of Law, and (6) Control of Corruption. The indicators take the value from -2.5 to +2.5. We expect the improvement of governance indicators over a certain period to have a positive effect on increase in private fixed investments. The average of these six indicators was used in the paper as a determinant of private fixed investments.

Real interest rate. This is another independent control variable. To calculate the real interest rate, we used key policy rates of central banks and the average annual inflation rates. In line with economic logic, we expect the reduction in the real interest rate to have a positive effect on growth in private fixed investments. The level of the real interest rate was included in the model as a determinant.

Real GDP growth in the euro area. An independent control variable to approximate external demand. Bearing in mind that the euro area is the key foreign trade partner to selected CESEE countries, we expect euro area GDP growth to have a positive effect on the rise in private fixed investments in selected CESEE countries. This variable is included in the model as the annual real GDP growth rate.

Relative price of capital. The relative price of capital goods is the independent control variable representing the relation between the prices of capital goods and consumer goods in an economy. We approximate this variable by the difference in the annual rate of fixed investment deflator and the average annual inflation rate in each observed country. We approximate the prices of capital goods with the investment deflator, which should directly or indirectly include the price of construction works, prices of real estate and other construction facilities, interest rates and domestic and import equipment prices. The average annual inflation rate *per se* means a change in the prices of consumer goods. We expect the relation between the prices of capital and consumer goods to represent an important determinant of private investments in the sense of encouraging the private sector to invest. Intuitively, we expect investment propensity to rise if the increase in the price of capital goods is smaller than the increase in consumer prices, i.e. if it is “cheaper” to spend on investments than on consumer

goods, though this relation need not be such. Just as, for instance, fixed investments include real estate investments, thus the deflator of fixed investments directly or indirectly includes real estate prices. In conditions when real estate prices are on the rise, the private sector may decide to invest additionally in real estate if it perceives that the prices will continue up going forward. The relative price of capital is included in the model in the form of a quotient between the annual investment deflator and the average annual inflation.

Economic openness. Economic openness as an independent control variable is approximated by the share of the sum of goods and services export and import in GDP, in current prices. Over the past two decades, a significant portion of private investments in the CESEE region came in the form of FDIs. Bearing in mind that foreign investors (as well as domestic ones) in these countries mostly manufacture products for the purpose of export to third countries, and that they need to import equipment and intermediate goods from third countries, we expect the increase in the level of openness of an economy to have a positive impact on growth in private investments. Economic openness was included in the model in the form of a level, i.e. the share of the sum of goods and services export and import in GDP.

Financial market development. Financial market development level is approximated by the share of other deposit institutions total loans to private sector in GDP. As each investment must have a source of financing, we intuitively expect financial market development to contribute to the increase and diversification of the sources of investment financing, and thereby to growth in private investment. On the other hand, we should bear in mind that a large portion of investments in CESEE countries in the observed period was financed directly from abroad (equity capital, reinvested earnings of non-residents, intercompany loans between the parent company abroad and the daughter company, cross-border loans, etc.), therefore the cause-and-effect relationship between financial market development and private fixed investment need not be necessarily significant. In addition, financial market development can significantly facilitate household borrowing, which, via an increase in final consumption, can have a negative impact on the composition of economic growth, widening of external imbalance and growth in country risk premium, thus in fact deteriorating a country's perception from an investor's point of view. This effect can particularly be pronounced in emerging countries. Financial market development is included in the model in the form of a level.

Table 4 **Data description**

DATA USED IN ECONOMETRIC ANALYSIS OF THE IMPACT OF MACROECONOMIC STABILITY ON PRIVATE FIXED INVESTMENTS			
Variable	Expected sign	Variable description	Data source
Share of private fixed investments in GDP (dependent variable)	/	Difference between the share of total fixed investment in nominal GDP and government investment in nominal GDP	Author's calculation based on Eurostat and OECD data
Average annual inflation	Negative	Average of twelve y/y CPI growth rates during the year	Author's calculation based on Eurostat data
Current account deficit	Positive / negative	Current account balance in euros, expressed as a percentage of nominal GDP in euros	Author's calculation based on Eurostat data
Fiscal deficit	Positive / negative	General government fiscal balance in national currency, expressed as a percentage of nominal GDP	Author's calculation based on Eurostat data

DATA USED IN ECONOMETRIC ANALYSIS OF THE IMPACT OF MACROECONOMIC STABILITY ON PRIVATE FIXED INVESTMENTS			
External demand	Positive	Euro area real GDP growth rate. National accounts statistics. Annual GDP growth rates expressed in constant prices.	Eurostat database
Dummy variable for EU entry	Positive	Variable takes value of 1 for the year of joining EU and value of 0 (zero) for all other years. Czech Republic, Poland and Hungary became EU members in 2004, Romania in 2007, while Serbia still did not become a member.	Author's entry
Governance indicators	Positive	Six indicators produced and published by the World Bank: (1) Voice and Accountability, (2) Political Stability and Absence of Violence and Terrorism, (3) Government Effectiveness, (4) Regulatory Quality, (5) Rule of Law and (6) Control of Corruption	World Bank WGI database and author's calculation
Real interest rate	Negative	Annual average key policy rate deflated by the annual average inflation rate.	Author's calculation based on BIS and IFS data
Relative price of capital	Positive / negative	National accounts statistics, quotient between the deflator of fixed investments and deflator of total GDP expressed in percentage points	Author's calculation based on Eurostat and IFS data
Financial market development	Positive / negative	Private sector lending. Monetary statistics, the share of private sector lending by other deposit institutions in GDP	World Bank database
Openness of the economy	Positive	Sum of the nominal export and import of goods and services, expressed as a share in nominal GDP	Eurostat database and author's calculation

5 Econometric methodology, estimated model and interpretation of results obtained

5.1 Econometric methodology

The research conducted in the paper is based on a panel analysis of data for five CESEE countries pursuing the inflation targeting regime. The analysis was done on the example of the Czech Republic, Poland, Hungary, Romania and Serbia, using annual data, and covers the period from 2001 until 2019.

In order to study the impact of macroeconomic stability on private fixed investment in selected CESEE countries, a panel analysis was conducted in the Stata software package.

Choosing between models with fixed and models with random effects³¹

On principle, whether we use a model with fixed effects or a model with random effects will depend on whether regression parameters are treated as fixed or random variables with a common median and variance. Generally, the choice of the panel model depends on the nature of data used in the panel and the goal of the econometric research. The panel model with fixed effects (FE model) is generally chosen when we limit the conclusions to a specific set of

³¹Jovičić, M., i Dragutinović Mitrović, R. 2011. *Ekonometrijski metodi i modeli*, Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu, 248–252.

several units (e.g. several countries, regions or economic branches, where we know some of their characteristics in advance), whereas the panel model with random effects (RE model) is often chosen when a large number of units is randomly selected from the population and when a large number of degrees of freedom is lost.

Using the FE model in practical research comes with some limitations. First, parallel with the increase in the number of observed units, the number of dummy variables also increases, whereby a large number of degrees of freedom is lost because in addition to parameters with the variables, the addition of N parameters with dummy variables is also estimated, which may cause a harmful multicollinearity. Second, the covariance estimate in the FE model does not take into account the variations between observed units, but only variations within observed units. And third, the impact of individual variables cannot be estimated in isolation due to their perfect correlation with individual effects already included in the model.

That is why contemporary literature sometimes starts with random effects model, i.e. the RE model, stating that by definition, μ_i is the effects of individual variables not included in the model, therefore they are part of a random error and are stochastic in character. A key problem in estimating the stochastic specification and choosing between panels with fixed and random effects, is most often associated with the impairment of the assumption about the absence of a correlation between regressors and individual effects as components of a random error. If this assumption is fulfilled, i.e. if $E(\mu_i X_{it}) = 0$, then there is no statistically significant difference between the estimates of the FE and of the RE model. The estimate of the RE model is efficient relative to the covariance estimate of the FE model, and so the RE model is chosen. Conversely, if the assumption is impaired, i.e. if $E(\mu_i X_{it}) \neq 0$, then the estimate of the RE model is biased and inconsistent. The covariance estimate of the FE model remains unbiased and consistent due to the correlation between the regressor and individual effects, therefore the FE model is chosen. An error in specification in practice usually occurs due to the correlation between the regressor and random error components (individual and/or temporal effects). In our example analysis of determinants of private fixed investments, individual effects can contain effects of an omitted variable, such as, for example, the age composition of the population, which can be correlated with some of the independent variables determining private fixed investments.

For the purpose of determining the nature of individual effects, i.e. in order to establish whether the individual effects are fixed or random, Hausman specification test is used. A significant difference between estimates of the FE and RE models is the indicator of the specification error.

The following hypothesis is tested:

$$H_0: E(\mu_i | X_{it}) = 0 \text{ versus } H_1: E(\mu_i | X_{it}) \neq 0.$$

Statistics of the Hausman test is as follows:

$$m_1 = \hat{q}_1' \text{Var}(\hat{q}_1)^{-1} \hat{q}_1$$

and according to the null hypothesis, it has an asymptotic χ^2 distribution with $K - 1$ degree of freedom ($K - 1$ is the number of regressors in the RE model) where:

$$\text{Var}(\hat{q}_1) = \text{Var}(\hat{\beta}_{FE}) - \text{Var}(\hat{\beta}_{REGLS})$$

The rule for deciding says that if the $m1$ statistics value is higher than the critical value, then H_0 is rejected, and we conclude that there is a statistically significant difference between the estimates of FE and RE models. With this in mind, the FE model is chosen. If the null hypothesis is not rejected, it follows that the Hausman test cannot be used in a situation when heteroscedasticity and (or) autocorrelation is present, given that the bias of variance estimates of regression parameters leads to the bias of the test itself.

We initially estimated the panel model with fixed individual effects, and then the model with the same specification of variables, but with random individual effects. By applying the Hausman test, we chose the panel model with fixed individual effects as the most relevant for statistical deduction and analysis of obtained results. Afterwards, in order to test the robustness of the estimated model, we tested several other panel models with different combinations of variables. The results of the additional estimated models indicate the robustness of obtained results.

5.2 Estimated model

Different authors analysed investment determinants, mostly using either total fixed investments or foreign direct investments as a dependent variable. Based on the analysis of numerous empirical research, we arrive at the conclusion that investment determinants can be divided into several groups: indicators of macroeconomic stability, indicators of the quality of institutions or structural reforms, and other indicators, such as the level of financial market development or openness of the economy, as well as variables such as external demand or interest rates.

In the estimated model, macroeconomic stability is approximated by the change in the annual inflation rate, the current account deficit share in GDP and the change in the fiscal deficit share in GDP. As control variables, we use, conditionally, “standard” private investment determinants which are found in literature. These are the quality of institutions, external demand, relative price of capital goods, real interest rate and openness of the economy.

Table 5 Estimated panel model with fixed individual effects

Dependent variable: private_inv (D1)	Coefficient	Standard error	T-statistics	P-value	Confidence interval 95%	
inflation(D1)	-0.1723	0.0607	-2.8400	0.0060	-0.2933	-0.0513
dummy_eu	2.1389	0.6748	3.1700	0.0020	0.7946	3.4832
ca_balance	-0.3015	0.0611	-4.9400	0.0000	-0.4231	-0.1798
fiscal_balance(D1)	0.2223	0.1009	2.2000	0.0310	0.0214	0.4233
real_interest	-0.1752	0.0760	-2.3000	0.0240	-0.3266	-0.0237
ea_gdp_growth	0.2547	0.1080	2.3600	0.0210	0.0396	0.4699
rel_price_capital	0.1957	0.0783	2.5000	0.0150	0.0397	0.3517
trade_openess	0.0672	0.0195	3.4500	0.0010	0.0284	0.1060
fin_dev	-0.0259	0.0215	-1.2000	0.2330	-0.0688	0.0170
C	-7.6302	1.7731	-4.3000	0.0000	-11.1623	-4.0981

The table shows that all private investment determinants related to macroeconomic stability are statistically significant and that all but one control variables are also statistically significant. Furthermore, all variables are of the expected sign, considering that in some variables the expected sign may be either positive or negative.

The estimated model confirms the importance of achieving and preserving macroeconomic stability for the rise of private fixed investment in GDP, while also confirming the significance of institutional development through the EU accession process, the importance of the real interest rate, external demand, relative price of capital and external trade openness of the economy.

Speaking of changes in the inflation rate, the estimated model shows that a 1 percentage point decrease in inflation rate leads to a 0.17 percentage point rise in the share of private fixed investment in GDP. In the column showing P-values, we can see that the impact of the changed inflation rate on the share of private investment is statistically significant at the highest level of 99%. The highest level of statistical significance is also seen in the second determinant used to approximate macroeconomic stability – the current account deficit. The coefficient also has the expected sign and indicates that the reduction of the current deficit share in GDP by 1 percentage point increases the private fixed investment share in GDP by 0.30 percentage points. The third determinant used to approximate macroeconomic stability – change in the fiscal deficit – is also statistically significant, but at the level of 95%, as indicated by its P-value of 0.0310. The coefficient has a positive sign, which could be explained by the fact that the rise in private and government investments often goes hand in hand, with the possibility of the rise in government investment temporarily pushing the fiscal deficit up, until the investments start producing results and fiscal gains. The government frequently uses tax policy (giving up on certain taxes) to positively impact private investment growth, which also leads to a temporary rise in fiscal deficit. Finally, the increase in government current expenditure (which pushes fiscal deficit up) may have a certain bearing on household real estate purchases, which is also a part of private fixed investments.

As for control determinants, we can see that they are all statistically significant at the level of 99% or 95%, except for the financial market development, whose P-value of 0.2330 indicates that this determinant does not have a statistically significant impact on the rise in private investment share. In addition, the sign before financial market development is negative (-0.0259), which would mean that financial market development in selected CESEE countries had a mild negative impact on the rise in private fixed investment share. The absence of statistical significance can be explained by the fact that a large number of investments in CESEE countries is financed directly from abroad in the form of foreign direct investments (equity capital, reinvested earnings of non-residents and intercompany loans) or cross-border loans, which does not require a high level of financial market development. The negative coefficient could be explained by a frequent phenomenon that the financial market development, measured by lending to the private sector, leads to the rise in household lending channelled predominantly to final consumption. All other control variables are statistically significant and have the expected sign.

The real interest rate is statistically significant at the level of 95% and the model shows that a decrease in the real interest rate of 1 percentage point leads to a rise in private fixed

investment share in GDP of 0.17 percentage points. The rise in external demand, approximated by the rate of real GDP growth in the euro area, is also statistically significant at the level of 95%, with the model showing that a 1 percentage point real growth in euro area GDP leads to a 0.25 percentage point rise in private fixed investment share in GDP. Statistical significance of 95% is also indicated by the relative price of capital, with the positive coefficient, which proves that in CESEE countries private investments are on the rise when prices of capital goods increase faster than prices of consumer goods. Openness of the economy shows a statistically significant influence of 99%, and the estimated coefficient shows that a rise in openness of 1 percentage point should lead to a 0.07 percentage point rise in private fixed investment share in GDP. Finally, the dummy variable for the year of entry into the EU shows the highest level of statistical significance of 99%, and also the highest magnitude of impact. The estimated coefficient shows that entry into the EU and the accession process, also implying that the strengthening of institutions and the rule of law, increases the share of private investments by 2.14 percentage points of GDP. Such estimate points to the conclusion that the development of institutions, rule of law and transposition of the EU legal framework, integral to the EU accession process, are essential for increasing the investment share in GDP.

In continuation of the analysis, we estimated the panel with random individual effects, with the same combination of determinants.

Table 6 Estimated panel models with fixed and random individual effects

Dependent variable: private_inv (D1)	Model 1 fixed effects	Model 2 random effects
inflation(D1)	-0.1723***	-0.1110*
dummy_eu	2.1389***	1.8361***
ca_balance	-0.3015***	-0.1770***
fiscal_balance(D1)	0.2223**	0.2459**
real_interest	-0.1752**	-0.1795**
ea_gdp_growth	0.2547**	0.3853***
rel_price_capital	0.1957**	0.2827***
trade_openness	0.0672***	0.0091
fin_dev	-0.0259	0.0198
C	-7.6302***	-2.7963***

The estimated panel with random individual effects shows great similarities, with some minor differences which however do not point to different conclusions with regard to the impact of macroeconomic stability and control determinants on the growth of private fixed investments. As for statistical significance of the impact and impact magnitude, there is almost no difference in dummy variable for the entry into the EU, current account deficit, fiscal deficit, real interest rate and financial market development. There are three key differences: (1) in the random effects model, inflation is significant at the level of 90% (as opposed to 99% in the fixed effects model) and shows a weaker impact on growth in private fixed investment, (2) external demand is statistically more significant (99% vs. 95%) and shows stronger impact (coefficient 0.3853 vs. 0.2547) and (3) openness of the economy loses statistical significance.

Let us recall that in the panel with random individual effects it is practically assumed that all differences between the observed five CESEE countries are of random character, while in the panel with fixed effects, it is assumed that inter-country differences are not random.

We choose between panels with fixed and random individual effects based on the Hausman test.

The Hausman test shows the following results:

Table 7 **Hausman test**

	Coefficients		Difference (b-B)	Sqrt (diag(V _{b-V_B})) S.E.
	(b) FE	(B) RE		
inflation(D1)	-0.1723	-0.1110	-0.0613	0.0040
dummy_eu	2.1389	1.8361	0.3028	.
ca_balance	-0.3015	-0.1770	-0.1244	0.0410
fiscal_balance(D1)	0.2223	0.2459	-0.0236	.
real_interest	-0.1752	-0.1795	0.0043	0.0219
ea_gdp_growth	0.2547	0.3853	-0.1306	0.0255
rel_price_capital	0.1957	0.2827	-0.0870	0.0277
trade_openess	0.0672	0.0091	0.0582	0.0184
fin_dev	-0.0259	0.0198	-0.0457	0.0132
C	-7.6302	-2.7963		
Chi-Sq. Statistic	13.75			
Prob.	0.1316			

Based on chi-square statistics and appropriate P-value we reject the null hypothesis. We derive the conclusion that individual effects are fixed in nature.

In continuation, with a view to examining the robustness of the analysis and the selected model, we estimated several more models with different combinations of determinants. In models 3 and 4 we excluded financial market development as an explanatory variable which previously did not prove to be statistically significant. Model 3 was estimated with fixed effects and model 4 with random effects. The results are similar to models 1 and 2 which we estimated in the first step. The fixed effects model has on principle the expected coefficients and shows statistical significance of private investment determinants at levels 99% and 95%, while the random effects model shows the expected coefficients, but with a lower level of statistical significance.

In models 5 and 6, the dummy variable for entry into the EU is replaced by governance indicators published by the World Bank (WGI - Worldwide Governance Indicators). Model 5 was estimated with fixed effects, while model 6 was estimated with random effects. Model conclusions in terms of the impact of macroeconomic stability and the majority of control variables are practically the same as in earlier models, except that governance indicators show statistical significance only in the random effects model, with a six-year time lag.

Table 8 Estimated alternative panel models

Dependent variable: private_inv (D1)	Model 3 fixed effects	Model 4 random effects	Model 5 fixed effects	Model 6 random effects
inflation(D1)	-0.1721***	-0.0947	-0.1392**	-0.1621
dummy_eu	2.0866***	1.8158***	-	-
governance_ind	-	-	- 1.1907	-
governance_ind(L6)	-	-	-	1.0260*
ca_balance	-0.2755***	-0.1746***	-0.3120***	-0.3422***
fiscal_balance(D1)	0.2299**	0.2437**	0.2669**	0.2930**
real_interest	-0.1907**	-0.1690**	-0.1243	-0.2167*
ea_gdp_growth	0.3068***	0.3578***	0.2973***	0.4042***
rel_price_capital	0.2316***	0.2575***	0.2561***	0.3697***
trade_openess	0.0507***	0.0126**	0.0496***	0.0110
fin_dev	-	-	-	-
C	-6.8016***	-2.3721***	-6.2077***	-2.8753***

5.3 Interpretation of results obtained and recommendations to economic policy makers

In case of analysed CESEE countries, results of the estimated model identify a significant role of achieving and maintaining macroeconomic stability in raising the share of private fixed investments in GDP. At the same time, most of the control variables proved statistically significant in terms of the impact on private fixed investments – primarily institutional quality, as well as the real interest rate, growth of the euro area GDP, relative price of capital, real interest rate and external trade openness of the economy. As for the impact of financial market development on the share of fixed investments in GDP, the estimated model did not confirm a statistically significant relationship. Of course, the results of the estimated model need to be taken with a dose of caution, in view of the potential model bias due to possible omitting some of the variables which could have a statistically significant impact on the share of private fixed investments in GDP in CESEE countries. This primarily concerns the variable of institutional quality, bearing in mind that this variable may be approximated in a number of ways. Still, we believe that this paper may provide useful guidance both to the public and economic policy makers in considering ways to increase the share of private fixed investments in the CESEE region, as well as in other small and open economies.

Regarding estimated coefficients of impact of independent variables on private fixed investment share, in the estimated model, the coefficients show the expected sign in almost all variables. It follows that the rise of private investments in GDP is driven by a decline in inflation, reduction in the current account deficit, higher institutional quality, decrease in the real interest rate, rise in external demand, increase in the relative price of capital relative to consumer goods and the rise in external trade openness. A somewhat unexpected sign (it does

not have to be necessarily negative) is shown by the change in the fiscal deficit, while financial market development proved to be the only statistically insignificant variable.

From the standpoint of the overall economic policy, the analysis shows that the achievement and preservation of macroeconomic stability and strengthening of institutions are key to private investment growth and, by extension, key to economic growth.

From the standpoint of monetary policy, the analysis shows the justifiability of the inflation targeting regime run by selected CESEE countries focused on achieving and preserving low and stable inflation. The analysis also confirms that one of the key determinants of private fixed investments is the real interest rate.

As for fiscal policy, the analysis shows that the rise in fiscal deficit in itself does not necessarily lead to a decrease in investment, but does point to the conclusion that it is desirable that countries stimulate investment at the expense of current spending, as well as by the adequate tax policy. Given that the decline in the interest rate positively affects investment growth, the results point to the conclusion that the countries observed must apply fiscal discipline, which will on the other hand enable central banks to reduce their policy rates to the lowest possible level which does not jeopardise price stability as the main objective.

In terms of structural policies, it was shown that one of the key factors of investment growth is the improvement of institutional quality, encouraged and coordinated through the EU accession process, which confirms the justifiability of the decision of the observed countries to prioritise EU accession in their foreign policy. With a view to additionally stimulating growth in exports and economic openness (faster rise of foreign trade exchange compared to that of GDP), the analysis shows the necessity of introducing policies which stimulate industrial production and other export-oriented sectors in the domain of both goods and services.

The results of the analysis show that external demand has a significant impact on private investments, which from the standpoint of economic policy management shows that the observed countries, in making economic policy decisions, should seriously consider global growth prospects, primarily prospects for the euro area.

It is reasonable to expect that external trade openness of the economy would gradually increase if all the abovementioned conditions are fulfilled, which would exert a positive impact on private investment growth.

6 Conclusion

Based on the presented results of the estimated models, as well as the results and conclusions of other authors who have dealt with these and similar problems, we conclude that the results of the analysis confirm the main hypothesis of the paper that improved macroeconomic stability indicators have a positive effect on the share of private fixed investments in GDP. We also state that the main objective of this paper has been achieved, to prove the importance and quantify the impact of macroeconomic stability on the increase in the share of private fixed investments in GDP in selected CESEE countries. The results of the analysis also confirm the additional hypothesis that the improved quality of institutions has a

beneficial effect on the share of private fixed investments in GDP, and thus improves the outlook for economic growth. In addition to macroeconomic stability and improved quality of institutions, it has been identified that the positive impact on the increase in the share of private fixed investments in GDP also comes from external demand, real interest rates, relative price of capital and openness of the economy. The results of the analysis should certainly be taken with a dose of caution, given that there is a possibility that a certain statistically significant variable was omitted, which could lead to a bias of the estimated model.

The contribution of this research is reflected in the fact that this is one of the few papers that, through panel analysis, deals with the impact of such a wide range of variables on investments in CESEE, including Serbia. Also, this paper does not use foreign direct investments as a dependent variable, which is most often the case in available literature, but rather the private component of fixed investments. At the time of writing, according to the information available to the author, this has been the only paper that takes private fixed investments as a dependent variable in the analysis of the impact of macroeconomic stability on investments, while including Serbia in the sample. The contribution of this research to the academic literature is reflected in the fact that it provides additional insight into the issues related to monetary policy, monetary and fiscal policy coordination, as well as potential entry of CESEE countries in the euro area.

When it comes to possible directions of further research on this topic, one of the possibilities is the application of a dynamic panel model. Another possibility is to separate the analysis into sub-periods where it would be determined whether there are considerable differences in the statistical significance and direction of the impact of individual determinants of private investment, before, during and after the financial and debt crisis in Europe that lasted from 2009 to 2012. Thirdly, instead of examining the impact of individual macroeconomic and fiscal indicators on private investment, future analysis could extract factors (common components) from the group of “similar” variables using the PC method (Principal Components), and then examine the impact of these factors on private fixed investments. For example, one factor of private fixed investments could be created from consumer and producer prices, exchange rate and terms of trade, another factor from fiscal variables such as fiscal deficit and public debt, a third factor from various external sector indicators, a fourth factor from different structural variables and alike. Finally, the subject of further analysis could be a comparison of investment determinants in CESEE countries which apply the inflation targeting regime and CESEE countries which apply a fixed exchange rate regime.

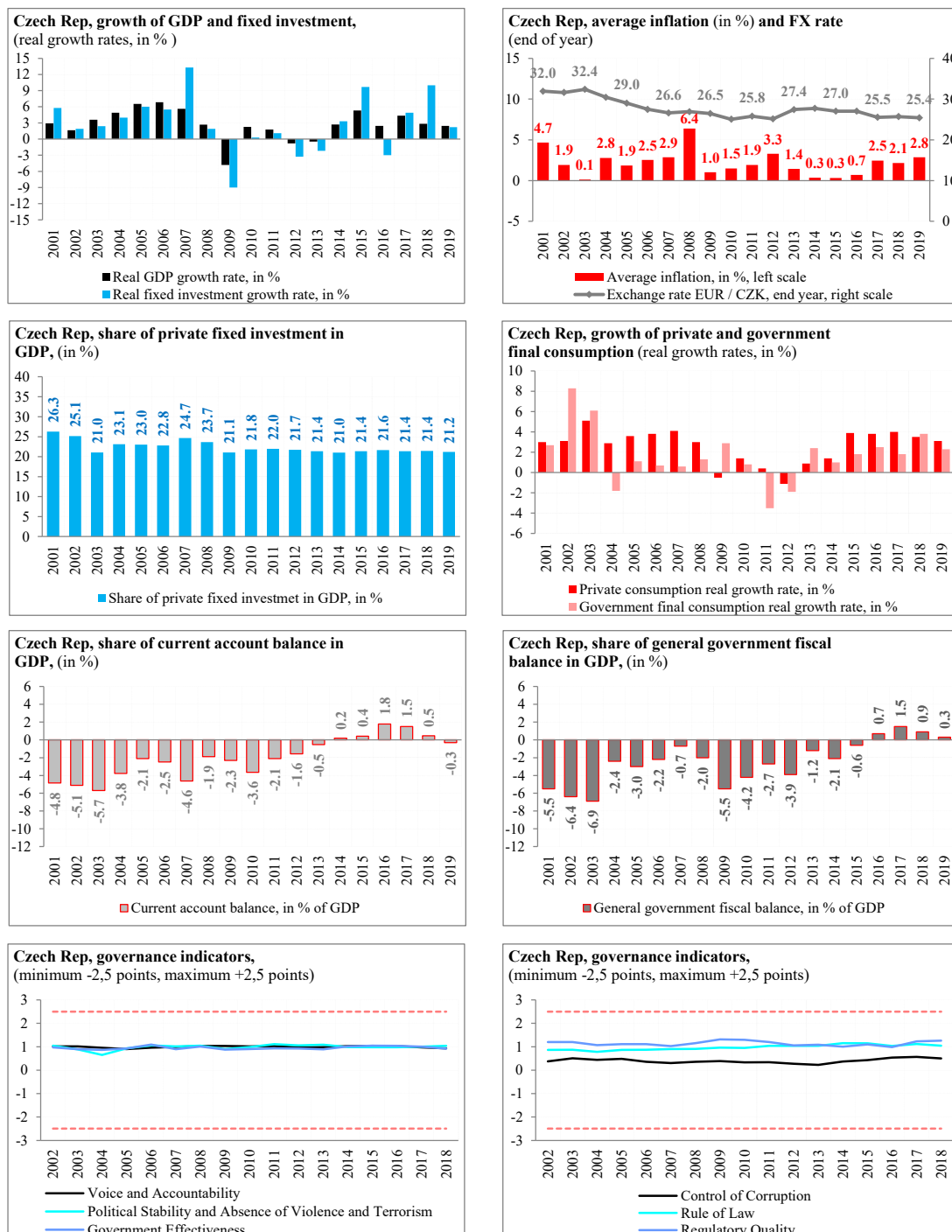
The use of panel analysis has certain limitations, which also gives rise to potential ideas for further work on this and similar topics. A potential limitation of the use of panels in such analyses is the possibility that the significance of potential explanatory variables may vary greatly by country, which could lead to biased estimates of individual parameters when looking at individual countries. For example, the importance of reducing inflation volatility for private investment growth may be different in countries that through history experienced periods of “only” galloping inflation and those that faced hyperinflation (such as Serbia), where several dozens or hundreds of percent inflation was common on a daily basis. In order to overcome this problem, various model averaging techniques can be used to allow the inclusion of all (but not necessarily all) relevant variables while focusing on each individual

country. Model averaging in the context of this analysis would mean using different combinations of potential determinants of private fixed investment as individual models, while the final score would be obtained by averaging all estimated models using appropriate weighting criteria for individual models. Also, future analysis could include examining the existence of a threshold for indicators of macroeconomic volatility.

To summarise, based on the conducted econometric research and the views of other authors in this field, we conclude that achieving all the above economic policy goals leads to an increase in the share of private fixed investments in GDP, which further affects the opening of new companies, adoption of new technologies, job creation and total GDP growth, while at the same time exerting a beneficial effect on the reduction of internal and external imbalances. This increases the confidence of portfolio investors and investors in the real sector, which can have a reciprocal effect on even higher investment growth and lower internal and external imbalances. All the above leads to the conclusion that when the country delivers macroeconomic stability for an extended period, strengthens institutions, starts an investment cycle and thus ensures high and sustainable economic growth, there is more room for the government to work on providing other essential functions, such as security, health, education and social protection, which are the key factors of growth and development of a country and its economy in the long run.

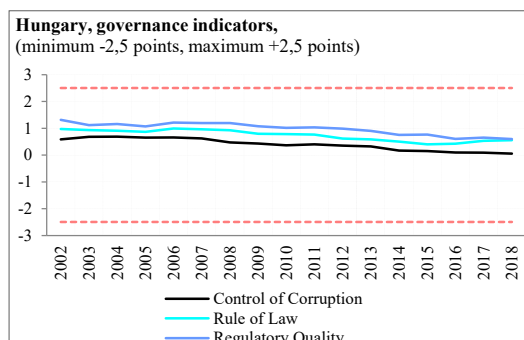
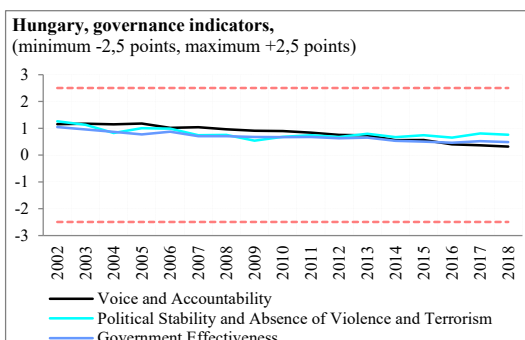
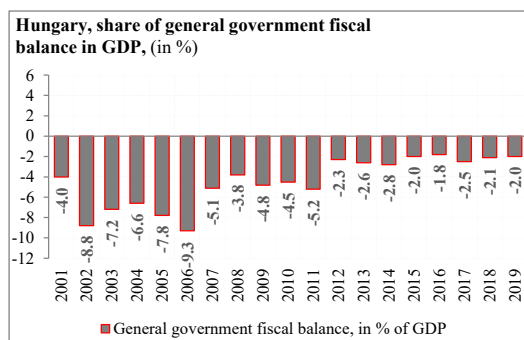
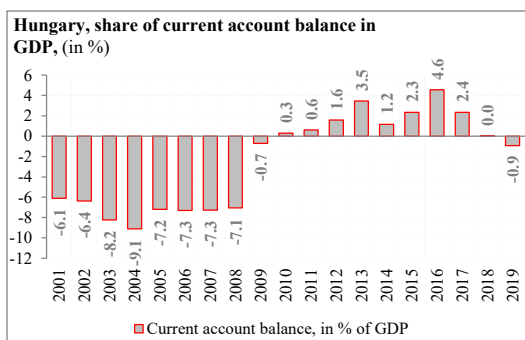
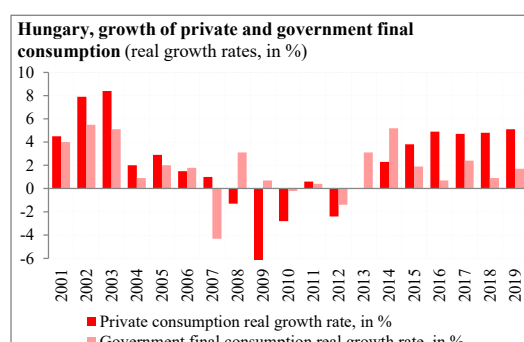
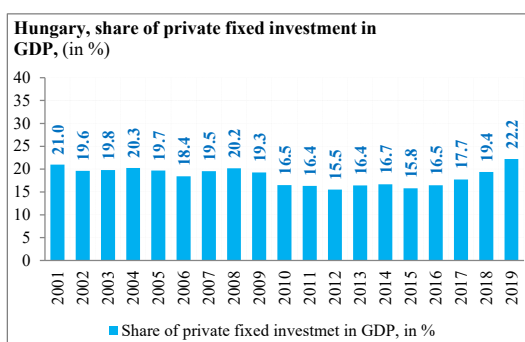
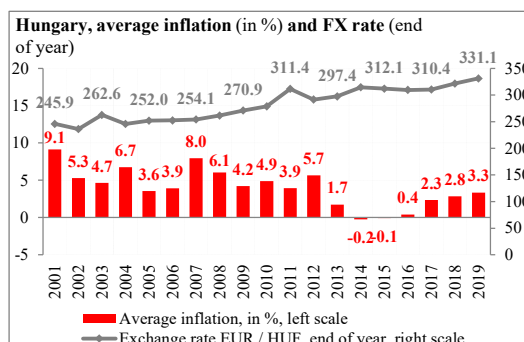
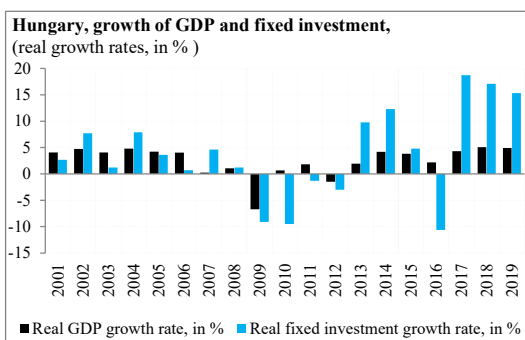
Appendix

Charts 1 to 8 Macroeconomic, fiscal, and structural indicators in the Czech Republic from 2001 to 2019



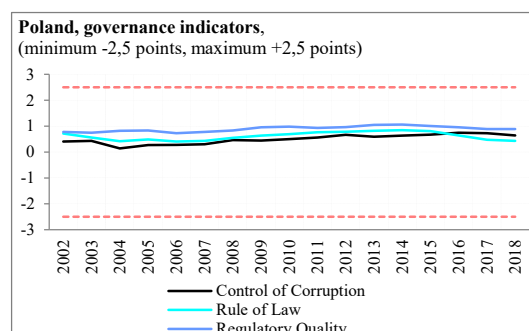
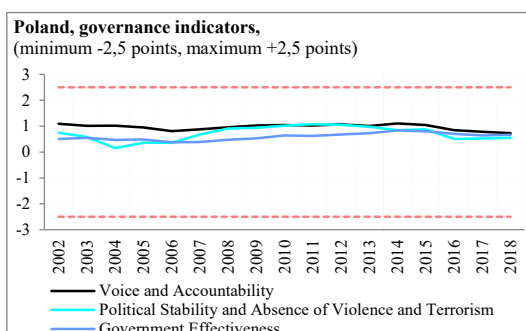
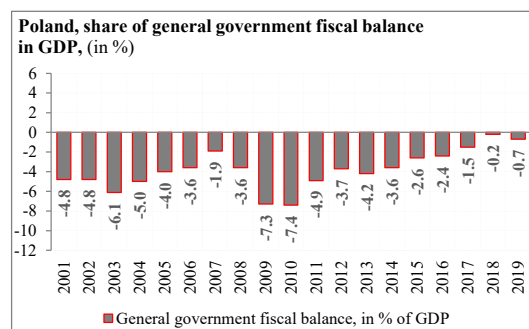
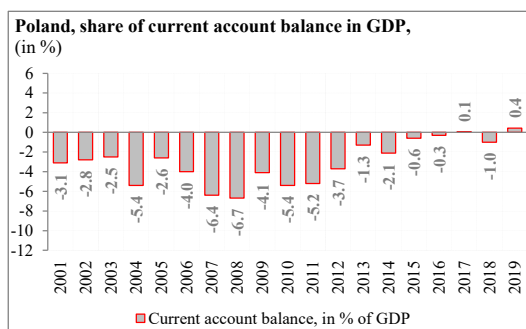
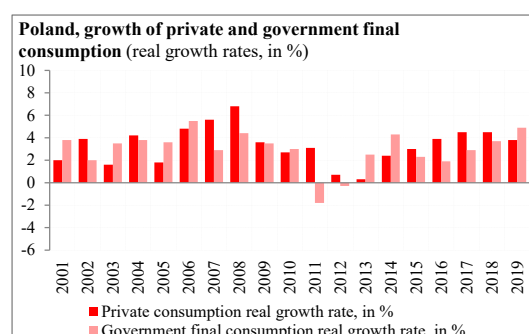
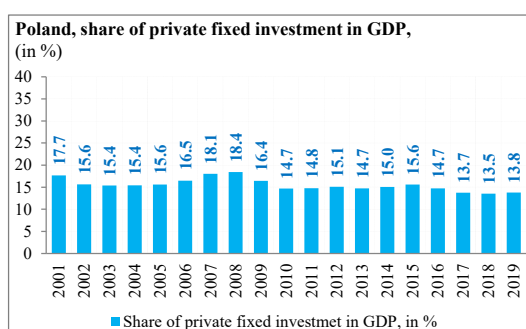
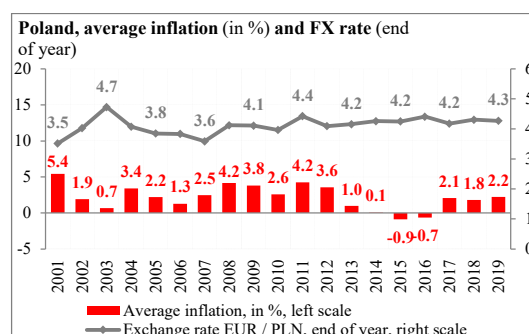
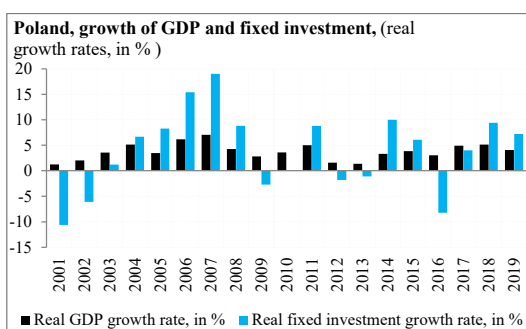
Sources: Eurostat database for national accounts data, BoP data and fiscal data, IMF IFS database for exchange rate and inflation data and WB database for governance indicators.

Charts 9 to 16 Macroeconomic, fiscal, and structural indicators in Hungary from 2001 to 2019



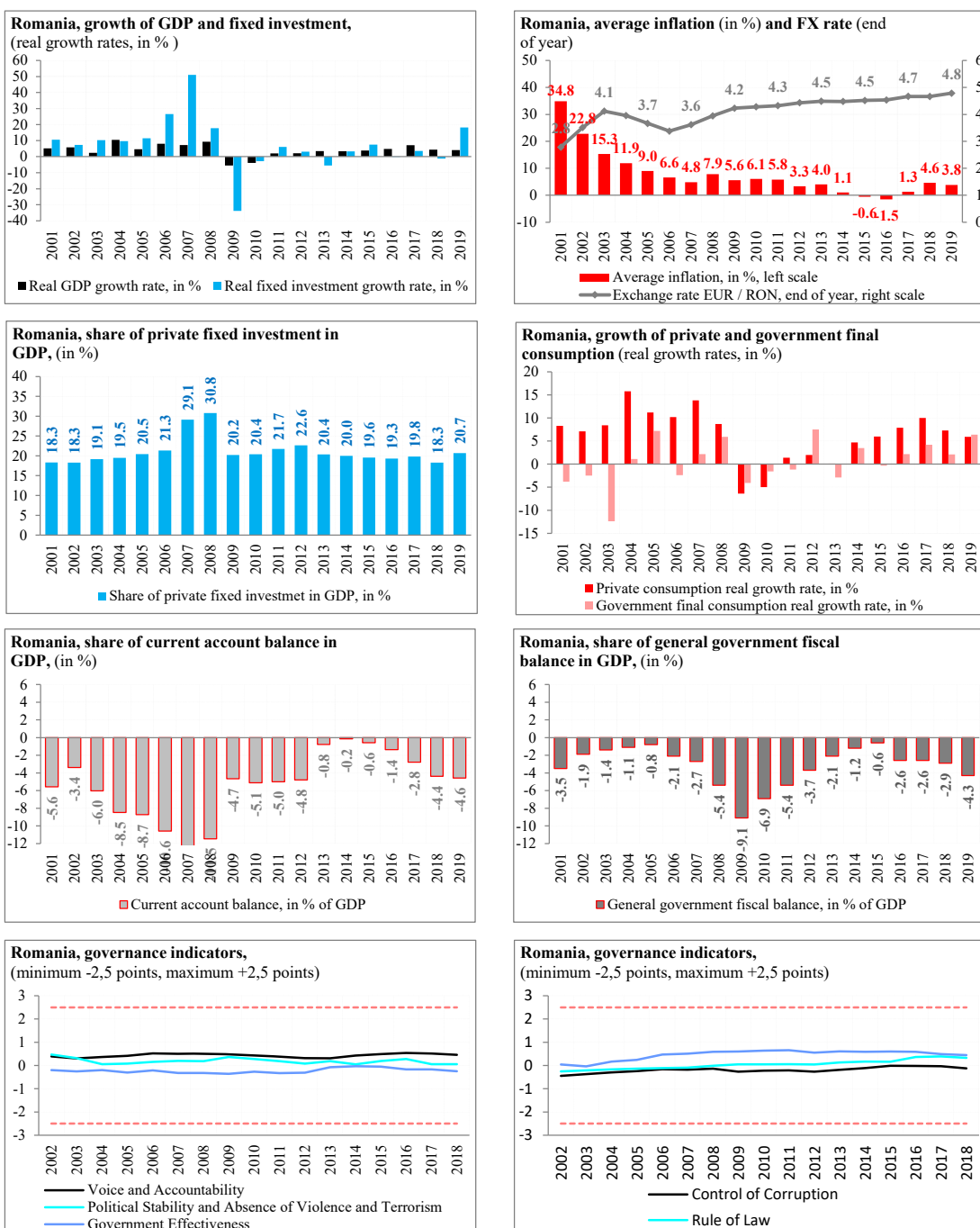
Sources: Eurostat database for national accounts data, BoP data and fiscal data, IMF IFS database for exchange rate and inflation data and WB database for governance indicators.

Charts 17 to 24 Macroeconomic, fiscal, and structural indicators in Poland from 2001 to 2019



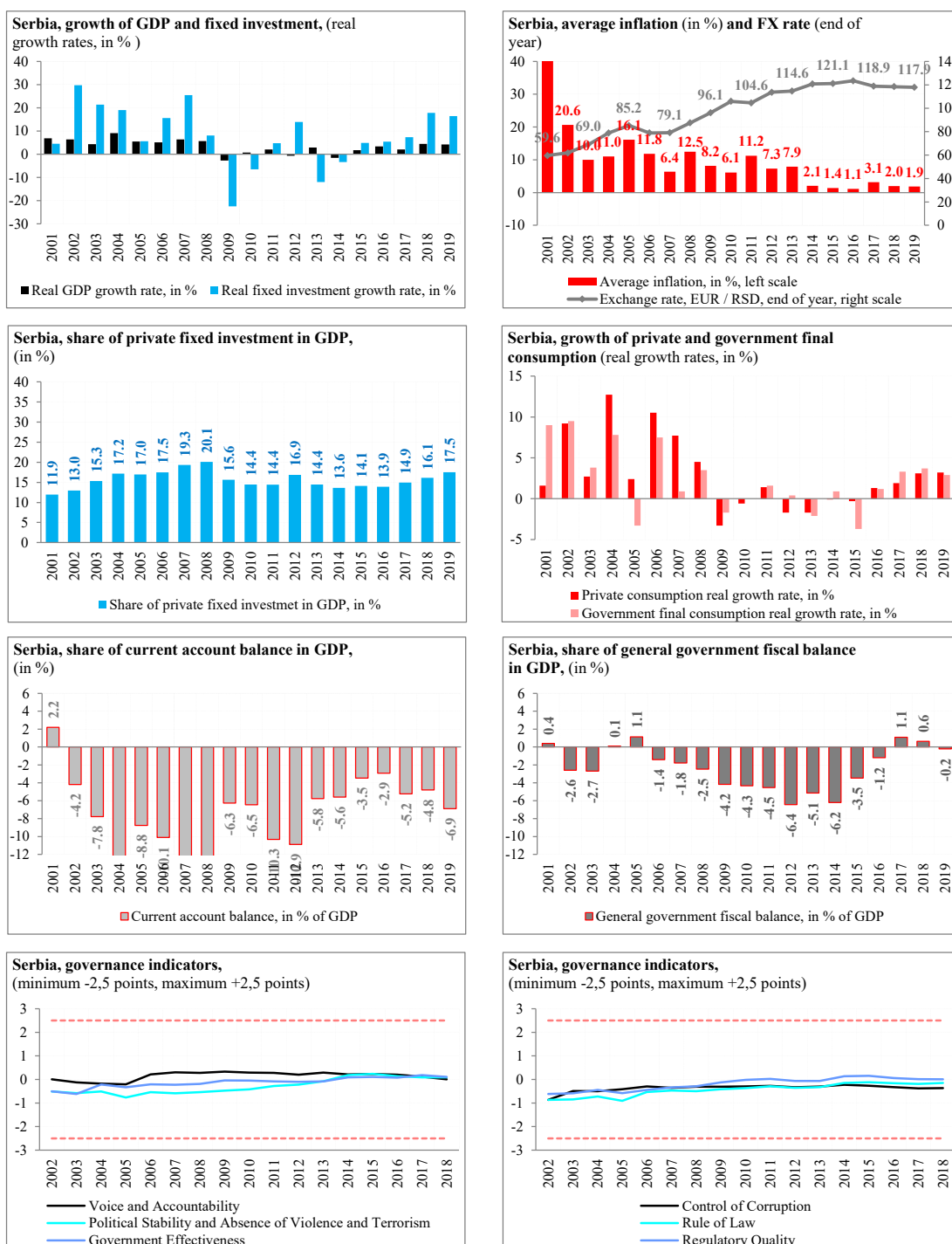
Sources: Eurostat database for national accounts data, BoP data and fiscal data, IMF IFS database for exchange rate and inflation data and WB database for governance indicators.

Charts 25 to 32 Macroeconomic, fiscal, and structural indicators in Romania from 2001 to 2019



Sources: Eurostat database for national accounts data, BoP data and fiscal data, IMF IFS database for exchange rate and inflation data and WB database for governance indicators

Charts 33 to 40 Macroeconomic, fiscal, and structural indicators in Serbia from 2001 to 2019



Sources: Eurostat database for national accounts data, BoP data and fiscal data, IMF IFS database for exchange rate and inflation data and WB database for governance indicators.

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List of abbreviations

GDP – gross domestic product
CESEE – Central and Southeast Europe
EU – European Union
FE model – Fixed Effects Model
GARCH – Generalised Autoregressive Conditional Heteroskedasticity
GLS –Generalised Least Squares
IFS – International Financial Statistics
LSDV – Least Squares Dummy Variable Method
IMF – International Monetary Fund
OECD – Organisation for Economic Cooperation and Development
OLS – Ordinary Least Squares
RE model – Random Effects Mode)
USA – United States of America
WB – World Bank
VAR model –Vector Autoregression Model
WGI –Worldwide Governance Indicators