

# Determinants of variation in public investment in emerging Europe

Determinants  
of variation in  
public  
investment

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## Abstract

**Purpose** – This paper evaluates the economic, political and institutional determinants of variation in public investment in emerging Europe.

**Design/methodology/approach** – Panel econometrics (panel-corrected standard error, generalized least squares and the two-stage least squares) methods have been applied using annual data from 2000 to 2017 for 16 countries from Central and Eastern Europe (CEE).

**Findings** – Public investment was procyclical in relation to output and negatively associated with the level of public debt. Austerity episodes triggered a significant drop in public investment. Positive drifts in public investment during election periods and the negative impact of the number of cabinet seats held by left-wing parties have been captured. While no firm evidence on the impact of EU membership was found, the results show that arrangements with the IMF were strongly associated with lower public investment. Political factors were of greater importance in Central Europe and the Baltics, while institutional factors had a more significant impact in South Eastern Europe.

**Practical implications** – To foster public capital formation, it is necessary to: 1) strengthen the countercyclicality of public investment policy and to keep public debt at a low level; 2) adjust the fiscal criteria for EU membership in a manner that would enable countries to use the EU structural fund more effectively, while maintaining fiscal sustainability; 3) put a stronger emphasis on structural features of fiscal policy when designing country-level arrangements with the IMF.

**Originality/value** – The paper contributes to the literature on determinants of public investment policy by adding empirical evidence for emerging Europe countries.

**Keywords** Public investment, Fiscal policy, Central and Eastern Europe

**Paper type** Research paper

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## 1. Introduction

In contrast to developed European countries, in which public investment in the last two decades has posted a mild but steady decline (from 3.8% to 2.9% of GDP), the emerging economies of Central and Eastern Europe (CEE) have seen a significant rise in average annual public investment (from 3.3% of GDP in the early 2000s to 5.4% in 2017). This substantial rise in public investment over the last two decades has been driven by the need of CEE to converge with the developed countries in terms of size of public capital stock. Public investment yields a double dividend in terms of economic growth and a decrease in unemployment, as it provides a positive impetus both during its implementation (boosting demand) and after completion (encouraging supply, by reducing the costs and risks of private investment). Many empirical studies show that fiscal multipliers of public investment are rather high, not only in large economies but also in small economies, thus outperforming multipliers of current expenditures (Ilzetzi, 2013; Alich, 2019).

The positive impact of public investment on economic growth is to a large extent a consequence of the positive relationship between public and private investment (Abdul Abiad and Furceri, 2016). Larger and less volatile public investment may foster private capital formation, provided that the evaluation and selection of investment projects are based



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on sound, evidence-based methodology (Boeri, 2019) and the implementation is conducted in an efficient manner (Abdul Abiad and Furceri, 2016). The relationship between public and private investment is also conditional on the features of the legal and economic system. In developing countries, large fiscal deficits may trigger an increase in the interest rate (Hasnat and Ashraf, 2018), which can have an adverse impact on private investment. However, if the fiscal deficit is induced by well-targeted public investment, the crowding-out effect can be dampened or eliminated. Empirical studies show that the relationship between public and private capital becomes positive and relatively strong after promarket reforms, aimed at promoting free trade and fair competition, have been implemented (Bahal *et al.*, 2018). If the aforementioned conditions are met, investment in public capital may have a significant positive impact on private-sector productivity, with estimated rates of return ranging from 15% to 45% (Bivens, 2012), thus encouraging private investment and output growth.

Although most of the CEE governments invested more in fixed capital (on average – 8.9% of consolidated government expenditures) than the developed countries (on average – 7.2% of consolidated expenditures), there are considerable differences across the CEE in the level and dynamics of public investment. Hence, time variation in public investment in CEE from 2000 to 2017, measured using the coefficient of variation, was higher by one-third than in developed European countries. At the same time, average annual public investment across CEE countries ranged from 2.4% to 5.8% of GDP, suggesting that some CEE governments tended to invest significantly more in public capital than others.

Understanding the drivers of public investment policy may help policymakers in developing institutions and systemic rules that can dampen the impact of factors that have a negative impact and foster factors that have a positive impact on public investment level and dynamics. Even though public investment is of great economic and fiscal importance, and there have been considerable variations across CEE countries in terms of the levels and dynamics of public investment, there is still a gap in the empirical literature dealing with the explanations of the drivers of public investment policy in these countries. The empirical literature on fiscal policymaking mostly deals with the explanation of variation in headline fiscal outcomes (fiscal deficits and public debt) or total general government expenditures (Roubini and Sachs, 1989; Peacock, 2004). On the other hand, in the last two decades, a few panel studies have emerged that evaluate the role of economic and political or economic and institutional factors in explaining the declining trend in public investment in developed European countries that became EU members before 2004 (De Haan *et al.*, 1996; Mehrotra and Valila, 2006).

Considering the economic importance of public investment, its substantial variation and the state of the empirical literature in this field, the aim of this paper is to identify key (economic, political and institutional) drivers of public investment policy in CEE, that is, to answer the question of why some CEE governments in some periods tend to invest more in public (fixed) capital, than others. Understanding fundamental drivers of public investment policy is important, from theoretical, empirical and policy perspectives considering the significant share of public investment in total government spending and the strong impact of public investment on economic growth. This issue is becoming increasingly important, particularly in times when monetary policy is facing a zero-lower bound, while governments are running rather high public debts, which means that pro-growth economic policy is expected to be more focused on the structural features of fiscal policy.

To answer this question, we employ panel econometric methods using annual data for 16 countries from CEE from 2000 to 2017. Against this backdrop, this paper provides a number of contributions. This is the first paper to deal with determinants of public investment in emerging European countries, in which public investment has an increasing economic and fiscal relevance. Second, to the best of our knowledge, this is the first paper to encompass economic, political and institutional factors in the analysis of public investment dynamics

and to cover the period of EU membership of the emerging Europe countries that became members in 2004, 2007 or 2013. The period of our sample includes the time of the economic boom until 2008 and the subsequent decade of crises and recovery, which allows us to compare the role of different factors in two different cycles. Finally, in contrast to the empirical literature dealing with the cross-country analysis of fiscal policy in emerging Europe, which often includes only the CEE countries that have become EU members during the last two decades, in this paper we also include the countries from South Eastern Europe (SEE) that are in the preaccession process. This also allows us to compare the role of economic, political and institutional factors in shaping public investment policy in two subgroups of countries, with different institutional settings.

Our results show that public investment has been procyclical in relation to output, especially in the Central Europe and Baltic (CEB) [1] countries, and negatively associated with the level of public debt, while austerity episodes have dampened public investment, especially in SEE [2]. Public investment tends to rise during election periods and to decline with the increase in number of cabinet seats held by left-wing parties. We find weak evidence of the impact of EU membership and robust evidence of the negative impact of IMF arrangements on public investment, especially in the SEE countries and in the precrisis period. We also find that austerity programs implemented through IMF arrangements harmed public investment.

The rest of this paper is structured as follows. Section 2 provides a review of the literature on economic, political and institutional drivers of government expenditures. In Section 3, we present stylized facts about public investment in the CEE countries. Section 4 describes the data and methodology, while Section 5 contains the results and discussion. In Section 6, concluding remarks and policy recommendations are presented.

## 2. Literature review

From a normative point of view, fiscal policy decisions are made by a welfare-maximizing social planner, who tends to reduce the deadweight loss of taxation for a given level of government expenditures (Barro, 1979). In an attempt to shed light on the policymaking patterns and drivers, in the last few decades there has emerged a growing empirical literature that explains fiscal policy decisions using economic, political and institutional factors (Roubini and Sachs, 1989; Perotti and Kantopoulos, 2002). Empirical studies dealing with fiscal policymaking usually aim to evaluate the factors that shape headline fiscal outcomes, such as the level of fiscal balance (total, primary or structural) or the level of public debt. There are also numerous studies that explain cross-country differences in the level and dynamics of total government expenditures (Saunders and Klau, 1985; Roubini and Sachs, 1989; Peacock, 2004).

However, literature dealing with the composition of government expenditures and cross-country differences in particular items of government spending is scarcer. Solano (1983) uses the data for high-income countries to explain variation in education, defense and social security spending by employing institutional factors. Sanz and Velasquez (2002) use the OECD countries' data from 1970 to 1997 to explain the composition of government expenditure with socioeconomic and institutional factors (e.g. income and prices, population density and its age). Similarly, Shelton (2007) exploits the IMF data sets covering over 100 countries from 1970 to 2000 to evaluate variation in government expenditure in terms of functional classification (defense, education and health care) as well as in terms of the levels of government (central and local). As public investment is an item of economic, rather than functional, classification, Shelton (2007) does not provide any insight into the drivers of investment dynamics. Zugravu and Sava (2014), who deal with the evaluation of the relationship between the composition of government expenditures and economic growth in

10 CEE countries from 1995 to 2012, find that expenditures composition is suboptimal from the growth maximization perspective.

The emerging literature on fiscal multipliers strongly suggests that public investment has a significant positive impact on economic growth, both in the high income and in developing countries (see [Leeper \*et al.\*, 2010](#); [Ilzetzki \*et al.\*, 2013](#); [Eden and Kraay, 2014](#); [Alichi \*et al.\*, 2019](#)). Many of these studies also indicate that fiscal multipliers associated with public investment are significantly higher than multipliers associated with current expenditures ([Ilzetzki \*et al.\*, 2013](#)). Despite the evident importance of public investment for overall economic performance, the empirical literature on determinants of the level and variation in public investment across countries is somewhat limited. Earlier literature on this topic (from the 1980s) deals with the country-level analysis of drivers of public investment using time series data from developed countries. Thus, [Henrekson \(1988\)](#) exploits the data for Sweden from 1950 to 1984 to explain variation in public investment using economic (GDP, unemployment, government deficit) and political factors (degree of unionization, coalition variables). [Kirchgässner and Pommerehne \(1988\)](#) evaluate public investment dynamics in Germany from 1961 to 1984 by employing the same set of economic factors and adding a few political variables – election cycles and ideology. Similarly, [Sorensen \(1988\)](#) exploits 1865–1985 data for Norway to explain the dynamics of public investment by taking into account mostly the same economic variables. [Van Dalen and Swank \(1996\)](#) use 1953–1993 data for the Netherlands to explain the trends in public investment variation with standard economic factors, but at the same time put a strong emphasis on political factors, such as election cycles and ideology. They find a significant impact of ideology (leftist parties tend to spend more on social security, while right-wing parties are more focused on investment). They also find evidence of upward shifts of public investment during election cycles. The relationship between election cycles and public investment dynamics has also been evaluated by [Gupta \*et al.\* \(2016\)](#), who use the data on 67 countries from 1975 to 2012 and find a relatively strong link. Their findings also suggest that fiscal rules and stronger institutions seem to attenuate the impact of elections on investment. Empirical studies also show that political factors may shape public investment dynamics by means of regional allocation of investments. [Rodríguez-Pose \*et al.\* \(2016\)](#) use 1975–2009 data for Greece and show that an increase in electoral returns of the governing party in a region has traditionally been followed by greater public investment per capita in that region.

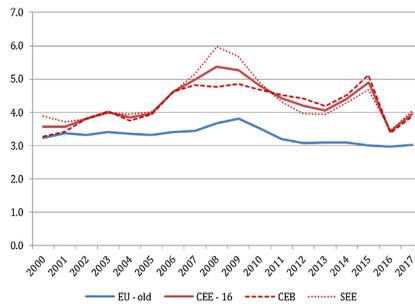
Empirical literature dealing with the evaluation of drivers of cross-country (and time) variation in the level of public investment started emerging in the mid-1990s. Thus, [De Haan \*et al.\* \(1996\)](#) use the panel data for 22 OECD countries, from 1980 to 1992, to explain variation in public investment with politicoinstitutional variables, including the impact of fiscal consolidation programs, political polarization and ideology of the government, political stability, election cycles, the level of private investment, fiscal centralization and so on. Their results show that only fiscal consolidation episodes, length of the political horizon of the government and private investment seem to play a role in shaping the public investment dynamics. [Gali and Perotti \(2003\)](#) estimate the impact of economic and institutional factors on public investment in developed EMU countries and find that public investment is mildly procyclical. They observe no significant impact of the institutional constraints associated with EMU membership. The [Turrini \(2004\)](#) use the data on EU member states (which became members before 2004) to conclude that public investment was mildly countercyclical and that it tends to decline with an improvement in the cyclically adjusted budget balance and with increasing public debt. They also observe a positive impact of EMU membership on public investment. For almost the same group of old EU member states, [Mehrotra and Valila \(2006\)](#) evaluate the dynamics of public investment from 1970 to the 2000s and conclude that public investment tends to rise with an increase in income (procyclicality) and to decline with an

increase in public debt and fiscal deficit. They find no evidence of the impact of the cost of financing or institutional constraints associated with EMU membership.

The review of the empirical literature shows that most of the existing studies combine economic and political or economic and institutional factors when explaining cross-country or cross-time variation in public investment. It also indicates that empirical studies mostly deal with developed countries, covering the period until the early 2000s. Therefore, the state of the empirical literature suggests that there is a gap in the empirical papers dealing with the explanation of public investment policy in emerging Europe.

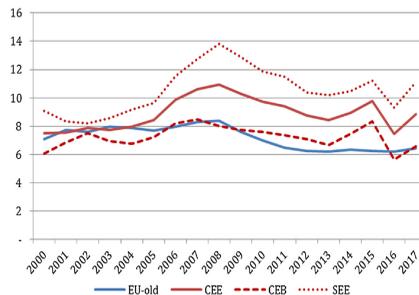
### 3. Public investment in emerging Europe – stylized facts

In the year 2000, public investment in the CEE countries was, on average, close to the levels in the old EU member states (around 3.2% of GDP). However, in the course of efforts to attain convergence in the quality of public infrastructure and economic development, the CEE countries have considerably increased their public investment since then. Hence, over most of the period from 2000 to 2017, public investment in CEE was substantially higher than in the old EU countries, both relative to GDP and as a share of the total government expenditures (Figure 1 and Figure 2). The average annual public investment in the CEE countries in this period stood, on average, at approx. 4.3% of GDP, thus outperforming the old EU member states (EU-old) [3] by 1% point of GDP. Public investment in the CEE countries over the same period accounted for 8.9% of total government expenditures and made up close to 18.5% of total investment, which is higher by one-fifth than in the old EU member states. These data indicate the importance of public investment in the CEE countries for national gross fixed capital formation and GDP growth, but also from the fiscal perspective.



Source(s): Author's calculations using Eurostat and IMF data

Figure 1.  
Public investment  
dynamics in Europe  
(% GDP)

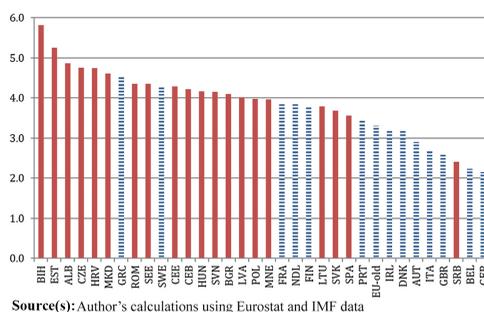


Source(s): Author's calculations using Eurostat and IMF data

Figure 2.  
Public investment  
dynamics in Europe (%  
total government  
expenditures)

In addition to being more buoyant than in the old EU member states, public investment in the CEE countries also exhibits stronger variation. The average coefficient of variation in public investment in CEE from 2000 to 2017 equals 0.28, while the EU old average stood at 0.21. Data presented in Figure 3 show that average annual public investment in the CEE countries ranged from 2.4% to 5.8% of GDP, which reinforces the conclusion of a significant variation in public investment across the CEE.

Emerging theoretical and empirical literature explains fiscal policy using economic, political and institutional factors (Roubini and Sachs, 1989; Perotti and Kantopoulos, 2002). The data indicate that there were two subperiods in terms of the public investment dynamics – a substantial rise from 2000 to 2008 and a decline afterward (Figure 1 and Table 1), suggesting that the dynamics of public investment may be associated with general economic trends. Significant variation in the dynamics of public investment before and after the 2008 crisis was especially evident in the SEE countries. As a result of buoyant public investment,



**Figure 3.**  
Average annual public investment from 2000 to 2017 (% GDP)

		CEE-16	CEB-8	SEE-8
<i>Economic variables</i>				
Public investment (2000–2017)	% GDP per year	4.3	4.2	4.4
	% GDP, cumulative	76.9	76.0	77.8
	% gov. expenditures	8.9	7.2	10.6
	% total investments	18.5	17.8	19.2
	coefficient of variation	0.27	0.22	0.32
Public debt	2000	48.2	28.1	71.1
	2008	28.5	28.8	30.1
	2017	49.4	46.5	52.3
Fiscal balance, mean (% of GDP)	2000–2017	–2.7	–2.9	–2.6
	2000–2008	–2.3	–2.7	–1.8
	2009–2017	–3.2	–3.0	–3.4
GDP growth, mean (% of GDP)	2000–2017	3.3	3.3	3.3
	2000–2008	5.3	5.5	5.1
	2009–2017	1.4	1.6	1.2
<i>Political variables</i>				
Average election cycles (years)		3.55	3.43	3.66
Type of government (left = 3, center = 2, right = 1)		1.47	1.52	1.44
<i>Institutional variables</i>				
EU membership: cumulative no. of years		139	112	27
IMF arrangement: cumulative no. of years		80	17	63

**Table 1.**  
Descriptive statistics

the CEE countries narrowed the gap in terms of the public capital stock, compared to the old EU member states, from 23.2% of GDP to 15.3% of GDP.

Decisions on the level and structure of public investment depend not only on the state of the economy and the need for the creation of public fixed capital, but also on the fiscal capacities of a particular country to pursue expansionary investment policy. Over the 2000–2017 period, the CEE countries were running considerable fiscal deficits, which were on average higher (in relative terms) than in the old EU member states. However, during the same period, the CEE countries posted considerable GDP growth, which is why the total public debt in 2017 was almost at the same level as in 2000.

In political terms, the CEE countries are considered young parliamentary democracies, since our sample period starts only a decade after they introduced political pluralism. Although in all of these countries the legislative election cycle is four years, they have been holding elections, on average, every 3.5 years – slightly more frequently in the SEE than in the CEB (Table 1). In terms of the nominal political ideology of the ruling coalition, over most of the period, the governments were more right-wing-oriented, especially in the SEE countries. The data also show that the share of cabinet seats held by right-wing parties after the 2008 crisis rose significantly (the ideology index declined from 1.71 to 1.24) [4].

Public investment policy needs to fit into the overall fiscal framework, which is not only a matter of discretionary decision by the government but also a matter of constraints imposed by external institutional arrangements. In this connection, fiscal policy in these countries has also been under the influence of the rules they have had to comply with in order to become EU members or to make a step toward that membership. Out of the 16 CEE countries, 11 became EU members between 2004 and 2013, while the remaining five, from SEE, are still (potential) candidates for EU membership. Similarly, some of these countries had different forms of arrangements with the IMF, in the course of reforms, aimed at ensuring macrofiscal stabilization – 11 CEE countries had some form of arrangement with the IMF from 2000 to 2017, with the SEE countries being more prone to entering into such arrangements than the CEB countries (Table 1).

#### 4. Research design, data and methodology

The economic rationale for public investment is built on several arguments – supply of (intermediate) public goods, market failure, shortage of capital due to information asymmetry, increasing return to scales, natural monopoly and so on. (Turrini, 2004). From a normative perspective, public investment is justified if its marginal social productivity exceeds the social marginal costs. However, decisions on public investment are made within a broader, fiscal policymaking process, which is often explained by institutional and political factors, as well by economic outcomes (Roubini and Sachs, 1989; Perotti and Kantopoulos, 2002). Therefore, in this paper we follow the approach taken by De Haan *et al.* (1996) and Mehrotra and Valila (2006) and use the annual data from 2000 to 2017 for 16 countries from CEE (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Montenegro, North Macedonia, Poland, Romania, Slovenia, Slovakia and Serbia) to evaluate the impact of economic, political and institutional factors on public investment policy.

As the aim of the paper is to shed light on the drivers of public investment, the dependent variable is the consolidated government gross fixed capital formation as a % of GDP ( $PIN_{it}$ ). The data on the dependent variable are sourced from the IMF Outlook Database. We check the robustness of the results by using an alternative dependent variable – the share of capital expenditures in the consolidated general government expenditures.

Drawing on the inputs from economic theory and the approach of De Haan *et al.* (1996), we include a vector of economic variables – output, public debt and an austerity episodes

dummy. The level of public investment may be influenced by general economic trends, which is why public investment models usually include an indicator of aggregate output. For this reason, we include the real GDP growth variable ( $GDP_{it}$ ), to check whether public investment in CEE was procyclical, countercyclical or noncyclical, with all of the three outcomes being theoretically possible. To tackle the endogeneity issue, the lagged level of GDP dynamics is included in the model.

To capture the fiscal sustainability constraints, we include the public debt relative to GDP ( $DEB_{it}$ ). During the sample period, many CEE countries implemented fiscal consolidation programs, aimed at reducing the fiscal deficit and restoring public finance sustainability. It is often argued that from the political economy point of view, it is easier for governments to cut capital expenditures rather than current expenditures in order to achieve fiscal targets (Oxley and Martin, 1991; De Haan *et al.*, 1996). To capture the impact of austerity programs, we create a dummy variable ( $AUS_{it}$ ), following the approach proposed by De Haan *et al.* (1996). For this purpose, we calculate the cyclically adjusted budget balance (CABB) for all the CEE countries. In order to calculate this CABB variable, we estimate potential output using the Hodrick–Prescott filter and use the coefficients of sensitivity of the budget balance derived from the European Commission annual reports (European Commission, 2018) for EU member states and national economic reform programs for non-EU states. By using the CABB data, instead of actual budget balance data, we capture the effects of discretionary measures of fiscal policy. The austerity dummy variable equals 1 during the fiscal consolidation episodes, when the annual change in the CABB exceeds  $-0.5\%$  of GDP, while in the remaining periods it equals 0. In this manner, we mitigate the multicollinearity problem, which may arise if a continuous variable (e.g. CABB or the fiscal balance series) has been used. As the decisions on public investment are made within a broader framework of government expenditure policy, the effects are to be controlled for variation in the consolidated government current expenditures as a percent of GDP ( $CEX_{it}$ ), as suggested by Mehrotra and Valila (2006). Real GDP dynamics, general government gross debt and the consolidated government expenditures data are sourced from the IMF Outlook Database.

To capture the effects of political factors, we employ two variables – election cycles ( $ELE_{it}$ ) and the ideology of the government ( $IDE_{it}$ ). The election cycles dummy equals 1 in the year when parliamentary elections are held and 0 in the remaining years. Elections may have a positive impact on public investment if the government tends to improve its re-election perspectives by launching investment projects. On the other hand, elections can also have a negative effect if a government facing hard budget constraints tends to increase current spending by crowding-out capital spending (Van Dalen and Swank, 1996; De Haan *et al.*, 1996). To create the variable that describes the ideology of the government, we use the data on the nominal ideology of each party in the government coalition – the right-wing ideology = 1, the centrist stance = 2, while the left ideology = 3. The ideology variable is created as the weighted average of all the parties that constitute the cabinet, with the number of cabinet seats of each party being used as the weight. Both election cycles and ideology data come from the Database of Political Institutions, produced by the Inter-American Development Bank. Theoretical and empirical considerations suggest that left-wing parties are more oriented toward redistributive policies, by means of current spending (e.g. benefits, social security, housing subsidies), rather than capital spending (Van Dalen and Swank, 1996), which means the coefficient of our variable on ideology is expected to have a negative sign.

The evaluation of the impact of institutions (or external constraints) on fiscal outcomes is often focused on the analysis of the influence of appropriate institutional arrangements, which are, once established, to some extent exogenous, from the government point of view (Ebeke and Ölcer, 2013; Mehrotra and Valila, 2006). In the case of these countries, following the approach of De Haan *et al.* (1996) and Arsic *et al.* (2017), we take into account the external constraints associated with EU membership and the IMF arrangements.

As mentioned earlier, over the sample period, 11 CEE countries joined the EU, while the remaining five took steps toward membership. EU accession may have a twofold impact on fiscal policy and public investment. Firstly, EU member states need to comply with the relevant collective fiscal rules (fiscal compact), which are focused on fiscal deficit and public debt targeting, thus having a potentially negative impact on public investment. On the other hand, preparation for EU membership and the membership itself open access to (co)financing of investment projects from EU funds, which may have a positive impact on the total level of public investment. Due to the opposing direction of the two effects, there is no consensus in the empirical literature on the impact of EU/EMU membership on public investment (De Haan *et al.*, 1996; Gali and Perotti, 2003; Turrini, 2004; Mehrotra and Valila, 2006). In order to estimate the relationship between EU accession and public investment dynamics, we introduce a dummy variable ( $EU_{it}$ ), which equals 1 in the membership years and 0 in the rest of the period.

To improve external solvency and fiscal sustainability, and to foster structural reforms, the CEE countries have had different forms of engagement with international financial institutions, primarily with the IMF and the World Bank. As IMF programs are more focused on macroeconomic performance, the provisions of the (standby and similar) arrangements may impose additional constraints on fiscal policy. Such arrangements can potentially harm the level of public investment if the pressure to achieve headline deficit/debt targets translates into a cut in capital spending. Over the sample period, 11 CEE countries had such (standby or similar) arrangements with the IMF. To check for the role of the IMF arrangements in public investment policy shaping, we employ the IMF arrangement dummy variable ( $IMF_{it}$ ), which equals 1 in the years when there was an effective arrangement and 0 through the other years. The data on the arrangements come from the IMF database.

Drawing on the aforementioned, our model takes the following form:

$$PIN_{it} = \alpha_1 + \alpha_{21}GDP_{it-1} + \alpha_{22}DEB_{it} + \alpha_{23}AUS_{it} + \alpha_{24}CEX_{it} + \alpha_{31}ELE_{it} + \alpha_{32}IDE_{it} + \alpha_{41}EU_{it} + \alpha_{42}IMF_{it} + \alpha_5\mu_{it} + u_{it} \quad (1)$$

The selection of estimators is conditional on the properties of the model. A panel-modified Wald test suggests heteroskedasticity and a serial correlation test indicates autocorrelation, while the Pesaran, Frees and Friedman tests show that there is a cross-sectional dependence. To tackle these issues, we opt for robust estimators, such as the panel-corrected standard error (PCSE) and generalized least squares (GLS). In order to handle the endogeneity, we use the lagged real output growth variable when running estimations using the PCSE and GLS method. We additionally control the endogeneity by estimating equation (1) using the two-stage least squares (TSLS) method, employing the real GDP dynamics in the old EU (15) member states as the instrument. The selection of instrument is driven by the fact that the old EU member states are major investment and trade partners of the CEE countries, which is why the business cycles in the CEE are related to the business cycles in the old EU member states. Estimating the same model using three different estimators and two different dependent variables, as well as estimating the model using subperiods and subgroups of countries, provides a comprehensive robustness check of the results.

## 5. Results and discussion

Table 2 presents the main results on the economic, political and institutional determinants of public investment in the 16 CEE countries from 2000 to 2017. We have allowed for country fixed effects, as indicated by the Hausman test. To confirm the robustness of the results, equation (1) is also estimated using the share of public investment in the consolidated general government expenditures (see Appendix Table A1).

Our results show that public investment in CEE was procyclical in relation to output. This finding is robust for the entire sample and for the subperiods, while in terms of regions the

Dep: Public investments	m1_pcse	m2_gls	m3_tsls
GDP(-l)	0.013*** (0.005)	0.009*** -0.002	
IV-GDP			0.068* (0.039)
Public debt	-0.008* (0.004)	-0.024*** (0.002)	-0.023*** (0.007)
Austerity	-0.335*** (0.101)	-0.320*** (0.034)	-0.023 (0.297)
Curr. expenditures	0.084*** (0.021)	0.038*** (0.009)	0.105* (0.058)
Elections	0.17* (0.104)	0.102*** (0.038)	(0.058) (0.232)
Gov.Ideology	-0.067 (0.074)	-0.150*** (0.021)	-0.175* (0.103)
EU	-0.076 (0.332)	-0.122 (0.116)	-1.727* (0.963)
IMF	-0.291* (0.179)	-0.269*** (0.054)	-0.751** (0.354)
N	269	240	284
r <sup>2</sup>	0.902		
Wald chi2	7462.56	764.97	
Prob > chi2	0.0000	0.0000	
F-stat			2.99
Prob > F			0.0032

**Table 2.**  
Determinants of public  
investment in the CEE

**Note(s):** \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

effect was stronger in CEE than in SEE countries. The procyclicality of public investment in relation to output in the CEE countries is in line with the findings of other empirical studies dealing with economic drivers of government fixed capital formation in developed countries (De Haan *et al.*, 1996; Gali and Perotti, 2003; Mehrotra and Valila, 2006). Moreover, Lane (2003) finds that public investment is the most procyclical component of government expenditures in OECD countries. Procyclicality of government expenditures, including capital spending, may be explained by political economy arguments, such as the “voracity effect,” which implies that numerous power blocks compete for a share in government revenues, with the efforts to increase that share being especially pronounced during economic upturns (Tornell and Lane, 1999; Lane, 2003). Consequently, public investment tends to be lower during recession periods, although the fiscal multipliers associated with them are relatively high.

Regarding the impact of the general fiscal framework, we find that public debt had a negative impact on public investment, with the results being strongly robust for the whole sample, as well as for the subperiods and country groups. This finding is in accordance with the results of other studies, mostly dealing with developed EU countries (De Haan *et al.*, 1996; Gali and Perotti, 2003; Turrini, 2004). In a broader context, this result can be interpreted as evidence that rising public debt is a sort of break for future public investment. One possible explanation for a negative nexus between public debt and public investment is that with the rise in public debt, concerns regarding fiscal sustainability prevail over the need to develop public capital so that governments are prone to cutting public investment in order to restore debt sustainability. This is also suggested by many empirical studies that argue that it is (politically) more convenient to cut or postpone public investment than to cut current expenditures (Oxley and Martin, 1991; Turrini, 2004).

During the sample period, many CEE countries had to implement fiscal consolidation programs to ensure fiscal sustainability. According to Table 2, coefficients of the austerity

variable are strongly negative and statistically significant, which implies that fiscal consolidation programs were associated with a decline in public investment. This result suggests, namely, that in the CEE countries a cut in public investment was a significant part of a fiscal consolidation strategy. This result is also robust for groups of countries (CEB and SEE), while time-wise the effect was more pronounced before the 2008 crisis.

The impact of the economic and other variables on public investment dynamics was controlled for the level of current government expenditures. The estimated coefficient of current expenditures in CEE is positive, which is in line with the finding of [Mehrotra and Valila \(2006\)](#) for the old EU member states. This result is robust over the entire sample period and over both subperiods. Disaggregated by groups of countries, the effect is statistically significant in the CEB countries, while the evidence on this relationship in the SEE countries is weak. In addition to these three economic variables, we attempted to include the lagged dependent variable, the costs of borrowing (measured using the 12-month money market interest rates or the shadow interest rate) and the initial level of public capital stock (relative to GDP, based on the IMF capital stock database), but no significant effects were detected.

In addition to the economic factors, we find some evidence of the impact of two political variables on public investment – elections and government ideology. Specifically, our results suggest that public investment tends to rise in times of parliamentary elections, with the relationship being particularly significant in the CEB countries. This result is in line with evidence obtained by [Van Dalen and Swank \(1996\)](#) that there are positive drifts in public investment during the election cycles in the Netherlands, although some studies suggest that this relationship could also be negative, due to the crowding-out of current expenditures ([De Haan et al., 1996](#)). A positive relationship between elections and public investment may be explained by [Nordhaus's \(1975\)](#) political business cycles model, which implies that policymakers tend to create an economic boom in election years to enhance re-election chances. Alternatively, even within the “rational expectations” partisan model, which assumes that voters are rational and forward-looking, political business cycles may still exist if voters have incomplete information and competency.

In terms of the impact of ideology, we also find solid evidence that left-wing ideology is associated with lower public investment. This result is also in line with the finding of [Van Dalen and Swank \(1996\)](#) that left-wing governments tend to spend less on infrastructure than right-wing governments do. Our result is also consistent with the partisan theory, which suggests that left-wing parties are more oriented toward transfers to low-income groups than toward spending without direct redistributive effects. The impact of government ideology in our model is stronger in the CEB countries than in the SEE countries, while in terms of time, the effects start kicking-in in the second subperiod. This is in accordance with expectations, as the link between the formal ideology and actual policy tends to be stronger, the more mature the democracy is. In addition to elections and government ideology, we also considered government dispersion, that is, the impact of the size of the government coalition, but no significant results were found.

In terms of the role of external, institutional constraints, we find no strong evidence of the systemic impact of EU accession on public investment, although some evidence is found in the precrisis period and for SEE countries, which at that time had only limited access to EU funds. Our finding is consistent with the results of [Gali and Perotti \(2003\)](#) and [Mehrotra and Valila \(2006\)](#), who found no significant impact of EMU membership on public investment. Lack of a systemic impact of EU membership on public investment may be because the positive impact of access to EU funds has been offset by the need to comply with increasingly strict fiscal rules associated with EU membership.

On the other hand, our results provide strong evidence of the negative impact of arrangements with the IMF on public investment, with the effect being especially robust in

the precrisis period and the SEE countries. This negative effect may be a consequence of the fact that the IMF programs are often focused on the headline fiscal outcomes (net lending, public debt) rather than on structural features of fiscal policy. This conclusion is underpinned by the results of an auxiliary regression (see Appendix Table A2), in which we regress the dependent variable on a dummy variable, which equals 1 in the periods when a country was running both an austerity program and the arrangement with the IMF. The respective coefficient in the auxiliary regression is statistically significant and negative under all three estimations. In addition to external institutional constraints, we checked the impact of the efficiency of government institutions, measured using the Heritage Foundation Economic Freedom Index, the Government Integrity Index or the World Bank Governance Indicator, but no significant results were obtained.

Even though the CEE countries share a relatively similar institutional heritage, their economic transition and development patterns are, to some extent, different. In one group, there are eight countries, from CEB, that started the transition in the early 1990s and had, to a large extent, established a functioning market economy by the early 2000s. These countries became EU members in 2004, and most of them joined the EMU afterward. In the other group are eight countries from SEE that effectively commenced the transition in the late 1990s or early 2000s. Three of them became EU members in 2007 or 2013 (none of them having become an EMU member yet) and the rest of them remained in the preaccession process throughout the sample period. The average (PPP-adjusted) GDP per capita was 76.7% higher in the CEB countries than in the SEE from 2000 to 2017. Therefore, we also estimate equation (1) for each of these two country groups to investigate whether there are any significant differences between them in terms of drivers of public capital formation.

The results reported in Table 3 indicate that in CEB, public investment was procyclical, while the impact of output in SEE does not seem to be robust. In both groups, public debt represented a break for public investment. The results also indicate that there is solid evidence of the adverse impact of fiscal consolidation on public investment in SEE, while the

Dep: Public investments	Central Europe and Baltics			South Eastern Europe		
	m1CEB_pcse	m2CEB_gls	m3CEB_tsls	m1SEE_pcse	m2SEE_gls	m3SEE_tsls
GDP	0.009** (0.004)	0.011*** (0.004)		0.026*** (0.006)	0.005 (0.004)	
IV-GDP			0.013 (0.013)			0.058 (0.052)
Public debt	-0.029*** (0.008)	-0.017*** (0.004)	-0.029*** (0.009)	-0.011** (0.006)	-0.015*** (0.004)	-0.022*** (0.007)
Austerity	-0.028 (0.12)	-0.231*** (0.077)	-0.078 (0.178)	-0.311* (0.166)	-0.529*** (0.149)	-0.032 (0.507)
Curr. expenditures	0.114*** (0.019)	0.044** (0.018)	0.101*** (0.038)	0.046** (0.023)	-0.017 (0.011)	0.032 (0.04)
Elections	0.218* (0.123)	0.204*** (0.067)	0.172 (0.174)	0.021 (0.13)	0.043 (0.106)	-0.039 (0.343)
Gov. ideology	-0.175* (0.096)	-0.086* (0.03)	-0.262*** (0.091)	0.014 (0.136)	-0.251*** (0.071)	-0.212 (0.144)
EU	0.22 (0.394)	-0.053 (0.416)	0.252 (0.751)	-0.522 (0.526)	-0.746*** (0.222)	-2.08 (1.278)
IMF	-0.257 (0.271)	-0.14 (0.114)	-0.038 (0.255)	-0.278 (0.285)	-0.758*** (0.179)	-1.082** (0.415)
<i>N</i>	136	120	136	134	120	140
<i>r</i> <sup>2</sup>	0.928			0.676		
Wald chi2	767.61	188.15		226.65	89.22	
Prob > chi2	0.0000	0.0000		0.0000	0.0000	
Prob » <i>F</i>						3.0
						0.0040

**Table 3.** Determinants of public investment in the CEE – by country groups

**Note(s):** \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

evidence on CEB is relatively weak. This could be because the CEB countries, being relatively more advanced in economic and institutional terms, were less prone to fiscal profligacy.

On the other hand, political factors played a more significant role in shaping public investment policy in the CEB than in the SEE countries. The results show the fairly robust impact of election cycles on public investment and strong evidence of the impact of government ideology in the sense that public investment declines with the number of cabinet seats held by left-wing parties. Neither election cycles nor government ideology seemed to have had an impact on public capital formation in the SEE countries. This may indicate that the re-election strategy of governments in the SEE relied more on the increase in the current expenditures, rather than raising capital spending.

In terms of institutional factors, we find robust evidence of the significant (negative) impact of arrangements with the IMF and some evidence of the impact of EU membership on public investment in the SEE countries, but not in the CEB countries. This could be attributed to the fact that the SEE countries more frequently engaged in such arrangements than CEB countries did (see Table 1). In general, these results indicate that economic factors play an important role in shaping public investment policy both in the CEB and in the SEE countries, with the role of political factors being more pronounced in the CEB, while the institutional factors are of greater relevance in the SEE countries.

During the sample period, there was a period of a sharp economic upturn (2000–2007), a period of double-dip crisis and subsequent sluggish recovery. We use the significant economic discontinuity that occurred in 2008 to check whether the drivers of public investment in CEE changed after the global financial crisis as compared to the precrisis time.

The results (Table 4) suggest that public investment was procyclical and negatively associated with the level of public debt both before and after the crisis. We also find robust evidence of the negative impact of austerity on public investment before the crisis, while the

Dep: Public investments	m1a_pcse	2000–2007 m2a_sls	m3a_tds	m1b_pcse	2008–2017 m2b_gls	mb3_tsls
GDP	0.030*** (0.003)	0.031*** (0.012)		0.021*** (0.005)	0.020*** (0.002)	
IV-GDP			0.037* (0.021)			–0.011 (0.021)
Public deet	–0.017** (0.007)	–0.033** (0.016)	–0.017*** (0.005)	0.001 (0.0 08)	–0.009*** (0.003)	–0.015* (0.009)
Austerity	–0.177* (0.098)	–0.632*** (0.236)	–0.12 (0.246)	–0.268* (0.162)	–0.144 (0.111)	–0.131 (0.345)
Curr. expenditures	0.053** (0.021)	0.064 (0.047)	0.061** (0.031)	0.058** (0.025)	0.054*** (0.007)	0.172** (0.066)
Elections	0.107 (0.101)	0.199 (0.333)	0.147 (0.2 S)	0.111 (0.149)		0.561 (0.467)
Gov. ideology	–0.067 (0.098)	0.015 (0.204)	–0.097 (0.127)	–0.182 (0.157)	–0.201*** (0.051)	–0.038 (0.211)
EU	–0.243 (0.166)	–0.848*** (0.304)	–0.796* (0.471)	–0.866** (0.441)	–0.042 (0.156)	0.279 (0.599)
IMF	–0.415** (0.207)	–0.617** (0.303)	–0.337 (0.331)	–0.058 (0.309)	–0.003 (0.138)	0.218 (0.506)
<i>N</i>	111	80	110	144	144	160
<i>r</i> <sup>2</sup>	0.8937		0.183	0.861		
Wald chi2	1396.28	617.69		410.99	4560.78	
Prob > chi2	0.0000	0.0000		0.0000	0.0000	
<i>F</i> -stat			3.55			
Prob > <i>F</i>			0.0011			

Note(s): \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

Table 4.  
Determinants of public  
investment in the  
CEE – by subperiods

evidence of its impact after the crisis is relatively weak. Furthermore, we detect some (yet relatively weak) evidence of the relationship between government ideology and public investment in the second subperiod, which, as mentioned earlier, may be because ideology starts playing an effective role as a democracy becomes more mature. However, institutional factors (EU membership and IMF arrangements) had a more significant impact on public investment policy before the crisis. These results drive the conclusion that the role of economic/fiscal factors in shaping public investment dynamics did not change during the crisis – the political factors started kicking-in during the crisis, while the institutional constraints had a more prominent role before the crisis.

## 6. Conclusion

Investment in fixed capital is one of the key drivers of long-term economic growth (Barro and Sala-i-Martin, 1995), with government investment making up a considerable fraction of the total investment. To converge with the old EU member states in terms of volume and quality of public capital, many CEE countries have substantially increased public investment in the last two decades. However, as some countries tend to make a considerably larger public investment in some periods, there has been a significant variation in terms of the level and dynamics of public investment across the CEE countries in the last two decades. While there are many empirical studies that deal with the identification of determinants of private (and especially, foreign direct) investment (see Kumari and Sharma, 2017), literature on the drivers of public investment is scarce. This paper provides insight into the role of economic, political and institutional factors in explaining the variation in public investment across the CEE countries over the 18-year period.

The results indicate that public investment tends to rise in good times and decline in bad times, instead of being used as shock absorbers. Public debt tends to apply negative pressure on public investment. Our result shows that governments, especially those from SEE, tend to cut public investment during austerity episodes, which has a positive direct effect on fiscal stabilization but has an adverse impact on long-run economic performance. While part of the variation in public investment can be attributed to election cycles, especially before the 2008 crisis, we also find a significant impact of government ideology (particularly in the CEE countries), with left-wing governments being less prone to engaging in public investment spending. While EU membership does not seem to affect variation in public investment, arrangements with the IMF tend to harm public investment – especially in the SEE countries. Our result may suggest that arrangements with the IMF focus strongly on headline fiscal outcomes, rather than on the structural features of fiscal policy.

Empirical studies show that the impact of public investment on private capital formation and output is particularly strong in less developed countries. Thus, Eden and Kraay (2014) find that in the low-income countries, the multiplier of public to private investment is close to 2, while the multiplier of public investment to output is 1.5. They also find that for most of these countries, the returns to government investment exceed the world interest rate, although this difference decreases with the level of public capital stock. Public investment reduces the costs of doing business, thus having a significant positive impact on private sector productivity (see Bivens, 2012). A rise in productivity paves the way for an increase in wages, which means that public investment may also have positive distributional effects. Furceri and Li (2017) show that public investments in emerging and developing countries tend to lower income inequality, since an increase in public investment by 10% is associated with a decline in the Gini coefficient of 0.2%. These considerations suggest that appropriate public investment policy with significant and stable dynamics of investment outlays can yield dividends for businesses (in terms of productivity and profitability), for workers (in terms of increases in wages) and for the whole society, as stronger economic growth and lower inequality promote social stability.

Considering the significant benefits from adequate public investment policy, mapping determinants of public investment dynamics is particularly important for emerging economies. Understanding the mechanism through which the economic, political and institutional contexts influence public investment policy enables policymakers to act proactively in designing institutions and rules that can foster public investment (by mitigating downward pressures) and reduce their volatility.

In light of this, the results of this analysis may provide important insights for policymakers in the emerging European countries, but also in other developing countries and international institutions, thus helping them to devise their fiscal and development strategies in a manner that would provide a more effective balance between fiscal sustainability and the need to promote growth. On a country level, the results would suggest the need to strengthen countercyclicality in medium-term fiscal planning and the necessity to reduce/keep public debt to a low level, thus making space for countercyclical investment reactions to the crisis. Against this backdrop, enacting well-designed fiscal rules that provide public finance sustainability and countercyclicality of fiscal policy would strengthen economic enablers of public investments. As [Jacobs and Matthews \(2017\)](#) have shown, citizens' support for public investment depends on the credibility of fiscal policy. In this sense, strengthening well-designed and binding fiscal rules may improve the credibility of fiscal policy, triggering a positive impact on voters' support of public investment, thus providing a significant political enabler of effective public investment policy. From the EU point of view, the results may indicate the need to adjust the fiscal criteria for membership in a manner that would enable countries to use the EU structural fund more effectively, while retaining fiscal sustainability. In terms of IMF operations, the results may be read as a signal of a need to put a stronger emphasis on structural features of fiscal policy, in addition to headline fiscal targets, when designing the country level arrangements. Since it is mostly developing countries that make arrangements with the IMF, redesigning the IMF approach to macrofiscal stabilization would be especially beneficial for these countries as it would foster public capital formation, with a potentially positive impact on private investment and economic growth.

### Notes

1. CEB countries: Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia
2. SEE countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, North Macedonia, Romania and Serbia
3. EU member states that joined the EU before 2004.
4. Further information on the way the ideology index is computed can be found in [Section 4](#).

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Dep: Public investments (% GOV. Expenditures)	ml_pcse	m2_gls	m3_tsls
GDP(-)	0.041*** (0.013)	0.019*** (0.005)	
IV-GDP			0.167* (0.091)
Public debt	-0.020* (0.011)	-0.049*** (0.005)	-0.049*** (0.016)
Austerity	-0.628*** (0.233)	-0.746*** (0.066)	-0.129 (0.701)
Curr. expenditures	0.185*** (0.057)	-0.214*** (0.018)	-0.043 (0.137)
Elections	0.423* (0.248)	0.282*** (0.063)	0.121 (0.547)
Gov. ideology	-0.217 (0.175)	-0.312*** (0.039)	-0.374 (0.242)
EU	-0.022 (0.854)	-0.115 (0.121)	-4.227* (2.271)
IMF	-0.674 (0.47)	-0.515*** (0.123)	-1.856** (0.835)
<i>N</i>	269	240	284
<i>r</i> <sup>2</sup>	0.897		
Wald chi2	5179.19	2207.15	
Prob > chi2	0.0000	0.0000	
<i>F</i> -stat			10.56
Prob > <i>F</i>			0.0000
- robustness check	<b>Note(s):</b> * <i>p</i> < 0.10; ** <i>p</i> < 0.05; *** <i>p</i> < 0.01		

**Table A1.**  
Determinants of public  
investment in the CEE  
- robustness check

Dep: Public investments	m1_pcse	m2_gls	m3_tsls	Determinants of variation in public investment
GDP(-1)	0.015*** (0.005)	0.059** (0.028)		
IV-GDP			0.013*** (0.001)	
Public debt	-0.015* (0.009)	-0.021*** (0.005)	-0.029*** (0.001)	
Imf and austerity	-0.295* (0.-17)	-0.603* (0.331)	-0.154*** (0.044)	
Curr. expenditures	0.075*** (0.023)	0.092** (0.043)	0.048*** (0.009)	
Elections	0.196* (0.106)	0.021 (0.216)	0.163*** (0.022)	
Gov. ideology	-0.09 (0.078)	-0.177* (0.095)	-0.170*** (0.021)	
EU	-0.085 (0.337)	-1.384** (0.671)	-0.008 (0.1)	
<i>N</i>	269	284	240	
<i>r</i> <sup>2</sup>	0.891			
Wald chi2	7301.94	1623.4		
Prob > chi2	0.0000	0.0000		
<i>F</i> -stat			3.5	
Prob > <i>F</i>			0.0013	

**TableA2.**  
Auxiliary regression  
results – IMF *x*  
Austerity

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