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**EFFICIENCY OF PUBLIC INVESTMENT SPENDING IN  
SOUTHEAST EUROPE – SPECIAL FOCUS ON THE REPUBLIC  
OF NORTH MACEDONIA**

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УНИВЕРЗИТЕТ „СВ. КИРИЛ И МЕТОДИЈ“  
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**ЕФИКАСНОСТА НА ТРОШЕЊЕТО НА ЈАВНИТЕ  
ИНВЕСТИЦИИ ВО ЗЕМЈИТЕ ОД ЈУГОИСТОЧНА ЕВРОПА –  
ПОСЕБЕН ФОКУС НА РЕПУБЛИКА СЕВЕРНА МАКЕДОНИЈА**

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**Abstract**

There is a newfound scientific and applicative interest for improving efficiency and effectiveness of public spending, as there are public finance pressures due to crises, downturns, and socio-demographic trends, while there is a growing demand for more and better public services. The goal of this research is exploring and assessing public investment efficiency; identifying the interrelation between public and private investments, economic activity, and identification of the significance of institutional variables within the countries in SEE. The research covers assessment and benchmarking of general and sector-specific public spending efficiency. Various methodologies are utilized, such as DEA for efficiency assessment and benchmarking, as well as the statistical model application to explore the connection between public investments, economic output, and private investments (including regression, cointegration, VECM, ARDL, etc.). The research confirms that SEE's EU member states perform better than non-EU states both in general and sectorial efficiency of public money spending. Specifically, North Macedonia lags behind the other countries in the group, both in overall public sector performance and efficiency in capital investment spending. There is a widening gap in cumulated capital stock and infrastructure quality between the member and non-member countries. The research also reveals a crowding-in effect from public to private investments among EU member countries, while not among SEE's non-EU member states. There is sufficient evidence for North Macedonia that points to the existence of a long-term relation between public and private investment with a crowding-out effect. The strength of a country's governance plays a key role in driving public investment efficiency, with a strong positive association with government effectiveness and corruption control. The research also suggests that central and local government investments in the region are complementary in generating a positive effect on mobilizing local revenues, with local investments exerting a greater influence.

**Keywords:** public spending; public sector efficiency; public investment; crowding-out effect; crowding-in effect

**JEL:** H50, H54, H11, E62, C14

**Весна Гарванлиева Андонова**

## **ЕФИКАСНОСТА НА ТРОШЕЊЕТО НА ЈАВНИ ИНВЕСТИЦИИ ВО ЗЕМЈИТЕ ОД ЈУГОИСТОЧНА ЕВРОПА – ПОСЕБЕН ФОКУС НА РЕПУБЛИКА СЕВЕРНА МАКЕДОНИЈА**

### **Апстракт**

Поради зголемениот притисок врз јавните финансии предизвикан од низата кризи, економски падови и социодемографски трендови, во услови на зголемена побарувачка за повеќе и подобри јавни услуги, се зголемува научниот и апликативниот интерес за ефикасноста и ефективноста на јавните трошења. Целта на ова истражување е да се оцени ефикасноста на јавните инвестиции; да се идентификуваат каналите на интеракција на јавните со приватните инвестиции, економската активност, како и да се утврди значењето на квалитетот на институциите кај земјите од ЈИЕ. Истражувањето опфаќа оценување и одредување на референтните вредности на општата и специфичната секторска ефикасност на јавните трошења. Во истражувањето се користат различни методи, како што е ДЕА за оценка на ефикасноста, а се применуваат и статистички модели за испитување на поврзаноста помеѓу јавните инвестиции и економскиот аутпут и приватните инвестиции (вклучувајќи регресија, коинтеграција, ВЕЦМ, АРДЛ итн.). Истражувањето укажува дека земјите членки на ЕУ од ЈИЕ имаат значително подобри резултати од земјите коишто не се членки на ЕУ и во однос на општата, и во однос на секторската ефикасност и ефективност во трошењето на јавните ресурси. Северна Македонија заостанува зад другите земји во ЈИЕ, како во вкупните остварувања, така и во ефикасноста во трошењата за капитални инвестиции. Исто така, постои значителен јаз во квалитетот и квантитетот на акумулираниот капитал помеѓу земјите членки и земјите коишто не се членки на ЕУ. Истражувањето потврдува дека постои ефект на привлекување (англ. crowding-in) на јавните врз приватните инвестиции кај земјите членки, но не го потврдува ефектот и кај земјите коишто не се членки на ЕУ. Конкретно за случајот на Северна Македонија, емпириските докази укажуваат дека постои долгорочна врска помеѓу јавните и приватните инвестиции со ефект на истиснување (англ. crowding-out) на приватните од страна на јавните инвестиции. Квалитетот на институционалното управување игра клучна улога во поттикнувањето на ефикасноста на јавните инвестиции, со особено силна позитивна асоцијација на ефикасноста на капиталните трошења со индексите на владината ефективност и контролата на корупцијата. Истражувањето, исто така, укажува дека инвестициите на централната и локалната власт во регионот се комплементарни при создавањето позитивен ефект за мобилизирањето на локалните приходи, при што локалните инвестиции имаат посилено влијание од инвестициите од централно ниво.

**Клучни зборови:** јавни трошења; ефикасност на јавниот сектор; јавни инвестиции; ефикасност на јавни инвестиции; ефект на привлекување; ефект на истиснување.

JEL: H50, H54, H11, E62, C14

I declare that this doctoral dissertation has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgment, the work presented is entirely my own.

I also declare that the text in the electronic version is identical to the text in the printed version.

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## LIST OF ABBREVIATIONS

ARDL	Autoregressive Distributed Lag
DEA	Data Envelopment Analysis
EU	European Union
EUR	Euro
EUROSTAT	Statistical Office of the European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
IMF	International Monetary Fund
LGU	Local Government Unit
LPI	Logistics Performance Index
OECD	Organisation for Economic Co-operation and Development
OSR	Own Source Revenue
PIM	Public Investment Management
PIP	Public Investment Plan
PSE	Public Sector Efficiency
PSP	Public Sector Performance
SEE	Southeast Europe
UNCTAD	United Nations Conference on Trade and Development
VAR	Vector Autoregression
VEC	Vector Error Correction
WB	Western Balkan
WDI	World Development Indicators
WEF	World Economic Forum
WGI	World Governance Index

# **Chapter 1**

## **Introduction**

## Chapter 1 INTRODUCTION

### 1.1. Introduction to the Research Subject & Overview of Achievements Related to the Research Subject

The governments' role and participation in the economies have been continuously increasing throughout the past. Since the beginning of the twentieth century, the public spending to GDP ratio, has risen globally from an average of around 10%, with wide country differences, to well above 30% (Mauro et al., 2015) more recently. The differences in the ratio are wide when comparing developed and developing countries, whereby it averages around 27% among low-income and developing countries, while above 46% among the advanced economies. Being a mix of heterogeneous countries, the Southeast European (SEE<sup>1</sup>) area covers the Western Balkans (WB)<sup>2</sup> as aspiring EU countries and a set of EU member countries. Simultaneously, the SEE group of countries is also a blend of both middle-income and high-income countries, among which the public spending to their respective GDP is quite variable.

Combined and driven by various affecting events, many economies have taken expansionary policies which have led to an enduring proliferation of the public expenditure that remained permanent; this being especially relevant for wages and transfer spending categories. Undeniably, the dramatic changes in the role of the government in the twentieth century have had a major impact in the governments' spending size, due to the assumed public roles and responsibilities in the areas such as pension, social and welfare systems, health service, education, unemployment assistance, business subsidies, etc. Furthermore, governments took on other responsibilities including income distribution, and economic and social regulation (Tanzi, 2011).

Thus, the question of growth, and more specifically the adequate size, of a government's participation in the economy cannot be simply answered and calculated, as it depends on a myriad of aspects ranging from political, economic, social, and demographic issues.

Public finance theory reasons that the public sector involvement within an economy of a country, is motivated primarily by the principles of efficient resource allocation, equal income and wealth distribution, and economic activity stabilization (output and employment) over the business cycle (Musgrave, 1959), thus higher efficiency and equity in the provision of the public goods to the citizens leads to enhanced welfare.

Countries all over the world are faced with, and yet to be facing, even more intensely, an increasing pressure on public finance balances, coming from numerous reasons, events, and their effects, caused by global crises, economic downturns, and long hanging pressures arising from the socio-demographic global trends, all requiring fiscal strengthening. Simultaneously, there is a growing pressure coming from the increasing demand for provision of both more and better public services. Therefore, the question of how to solve the fiscal strengthening needs and growing demands is perplexing. Indeed, the direction of the explanation is in fiscal efficiency and adequate spending, rather than broad-spectrum public spending cuts to achieve better fiscal sustainability. Simply put,

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<sup>1</sup> SEE countries refer to: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Moldova, Montenegro, North Macedonia, Romania, Serbia, Slovenia. Out of these, five are members of the European Union: Bulgaria, Croatia, Greece, Slovenia and Romania, while when referring to the Western Balkans or also being referred to as SEE6 countries, we consider Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, Serbia – all aspiring and non-EU member states.

<sup>2</sup> The Western Balkan 6 include North Macedonia, Serbia, Montenegro, Bosnia and Hercegovina, Kosovo, and Albania.

this means doing more with less resources. Thus, enhancement of both the efficiency and effectiveness of public expenditure is (should be) placed high on the economic and political priority list of countries' agendas.

Governments provide an array of goods and services for their citizens, aimed at the achievement of different objectives, either social or economic. The efficiency with which the goods and services are provided thus is important not only in relation to the size of the government (i.e. public sector) but also to the private sector, the role towards stability, economic growth, etc. An increasing amount of literature has been exploring the stabilization, allocation, and distribution effects of public expenditure and contributing to the debate on the role of the state through empirical assessments of efficiency and usefulness of the public sector's activities.

The enhanced efficiency and effectiveness of public spending help to sustain the fiscal discipline but also back up the structural adjustments and reforms, which are especially needed in the Western Balkan countries and as well as other SEE countries striving towards EU membership. Enhanced efficiency and effectiveness of public spending consequently means achieving the same results at lower levels of spending, or increased value-for-money by achieving better outcomes at the same spending level. As public spending represents a sizeable part of the countries' GDP (and increasing), the governments have the role to spend the public money in the best possible manner, to support both growth and development. The available public resources are scarce and limited, raising the taxes is politically pricey, there are limits to indebtedness (where fiscal rules are binding), and there is growing demand for public services (in quantity and quality), while the policymakers are faced with budget constraints, thus the government's role is to ensure that public expenditure is designed in a manner that provides sustainability in public finances (Barrios & Schaechter, 2008). Therefore, the viable solution is to boost efficiency in service provision (output) restricted to the limited amount of resources (input).

Decades ago, Farrell (1957) posed and addressed the question of quantifying the efficiency and its relevance for policymakers through conceptualizing a framework for the connection between the inputs, outputs, and outcomes. This higher efficiency refers to greater output produced with a lower given input whereby in the public sector this translates into expenditure. Effectiveness relates the input or the output to the final outcomes. The outcome (performance, results) is most often a growth objective (economic output). As a result, demonstrating level of efficiency and effectiveness should be reflected in the success of a nation in expending its scarce resources to achieve growth objectives.

In more recent years, more and more empirical assessments are focused on the efficiency and effectiveness of public sector activities. An abundance of literature has been investigating and assessing the allocation and distribution effects of public expenditure in general and specifically in education, social care systems, security, etc., as well as at different governmental levels. Most of these assessments have concluded that public spending could/should be reduced and be more efficient - optimized, and the governments need to adopt better practices in doing so (Mandl, Dierx, & Ilzkovitz, 2008; Afonso, Schuknecht, & Tanzi, 2010). This proposition is especially relevant for the developing economies since a minor change toward increased public spending efficiency could result in a significant impact on the national GDP (Herrera & Pang, 2005; Afonso & Kazemi, 2017).

Considering the expenditure magnitude, the neoclassical economic theory envisages a negative relationship between the size of the public spending and the country's GDP in the medium to long run due to the crowding-out effect caused by the private investment and taxation distortion (Bergh & Henrekson, 2011). Nevertheless, on the other hand, short-term positive effects in the fiscal multiplier (Keynes-inspired texts) are anticipated as well, due to expectations for aggregate demand increase. The two theories are integrated into the "inverted U", Armey curve (1995) which implies an existence of a threshold – at which a particular government spending will maximize the economy's output, *ceteris paribus* – above which the growth turns negative and the economic output will start to decline as the government starts to 'crowd-out' the private sector by assuming more and more of its resources and functions<sup>3</sup>.

On the subject of public expenditure composition/structure, the neoclassical growth literature, i.e. Solow-Swan model (as most often cited, Solow, 1956 and Swan, 1956), highlighted the role of capital accumulation as one of the key economic growth drivers (both in the short run and long run). On the other hand, the endogenous growth theory (Barro 1991; Acemoglu 2009; Aghion & Howitt, 2009) considers the effects of other variables such as human capital investment and population dynamics. Empirically, there has been no consensus found, as results differ across countries, regions, time periods, empirical techniques and models, variable combinations, etc.

Public investments financed by a public expenditure system, regardless of the government level, build the nation's capital stock by devoting public resources into physical infrastructure, green investments, education, etc., with the ultimate goal of higher productivity, living standards, enhanced economic activity and output. Reconciling the dilemma of limited resources versus the increasing demand can be found in reducing the inefficiencies in public spending. Identification of specific sectors by cross-sectionally dissecting the public spending is a better approach than the practice of cutting expenditure across all sectors, especially with bias towards public investments. This can be achieved by proper identification and measuring of the technical and allocative inefficiencies and reallocate/switch spending (Cavallo & Serebrinsky, 2016, called this a 'smart' adjustment). A particular focus on public investments (in)efficiencies and their interrelation with other economic variables is an important aspect because public investments have wide societal effects. The gains they produce accumulate not only to those undertaking the investment (as private investments do) but to the society overall.

Since globally, for a longer period there has been a trend and prospect of a protracted weak economic growth, in a constellation of limited resources, channelling finances into productivity-enhancing public sector investment is the norm. The importance of public investment has been also illustrated by the idea of the so-called 'golden rule', suggesting that spending on public investment should be financed by issuing government debt, only by setting formal rules that budget deficits cannot exceed public investment<sup>4</sup>. Ever since Aschauer's (1989) contributions to the elasticity of the economic output concerning public capital stock, there has been an interest in measuring the effects of public investment on the economic activity, as well as assessing the nexus with private investments, i.e. crowding-in or crowding-out effects.

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<sup>3</sup> The Armey curve depicts a relationship of diminishing marginal returns to the government in the economy, and conceptually is similar to the Laffer curve.

<sup>4</sup> Musgrave (1939) discussed the appropriateness of financing via government debt, while Balassone & Franco (2000) discuss the pros and cons of a golden rule.

As adequately efficient and effective infrastructure is expected to have a positive effect, inadequate public infrastructure can impede economic growth and development. Despite the theoretical importance of public capital (predominantly referring to infrastructure investment), there is wide disagreement about the size and significance of its effect on economic growth, especially in developing countries (Calderon & Serven, 2014), where the investment needs are great due to deprivation of access to infrastructure for provision of basic services, such as access to drinking water, electricity, while in more developed countries quality public road infrastructure is lacking. In that light, an abundance of literature has estimated large returns to capital infrastructure investment (as in Aschauer, 1989), while others have found insignificant or negative impacts (such as Bom & Ligthart, 2014), very plausibly due to the failure of productive capital reflected in a weak institutional and political set-up (to name a few – corruption, lack of trust in the government or the presence of Pritchett’s ‘white elephants’ (Pritchett, 2000)).

Subsequently, there is a great deal of disagreement on the dynamics and mechanisms through which public investment affects growth and development in a globally accepted realm of a trillion-dollar ‘infrastructure gap’<sup>5</sup>. Public investment levels globally have been declining, especially followed by the global crisis, although with heterogeneous developments across countries (European Commission data) and signs of picking up among developing countries (World Bank data), while structural changes (e.g. aging population, increased pension and health spending) are adding to the crowding-out effects on capital expenditure budget items (Schuknecht & Zemanek, 2018).

Furthermore, the ‘capital investment bias’ is reinforced further during economic turmoil, such as periods of fiscal adjustments, crises, and downturns, more prevalent across developing countries (Easterly & Serven, 2003; Serven, 2007; Bamba et al., 2020). When a decision for budget deficit reductions is in place, the general tendency is to cut down capital expenditure (public investment) to a much larger size than current expenditures (government consumption), contributing to a pro-cyclical bias in public capital expenditure (as in Akitoby et al., 2006; Arezki & Ismail, 2013). By large, this is a consequence of a politically more acceptable choice compared to the alternative of reduction of the government’s current expenditures (Ardanaz & Izquierdo, 2017).

Nevertheless, other factors, from political economy aspects, such as the state of the country’s governance to the quality of the public investment management processes<sup>6</sup>, as well as the non-tangible aspects (for instance the degree of good governance), are important aspects of public investment efficiency and effectiveness. Pritchett (2000) denotes numerous examples where public investment has been mismanaged in countries with higher levels of corruption, which are overwhelming the PIM process. Namely, inefficiencies may be arising in any phase of the public investment process, starting from the inadequate selection of projects to implementation, furthermore due to limited information and knowledge, waste and leakage of resources, and weak capacities. Consequently, the effects are spilled over onto the private sector as a lower return to private investment due to lack of complementary public inputs. On top of that, in a weak institutional environment, substantial scaling of public investment can increase the risk of undermining growth benefits and decrease fiscal and debt sustainability. Relatively

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<sup>5</sup> The ‘global infrastructure gap’ is estimated at a value of trillions of dollars, as a difference between the infrastructure investment planned to take place globally between the years of 2015 and 2030 and the estimated needed amount for infrastructure in order to achieve the projected global GDP growth rate for the same time period. This estimate is according to the 2016 McKinsey Global Institute publications.

<sup>6</sup> Public capital stock may enhance private investment and productivity. Nevertheless, the low quality of the PIM process may generate opposite crowding-out effects (Cavallo & Daude, 2011).



recent models show that inefficient and corrupt bureaucratic states interact with public infrastructure investments by quality and effectiveness reductions, private investment disincentives, and hence negative growth effects (Chakraborty & Dabla-Norris, 2011).

## **1.2. Research Subject and Research Problem**

The increase in developed countries' public spending throughout the past decades has not necessarily led to an increase in social welfare and economic growth at the same rate (Tanzi & Schuknecht, 2000). More recent trends show a slight decrease in the global magnitude of public spending, however with a strong indication of a reoccurring trend of public spending increase in the context of post-pandemic recovery and onset of different crises (energy, security, etc.). Thus, an increase in the efficiency of the existing public funds is vital. In that sense, the efficiency of public funds in the SEE region, including North Macedonia, has been of particular interest to be covered as it has not been often and exclusively of particular focus.

The main focus of the dissertation research is to examine the efficiency of public spending, with a specific emphasis on the allocation of funds for public investments. The geographical scope will be contained to the countries belonging to the geographical macro-region of Southeast Europe (SEE), with specific interest in the Republic of North Macedonia in particular parts. Unless otherwise specified, the timeline will primarily cover developments from the 2000s onward.

### ***Research Problem***

Fluctuating and slow-moving economic growth, suboptimal productivity, and a biased capital budget are challenges faced by developing and emerging markets in SEE. These problems are further exacerbated by rising public debt and weaknesses in governance and institutional features. In a constellation of scarce public resources and limited fiscal space, the subject of efficiency of public expenditure and particularly of capital spending and its effect on the economy is a valid and contemporary problem noteworthy for in-depth research.

### ***Research Questions***

The research questions arising from the research problem and objective are the following:

1. What are the efficiency levels of public expenditures in SEE and how do the efficiency levels compare among countries in SEE?
  - a. What are the technical efficiency input vs. output levels and the improvement possibilities?
  - b. How do the public capital efficiency levels compare among countries in SEE and sub-groups?
2. To what extent does the public investment affect the economic output of the countries in the SEE region?
  - a. What is the significance, size and extent of the effect: short-term or long-term?
3. What is the role of the private sector and is there a nexus of public with private investments in North Macedonia and the region?
  - a. Is there a significance in crowding-in, crowding-out or no effect between private and public investment?

4. Do the governance aspects (economic, social, and institutional determinants) influence public expenditure spending especially public capital investment?
5. How do central government investments and local public investments interact?

### ***Research Objective and Hypotheses***

#### ***Research Objective***

*The main goal of the research is to explore and assess the public investment spending efficiency; the interrelation of public investment and the economic activity of a country, and the (in)significance of various socio-economic and institutional variables over public investments, in the SEE countries, with a focus on North Macedonia.*

The assessment is conducted by quantification, benchmarking, and exploration of possible links/interactions and determinants of public investment spending and efficiency on national macro performance, consequently the research aims to:

- i) Assess and compare the level of public expenditure efficiency with a focus on public capital spending efficiency;
- ii) Estimate the significance of public investment impact on the economic output;
- iii) Determine the nature of the nexus between public and private investments;
- iv) Identify socio-economic and institutional determinants affecting the efficiency of public investment;
- v) Determine the interplay between central and local government public investments.

#### ***Specific Objectives***

**SO1: To assess the public expenditure efficiency of the SEE countries through benchmarking and juxtaposition of their efficiency within the peer country group.** It will provide an efficiency benchmark comparison of the SEE region's countries, placing each country in relation to the efficiency frontier. Likewise, quantitatively it will determine the level of inefficiencies (output and input), such as the potential for improved performance without increasing expenditure or achieving the same performance with reduced expenditure. Additionally, it will focus on evaluating the efficiency of particular sub-sectors in the public domain and compare how the efficiency relates to factors such as size of the public sector and EU membership status.

**SO2: To establish an impact and the degree of the impact of public investment on the economic output.** To explore the existence and significance of impact public investment on the economic output of the SEE countries and discuss the economic mechanisms determining the transmission of public investment shocks and public capital variation over countries and time.

**SO3. To determine if there is a nexus and the nature of the nexus between public and private investments.** To explore whether there is an existence of a significant short-term and/or long-term interconnection between a public investment and a private domestic investment, to provide insights on the existence and significance of crowding-in or crowding-out effects occurring between investments.

**SO4: To identify and assess the influence of specific socio-economic and institutional determinants affecting public investment (in)efficiencies.** To identify and cover an

array of different variables (socio-economic and institutional) assumed to affect the efficiency of the public spending and specifically public investment spending.

**SO5: To determine the interplay between central and local government public investments.** To identify the significance of the interaction between local and central government-financed public investments and their role in own-source local revenue mobilization efforts.

### ***Research Hypotheses***

Primary Hypothesis: Scientifically and empirically based knowledge of public spending in the wider SEE region, including North Macedonia, can propose a theoretically based and practically applicable model of assessment of relative overall and public capital sector efficiency and extract the key influencing factors.

Working hypotheses:

- 1.1. A more efficient public sector will likely be able to produce more outputs with same spending on inputs, or same outputs with less spending on inputs.
  - 1.1.1. The level of public expenditure (greater or minor) may not necessarily lead to greater efficiency (cross-country variation in efficiency and effectiveness in public spending depend on government size and development level).
  - 1.1.2. Performance in provision of public sector outcome is not solely determined by public spending efficiency.
- 1.2. There is a variety of efficiency (cross-country) gaps in public capital spending.
  - 1.2.1. Weaker/stronger institutional or governance set-up is reflected in lower/higher efficiency in public capital spending.
  - 1.2.2. There is significant positive association of infrastructure quality perception and the country's public capital stock level.
- 1.3. There is a long-term positive relationship and effect of public investment on economic output.
  - 1.3.1. The strength of the relationship depends on the absorptive capacity and the strength of the investment process.
  - 1.3.2. Public capital spending is an effective/ineffective tool for enhanced economic growth.
- 1.4. There is an interplay between the local and central government financed capital investments.
  - 1.4.1. The local capital investment's size has a positive impact on the efforts for own-source revenue mobilization.
  - 1.4.2. The local governments' dependence on intergovernmental transfers has a positive/negative impact on the municipal own-source revenue mobilization.

### ***Research Content***

The first *introductory* chapter of the research provides explanatory details of the identified research problem and subject, including research goals, methodology, approach, and the limiting factors.

Chapter 2, *Theoretical Aspects and Trends in Public Spending*, provides an overview of the global development of governments' role and increasing public spending trends and importance. It provides a condensed synopsis of main theories and views on the public sector's spending role and effects on the economy. Furthermore, it delivers an overview and elaborates on key terms and concepts in public spending and public spending efficiency. In the second part, the chapter provides stylized facts and descriptive analysis of the trends of public sectors' magnitude of spending, economic growth trends, fiscal sustainability, and tendencies in the SEE region. The descriptive analysis also considers the different spending categories' trends across countries, identification of possible spending category bias, and possible factors explaining the spending composition of the countries in the region, including North Macedonia.

Chapter 3, *Assessment of Public Spending Efficiency*, elaborates on and explores the first working hypothesis. The chapter gives a deeper insight into the concepts of public spending to explore the hypothesis, by which the efficiency of public spending is assessed empirically, juxtaposing and benchmarking the group of countries of interest. It further explores specific public sub-sectors' efficiencies (health, education, investments) and the magnitude for potential technical efficiency enhancement compared within the group. The section explores the performance of the SEEs' public sector, to answer the hypothesis if the estimated input/output efficiency is associated with the size of the countries' public sector or development. A section of the chapter explores the possible association of the efficiency ranking with selected governance indicators. The chapter concludes by discussing the results and presenting conclusions.

Within Chapter 4, *Efficiency Assessment of the Public Investment*, there is more in-depth exploration of the efficiency of a specific public spending category – public investment. The efficiency of public investments is estimated, countries are benchmarked and ranked based on the estimated input and output efficiency gaps. The chapter also provides SEE stylized facts and descriptive analysis of the public spending trends, level of public stock accumulated, infrastructure quality perception, and it considers their joint association. Following the estimation of the public investment efficiency scores, the chapter explores the relationship significance with the pillars of the governance composite index. The section following explores the strength and association of public investment size with variables such as public debt, economic output growth, and private investment. The chapter concludes with a section on discussion of results and concluding remarks specific to the subject of public investment spending.

Chapter 5, *Public Investment Nexus with Economic Output, Private Investment & Public Debt*, examines the link between public investment and economic output, private investment, and public debt. The theory that public investment positively impacts economic activity is tested, along with the short-term and long-term effects on private capital productivity in the specific region of interest. The chapter explores the presence of cointegration among the variables and their dynamic relationships in both the overall group of countries and in sub-groups. In addition, the chapter includes a discussion and concluding remarks that focus on the findings regarding the relationship between public investment and other types of investment, as well as the identified variables.

Chapter 6, *Nexus Between Public & Private Investments: North Macedonia*, focuses on the relationship between public and private investments in North Macedonia. It explores the significance of the structure and type of investments and investigates whether there is evidence of public and private investments complementing or substituting each

other. Additionally, it delves into the role of foreign direct investments in this particular relationship.

Chapter 7, *Local Public Investments as Determinants of Local Revenue Mobilization*, explores the impact of local public investments on the ability of local governments to generate revenue. Furthermore, the chapter explores the relationship between locally and centrally funded public investments, as well as the structure of local expenditures.

Chapter 8, *Conclusions & Recommendations* – provides an overview of the findings and conclusions derived from the previous sections, while offering suggestions. This section delves into the outcomes related to the research questions and hypotheses.

### ***Scientific Methods Applied***

The research makes use of several scientific methods and an approach of induction and deduction, the method of analysis and synthesis, the empirical method, the method of compilation, the method of comparison, and statistical methods.

The empirical method is used to explore experiences and observations to determine the state and the effects of efficiency on economic output and activity. The method of analysis and synthesis is used for the logical presentation of the subject of the research by breaking down the whole into parts and components and combining the results in determining the validity of hypotheses to come to specific conclusions and compile the conclusions into recommendations. The comparative method is implemented in the process of benchmarking and comparing the situation and the assessment of different sector efficiency among countries in SEE as well as the effects of determinants on a country level. The descriptive method is used in the process of explaining and expressing trends and different aspects of the economic situation and their correlation and links to affecting and affected variables used in the development of the research topics.

The statistical method is used in grouping and manipulating the empirical data obtained for and from the research. The statistical analysis uses secondary data sources, from different international data sources. The research includes correlation analyses and descriptive statistics of variables, as well as model testing. Where applicable, econometric analysis is employed with specifications suited to address the research questions. The econometric models of regressions used depend on the characteristics of the data and the desired testing. A variety of statistical methods and models are used in evaluating each of the aforementioned research topics and provide answers to the research questions.

In the process of assessment of the public sector and investment efficiency, data envelopment analysis (DEA) is employed. It represents a non-parametric method for the estimation of production frontiers by exploring several models of input and output variables, as it is recognized as more suitable for performance measurement activities compared to econometric methods such as regression analysis or ratio analysis. In determining the existence and the nature of the interrelation of the public investments with other variables, regression and/or vector autoregressive models are employed. The specific method applied depends on the nature of the variables and relationships being studied, to provide insights into the existence of a (short- and long-run) relationship between (economic) variables in an equation time series and the possibility to establish the dynamic relationship among the variables.

In this research, study secondary data is used and gathered from different relevant books, journals, reports, conference proceedings, policy documents, etc. The literature review forms the theoretical foundation of the study from which empirical interpretations

are developed. The data are gathered and procured from multiple sources and databases including the World Bank, IMF, OECD, EUROSTAT, UNCTAD, World Pann Tables, national statistics, and other institutions in the SEE countries. The data used are presented both graphically and in tabular presentations; time series of data are analysed and cross-referenced. The research takes into consideration the limitations imposed by the data and the short-time series of some variables and, accordingly, appropriate models chosen.

### ***Scientific Contribution***

The theoretical and literature review section(s) of the research provide a systematized view of the existing literature on the efficiency of public expenditure, with a special in-depth focus on public investments, the relation with other variables as well as numerous determinants. The specific research topics covered contributes to the empirical scientific literature through the analyses of the effects of public expenditures on other macroeconomic variables and economic activity overall. This will specifically contribute to the theory and practice in the SEE region and place North Macedonia in the context of the peer countries with comparative analyses and assessments.

The research contributes to systematizing and methodizing the literature on public sector efficiency, with special focus on public investment efficiency. The study adds to the collective knowledge in the field, recognizing a specific area that lacks sufficient research, and addresses this gap by providing new findings through the conducted research. Additionally, the review of literature also identifies areas for further research.

The analysis of data involves organizing and examining patterns and connections among specific macroeconomic, social, and other factors, to establish trends and dynamics related to the efficiency of shaping public investment determinants in the SEE region.

While public sector performance evaluations and their impacts are commonly discussed, the region and North Macedonia, has not received much attention in this regard. As a result, it is anticipated that the research findings will offer a more comprehensive understanding of the countries in the specific SEE geographical area. The role of investment in economic performance has also attracted the interest of the literature, yet has remained controversial. Placing a focus on North Macedonia and the countries in the SEE region provides a deeper insight into the relation (nexus) besides the efficiency, with the other investments and economic output in a more recent period, sub-sectors, and methodologies. Thus, the research contributes to closing the geographical gap, methodological gap, and literature gap, as well as examining the causality between efficiency of public investment and economic growth, and will have added value with policy implications.

Furthermore, this research will contribute to the methodological empirical literature by the implementation of various models and analyses, such as data envelopment analysis (DEA), other regression models, such as vector error correction (VEC), and autoregressive distributive lag (ARDL), etc.

### ***Application of Research Results***

The current trend, especially in light of recent multiple crises (coronavirus pandemic, food and energy crisis, climate emergency), is to establish new policies that aim to support, retain, and encourage public investment in order to stimulate growth and development. Over the past few decades, in the non-EU SEE countries, there has been a consistent capital budget overestimation, even though in the last decade, there is a trend

toward de-escalating to stable spending to GDP ratios with noticeable differences among time periods and member vs. non-member countries.

Numerous international relevant parties have noted the shortages of core public infrastructure among the non-members as an obstacle for higher economic growth and faster income convergence. As a result, these countries face overall lower capital stock compared with the EU average; low government spending efficiency; limited efforts for accommodating greater capital spending by expenditure rationalization and revenue mobilization, etc. Assessing the effectiveness and efficiency of the public sector and specific sub-sectors, as well as understanding the relationship between different types of investment and economic activity, can provide valuable information for policymakers to shape public policy and ensure more efficient use of public funds in the face of increasing demands and limited resources.

By identifying specific factors that contribute to inefficiencies and efficiencies in public investment, policymakers can gain valuable insights to inform their decision-making and design improved public policies for sustainable long-term economic growth and development in an era of ever-increasing pressures and limitations (increasing demand for public goods and services vs. shrinking fiscal space and public debt sustainability).

### ***Limiting Factors of the Research***

The findings of this study must be seen in light of some limitations. Firstly, the research covers only a limited period of time constrained by data availability, and it covers limited geographical scope of the SEE region. The research is often constrained by the availability data for a given period, for a certain variable, or a country, in some cases restricting statistical measurements and their application. Secondly, the data used are often compiled from a combination of different sources due to the limited availability from one source which often with crosschecks returns differences, which may affect the outcome of inferences in making comparisons. Another limiting factor is that research is based on secondary public finance data collected from different international and country resources, thus generalization of the inferences derived may not be applicable to other countries. Lastly, the topics cover all SEE countries jointly, and generally with an emphasis on North Macedonia more than the other countries.

## **Chapter 2**

### **Theoretical Aspects**

### **& Trends in Public Spending**



## Chapter 2 THEORETICAL ASPECTS & TRENDS IN PUBLIC SPENDING

### 2.1. Key Terms & Concepts in Public Spending

#### *Macroeconomic Policies & Public Spending*

Fiscal policy measures, including the government spending are one of the two main sets of macroeconomic tools, along with taxation, which are at the disposal of governments to enhance and affect economic growth, macroeconomic stability, and sustainability of social results. Fiscal policy is essential in directing macroeconomic performance and growth enhancement over the short term, mid-term and long term. The fiscal policy measures are increasingly important in the wake of reoccurring crises and challenges, especially relevant for the SEE countries, which must operate in an intricate global environment, which in the last decade was characterized by slow recovery from the global financial crisis, heightened risks, a global pandemic crisis, a global energy crisis, climate changes, etc., encompassing periods of shockwaves and distress, followed by recovery and rebound, needs for building resilience and new challenges to be tackled.

Among the vast literature, there is little consensus on the adequacy of the size of the public spending, and the exact performance and assessment of the efficiency of public spending, as the effects of public spending are heterogeneous both within countries and across countries. Nevertheless, (improving) efficiency and effectiveness are key features of good governance, and within the public sector this translates into being responsible for finding ways to make the best use of the resources in a world of scarce resources for achievement and maintaining sustainable development.

Broadly speaking, the government's role is to enhance the performance of a market economy, where the perfectly competitive market economy is accepted as the model economic system. However, even a perfectly competitive economy cannot solve all the economic problems, thus placing the government's role within the market economy. The government's role gains legitimacy through the existence of market failure (as initially defined by Bator, 1958), explaining that the government should perform those economic functions that the market cannot perform or are poorly performed, thus demanding government intervention. Otherwise, in a performing market, government interventions are not justified.

The government functions, with moderate disagreements, are implied by the market failure criterion caused by an asymmetric or lack of information, concentrated market power, public goods, and externalities. Consequently, the goals of public policy, widely put, can be expressed as the promotion of the nation's economic well-being, through efficiency and equity (or fairness). Market failure predominantly means failing to efficiently allocate resources, therefore public policies are considered superior in terms of Pareto optimality<sup>7</sup>. Refined by Debreu (1959), the fundamental *theorems of welfare economics* imply that public policy can reallocate resources to 'at least make one consumer better off by reallocation of resources and not causing anyone to be worse off'.

Nevertheless, even in a perfectly competitive market economy, the distribution of goods and services cannot be guaranteed to be socially acceptable and considered as just by an all-collective decision. This poses the question of the *distribution of income*. Musgrave's theory (as explained by Oates, 1968) suggests that the public economic

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<sup>7</sup> Microeconomic efficiency, or Pareto optimality, is achieved when it is impossible to make one person better off without making someone else worse off (Winston, 2006)

policy has three objectives: 1) to establish an efficient allocation of resources; 2) to attain desired distribution of goods & services (wealth and income); and 3) to maintain the stabilization of the broader economy; thus the governmental economic activity function is broken down into: allocation, distribution, and stabilization. Richard Musgrave (1959) in his book, described the allocative, stabilizing, and redistributive functions that a modern government should undertake. According to the analyses of Musgrave (as well as Rostow, 1960) in the early stages of economic growth the investments of the public sector compared to the overall investments, are higher (such as investments in infrastructure, law and order, health, education, as well as in human capital). They argue that public sector investments have been necessary to take the economy from early take-off to the middle stages of economic and social development. In that middle stage, public investments are then becoming complementary to the growth of the public sector.

The development of the theory of public goods and of the concept of externality suggested a growing allocative role for the state. Tanzi & Schuknecht (2005) explain that following the fear of unemployment, Keynes's General Theory (through the works by Alvin Hansen, Abba Lerner, Lawrence Klein, and others) provided the tools for stabilization and, yet, another powerful reason for governmental intervention, guided by the belief that the Keynesian demand policy could eliminate or at least reduce business cycles and unemployment. The Keynesian framework elaborates that government spending regulates the rate of economic progress. This perspective might overstate the significance of government expenditure, however it affirms a positive impact of public expenditure on GDP growth. As per the Keynesian school of thought, an increase in government expenditure enhances domestic consumption (particularly in economic downturns), when the free market forces fail to maintain equilibrium due to labour market inflexibilities, which reflects the Keynes favourism of expansionary fiscal policies in times of recession, as an increase in government spending will result in economic and social progress.

The beliefs about the strong influence of the government (read government spending) were shared by other influential economists at the time, such as Galbraith, Gator, Tobin, etc. This was followed by the development of various techniques for the evaluation of government programs and budgeting, aiming at better public expenditure efficiency.

In the period between the 1960s and 1980s, the world saw an unprecedented enthusiasm (as stated by Tanzi & Schuknecht, 2000) for expenditure policies coupled with the rapid growth of the government involvement in the economy. In the neoclassical growth literature, the Solow-Swan model (as most often cited, Solow, 1956 and Swan, 1956) highlighted the role of capital accumulation, as one of the economic growth drivers (both in the short term and long term). On the other hand, the endogenous growth theory (Barro, 1991; Acemoglu, 2009; Aghion and Howitt, 2009) considers the effects of other variables, especially human capital investment, as well as population dynamics. The theoretical models for the analysis of the spending patterns of public expenditure developed in the past are described through either the 'development model', 'law on expanding state activity' or the one associated with 'political theory for public expenditure'.

## 2.2. Theoretical Foundations in Public Sector Spending

### *Different Theories for the Increasing Public Spending*

Globally the government's role and thus the participation of the public sector within the economies, has been steadily and continuously increasing throughout the past, at least tripling in the last century. Combined and driven by various affecting events, many economies undertook expansionary policies which have led to an enduring proliferation of public expenditure that remained permanent.

Thus, the question of the role and increment of public expenditures simultaneously with its adequate size and effectiveness cannot be simply answered and calculated. The optimal size of the public sector has been one of the most appealing topics in fiscal policy and public finance studies. A number of theories have advanced to explain this problem in different countries. Nevertheless, the explanation of the increment of public expenditures has been theorized through different aspects, analysing the trends and determinants without a comprehensive theory. The goal of these theories has not been solely in explaining the increment of public spending, however, but to also discuss solutions for efficient distribution and 'optimal' governmental size. Some of the theories to explain the determinants of the increasing public expenditures stem from the theory of economic growth.

- *Marginal utility approach* (since the 1920s, by Marshall, Pigou, Dalton, and others) – according to which, the government is spending the limited and scarce incomes in a way that the marginal benefit is the same for all. Pigou and Dalton discuss '*maximum social welfare*', according to which, public expenditure should extend to the point when dis-utility from the marginal taxation (social sacrifice) is equivalent to the utility derived from the marginal public expenditure (social benefits), as public expenditure is subject to diminishing marginal social benefits and the taxes to increasing marginal social costs (Sandford, 1970). The theory is criticized for its limitations predominantly to its practicality, as being normative (what ought to be) rather than positive (what is).
- *Pure theory of public expenditure and public good approach* (as developed by Samuelson, 1955) emphasizes the form of consumption of government services and introduces the concept of public goods, as it considers that there is no private mechanism for their provision and are consumed by all and in equal amounts (the criteria of the public goods of non-excludability and non-rivalry). In that case, the demand for public goods and services grows and it becomes an important element in determining public expenditure (Oakland, 1987). The services or public goods are provided in a way that are equally consumed by all regardless of whether the citizens pay or do not pay for them. Thus, not being able to determine a pricing mechanism for provision of the service via regular operations requires the need for the role of the government (on top of market failure). The theories of public good are normative in nature, and the economists' interest is confined into determining the expenditure policy of the government, further leading to the positive public expenditure theory development.
- *Public choice* (developed by Buchanan and his followers) recognizes the importance of political processes in public preferences and explains government decision-making as a result of the actions of individual, self-interested public policy actors, who make decisions as civil servants or elected officials. Buchanan's public choice theory complemented the traditional public economics by providing an economic theory of

the political process as the economists have provided for the private market processes. Public choice modified the traditional model to allow for not only market failure but also to allow for government failure, as the traditional economic normative model assumed an efficient government to correct the occurrences of market failure (Toma, 2014). Downs' theory of democracy (1957) provides a general framework to explain public expenditure through the democratic society, where the government determines the revenues and expenses towards maximizing the probability of election-winning, thus will provide what the voters want and not necessarily what is beneficial (vote rather than welfare). Therefore, the impetus for expenditure expansion is followed by the need for larger bureaucracies, budgets, and resources to fund these budgets.

➤ *Positive approaches* – concerned with the growth of public expenditure over time and verification of theories have been numerous as well, among which:

- Wagner's law – referred to as the 'law of increasing state activity', which asserted that there is a long-run propensity for the scope of the government to increase with a higher level of development, i.e. with the rise of economic growth so will the public sector share, due to an increasing demand and provision of both existing and addition of new activities. Wagner based his law on historical facts (as in Musgrave & Peacock, 1967). He hypothesized a functional relationship between economic growth and a government's activity with the result that the government sector grows faster than the economy. Many researchers from different countries have analysed public expenditure data to prove or disprove the validity of the Wagner's theory, and have come to diverse conclusions, thus it is considered as quite vague. Nevertheless, the idea has continued to influence other economists, such as Bird (1970, 1971). Bird's positive theory of public expenditure as a body of economic and political analyses, attempts to understand patterns, level and changes of expenditure over time. This behavioural approach to public expenditure has had a significant role in public policymaking. On the other hand, Musgrave's explanation on the subject, however, adds that it is the analytics (disaggregation) of the expenditure in capital formation, consumption, and transfer payments that holds a more valid explanation rather than the total expenditure of the government.
- Peacock and Wiseman (1961) explain the public expenditure fluctuations over time with tendencies for 'sharp jerks and stepwise manners rather than continuously and smoothly'. They suggest that these movements, from the old levels to new and higher levels of expenditure, called 'displacement effect', are caused by large-scale social disturbances. The displacement effect signified that the public expenditure grew over time, not at a constant rate, but rather in a stepwise ascending scale. The displacement effect then leads to new emergency demands, causing an upward shift both in public expenditures and revenues to new higher levels, predominantly caused by social upheavals and/or natural disasters. These events lead to new demand for public spending that pertains a long time, for example such cases are the social and welfare schemes, pensions, etc. Prior to the increase, due to lack of pressure for the public expenditure, the revenue constraint was dominating, thus restraining the expansion of the public expenditure, while later on, under changed circumstances the restraint has been lifted, the public expenditure has increased and the revenue inadequacy is evident, consequently the movement of the new level of expenditure and taxation causes the displacement effect. The solution for the inadequacy of the revenues

due to the expenditure increase then creates an ‘inspection effect’ resulting in attainment of new levels of tax tolerance. The inadequacy of the revenue, compared to the required public expenditure creates the inspection effect. In this situation both the government and the citizens need to find a solution for the issues and come up with an agreement on the adjustment to finance the required expenditure, with a new tax tolerance level. As a result, a new level of stabilization is reached until a new disturbance occurs and causes another displacement effect.

- Clark’s critical limit hypothesis is concerned with predominantly the tax tolerance level. Clark hypothesizes (in Clark, 1945, 1964) that a twenty-five percent share of the government sector to the economic activity is a critical limit. Past that critical limit there are inflationary pressures, due to taxation beyond tolerance level, which is reducing incentives and productivity, thus dragging supply down even in the cases of a balanced budget. Clark argued that when government tax proceeds reach the critical ratio of 25% of the government sector, a progressive tax system generates increasing proportions of additional income from taxpayers, whose productivity falls – high taxation levels would reduce work activities and saving incentives. Furthermore, people become less resistant to the inflationary methods of government financing. Thus, the overall effect is that the aggregate supply falls and the expansion of the aggregate demand results in inflation. Decades after the post-world war period (which was the period of Clarks’ analyses for the hypothesis), empirical studies however show that many countries have crossed the 25% limit without much inflationary tendencies (Jain, 1989).
- The exogenous growth models have been used to evaluate the relationship between government spending and economic growth. Endogenous growth theories differ in the assumed relationship between growth and policy variables. The latter is predominantly based on the common grounds that the increasing returns to capital are associated with innovation. The endogenous growth theory unlike the exogenous theory, extends thought by arguing that growth can be affected by different channels of government policy, such as productive public spending, i.e. capital investment may increase returns to scale if capital is used for innovative purposes and knowledge. Romer (1986) constructed a model that allowed an endogenous positive long-run economic growth rate, attracting further interest in public policy influence on economic growth (e.g. Lucas, 1988; Barro, 1990, etc.). Barro (1990) demonstrated theoretically that the government size (via public expenditure size) to economic growth may be non-monotonic, known as the nonlinearity hypothesis.

### ***Public Investments and Economic Growth***

The general perception of public investment is that it is a catalyst for the economic growth of a country. Therefore, it is not unexpected that there exists vast literature on public investment (public capital expenditure and capital accumulation) and assessing its macroeconomic effects. Regardless of the abundance of studies, there is still an uncertainty about the magnitude of the effect of public investment on the economic output, which is especially the case for developing economies.

According to the neoclassical economic models (empirical studies derive equations from neoclassical economic theory), the rate of a country’s economic growth is

determined exogenously. The empirical links between the investments and economic growth predominantly stem from the applied economics literature of Aschauer (1997), prior to whom the capital stock was not considered as a variable in productivity growth. Aschauer identified a strong positive relationship between public capital and GDP growth for the developed economies.

Growth models further follow the model developed by Solow, explaining the long-term economic growth through capital and labour accumulation, population growth, and productivity – the neoclassical growth model or the exogenous growth model – where investments are treated as a key factor. There are many studies with different approaches in the scientific literature that investigate the empirical relationship between public investment and economic growth that follow Aschauer. Namely, using either production functions (e.g. Mankiw, 1992; Holtz-Eakin et al., 1995; Cavallo, 2011; Gupta et al., 2011, etc.) or another approach giving a broader picture by focusing on the feedback effects of public capital (higher public investment) via commonly used autoregressive vector and structural macroeconomic models. These studies address the effect of public investment mainly through public capital expenditure but less through public capital stock primarily due to limited availability of public capital stock data among the other challenges (thus an often-used measure for public capital is the gross fixed capital formation). In that vein, more recently, in cases when this is applicable, the empirical studies consider the effect of public capital stock on productivity, as more relevant to productivity than the flow of public capital spending.

In the same neoclassical context, it is considered that the advancement in public investment is detrimental to the private investment and it will either increase or decrease the economic growth rate depending on whether the marginal product of public capital is more or is less than the marginal product of the private capital. Consequently, many researchers have undergone regression estimations where the dependent variable is the economic output and the independent variables are public capital, private capital, labour, etc. Using this approach, the impact is assessed by detecting a nexus between the public and the private investments, i.e. whether there is complementarity or substitutability (crowding-in though stimulation, agglomeration, or crowding-out through exclusion) on private capital and their association with the economic growth (rates).

In discussing public expenditure, and in particular capital expenditure, it is necessary to mention the Keynesian concept of the fiscal multiplier. The Keynesian multiplier derives from the idea that an exogenous increase in expenditure results in a direct increase in the income of a group of recipients and turns into more expenditure, which then turns into income and in a like manner until the original impulse has exhausted its (multiplying) power. The models considered as faithful to the Keynesian paradigm (structural macro-econometric models) combine Keynesian short-run reactions with neoclassical features in the long run. In the case of investment, the expansionary effect is primarily due to an increase in capital spending, which is affecting the composition of the budget having long-term and lasting consequences.

The theories above link the government in influencing the economic growth but there is no specific theory that relates the size of the public sector to economic growth. The Armey curve (Armey, 1995) presents a hump-shaped relationship between the government size and economic growth, meaning that beyond a certain point of growth, the resources are less productive and thus rent-seeking appears. Buchanan (1990) though argues that this practice of rent-seeking is a result of the size of the public sector. Baumol

(1993) suggests that a larger public sector generates lower economic productivity and lower economic growth.

Having in mind the vast literature, and studies covering public sector and its size, its optimality and role of the government, for the purposes of this part we will contain the overview for the time being, and later, with the specific topics elaborated we will further present an additional review predominantly covering specific empirical studies for the specific subjects of interest.

### ***Government Size and Efficiency***

Free markets are often seen by economists as the ultimate mechanism for resource allocation, however the reality is that resource allocation in a substantial amount takes place outside of the markets and has an effect on while also being affected by the government (public sector). Tanzi (2005, and his earlier work), in discussing today's role of the government, elaborates on his views that when and as the markets and the economies develop, the technology for service provision is in innovation, then the justification for the government intervention should decline, i.e. a more efficient market should require less government. According to him, there is no need for any country to spend around thirty percent of the GDP on public sector activities. In the 21<sup>st</sup> century, the state should not be producing goods and services, but its fundamental role should be rather to make markets work well by being more efficient and transparent.

Dwelling deeper into efficiency of public expenditure research, it is implied that the services that are provided should be at the lowest cost to the taxpayer, thus the degree and depth to which the public sector is involved within the economy gives rise to the common denominator for measuring government activity – efficiency (Di Matteo, 2013). In this vein Di Matteo (2013, pg. 5) states: “The efficiency in government spending is a benefit that generates value to the taxpayers, ensures that the cost for taxation and government intervention for economic growth and market performance are minimized, and demonstrates stewardship on the part of political leaders for their nations.”

The minimal role of the government is commonly associated with Adam Smith, who in simplified terms, explains that the citizens in a well-functioning market use their own efforts and income to take care of both personal and social needs. The opposite view, though, is associated with Karl Marx, who also in simplified words, explains that the political representatives of the people are those that make political decisions and act for the state through centralized planning.

Thenceforth, in the next chapters the focus will be placed on public spending efficiency, especially on investment spending and the existing nexus between the different investment types and economic output.

### ***Concept of Efficiency & Effectiveness of Public Sector Performance***

Efficiency and effectiveness are concepts exploring the relationships between inputs, outputs, and outcomes. The pioneer in investigating the concept and measuring efficiency is Farrell (1957, pg. 11), highlighting the importance of these concepts for the economic policy by emphasizing that “it [economic policy] can be expected to increase its [industry] output by simply increasing its efficiency, without absorbing further resources”.

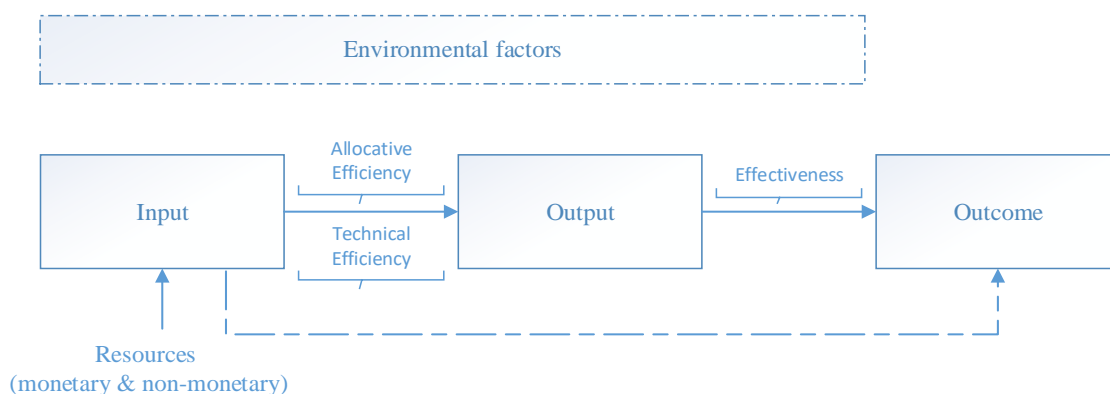
Although there are numerous techniques and approaches for assessing and measuring the efficiency of resources used, the subject has been of interest and analyses, particularly for various industry sectors. Nonetheless, the assessment and quantification of the

efficiency and effectiveness of public spending<sup>8</sup> has been a conceptual challenge due to the nature of the sector. The challenges arise from the public sector's multiple objectives and even more because the public sector outputs are not marketable (there is no market pricing), which makes the output difficult to be quantified.

The efficiency and effectiveness create a link between the inputs, outputs, and the outcomes (Figure 2-1), i.e. the resources used (inputs) either in monetary or non-monetary form are necessary to create an output. The ratio between the input and the output is a simple and basic measure of efficiency. The efficiency concept incorporates the idea of the production possibility frontier, indicating the feasible output levels given the scale of operations. In simple terms, the process/activity will be more efficient the greater the output for a given input is or the lower the input for a given output is. Productivity, on the other hand is the ratio of outputs to inputs.

Effectiveness links the input or output to the objectives to be achieved – the outcome. The outcome may be influenced by the outputs, however as well by external (exogenous) factors. This makes assessment of the effectiveness quite challenging compared to assessment of the efficiency, as the outcomes in the public sector are highly influenced by political choices. Making a clear distinction between the output and outcome is often not possible and not clearly visible, thus in many cases it is used interchangeably as not being able to isolate one from the other.

Figure 2-1 Concept of efficiency and effectiveness



Source: Conceptual framework of efficiency and effectiveness (Mandl, Dierx, Ilzkovitz, 2008)

In this concept (see more in Farrell, 1957; Wilson, 1989; Mandl, Dierx, & Ilzkovitz, 2008; Mihaiu, Opreana, & Cristescu, 2010; Afonso, Schuknecht, & Tanzi, 2003 & 2006, etc.), when there are cases of assessment of the efficiency, there is a difference made between technical efficiency and allocative efficiency. Namely: i) technical efficiency measures the pure relation between inputs and outputs – production possibility frontier. A technical efficiency is gained via movement towards the best practice position on the production possibility frontier; while ii) allocative efficiency introduces costs and benefits, by reflecting the link between the optimal combination of inputs taking into account costs and benefits and the output achieved. Measurement of the allocative efficiency requires in-depth analyses and a broad range of information. However, this means that there is no guarantee that when there is a high degree of technical efficiency there is an efficient functioning of public sector activities.

<sup>8</sup> In this section a distinction between public sector and public spending is not explicitly made, even though we recognise this is a fact.



Another culprit of the public sector efficiency and effectiveness measurement is the difficulty of measuring inputs and outputs due to interlinkages between services and policies, as well as the inclusion of one public service to another, which makes the public sector challenging in presenting a clear input-output-outcome relationship. The measuring of the efficiency and the specific approaches are discussed and applied in more details in Chapter 3.

### **2.3. Trends in Public Spending**

#### ***Public Spending in the SEE's Western Balkan and EU member countries: Trends & Key Policies***

There is a number of indicators that indicate the size of public sector. These are most often presented by total government expenditure as a share of GDP; public expenditure per capita or public sector employment trends. Each of those gives a sense of the size of the public sector. In the following section a number of stylized facts on primarily public spending are presented, covering the SEE<sup>9</sup> country group, including six Western Balkan countries and five SEE EU member states. Besides trends in public spending from the 2010s to the early 2020s, short points on several key expenditure policy issues are presented as well.

#### ***Fiscal Panorama***

During the last two decades the SEE area is converging rather slowly to the EU average, with still rather large gaps among the countries and regions with a heterogeneous pace for closing the gap. The region's heterogeneity as well as slow converging pace may be illustrated via the per capita output (see Figure 2-2). On the one side are the Western Balkan countries, still non-members of the union, hardly reaching half the average EU's GDP per capita. Closest to the half-mark (of 50% of EU's average GDP per capita) are Serbia and Montenegro<sup>10</sup>, as they have showed some progress in the last two decades, with an average annual positive change of around 2.5%. With this pace and measured solely via this indicator, moving with the average speed of convergence exhibited in the last two decades it will take from thirty to fifty years for the Western Balkan countries to reach the average per capita output of the European Union.

On the other side are the countries with an EU membership status<sup>11</sup> with a large variation of GDP per capita between them as well. Indexed to the EU's average (EU GDP per capita = 100), Bulgaria is furthest away from converging, with per capita GDP slightly below 60% of EU's average, and Croatia and Romania closer to 70%. Neighbouring closest to the community's average is Slovenia, with a steady level at around 90% of EU's average, however with a solid starting point even prior to its membership. Most significant progress in the last two decades in converging to the EU's per capita GDP is noticeable in the case of Romania, with a leap from 26% in Y2000 to 74% in Y2021. The

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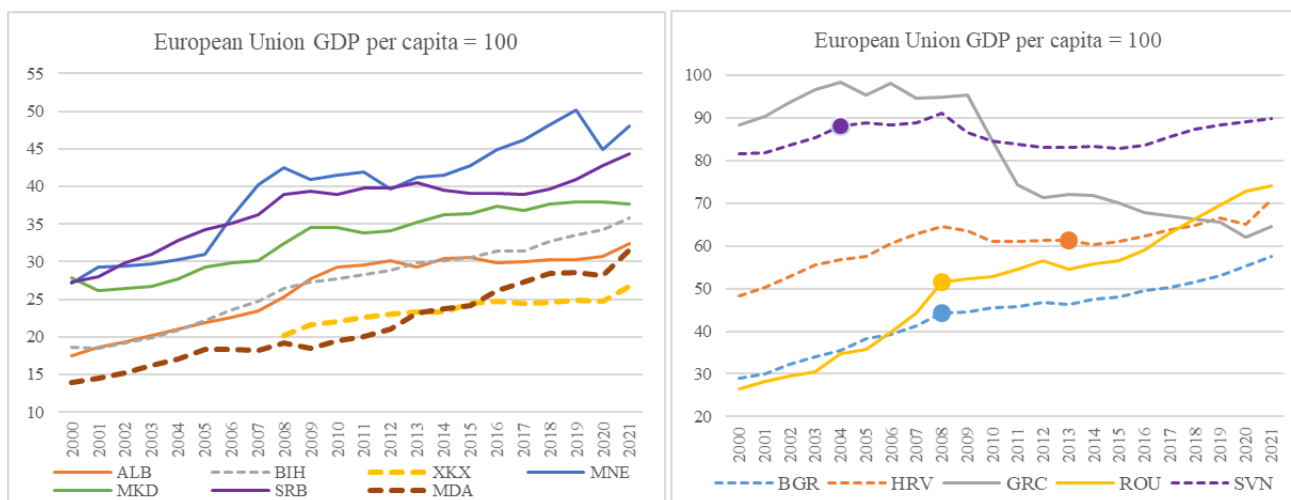
<sup>9</sup> SEE countries refer to: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Moldova, Montenegro, North Macedonia, Romania, Serbia, Slovenia; out these five are members of the European Union – Bulgaria, Croatia, Greece, Slovenia and Romania, while when referring to the Western Balkans or also referred to as SEE6 countries we consider Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, Serbia all aspiring and non-EU member states.

<sup>10</sup> Serbia and Montenegro are currently furthest in the process toward EU accession from the non-member countries.

<sup>11</sup> Joined EU in year: Croatia 2013, Romania and Bulgaria 2007, Slovenia 2004, Greece has been a member since 1981.

individual economic decline is noted in the case of Greece<sup>12</sup> with a drop of GDP per capita from 88% in Y2000 to 65% in Y2021.

Figure 2-2 GDP per capita, index comparison with EU average



Note: Based on GDP per capita PPP in current international US\$, EU average GDP per capita for the given year =100  
 Abbreviations note: ALB-Albania, BIH-Bosnia & Herzegovina, XKX-Kosovo, MNE-Montenegro, MKD-North Macedonia, SRB-Serbia, MDA-Moldova, BGR-Bulgaria, HR-Croatia, GRC-Greece, ROU-Romania, SLV-Slovenia. \* Year of joining EU

Source: World Bank Database, Development indicators, GDP per capita, PPP (current international \$)

Overall, as a group, the economies of the Western Balkan six have shown macroeconomic stability over the past decade with slow to moderate growths, nevertheless with notable heterogeneity within the group, mirroring the long-term effects of different policies and political circumstances. Table 2-1 presents a summary of the recent key macroeconomic development indicators for the non-member countries. The real GDP growth in 2021 (in a post-covid pandemic<sup>13</sup> recovery year) ranged from the lowest 4% in North Macedonia to the highest 12.4% in Montenegro, and relatively strong performances in the other countries of the region, whereby Serbia and Bosnia grew by over 7% and Kosovo by 9%, all showing a good pick-up after the health crisis. Conversely, after the vanishing effects of the health crisis, the countries faced another combination of challenges, consequential from the sharp energy price increases, growth slowdown which are pushing up the food prices and inflation – something that has not been an issue for a long period. The new circumstances resulted in diminishing purchasing power, coupled by monetary tightening, which is pushing up financing costs and weakening external demand.

The EU members in the country group, in Y2021 noted real GDP growth range from the lowest 5.8% in Romania to the highest 13.1% in Croatia, and relatively strong performance in all member states of the SEE region, as a recovery year following Y2020. Namely, Slovenia, Greece and Bulgaria grew by slightly around 8%, and Romania by 5.8%. The challenges of increasing prices and increased inflation resulting in diminishing

<sup>12</sup> During the period Greece faced a significant economic downfall with long-term consequences due to the 2015 debt default, following the financial crisis and longtime smoldering structural issues.

<sup>13</sup> During 2020 all the countries in the region marked significant economic backslides due to Covid-19, with GDP negative growth of -3.5% in Albania, -3.1% in Bosnia, -5.3% in Kosovo, -15.3% in Montenegro, -6.1% in North Macedonia, -0.9% in Serbia; -4.0% in Bulgaria, -8.6% in Croatia, -9.0% in Greece, -3.7% in Romania and -4.3% in Slovenia.

purchasing power and monetary tightening in Y2022 and Y2023 is felt in these countries as well (see Table 2.2).

*Table 2.1 Key Macroeconomic Indicators, 2021, SEE EU-non-members*

	Real GDP growth (%)	GDP per capita, PPP (current international \$)	Overall fiscal balance (%GDP)	Average annual CPI inflation (%)	Current account balance (%GDP)	Public Revenues (%GDP)	Public Expenditure (%GDP)	Public debt (%GDP)	Unemployment Rate (%)
Albania	8.50	17,245	-4.50	2.60	-7.63	27.00	31.50	72.10	11.47
Bosnia & Herzegovina	7.10	14,110	-2.50	2.00	-2.15	42.30	44.80	34.40	14.90
Kosovo	9.10	5,058	-1.40	3.40	-8.79	28.70	30.10	22.10	25.46
Montenegro	12.40	22,128	-2.00	2.40	-9.27	43.60	45.60	84.90	17.88
North Macedonia	4.00	13,890	-5.80	3.20	-3.45	32.30	37.70	51.80	15.78
Serbia	7.40	21,243	-4.10	4.00	-4.35	43.30	47.40	53.90	10.06

Note: GDP per capita PPP in current international US\$, the Unemployment rate for Albania is for 2019, and for Kosovo & Montenegro for 2020.

Source: WB Regular Economic reports 2021 and World Bank Development indicators

*Table 2.2 Key Macroeconomic Indicators, 2021, SEE EU-members*

	Real GDP growth (%)	GDP per capita, PPP (current international \$)	Overall fiscal balance (% of GDP)	Average annual CPI inflation (%)	Current account balance (% of GDP)	Public Revenues (% GDP)	Public Expenditure (% GDP)	Public debt (% GDP)	Unemployment Rate (%)
Bulgaria	7.60	28,106	-3.90	3.30	-0.44	36.70	40.60	23.90	5.27
Croatia	13.10	34,535	-2.60	2.55	3.02	46.00	48.50	78.40	7.61
Greece	8.40	31,486	-7.50	1.22	-6.45	50.00	57.40	194.50	14.71
Romania	5.80	36,101	-7.10	5.05	-7.26	32.70	39.80	48.90	5.59
Slovenia	8.20	43,805	-4.70	1.92	3.84	44.60	49.30	74.50	4.74

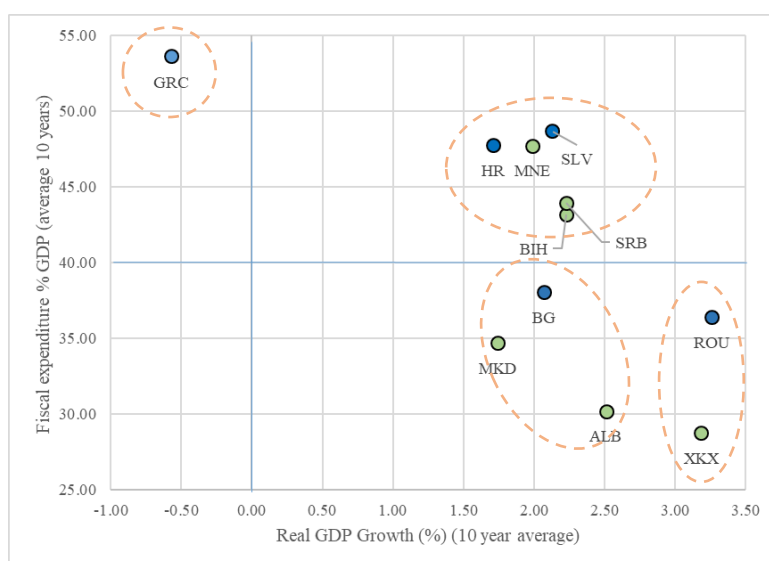
Source: World Bank Development indicators

From a fiscal standpoint, the countries of the Western Balkan region tend to show moderate to worrying overall fiscal deficits, of around 3% of GDP on average. North Macedonia and Albania demonstrate the widest overall deficits for 2021, of 5.4% and 4.5% respectively, primarily due to the fiscal stimuli to the economy with the incentivizing programs for Covid-19 relief to keep the employment and other direct influx for the assistance. This has left significant long-term damaging effects on the increasing public debt as well (World Bank, Regular Economic Report, 2022). The six countries of the Western Balkan region faced a new range of economic challenges despite the fact that the rebound from the pandemic caused recession. The additional stress and pressure aggravated and have detrimental consequences on the initially intended recovery, as a consequence of the war conflict between Russia and Ukraine, setting pressure via the energy crisis, which inevitably increased the public spending, put pressure on the fiscal balance, and increased both public debt and inflation. Preliminary estimates according to the World Bank for Y2022 projected growth was expected to decelerate to around 3% under the assumption that the prices will normalize.

Nonetheless, fiscal deficits increased, as per amplified public expenditure caused by the governments' yet another package of measures to mitigate rising inflation and energy increasing costs, with caused shocks especially among the energy-importing and dependent countries: Serbia, North Macedonia, and Kosovo. In such an environment, public debt is still elevated while financing conditions are tightening as global monetary

policy attempts to smoothen inflation. The countries also face limited fiscal revenues, increasing expenditures, thus a limited fiscal space to close the gaps in social and economic development, leaving a little margin for counter-cyclical spending to direct in an efficient and targeted manner. Investment public spending is expected to take the hardest hit if history repeats itself. Public investment, if efficiently and effectively targeted and managed, will not only positively affect capital accumulation but will also directly influence productivity, which is an essential component of overall macroeconomic growth. Capital accumulation and targeted public investments are fundamental for long-term growth and the necessary structural upgrading. It is expected that the public and private investment jointly encourage productivity gains and encourage economic growth for building a virtuous cycle of sustainable growth.

Figure 2-3 Fiscal Expenditure (% GDP) & GDP growth (ten-year average)



Abbreviations note: ALB-Albania, BIH-Bosnia & Herzegovina, XKX-Kosovo, MNE-Montenegro, MKD-North Macedonia, SRB-Serbia, BG-Bulgaria, HR-Croatia, GRC-Greece, ROU-Romania, SLV-Slovenia, average for the period 2012-2021, blue countries: EU members, green countries: non-members.

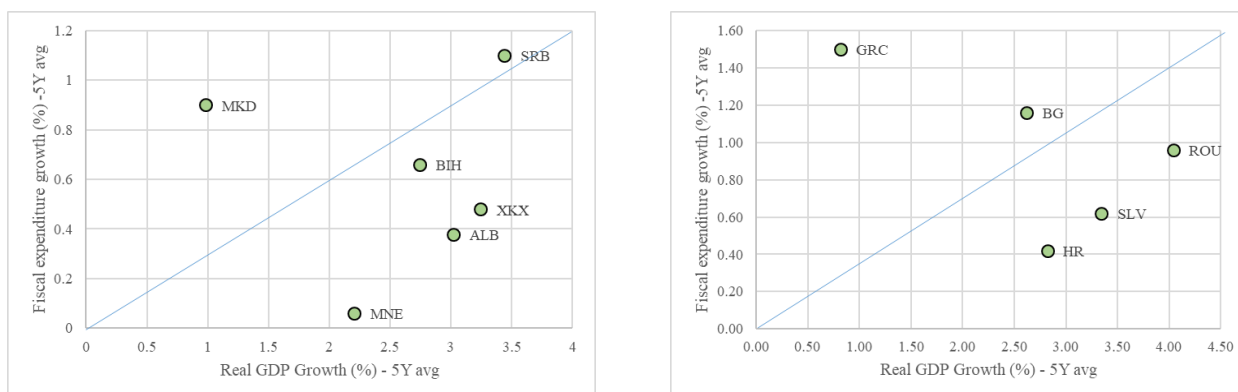
Source: Author's own elaboration, based on data from World Bank Regular Economic Reports; World Bank World Development Indicators & IMF Government Statistics

Figures 2-3 and Figure 2-4 portray the size of the public sectors in each of the countries in relation to the growth of the economy in the past decade as well as a more recent period. It is evident that on the upper side we have a cluster of several countries with average public expenditure to GDP above 40% but less than 50%, and another cluster of several countries with public spending below 40%, with Greece being an outlier with the public sector reaching 55% of GDP on average. Furthermore, these clusters can be regrouped by plotting their public sector size and the overall GDP growth, and it can be noted that those with average growth rates between 1.5 and 2.5 percentage cover countries with both relatively smaller public sectors of up to 40% public expenditure to GDP, as well as countries with larger public sectors which are above 40%. The cluster of countries with growth rates of around and above 3 percent have relatively smaller public sectors, and Greece is singled out as an outlier with largest public sector and negative average annual growth rate.

Considering the last five-year average (due to the particularity of 2020 & 2021), there is no evident positive/negative relationship between the increases/decreases in fiscal

spending and economic growth, although the movements and trends across countries is not homogeneous. In absolute terms, the public spending in these countries has been on the rise in the last decade, while in relative terms, as a ratio to GDP, it has predominantly been relatively stable. To illustrate, Albania showed (with the exception of Y2020) a slow but steady decrease in public expenditure to GDP in the period from 2015 to 2019, undertaking adjustment policies, while at the same time a positive and increasing growth. In relative terms the same is applicable for both Bosnia and Serbia as well. North Macedonia and Montenegro show relatively steady public expenditure to GDP ratio, while for North Macedonia growth is slow and minimal, in Montenegro it is more robust. Kosovo, as a separate case, demonstrates a rather large increase in spending while at the same time more robust growth. On average, as relative growths of fiscal expenditure to output growth rates (a five-year period of 2017-2021, Figure 2-4) among the Western Balkan sub-group, North Macedonia marks among the highest expenditure growth rates and the lowest average output growth rates in the five-year period, Serbia marks the highest expenditure growth rate and higher average output growth rate, while Montenegro marks moderate growth and almost no expenditure to GDP growth.

*Figure 2-4 Real GDP and fiscal expenditure growth, in percentages*



Abbreviations note: ALB-Albania, BIH-Bosnia & Herzegovina, XKK-Kosovo, MNE-Montenegro, MKD-North Macedonia, SRB-Serbia, BG-Bulgaria, HR-Croatia, GRC-Greece, ROU-Romania, SLV-Slovenia. Five-year period 2017-2021.

*Source: Author's own elaboration, based on data from World Bank Regular Economic Reports; World Bank World Development Indicators & IMF Government Statistics*

Subsequently to the budget-induced stimulating programs in 2020 among all countries, in Y2021, all but Bosnia, have adjusted downwards their public spending to GDP, resulting in a more or less robust pick-up of the growth.

The public spending in the SEE region's countries, which are also members of the EU, on average in the last decade has been on the rise, especially pronounced in the cases of Bulgaria and Romania. In relative terms, as a ratio to GDP for an illustration for Y2020 in all countries there is exceptionally high public spending, primarily due the Covid-19 assistance and aid programs. The largest cumulative change in the last five years is noted in the case of Greece despite the evident decade-long efforts for decreased public spending, again due to the Y2020 Covid-19 disruption, while at the same time it notes variable growth rates. The other countries in the sub-group show stable growth rates disrupted in 2020, but bouncing back in 2021. Slovenia demonstrates significant efforts for gradual and steady reduction of the public spending relative to GDP in the last decade (with the exception of Y2020) with stable and robust growth. For Y2021, all SEE EU

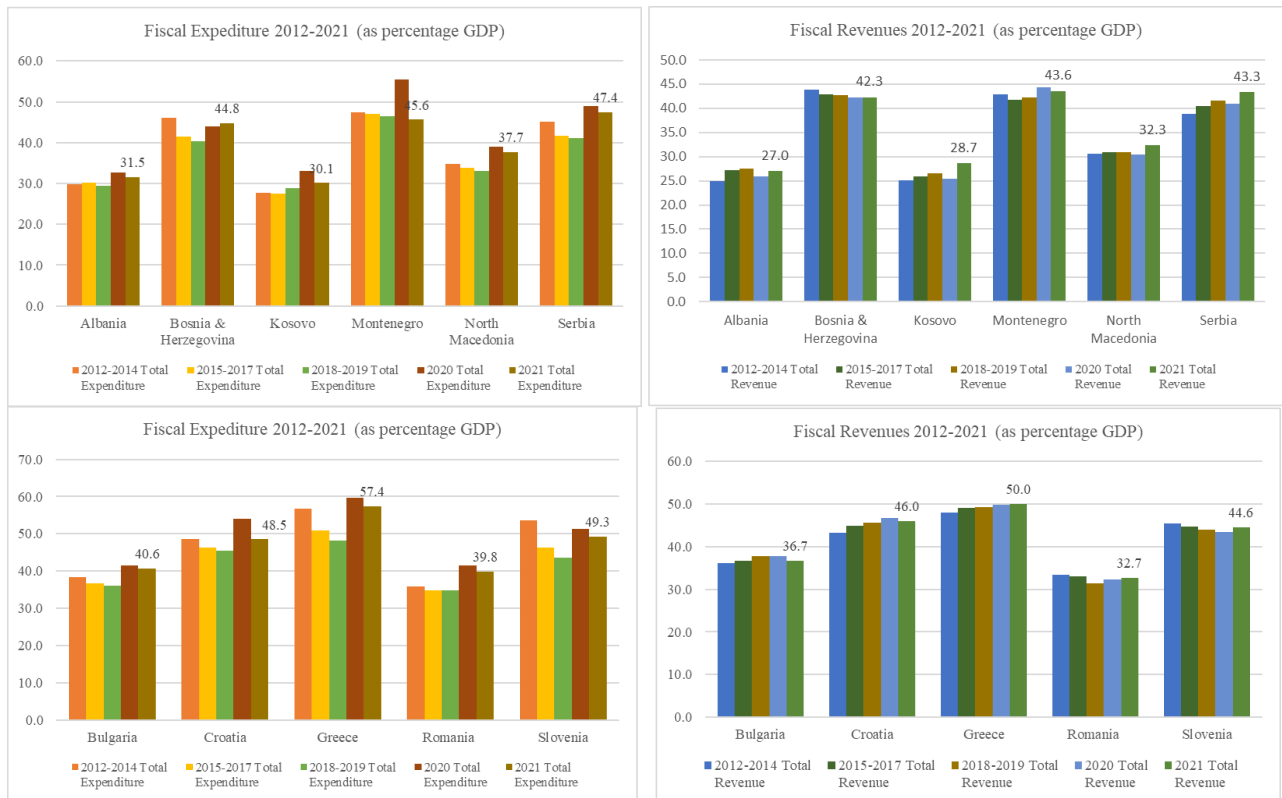
members have decreased the public spending to their respective GDPs, resulting with a robust pick-up of the growth.

Nevertheless, this does not solely provide enough information on the straightforward relationship between fiscal expenditure and real GDP growth, which while declining (decade data per country), is not always forthright and opens further enquiries.

### ***Magnitude of Public Revenues & Expenditure as a Share of GDP***

In this section, a brief overview of fiscal performance over the last ten years in the region is presented, to portray any trends, spending dynamics and to highlight any significant shifts across countries. As Table 2.3 and Table 2.4 illustrate, as a share of GDP, fiscal revenues in the countries in the Western Balkan region have increased only marginally over the last ten years. Total revenues as a share of GDP ranged from just around 25% in Albania and Kosovo during the period 2012-2014, to 27% and 29% in Y2021. Albania and Kosovo’s fiscal revenues are on the lower side in the region, at an average of 26% of the GDP. For North Macedonia, these are around 31% throughout the period of ten years without any substantial changes. Serbia, Montenegro, and Bosnia’s share of public revenues are closer to and above 40% of their respective GDP, with a few percentage point increases in the case of Serbia and Montenegro, while the same percentage point drop is recorded in Bosnia, despite the positive economic growth.

*Figure 2-5 Fiscal expenditure & Fiscal revenues (as % of GDP)*



Source: Author’s own elaboration based on data from WB Regular Economic reports, World Bank World Development Indicators & IMF Government Statistics

Among the region’s EU members, total revenues as a share of GDP show a marginal change of minor increases, except for the slight decreases in the case of Slovenia and

Romania. In Y2020, the Covid-19 consequences reduced the countries' fiscal income as a share of GDP in all but Croatia and Greece. As Table 2.4 illustrates, as a share of GDP, fiscal revenues in the member state countries have remained relatively stable over the last ten years. Total revenues as a share of GDP ranged from around 33% to 36% in Romania and Bulgaria during the period 2012-2014, and remained at the 33%-37% level respectively in the last year (Y2021). Fiscal revenues of Croatia, Greece and Slovenia are on the higher end of the spectrum, closer to and above 45% of GDP in 2012 and has remained on the same level in Slovenia, while it has increased in Croatia and Greece to 46% and 50%, respectively.

Largely, total revenues marginally increased as a share of GDP in all countries in the WB region, except for Bosnia. In Y2020, the Covid-19 consequences reduced the fiscal income as a share of GDP in all the countries of the Western Balkans, but Montenegro, while not as much among the EU member states of the SEE group.

*Table 2.3 Average Central Government Fiscal Revenues & Expenditure 2012-2021 in SEE non-EU members (as % of GDP)*

	2012-2014		2015-2017		2018-2019		2020		2021	
	TR	TE	TR	TE	TR	TE	TR	TE	TR	TE
Albania	24.9	29.8	27.2	30.1	27.5	29.4	25.9	32.6	27.0	31.5
Bosnia & Herzegovina	43.9	46.0	42.9	41.5	42.8	40.4	42.2	44.0	42.3	44.8
Kosovo	25.0	27.7	25.9	27.5	26.5	28.8	25.4	33.0	28.7	30.1
Montenegro	42.9	47.5	41.8	47.0	42.2	46.5	44.4	55.5	43.6	45.6
North Macedonia	30.7	34.7	30.9	33.8	30.9	33.0	30.5	38.9	32.3	37.7
Serbia	38.8	45.1	40.5	41.7	41.7	41.2	41.0	49.0	43.3	47.4

*Source: World Bank Regular Economic reports; World Bank Development indicators*

*Table 2.4 Average Central Government Fiscal Revenues & Expenditure 2012-2021 in SEE-EU members (as % of GDP)*

	2012-2014		2015-2017		2018-2019		2020		2021	
	TR	TE	TR	TE	TR	TE	TR	TE	TR	TE
Bulgaria	36.1	38.4	36.7	36.7	37.8	36.0	37.7	41.5	36.7	40.6
Croatia	43.2	48.6	44.9	46.2	45.7	45.4	46.7	54.0	46.0	48.5
Greece	48.0	56.7	49.1	50.8	49.2	48.3	49.8	59.7	50.0	57.4
Romania	33.4	35.9	33.0	34.9	31.5	34.7	32.3	41.5	32.7	39.8
Slovenia	45.5	53.5	44.7	46.3	44.0	43.6	43.4	51.2	44.6	49.3

Note: TR-Total Revenue, TE-Total Expenditure

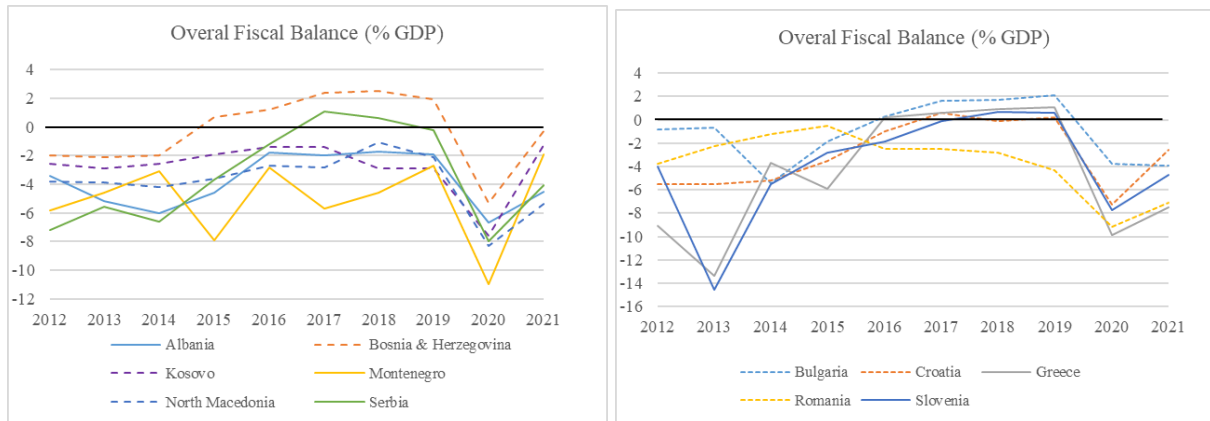
*Source: Author's own elaboration, based on data from World Bank World Development Indicators & IMF Government Statistics*

From a fiscal expenditure perspective, loosely speaking, the governments' balances have been for the majority of countries relatively stable from 2012 to 2021, ranging from surpluses in a few consecutive years (Bosnia and Serbia), however predominantly with budget deficits of around 3% up until 2020 (with Montenegro being an exception with deeper budget deficits of 6% and 8%) (See Figure 2-6, panel 1) and around 4% (Figure 2-6, panel 2) among the member sub-group. All the SEE countries, without exception, widened their overall fiscal deficits in Y2020 as a response to the pandemic crisis, breaking the EU treaties' fiscal rule of 3% deficit to GDP, due to the generous aid

packages (fiscal balances in Y2020 from the lowest -3.8% in Bulgaria to -11% in Montenegro).

From 2015 to 2019, to a greater extent the six Western Balkan countries enjoyed a period of relatively higher growth, which has reflected in the lower deficits. Nevertheless, the fiscal rules, where formally existent, were not always fully respected (Kikoni et al., 2019).

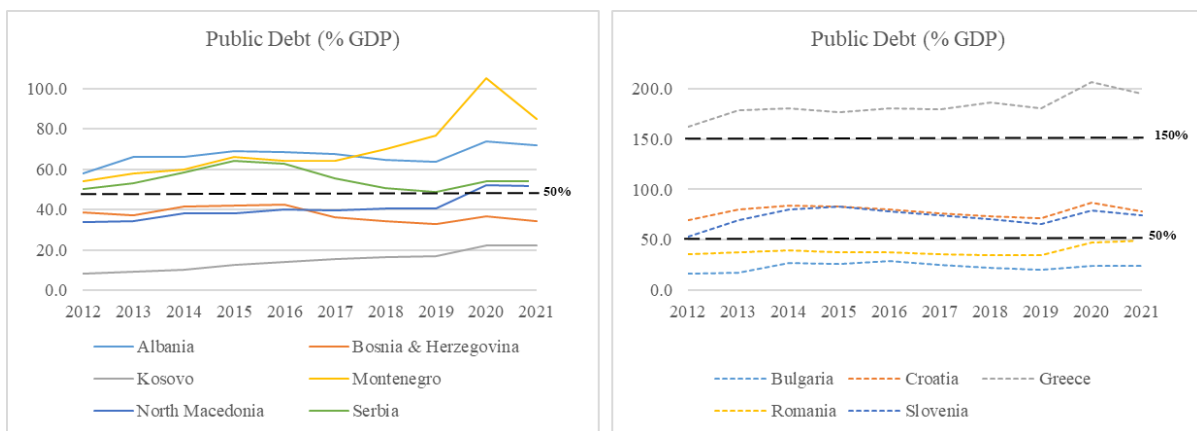
Figure 2-6 Overall Fiscal Balance, as percentage GDP



Source: Author's own elaboration based on data from World Bank Western Balkan Regular Economic reports and IMF Government Fiscal Finance Data

The public debt in the SEE economies remains elevated, even though the nominal GDP growth is assisting in bringing the debt burden (debt to GDP) moderately downwards (Figure 2-7). Although in the coming period the public and the publicly guaranteed debt is expected to decline slightly, it is still expected to remain above the pre-pandemic status. At the same time the financing conditions are tightening as attempts to tame the inflation shock affecting the Western Balkan countries. As the Western Balkan countries have become dependent on the issuance of the Eurobonds in the past years with the rapidly changing financing conditions, these issuances have become more expensive, thus leaving these countries in a vulnerable position (World Bank group, WB Regular report, 2022).

Figure 2-7 Public Debt, as percentage GDP



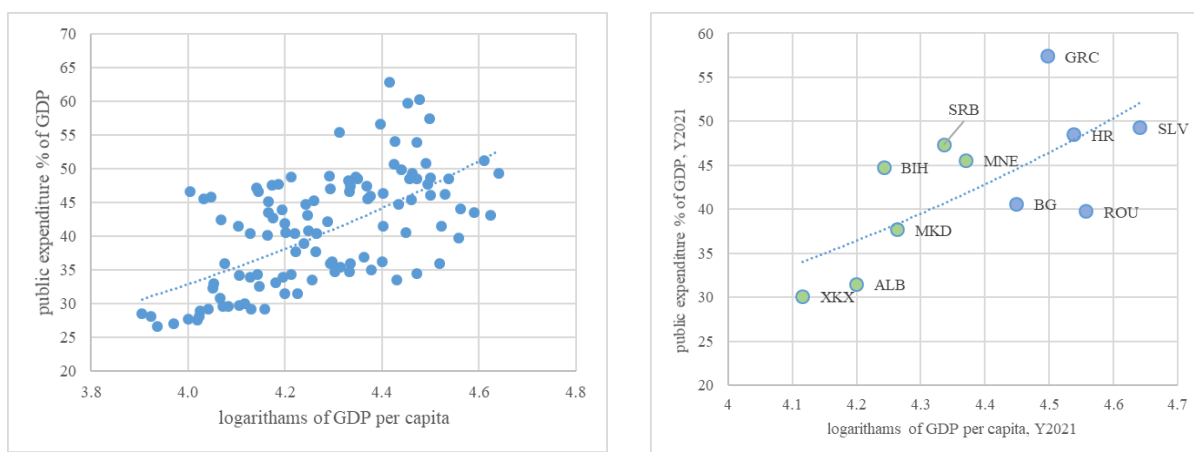
Source: Author's own elaboration based on data from World Bank Western Balkan Regular Economic reports and EUROSTAT Government Statistics Data



The issue of the financial sustainability and the increase of public spending is innately connected in the sense that increased public spending may affect the fiscal sustainability of the economies. The subject of fiscal sustainability is relevant for the SEE, however due to the heterogeneity it should be closely examined on a country-by-country basis. This is valid in circumstances of increasing public debt (to GDP) trends amongst most of the countries and in expectations for further debt increase due to deficit pressures (World Bank, Western Balkan Regular Report, 2022). The increasing debt points towards an anticipation of an increasing ‘appetite to spend’. Plotting public expenditure (% of GDP) and per capita GDP of the SEE countries for the past decade, illustrates the validity of Wagner’s law<sup>14</sup> for the region (Figure 2-8).

This does not straightforwardly and necessarily indicate that each of the economies needs to cut nor to increase spending, however it does signal the necessity for examining the efficiency in spending, to examine the long-run sustainability of the level of spending and possibilities for adjustment. Increasing public spending as a response to an increasing demand for public services though should not come at the expense of growth and development and should be accompanied by adequately equipped institutions. On the other hand, those countries that have a slack for further public spending should as well refrain from spending if it is not adequately planned with sustainable repayment methods.

*Figure 2-8 GDP per capita vs. size of public spending*



Note: Left panel all SEE countries, data point for every year 2012 to 2021, panel right is data points for 2021; Public expenditure % GDP & GDP per capita: Pearson correlation 0.564, Spearman rank correlation 0.618.

Source: Author’s own elaboration based on data from World Bank Western Balkan Regular Economic reports and EUROSTAT Government Statistics Data

In the last decade, among almost all the economies in the region there have been efforts for adjustments of the public debt levels, which have been interrupted by the Y2020 health crisis, likely to have long-term consequences in increased debt levels. All the adjustment choices however will not have equal effects, as general and across-the-board adjustments via public expenditure cuts may produce undesirable effects, therefore rather planned spending reductions that focus on inefficiency reductions along the public sector are preferable.

<sup>14</sup> Loosely stated, Adolph Wagner posed the thesis that as nations develop so will their public sector (and therefore public spending) grow in relative importance; the law is known as law of increasing state activity (Diamond, 1977).

Often the choice of cuts is focused on public investments, which may adversely affect growth prospects of the countries, social or other transfer cuts may lessen social gains achieved from past years as well, therefore careful planning is necessary, while the focus should be placed on tackling inefficiencies with smart spending and better institutions. Even in the cases when the public spending cuts are not detected and deemed as needed from a sustainability perspective, governments should prioritize tackling inefficiencies in public expenditure. It is expected that with income growth (especially when transitioning from one to another level of income development stage) the citizens will demand new and better public services (such as better education, health care, etc.). However, in circumstances of low growth there is not a lot of fiscal space to increase expenditure and respond to the increasing demand, but the governments need to respond to the demands within the auspices of the same resources, therefore gaining from improved efficiency will mean room for putting resources to better use.

A larger part of the countries in the SEE, especially those that do not belong to the EU, are classified as (upper) middle income development countries, and some have been lingering for some period thus avoiding the ‘middle-income-trap’<sup>15</sup> should be observed. Even in the cases where there is relatively low public expenditure to GDP ratio, governments face difficulties in increasing taxes as people are not willing to pay higher taxes if they do not believe that the additional incomes are going to be spent on citizens’ needs in an efficient and effective manner. Thus, it might as well be a matter of reverse causality, i.e. a precondition for higher taxes is for the governments to be efficient in providing the needed services for its citizens in order for them to trust the government decisions and be willing to pay for the services. This is especially relevant for those public services that take particularly longer time to effectuate gains and deliver, such as investments in infrastructure or education.

## **2.4. Trends in Spending Categories Across Countries**

Overall public spending amount gives some information on the preferences of public expenditure and size of the government, however it does not provide information on the prioritization of the expenditure or the combination for achievement of efficiency or equity objectives. For closer insight whether there is little or much investment, redistributive policy or spending on different functions such as health, education, infrastructure, then expenditure for public employees, retirement programs, poverty reduction, etc., it is inevitable to comprehend the composition of the public spending by function and/or economic classification.

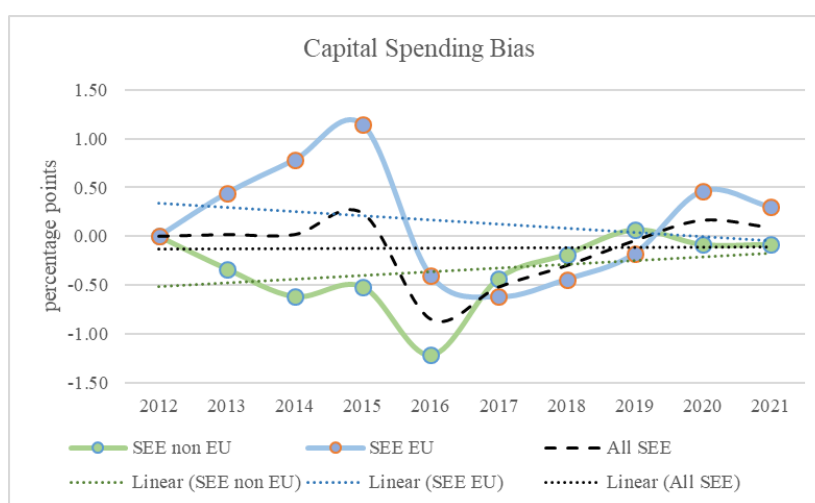
The trend among the SEE countries over the past decade for decreasing towards stable spending to GDP ratios is attributable to both lower current outlays (recurrent expenditure) as well as capital outlays (capital expenditure) (see Figure 2-10 region unweighted average, ten-year period). There are, however, specific detectable temporal differences among member vs. non-member countries in the SEE group, indicating spending category bias. Bias against capital spending can be measured in several ways, and when seen as a difference between the share of capital spending in each point and a base year (in this case Y2012) (See Figure 2-9) there is a tendency among the non-EU

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<sup>15</sup> The term ‘middle-income-trap’ refers to a situation whereby a middle-income country is failing to transition to a high-income economy due to rising costs and declining competitiveness, i.e. a country is unable to continue the process of moving from one to another bracket. It is indicated by leveling-off of income per capita and a decline or stagnation in an economy’s competitiveness. Investment and innovation are the two key ingredients to moving a middle-income economy into a high-income economy (See more in: Nallari, et al., 2011).

Western Balkan countries of decreasing capital spending following Y2012, a year marking the Euro area recession, leading up until Y2016. On the contrary, the SEE's EU member states record opposite policies, whereby the period is characterized with an increasing capital spending. The sub-groups demonstrate diverging policies in this short period for capital spending. Starting Y2017, an overall increasing capital spending throughout the SEE countries occurs and convergence in the efforts for increased capital spending, up until Y2020 and Y2021, when once again diverging policy paths for capital vs. current spending policies occur between members vs. non-members, pointing to the various cyclicity policies of the countries. Needless to reiterate, there is heterogeneity present among the countries, and each has a story of its own, however overall it can be seen that the most of capital spending bias among the non-EU members is particularly prominent in Kosovo and North Macedonia, and in Romania of the member states.

Figure 2-9 Capital spending bias, average



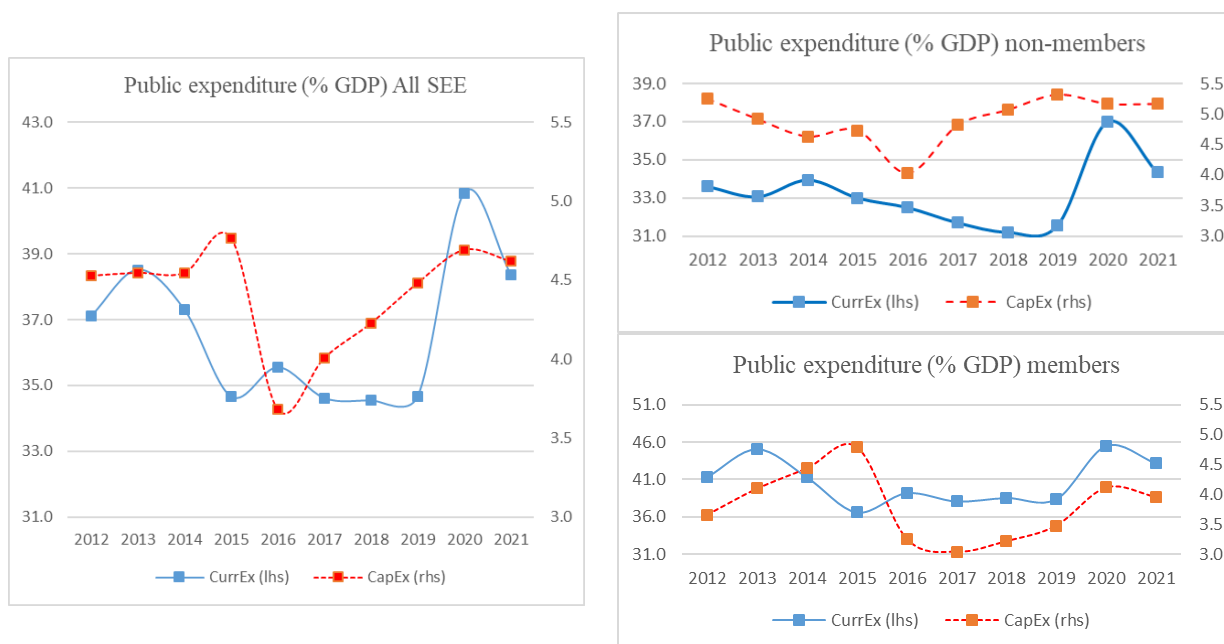
Note: Unweighted average percentage of ten SEE countries, out of which six are non-member countries, and five are members. Capital spending bias measured as a difference between the share of capital spending to GDP at each point in the ten-year period and that prevailing in 2012, averaged per group and sub-group. Source: Author's own elaboration based on data from WB Regular Economic reports and EUROSTAT Government Statistics Data

Further breakdown of the structure indicates that wage bills as a percentage of the GDP on average have decreased by about 1 percentage point over the period among the WB, while on average wage bills have been stable among the EU members in the SEE (not accounting for Y2020). Generally, we can observe a stable to slight declining wage bill spending participation, however on a country-by-country basis there are increases in Kosovo, Bulgaria, and Romania. The trend for the declining wage bill contribution to public spending was interrupted in Y2020, among all the countries, without any exception, with an upward quite significant movement in some instances, particularly in the cases of Montenegro, Croatia, Slovenia and Greece. The participation of the wage bill public expenditure as percentage of GDP in the following post-Covid Y2021 has reduced, however not as much as to reach pre-Covid levels.

The same trend holds for the social outlays as well; among all SEE economies there is an average gradual decrease of about 1 percentage point in the decade, up until Y2020, when as the wage bills so do the social outlays mark an increase, by 1 and 2 percentage points respectively (on average). Although the picture of the region is on the downward scale for social spending, the country's characteristics are not homogeneous, and they

differ, e.g. Kosovo, Albania, and North Macedonia experience a social outlay increase (not considering 2020 & 2021).

Figure 2-10 Current vs. Capital Expenditure, unweighted average, as percentage GDP



Note: Unweighted average percentage of ten SEE countries (panel left), six of which are non-members of EU (panel upper right), and five are members of EU (panel lower right)

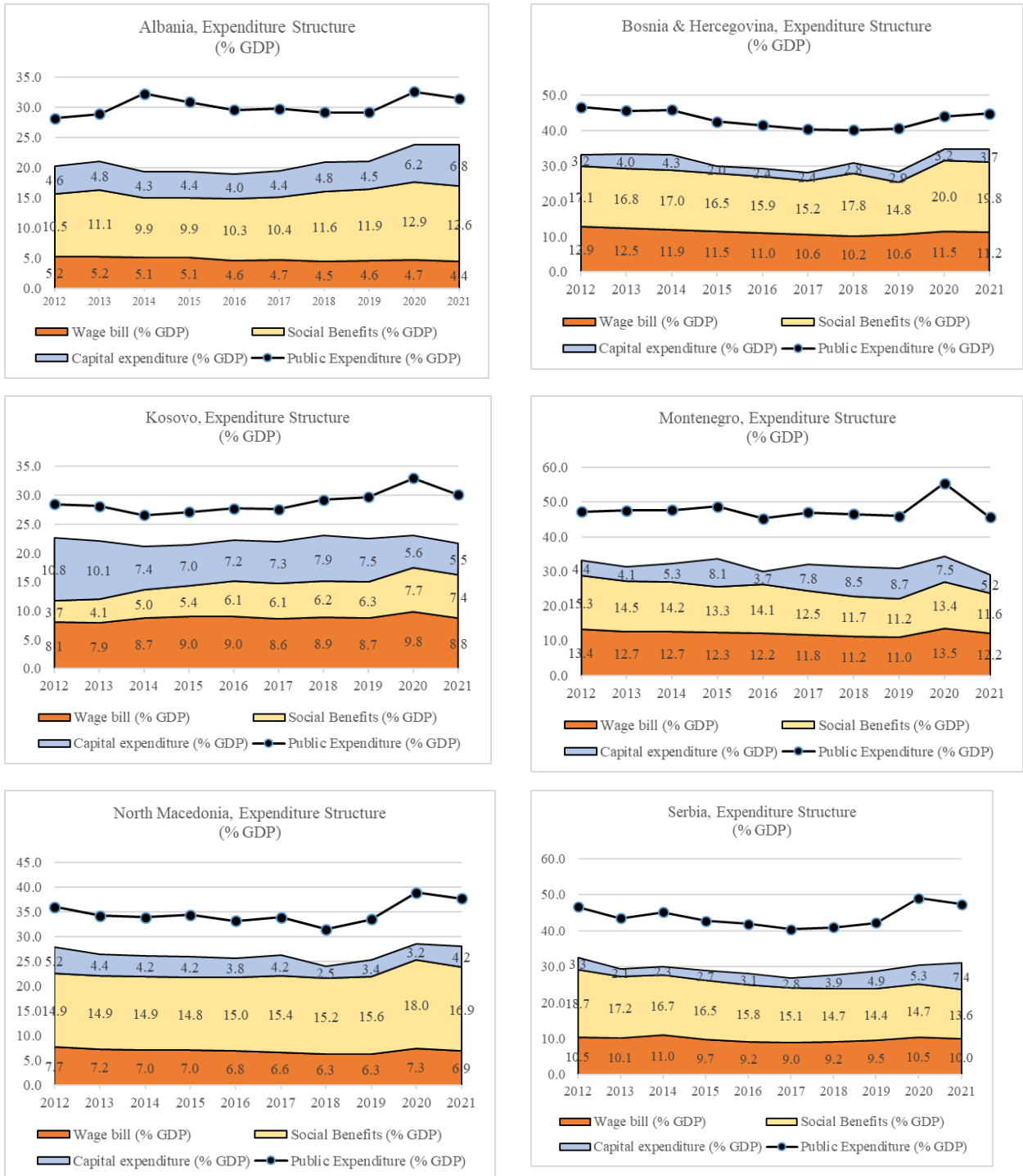
Source: Author's own elaboration based on data from WB Regular Economic reports and EUROSTAT Government Statistics Data

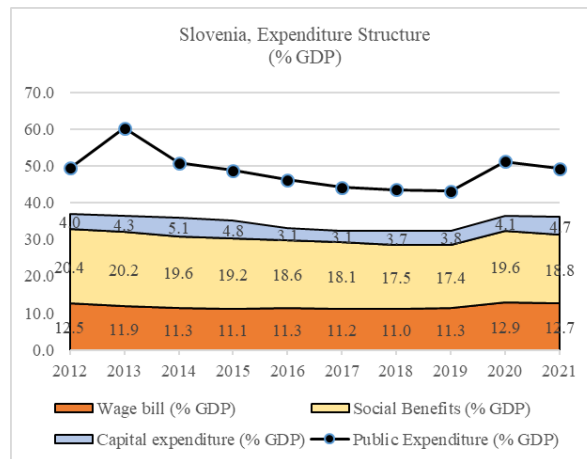
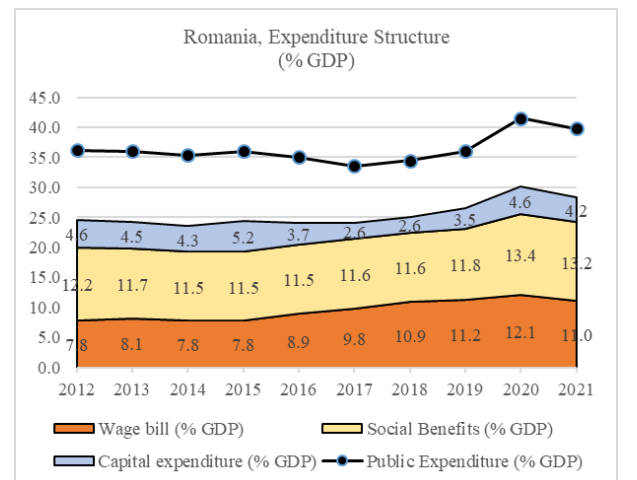
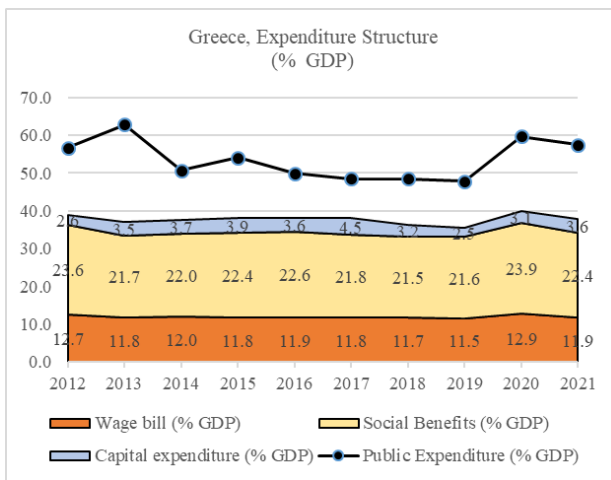
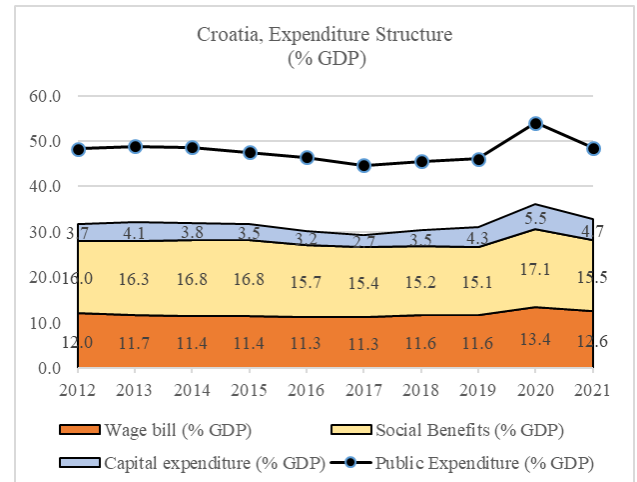
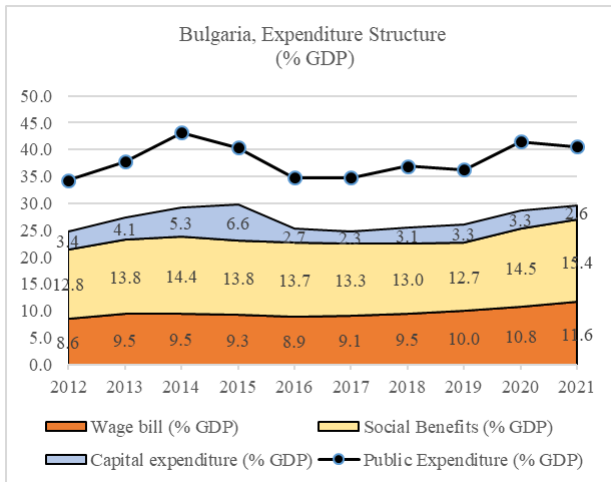
Capital expenditures, on average at the beginning of the 2010s, tended to decline among the Western Balkan countries, while they increased among the member states. In Y2016 there is an evident drop in the contribution of the capital spending among all SEE countries. The trend then is reversed in non-member states, when they pick up and push efforts in the public investments (relative to their GDP), while there is a much slower pick-up among the member states. This outlay floated near the 5 percent of GDP, before falling nearly a percentage point of GDP through Y2016<sup>16</sup>. As a result, the share of capital spending in total expenditures has declined. Capital outlays for the decade thus mark two phases, the first Y2012-Y2016, with a decreasing trend, after which a period of increased capital outlays follow, with a disruption break in Y2020. Notwithstanding these increases, the ratio of capital expenditures falls short of the level planned and desired. The Y2020 average decline in the Western Balkans vs. the increase among the EU member states points to the cut-offs in the capital budgets of the countries despite the need for a countercyclical policy in periods of economic downturns. Nevertheless, the heterogeneity of the countries is evident yet again, with Kosovo, Montenegro, and Serbia leading with the size of the capital investments, followed by more moderate and constant trends in

<sup>16</sup> Y2016 notes as a significant decrease in investments globally, but with a pronounced slowdown among the emerging and developing economies, according to the World Bank Global Economy, 2017: "...the numbers tell a stark story: investment growth in these economies has tumbled from 10 percent, on average in 2010, to about 3.5 percent in 2016." According to the same source, there are several causes, including weak growth prospects, commodities price bust, subdued foreign direct investments, policy and political uncertainty, and elevated private debt (Kose, 2017).

Albania, Bosnia, and North Macedonia. The Y2020 break is more intensely noted by the increased social outlays, which appear to have accounted for the overall higher spending.

Figure 2-11 Expenditure Structure, % of GDP





Source: Author's own elaboration based on data from Western Balkan, World Bank, Regular Economic reports for non-EU and EUROSTAT for EU members

## 2.5. Key Policy Explanation of Spending Composition

A range of economic factors may explain the composition and the decisions for the composition of public spending. Among these are business cycle, level of capital stock, inequality, openness of the economy, political factors, institutional factors, etc. Namely, in procyclical economies, those that follow policies that tend to deepen the cycle can affect the composition of expenditure, as each expenditure type may follow its own different cyclical behaviour.

Capital spending may be used to adjust, consolidate and reduce relative public spending, therefore during ‘bad’ times, current expenditure may expand more than capital expenditure (see for example Ardanaz & Izquierdo, 2017). In the long run this may create a bias towards current expenditure since lower capital spending share is expected in more procyclical countries. Furthermore, in order to comply with fiscal rules, when these are formally set, it can downplay cyclical behaviour when capital expenditure is used to adjust in bad times.

The level and degree of capital stock can also have an influence over the decision on the composition of public spending. Lower starting capital stock may lead to decisions for higher levels of capital investment spending, as capital is considered to be more productive in lower levels, due to decreasing marginal returns.

Income distribution and inequality levels can dictate the demand for redistributive policies and more social spending, which may create a bias for capital spending and reduce its share. Openness to international markets may also affect the spending composition, as more integrated countries are affected more by global disruptions, thus in such cases governments may need to compensate for these external risks by increasing social transfers or public employment, adding to the current expenditure and reducing capital spending.

Political and institutional factors may as well play a role, as politically left-oriented governments are more prone to pronounced social policies, while right-oriented governments towards more infrastructure and defence-spending policies. Institutional factors, such as governance quality, especially corruption levels, may be associated with preference of different levels of spending categories. It is expected that in countries with higher corruption levels larger infrastructure projects are preferred, which are considered to be more bribe-prone. The democracy level may affect the public spending composition as the median voter may favour redistributive policies and recurrent expenditure over capital spending.

Adopting fiscal rules can affect the composition of public spending, creating a bias towards current spending, although their main goal for sustainability is to create circumstances of counter-cyclical behaviour (save in good times, spend in bad times), however these do not particularly define the spending category adjustment. Considering the past practices in the region<sup>17</sup> (e.g. North Macedonia), the most common adjustments are implemented through capital expenditure cuts.

Larger dependency ratio over the population may ‘pull’ towards higher recurrent spending. The younger and the elderly may favour current spending, particularly for social outlays, as a result of their preferences and needs (such as for health, education, social security), thus the demographic structure of the population may affect the structure

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<sup>17</sup> Formal fiscal rules are in place among the EU member states arising from their membership: ER – expenditure rule, BBR – budget balance rule, DR – debt rule, while among the non-member states formal fiscal rules are in place in Kosovo BBR and DR, Montenegro BBR and DR, Serbia ER, BBR and DR (See more in: Davoodi, et al., 2022).

of the spending as well. Trust in the system and the politicians may be yet another determinant in the spending composition. In a situation of low trust, citizens may prefer short-term spending gains, particularly such as transfers due to lack of credibility of the government for long-term expectations of benefits.

## **2.6. Chapter Summary**

The role and increment of public expenditures simultaneously with the adequate size and effectiveness cannot be simply answered. The optimal size of the public sector has been an appealing fiscal policy topic in public finance studies; thus a number of theories have advanced to explain the increment of public expenditures through different aspects, trends and determinants, without settling on one comprehensive theory. The goal of the theories is not solely explaining the increment of public spending, but also providing a solution for efficient and 'optimal' governmental size. Some theories explain that the determinants for increasing public expenditures with the theory of economic growth. The models for the spending patterns are described either through 'development model', 'law on expanding state activity', or with 'political theory for public expenditure'.

The general perception of public investment is that it is a catalyst for economic growth, thus the vast literature on public investment, including public capital expenditure and capital accumulation, links and assesses their impact and effects. Regardless of the plentiful studies, still there is uncertainty about the magnitude of the effect of public investment on the economic output, especially for the developing economies.

Efficiency of public expenditure implies that the services that are provided should be at the lowest cost to the taxpayer, thus the degree and depth to which the public sector is involved within the economy gives rise to the importance of efficiency. Both efficiency and effectiveness create a link between the inputs, outputs, and outcomes. The resources used (inputs) either in monetary or non-monetary form, are necessary to create an output. The efficiency concept incorporates the idea of the production possibility frontier, indicating the feasible output levels given the scale of operations. Effectiveness links the input or output to the objectives to be achieved – the outcome. The outcome may be influenced by the outputs, however as well by external (exogenous) factors.

There is little consensus on the adequacy of public spending size, and the exact performance and assessment of the efficiency of public spending, as the effects of public spending are heterogeneous both within countries and across countries. Nonetheless, improving efficiency and effectiveness are key features of good governance, and within the public sector this translates into being responsible for finding ways to make the best use of the resources in a world of scarce resources for achievement and maintaining sustainable development.

During the last two decades, the SEE's area countries are slowly converging to the average EU economy. The heterogeneity and slow convergence illustrated via per capita output places on the one side the Western Balkan countries, which are hardly reaching half the average EU's GDP per capita, and on the other side, the EU member countries, with variations within. Bulgaria is furthest away from converging (below 60% of EU's average), and Croatia and Romania closer to 70%. Closest to the community's average is Slovenia, however, with a solid starting point prior to its membership.

The decelerating trend of public spending to GDP ratio, among the SEE countries in the past ten years, starting from the onset of the 2010s, has been attributable to both lower recurrent and capital outlays. There are detectable differences among two sub-periods and



sub-groups, pointing towards possible spending category bias and generally heterogeneity on a country basis. Among the non-EU Western Balkan countries, there is a tendency for decreasing capital spending in the period Y2012-Y2016. On the contrary, the SEE's EU member states mark opposite policies with an increasing capital spending, i.e. diverging policies. Starting from Y2017 there is an overall increasing capital spending throughout with converging efforts for increased capital spending, up until Y2020, when once again diverging policy paths occur. The downward trend of public spending has been disrupted by the health crisis. While the primary outlays have been relatively stable over time, they drifted upwards in Y2020. At the same time, the relatively small changes in spending-to-GDP ratios mask a volatile and in cases significantly increased real expenditures.

The composition of public spending can be explained by an array of factors. In the procyclical economies, cyclicity affects the composition of expenditure, as each category type may follow its own different cyclical behaviour. Capital spending may be used to adjust, and thus during 'bad' times, current expenditure may expand more than capital expenditure, creating in the long run a bias towards current expenditure. Formally set fiscal rules and their compliance can downplay cyclicity when capital expenditure is used to adjust in bad times. Capital stock level can influence the decision on the composition of public spending as lower starting capital stock may lead to decisions for higher levels of capital investment due to its decreasing marginal returns. Income distribution and inequality levels can dictate the demand for redistributive policies for more social spending. Openness to international markets affects the spending composition, as more integrated countries are affected more, thus governments compensate by increasing social transfers. Political factors may as well play a role, as left-oriented governments are more prone to pronounced social policies, while right-oriented government towards more infrastructure spending policies. Institutional factors, especially corruption levels, may be associated with preference of different levels of spending categories, as countries with higher corruption levels are associated with preference for larger capital spending. Larger dependency ratio over the population may 'pull' towards higher recurrent spending in favour of social outlays. Trust in the system and the politicians is another determinant in the spending composition, whereby in a situation of low trust, citizens may prefer short-term spending gains rather than uncertain long-term expectations.

## **Chapter 3**

# **Assessment of Public Spending Efficiency**

## Chapter 3 ASSESSMENT OF PUBLIC SPENDING EFFICIENCY

### Abstract

This chapter focuses on the assessment of public spending performance and efficiency of Southeast Europe's countries, overall and per specific public sector. The assessment of the public spending efficiency is completed via computing a composite index of public performance and public efficiency, composed of selected sub-indicators for each country in Southeast Europe. The overall public sector input and output efficiency of the selected countries is assessed through the usage of non-parametric production frontier with data envelopment analysis (DEA). The same technique was employed to assess education, health, and infrastructure sector efficiency.

The assessment indicates that there are significant inter-country differences in both performance and efficiency. The Public Sector Performance Index (PSPI) scores suggest that the best performer among the peer countries is Slovenia, while the Public Sector Efficiency Index (PSE) indicates that Romania is most efficient. Overall, there are country variations in both efficiency and effectiveness of public resources spent. Furthermore, a cross-country comparison denotes that the most effectively spent public resources by a specific country does not necessarily mean that they are at the same time the most efficiently spent resources. Yet, the least efficient and at the same time least effective country in using their public resources is Greece.

On average, the public spending efficiency and effectiveness benchmarking indicates that the SEE countries can improve their efficiency on average by decreasing the public spending by 15% and still reach the same output, or increase the effectiveness of the public resources spent by 9%, while maintaining the current level of public spending. Overall, on average, when total general government spending is considered, there is no significant difference among the countries' sub-groups of EU members and non-members.

There is significant education sector efficiency variation, however it is led by Slovenia, Romania, and Greece, as being most effective in SEE. The countries' mean potential for improvement of education sector performance is 10% with the same inputs, or decrease of the inputs by 16% to achieve the same performance. In the public health sector, the leading performer is Albania, followed by Slovenia, with Albania being the most efficient as well. The countries' mean potential for improvement of the health sector performance is by 24% with the same inputs, or decrease of the inputs by 30% to achieve the same performance. The EU member countries are by far both more effective and efficient when compared with the non-EU countries in the SEE group in the health sector.

For the infrastructure public sector, the group of countries that emerges as good performers include Slovenia, Serbia, Greece, and Croatia. While on average the SEE can potentially improve the quality of public infrastructure by 12% with the same level of inputs, it may provide the same quality infrastructure service with 20% less expenditure. In sub-groups, the EU member countries perform significantly better and more efficiently compared to the non-EU member countries, when it comes to providing quality infrastructure. The correlation of the public investment efficiency scores with the distinct governance indicators suggests a significant positive association of the efficiency with the countries' government effectiveness, accountability, rule of law, and control of corruption.

**Keywords:** public spending; expenditure efficiency; public sector performance; public sector efficiency; data envelopment analysis (DEA); Southeast Europe

**JEL:** H50, H11, E62

### 3.1. Introduction

Countries all over the world are faced with, and yet to be facing more intensely, the increasing pressures on the public finance balances, arising from numerous reasons. These have been aggravated by the latest budget draining induced by Covid-19, then followed by the more recent global and European energy and food crisis, along with the already extensive pressures from the socio-demographic trends. At the same time, there is a growing pressure coming from increasing demand for more and better public services. Therefore, the improvement of both efficiency and the effectiveness of public expenditure is (should be) placed high on the economic and political priority list of the countries' agenda.

Governments provide an array of goods and services for their citizens, aimed at the achievement of different objectives, either social or economic. The efficiency with which the goods and services are provided thus is important not only related to the size of the government (i.e. public sector), but also to the private sector, the role towards stability, economic growth, etc. An increasing amount of literature has been investigating the stabilization, allocation, and distribution effects of public expenditure, and contributing to the debate of the role of the state through empirical assessments of the efficiency and usefulness of public sector activities.

The enhanced efficiency and effectiveness of public spending helps maintain the fiscal discipline but also back up the structural reforms, especially needed in the Southeast European (SEE) countries, which are striving towards EU accession in pursuit to close the enormous economic development 'gap'.

Better efficiency and effectiveness of public spending means achieving the same results at lower levels of spending, or increased value-for-money by achieving better outcomes at the same level of spending. Public spending represents a large part of the countries' GDP (and globally continuously increasing), while the governments have the role and the responsibility to spend the public money in the best manner possible to support both growth and development. On the one hand, the available public resources are limited, as rising taxes is politically costly, and there are limitations to indebtedness (where debt fiscal rules are legally set), while on the other hand, there is growing demand for public services in quantity and quality. The public funds are limited and scarce, while the executive power is faced with budget constraints under the pressure to implement the best possible policies. In this constellation it is the government's role to ensure that the public expenditure is designed to provide sustainability in public finances (Barrios & Schaechter, 2008). Therefore, the public sector is bound to boost the efficiency in providing more services (output) restricted to a limited amount or resources (input). Doing 'the best possible' with the expenditures incurred means that the public expenditure needs to be efficient and effective, performing the best with the provided expenditure or performing the same while being more efficient.

In recent years, more and more empirical assessments are focused on the efficiency and effectiveness of the public sector activities. An abundance of literature has been investigating and assessing the allocation and distribution effects of public expenditure in general, and specifically in public sectors such as education, social care systems, as well as at different governmental levels. Most of these assessments have concluded that the public spending could be reduced and be more efficient (optimized), and the governments need to adopt better practices in doing so (see more in Mandl, Dierx, & Ilzkovitz, 2008; Alfonso, Schuknecht, & Tanzi, 2010). This is especially relevant for the developing

countries since a minor change in increased public spending efficiency could result in a significant impact over the national GDP (Herrera, and Pang, 2005; Afonso & Kazemi, 2017).

The aim of this chapter is to evaluate the public expenditure of the Southeast Europe region's countries for the last decade (the ten-year period between 2011 and 2020), overall and per several public sectors, from the perspective of performance and efficiency. It conducts benchmarking and ranking among the set of countries, based on the public spending efficiency and effectiveness.

The assessment shows that some of the countries in SEE are relatively inefficient in the provision of public services, especially Greece, which implies that allocation of additional public funds will not necessarily result in better or improved outcomes, without specific actions to be undertaken to correct the underlying causes of inefficiencies. The chapter further provides evidence that the best performers are not at the same time the most efficient spenders. Furthermore, the results indicate a variation in efficiency and effectiveness in public spending among the countries, as well as some differences depending on government's size and/or EU membership status.

The chapter is structured as follows: the second section provides an overview of the relevant literature; the third section elaborates on the data and methodology applied, including the construction of composite indicators on Public Sector Performance (PSP), and then Public Sector Efficiency (PSE). The fourth section includes an analysis of the constructed indexes/indicators per country inclusive of a data envelopment analysis – DEA approach for four models. The first model considers the efficiency of the government at a macro level, i.e. the overall public sector, and the other three models assess the efficiency of public expenditure in areas of government performance in education, health, and infrastructure. The last section is focused on concluding remarks.

### **3.2. Literature Review**

The studies on efficiency and effectiveness of public expenditure performance essentially make efforts to connect the inputs, outputs, and outcomes of the public policies. Farrell (1957) addressed the question of how to measure efficiency and highlighted its relevance for economic policymakers. The concept behind the efficiency and effectiveness is that the greater the output produced, with a lower given input, reflects a highly efficient public sector, while effectiveness relates the input or the output to the achievement of the final/desired outcome(s) in an environment of scarce resources.

The public sector efficiency studies worldwide are quite wide and diverse. As it will be seen in the following text, the studies measuring the technical or cost efficiency of the governments or the public sectors have predominantly focused on and covered particular areas/functions of the public sector, such as culture, education, energy supply, health care, transportation, social care, water supply services, etc., while efficiency studies for performance of countries or local governments have caused less interest due to the limitations posed with such an approach. Namely, it is more difficult to find suitable input and output indicators for a local government or central government than it is to find for an explicit area of the public sector. Furthermore, in investigating the technical or cost efficiency of the public sector, researchers have also been investigating the determinants of efficiency since the sources of the level of efficiency (either drivers or constraints) of technical or cost efficiency can be quite resourceful for the policymakers.

The empirical literature on assessing the government's spending efficiency obtains the efficiency frontiers either by applying parametric or non-parametric approaches: Stochastic Frontier Analysis (SFA) as a parametric approach, and Free Disposal Hull (FDH) and Data Envelopment Analysis (DEA), as two non-parametric approaches that have been mostly used by researchers to obtain an efficiency frontier. Efficiency frontier is understood as referring to the maximum output that can be produced by a given set of inputs or the minimum input required to produce a given level of output, i.e. an optimal combination of inputs that produces maximum output given available resource and technology.

To determine the efficiency of public expenditures, Afonso et al. (2005, 2010) constructed composite indicators and then used the DEA non-parametric method to obtain efficiency scores. Other authors also use DEA approach (Trabelsi & Boujelbene, 2022; Afonso & Fraga, 2021; Baciú, Livia, & Botezat, 2014; Dutu & Sicari, 2016; Esanov, 2009; Hauner & Kyobe, 2008; Wang & Alvi, 2011, etc), while another group of authors use Stochastic Frontier Analysis (such as Bamba & Sombe, 2022; Angelopoulos, Philippopoulos, & Tsionas, 2008; Adam, Delis, & Kammas, 2011). Afonso and Aubyn (2005) computed composite public sector performance indicators and public sector efficiency indicators as a proxy for measuring the public spending efficiency for over twenty industrialized countries, and then employed an input-output efficiency of the public sectors with the DEA approach. Their results indicate that economies with smaller public sectors exhibit higher efficiency compared to other industrialized countries with larger public sectors. Afonso worked with numerous authors on assessing public efficiency, predominantly using the DEA approach. Their findings indicate that there are both input and output inefficiencies across countries, even when it comes to specific public social spending or inequality in income distribution, or sector specific efficiencies, such as in the education and health sectors. In the extended study by Afonso, Schuknecht & Tanzi (2010), they empirically examine the income redistribution (with DEA), finding that redistributive government expenditure has a significant effect on income distribution. Afonso, Schuknecht & Tanzi (2006) analysed public sector efficiency in the then 'new' EU member countries by comparing them to the countries in the emerging markets. They found that public spending efficiency across the EU member states was varied in comparison to the Asian emerging markets. However, it was evident that the "new" member states (at that time) and others in the emerging markets can still consider enhancement of the efficiency of public expenditure by improving the outcomes and restraining resource use.

The analysis of the composite public sector performance and efficiency scores revealed that countries with 'leaner' public sectors and lower expenditure ratios tend to be more efficient. Using both FDH and DEA, the studies show that smaller-sized governments have the tendency to be more efficient compared to large governments, and further by a second-stage Tobit regression, the authors show that efficiency increases with the increase of per capita income, education level, the competence of the incumbents (elected officials), and the security of property rights.

Maudos, Pastor, & Serrano (2003) investigate the role of human capital in productivity gains in 23 OECD countries, by breaking down the productivity gains into technical change and efficiency gains using both the non-parametric DEA approach and stochastic frontier analysis (SFA). Their results indicate the existence of level and rate effect, meaning that richer counties experienced higher rates of technical change, showing that

there is a positive relationship between the growth rates of the OECD countries and human capital.

Herrera & Pang (2005) applied the DEA approach to assess efficiency of public spending in the education and health sectors, comparing over a hundred developing countries, finding that efficient spending was associated with lower expenditure levels. The same authors in their working papers on efficiency of public spending in developing countries use the efficiency frontier approach in health and education with FDH and DEA. The results show that countries with higher expenditure levels have lower efficiency scores, in addition to the fact that countries with higher aid-dependency ratios also tend to score lower in efficiency.

Sutherland (2007) works with two different methods to measure efficiency in tertiary education. First, they used a two-stage semi-parametric DEA method followed by a regression of output scores on non-discretionary variables, and secondly they apply an SFA method. Agasisti (2014) also uses DEA to analyse the efficiency of public spending in education in the EU countries and its determinants. Dutu & Sicari (2016) applied the DEA approach in the assessment of the public spending efficiency, specifically for welfare related spending of health care, secondary education and general public services, in a selection of OECD countries.

Ouertani, Naifar, & Haddad (2018) provide findings for the size of public expenditure on the efficiency for Saudi Arabia, indicating that an increase in the government investment does not produce significant improvement to the output or outcome. In addition, the authors use a DEA-bootstrap analysis, revealing that the size of the government positively affected the public expenditure's efficiency, and that there are environmental variables that affect the efficiency of the public spending on a sectoral level as well.

For the SEE region, Dzogic (2014) implements DEA for the six Western Balkan counties, for a five-year period between 2005 and 2010, and calculates the performance indicators, finding that overall Albania is most efficient, while Bosnia and Hercegovina is the least efficient. Furthermore, more recently there has been literature that considers the public sector efficiency on a local governance level, relating the PSE with the decentralization process and its contribution predominantly for developed countries (Adam, Delis, & Kammas, 2014).

All these studies confirm the hypothesis that a greater level of public expenditure may not necessarily lead to or does not mean greater efficiency in public spending. There have not been many studies of public spending efficiency assessments for recent periods covering the countries in SEE, and particularly none including the Western Balkans, either on an aggregate level or for the specific countries. Therefore, we focus on this geographical area to cover the identified existing empirical 'gap'. Considering the challenges and the continuous discussion in these countries on the increasing size of the public sector, pertaining corruption levels, increasing public debt, etc., it is of utmost importance to achieve better performing and more efficient public sector(s).

Analysis of public sector efficiency as an international comparison is challenging due to the different approaches to measurement, the availability and quality of data, and the different definition of public sector (Alfonso, Schuknecht, & Tanzi, 2005). Probably the availability of data (or the lack thereof of a longer time series) for the SEE countries has been one of the reasons why these countries are often not part of continuous works of the authors on the subject. Thus, the main aim of the chapter is to look at the public



expenditure efficiency of the SEE countries for the period between 2011 and 2020, and assess if these countries are performing efficiently compared to each other.

The assessment is dominantly based on the approach used in previous works of Afonso, Schuknecht, & Tanzi (2005) and Afonso & Kazemi (2016) for determining the public sector efficiency, conducted for OECD countries, Latin America (Afonso, Romero-Barrutieta, & Monsalve, 2013), etc.

### **3.3. Data and Methodology**

#### ***Data and variables***

The study's data is compiled from several data sources specifically listed in the annex. It is relevant to note that obtaining the necessary data for some of the selected non-EU countries has been an obstacle, especially retrieving data from a single database/source and/or recent data series. The data on public expenditure has also been a challenging task for the same reasons, thus it may be a case when different sources are used<sup>18</sup>.

For constructing the variables for the indexes for the performance, the data sources used are as follows. For the administration performance indexes (including corruption, red tape, quality of judiciary, social capital), we used data from the WEF Global competitiveness index; the education data is primarily retrieved from World Bank's World development indicators (WDI) and other education specialized databases; and health-related data as based on World development indicators (WDI) and the WEF Global competitiveness index. Public infrastructure performance data is taken from both the WEF Global competitiveness index and World Development Indicators (WDI), and for the construction of the 'Musgravian' indicators, as well as the public expenditures, they are sourced from WDI and the IMF's World Economic Outlook Database. The data considered covers a ten-year period, with preference for the latest data available (i.e. 2012 to 2021), however when these are not available the last available ten-year period is considered instead. The detailed explanation of the series of data, sources and explanation is provided in the annex.

#### ***Methodology***

Public sector performance is defined as the outcome of the public sector's activities with influence over some economic and social indicators. The methodology of macroeconomic analysis in the public sector analyses the relationship between the level of public expenditure and a selection of socio-economic indicators. This chapter follows the same approach, where the socio-economic indicators are constructed in separate sub-indicators, which are then generated into a composite indicator.

The study considers a set of selected Southeast Europe's countries, with compiled data on various socio-economic variables and the related public expenditures. The measure of the selected countries' public sector performance is calculated in a public sector performance composite index (PSPI), used as an output indicator in the subsequent DEA. DEA is a technique based on linear programming, used to measure the relative activity of organizational units when there are multiple inputs and multiple outputs. DEA has a variety of applications due to its simplicity. Unlike usual statistical approaches

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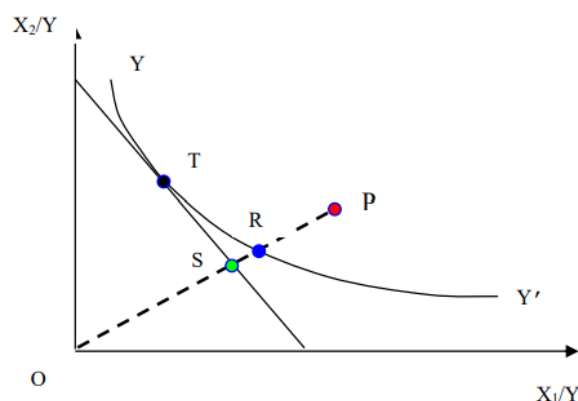
<sup>18</sup> In the case of Bosnia and Hercegovina, and Montenegro, some data is missing, thus restricting the possibility to estimate a composite PSE index.

referencing the averages, DEA defines a border, extremes, and the inefficiencies are established in relation to this border termed ‘efficiency frontier’.

The discussion of efficiency measurement originated in the works of Farrell (1957), who identified two inefficiency cases: i) when production agents use more inputs than technically required to obtain a given level of output, or ii) when production agents use a sub-optimal input combination given the input prices and their marginal productivities. The first inefficiency is named ‘*technical inefficiency*’ (TE), while the second is known as ‘*allocative inefficiency*’ (AE). TE considers attaining the maximum output of a Decision-Making Unit (DMU) given a set of inputs, whereas AE considers optimal allocations of inputs given the set of prices of the products. The total economic efficiency is composed from the two efficiency measures. Efficiency can also be viewed from input and output orientation. The inefficiency types graphically are presented as an isoquant curve (see Figure 3-1). The minimum inputs combination required for a unit of output is located on the isoquant curve YY’. An agent’s input-output combination defined by P produces one unit of output using input with the quantities  $X_1$  and  $X_2$ . As the same output can be achieved by consuming less of both inputs ( $X_1$  and  $X_2$ ) along the radial R, the RP represents the inefficiency in resource utilization. The technical efficiency (TE), input-oriented, is therefore  $TE = OR/OP$ .

Furthermore, the producer agent could achieve additional cost reduction by selecting an altered input combination. The least cost-generating combination of inputs that generates one unit of output is illustrated by the point T, where the marginal rate of technical substitution is equal to the input price ratio. To achieve this cost level as optimal inputs combination, input use needs to be contracted to combination S. The input allocative efficiency (AE) is thus defined as  $AE = OS/OR$ . In the following assessment the focus is explicitly on the technical efficiency, due to the non-existence of comparable input prices across countries, making the concept of efficiency narrower, as discussed by Tanzi (2004, pg. 3): “countries may be producing the wrong output very efficiently (at low cost)”.

Figure 3-1 Technical and Allocative Inefficiency Isoquant

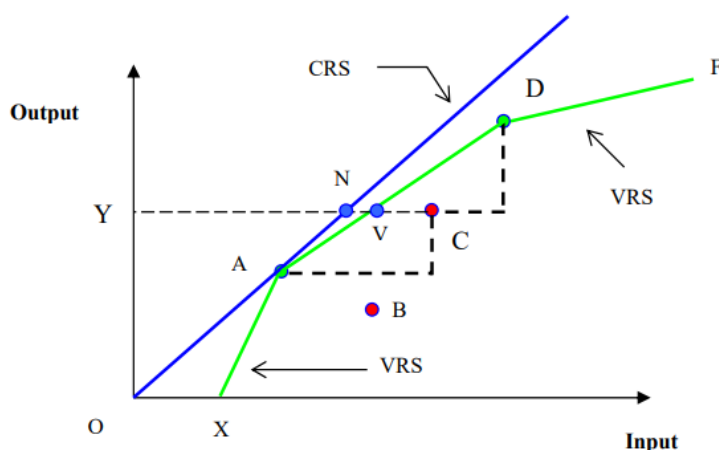


Source: *Efficiency of Public Spending in Education, Health, and Infrastructure. An International Benchmarking Exercise* (Herrera and Ouedraogo, 2018)

Data Envelopment Analysis (DEA), as one of the non-parametric approaches, assumes that linear combinations of the observed input-output combinations are feasible. Hence, it assumes convexity of the production set to construct an envelope around the observed combinations (as presented in Figure 3-2).

Figure 3-2 illustrates an example of one input-one output – DEA production possibility frontier. The feasibility assumption, for example in point C, presents the efficiency ranked (compared) against the best performers – peers, A and D, as well as a virtual V, which a combination of inputs A and D yield a virtual output. In this case, C is located below the variable returns to scale (VRS) efficiency frontier, represented with the line XADF, by DEA ranking. The input-oriented technical efficiency of C is thus defined by  $TE = YV/YC$ .

Figure 3-2 DEA production possibility frontier



Source: *Efficiency of Public Spending in Education, Health, and Infrastructure. An International Benchmarking Exercise* (Herrera and Ouedraogo, 2018)

### **Public Sector Performance Indicators (PSPI)**

To construct the public sector performance indicator (PSPI), various socio-economic variable categories are used as policy outputs (output measures) defined into seven public performance sub-indicators<sup>19</sup>. The sub-indicators are constructed within two larger components of the PSP: i) the opportunity indicators, and the so-called ii) ‘Musgravian’ indicators. The first set of indicators should reflect the quality of the interaction between the fiscal policies and market process influencing opportunities – ‘opportunity’ indicators. The opportunity indicator is composed of sub-indicators that reflect the government performance in administration, education, health, and infrastructure. Each of these are constructed on a series of variables (upper section of Table 3.1).

The second set of sub-indicators reflect the traditional ‘Musgravian’ tasks of the government, to assess governments’ performance in allocation, distribution, and stabilization. To measure the outcomes of the interaction with and reactions to the market process by the government, the Musgravian indicators are constructed of three further sub-indicators for: distribution, stability, and economic performance of the countries. Each of these are constructed on indexes used as proxies for performance (listed in the lower part of Table 3.1).

<sup>19</sup> To construct the indexes depending on data availability the average of the ten-year period (2011-2020) is used or for the latest available year. Each subcomponent i.e. sub index has an equal weight. We use average to the better reflect the stock of change.

Table 3.1 Components of PSP Indicator

Public Sector Performance (PSP) indicator: Sub-indicators	
<b>Opportunity Indicators</b>	
1. Administrative	Indexes on corruption, red tape, quality of judiciary, social capital.
2. Education	Secondary school enrolment rate, tertiary school enrolment, quality of math and science education, skillset of secondary education graduates, completion rate, total net enrolment rate, PISA results, human capital index.
3. Health	Life expectancy, infant mortality, healthy life expectancy adjusted, mortality rate of spec. disease.
4. Public infrastructure	Quality of infrastructure, logistics performance index.
<b>Musgravian Indicators</b>	
5. Income Distribution	Gini index
6. Economic stability	GDP growth stability through coef. of growth variance, and SD of inflation.
7. Allocative efficiency by economic performance	GDP per capita, real GDP growth rate, and unemployment rate.

Table 3.2 Public Sector Performance Indicators (ten-year average) SEE countries

	Opportunity Indicators				Musgravian Indicators			PSPI Public Sector Performance Index	Rank
	Admin Indicator	Education Indicator	Health Indicator	Public Infrastructure Indicator	Distribution Indicator	Stability Indicator	Economic Performance Indicator		
Albania	1.05	0.99	0.91	0.86	1.03	0.68	0.84	<b>0.91</b>	9
Bosnia & Herzegovina	1.18	0.92	0.97	0.88	1.01	0.81	0.74	<b>0.93</b>	8
Bulgaria	0.98	0.99	0.86	1.01	0.87	1.03	1.04	<b>0.97</b>	7
Croatia	0.89	1.06	1.07	1.15	1.06	1.45	0.95	<b>1.09</b>	2
Greece	0.97	1.17	1.24	1.13	0.95	0.35	0.52	<b>0.90</b>	11
North Macedonia	1.06	0.87	0.86	0.96	0.93	0.97	0.69	<b>0.91</b>	10
Montenegro	1.19	0.98	1.09	0.90	0.87	1.62	0.82	<b>1.07</b>	3
Serbia	1.11	1.00	0.94	1.01	0.87	1.15	0.86	<b>0.99</b>	6
Slovenia	1.13	1.17	1.46	1.16	1.32	0.89	1.39	<b>1.22</b>	1
Romania	1.01	0.94	0.86	1.00	0.92	0.97	1.59	<b>1.04</b>	4
Moldova	0.88	0.90	0.73	0.93	1.19	1.07	1.54	<b>1.03</b>	5
<i>AVERAGE</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<b><i>1.00</i></b>	
Small gov. avg.*	0.995	0.938	0.845	0.952	0.987	0.947	1.142	<b>0.97</b>	2
Medium gov. avg.**	1.147	0.959	0.959	0.943	0.936	0.979	0.801	<b>0.96</b>	3
Large gov. avg.***	1.045	1.098	1.214	1.088	1.048	1.077	0.921	<b>1.07</b>	1
Non-EU avg.	1.077	0.944	0.918	0.923	0.981	1.051	0.916	<b>0.97</b>	2
EU member avg.	0.997	1.067	1.098	1.092	1.023	0.939	1.101	<b>1.05</b>	1

Note: \*small government: total GG expense over GDP is < 35%; \*\*medium: total GG expense over GDP is >35% and < 45%; \*\*\*large: total GG expense over GDP is > 45%.

The sub-components are then combined into the composite PSP Index, with each sub-indicator contributing with equal weight. After the data on the variables of all sub-indicators has been collected, and the average of the last ten years has been calculated, the values are then calculated by dividing the value of the specific country with the average of all countries in the sample, to obtain result comparison. The overall PSP index

score was constructed by the aggregation of the measures, after assigning equal weight to all seven components. The index results and the ranking are given in Table 3.2.

### ***Public Sector Efficiency Index (PSEI)***

In order to compute the Public Sector Efficiency (PSE), we take into account the public expenditures that governments have in order to achieve a certain performance level. Therefore, the data on various governments' expenditures is used as the input measure for the efficiency analysis.

Public spending expressed as a percentage of GDP is assumed to reflect the opportunity costs for achieving the public sector performance (PSP) estimated in the previous section. In assessing the efficiency of the public sector (and specific sectors), we look at the total public spending and a selection of spending sectors, as proxies for the usage of resources/inputs. The public expenditures (as % of GDP) are then related to a specific sector's performance (Table 3.3).

*Table 3.3 Public Sector Input – Expenditure Indicators*

<b><i>Public Sector Spending as Input</i></b>	
Government Consumption	Input for obtaining the administrative performance
Government Education Expenditure	Input for obtaining the education performance
Public Health Expenditure	Input to the health performance indicator
Public Investment Expenditure	Input for the public infrastructure performance
Expenditure on Transfers and Subsidies	Input for the distribution indicator as it is considered that the expenditure on transfers and subsidies is the cost affecting the income distribution
Total Governmental Expenditure	Input for both the stability and economic performance

As for the PSP indicator, an average of the last ten years is calculated, and depending on the availability of data, these may vary to plus minus a year or two. All the data on public expenditure are then normalized by dividing the value of the specific country by the average of all countries in the sample, for comparability. The overall efficiency is then constructed by the aggregation of the measures after assigning equal weight to all. The index of public sector efficiency (PSEI) is then computed as a ratio of the PSPI to the government expenditure for each output. The ratio of the performance indicator(s) and public spending produces the indicators of efficiency for each country.

$$PSE_i Index = \frac{PSP_i Index}{Public Expenditure_i} \quad (Eq. 3.1)$$

It is noteworthy to mention the limitations to accurately relate public spending to the outcomes as an impact of public expenditure, independent of other factors not taken into consideration. Furthermore, public spending across the selected country group may not always be comparable and there might be possible data discrepancies arising from these differences<sup>20</sup>, however we cannot systemically resolve this limitation. Table 3.4 presents

<sup>20</sup> Due to data limitations to assign variables for public spending for Bosnia and Herzegovina in education, and for Montenegro in education and subsidies, these are omitted from the final PSEI calculation and ranking.

the results of the constructed PSE Indicators for the average ten-year period for the countries in the SEE region, further ranked by their efficiency.

*Table 3.4 Public Sector Efficiency Index – PSEI (ten-year average)*

	Admin. Efficiency	Education Efficiency	Health Efficiency	Public Infrastructure Efficiency	Distribution Efficiency	Stability Efficiency	Economic Performance Efficiency	<b>PSE Public Sector Efficiency Index</b>	Rank
Albania	1.64	1.17	1.35	0.68	1.37	0.92	1.14	<b>1.18</b>	2
Bosnia and Herzegovina	0.99	n.a.	0.80	0.86	0.96	0.74	0.68	n.a.	n.a.
Bulgaria	1.03	1.05	0.88	1.14	1.09	1.20	1.21	<b>1.09</b>	4
Croatia	0.73	1.05	1.13	1.40	1.00	1.23	0.81	<b>1.05</b>	6
Greece	0.83	1.32	1.10	1.47	0.82	0.27	0.41	<b>0.89</b>	9
North Macedonia	1.16	1.08	0.98	0.68	0.81	1.22	0.87	<b>0.97</b>	8
Montenegro	1.07	n.a.	0.99	0.62	n.a.	1.40	0.71	n.a.	n.a.
Serbia	1.16	1.05	0.80	1.40	0.64	1.09	0.81	<b>0.99</b>	7
Slovenia	1.05	0.92	1.30	1.24	1.17	0.74	1.15	<b>1.08</b>	5
Romania	1.13	1.23	1.25	1.04	1.53	1.15	1.89	<b>1.32</b>	1
Moldova	1.01	0.60	0.67	1.26	1.23	1.34	1.93	<b>1.15</b>	3
<i>AVERAGE</i>	<i>1.07</i>	<i>1.05</i>	<i>1.02</i>	<i>1.07</i>	<i>1.06</i>	<i>1.03</i>	<i>1.06</i>	<i>1.08</i>	
Small gov. avg.*	1.194	1.025	1.029	0.959	1.207	1.169	1.409	1.142	1
Medium gov. avg.**	1.074	1.050	0.797	1.133	0.798	0.915	0.749	0.992	3
Large gov. avg.***	0.920	1.096	1.130	1.183	0.998	0.910	0.769	1.007	2
Non-EU avg.	1.172	0.973	0.932	0.917	1.002	1.120	1.024	1.074	2
EU member avg.	0.953	1.114	1.134	1.258	1.122	0.919	1.094	1.085	1

Note: \*small government: total GG expense over GDP is < 35%; \*\*medium: total GG expense over GDP is >35% and < 45%; \*\*\*large: total GG expense over GDP is > 45%.

Lastly, we use a non-parametric approach to compute and present a production possibility frontier, while using DEA, and calculate the input efficiency and output efficiency scores, and then rank the sample countries in terms of public spending efficiency.

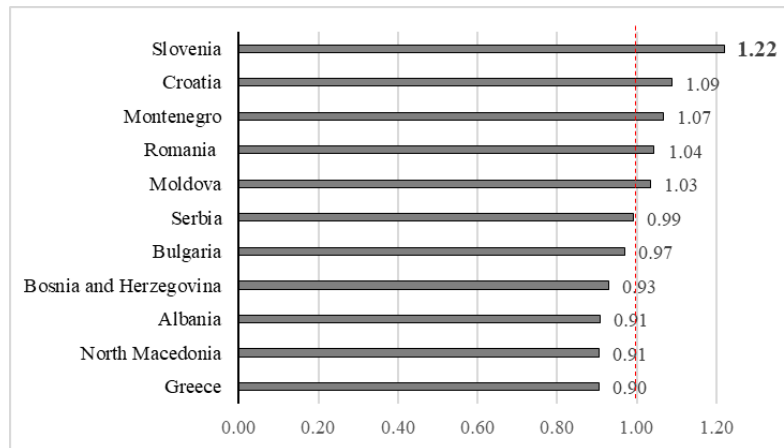
### ***Country Performance & Efficiency Analysis***

The calculated indexes of the SEE countries for public sector performance indicate significantly large differences among the countries in the sample. The PSP scores above 1.00 may be considered to indicate a ‘good’ performer country, i.e. above the average of its peer counties. The index scores of the PSP range from a minimum of 0.90 to a maximum of 1.22, ranking Slovenia as a frontrunner performer among the SEE, while Greece as the worst public sector performer. The highest PSP score of the selected countries, with a value of 1.22, is recorded for Slovenia, which is significantly better than the group average. Slovenia is followed by Croatia, with an index value of 1.09, and Montenegro with an index value of 1.07.

The performance indicators show an interestingly higher PSP index for the countries with larger governments as a group (total public spending >45% of the GDP) and smaller governments (total public spending <35% of the GDP), compared to the group with medium-sized governments (total public spending between 35% and 45% of the GDP).

Furthermore, the subgroup of EU members has a slightly higher average performance score of 1.05, as opposed to the non-members, with a value of 0.97 (simple group average).

*Figure 3-3 Public Sector Performance Index & Ranking*



Source: Author's calculation

In order to check for the robustness and to see the time difference and progress, we calculated the same PSE Index for only the most recent available five-year period (instead of ten years), and the changes are significant for some countries in the ranking of the performance. Namely, Slovenia is still the frontrunner and best performer, with slightly improved performance, followed by Albania with significant improvement, however the worst performer is North Macedonia. This may indicate that in the last five years, as a more recent period, the public sector performance in North Macedonia has negatively progressed compared to its peers, and/or Greece's performance (ranked as eighth out of the eleven countries in the five-year average) has improved in the last five years, as well as Serbia and Albania.

On a sub-sector performance indicator level, there are variations as well. For example, the administration performance indicator ranks Montenegro with highest index compared within the group, of 1.19, Slovenia & Greece in education (1.17), and yet again Slovenia as the best overall performer in most of the areas, including the health sector (1.46), public infrastructure (1.16), and distribution indicator (1.32). The best overall performer, Slovenia, is performing significantly above the average in most of the sectors, thus there is a significant difference between the first ranked (Slovenia), the second ranked, Croatia (1.09), and the third ranked Montenegro (1.07).

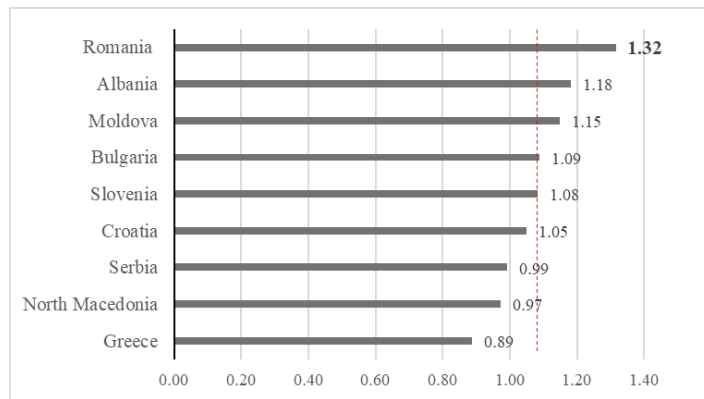
The assessment results of the public sector efficiency indicators (PSEI) are presented in Table 3.4 of the selected SEE countries, once again indicating large variations among the countries. The overall PSE scores, which are above the group average (1.08), indicate a country within the group that is relatively more efficient compared to its peers. The results from the SEE group of countries<sup>21</sup> range from the lowest PSE index of 0.89 for Greece, to the highest of 1.32 for Romania, suggesting that the least efficient country in the group is Greece and the most efficient is Romania, followed by Albania and Moldova.

Slovenia ranks fifth out of nine countries with the efficiency score, although ranked first in the PSP index score ranking. Nevertheless, Slovenia scores significantly above the average efficiency in the sectors: health, infrastructure, and distributive efficiency, while

<sup>21</sup> Due to missing data, Montenegro and Bosnia & Herzegovina are not included.

scoring less favourably than average in stability and education efficiency. These scores imply that although Slovenia scores highly in performance, i.e. effectiveness, it can potentially achieve these performances with smaller resources – more efficiently for specific areas. Greece, on the other hand, is at the bottom of the ranking of both performance and efficiency, while scoring highly in efficiency of the sectors education and public infrastructure.

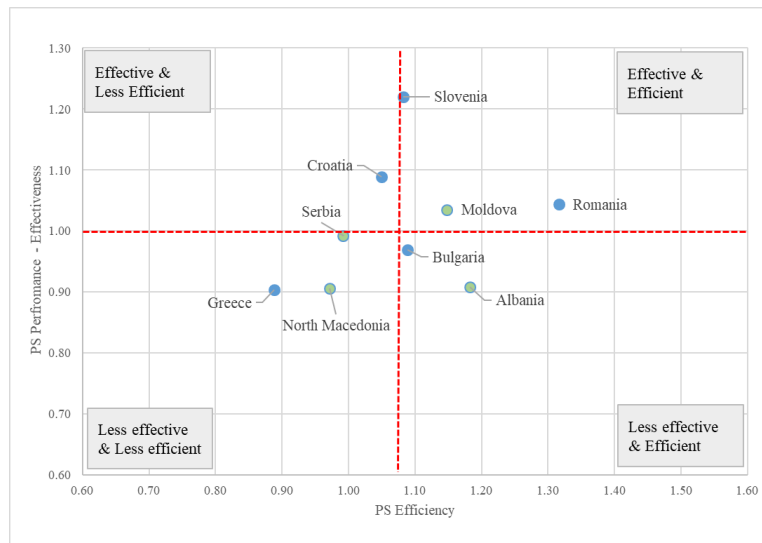
Figure 3-4 Public Sector Efficiency Index & Ranking



Source: Author's calculation

Based on the results of the PSP, the countries with scores above 1.00 are considered as good performers (Slovenia, Croatia, Montenegro), while in terms of efficiency measured as public expenditure for a level of performance, at the top of the rank are Romania, Albania, and Moldova. Plotted on a graph, the scores of both performance and efficiency place the countries in four quadrants depending on the degree of efficiency and performance (as in Figure 3-5). The most desired place would be the right-upper quadrant, where 'the most' effective and efficient countries, above the group's average are situated. The countries that are in this quadrant are Romania, Slovenia and Moldova.

Figure 3-5 Public Sector Performance vs. Public Sector Efficiency



Source: Author's calculation

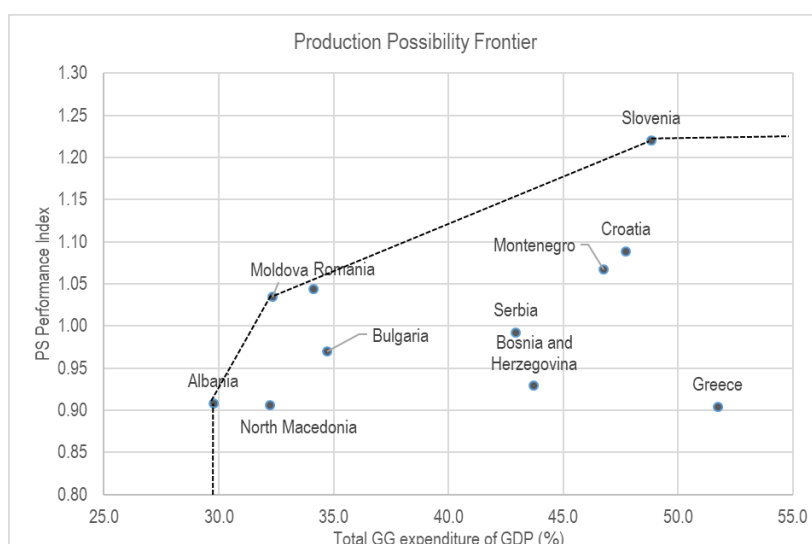


### 3.4. Data Envelopment Analysis

Data envelopment analysis (DEA) is an approach that assesses the relative performance and efficiency per decision-making units (DMU) with linear programming methods in order to construct a production frontier. DEA can be used for both input and output-oriented analysis, assuming the technology is constant or variable (CRS or VRS). If the efficiency score of a DMU (in our case a country) is 1.00, then the DMU is on the efficiency frontier and is considered as technically efficient.

Plotting the performance index of the countries to the size of the total expenditure to GDP, the production frontier line is designed where the ‘most efficient’ are identified, while the remaining peers that are less efficient fall below the frontier line. Considering the overall public sector efficiency and the size of the government the countries on the production frontier are Albania, Moldova and Slovenia, with Romania very close by, and all the remaining are below the frontier, Greece being the furthest away.

Figure 3-6 Production Frontier



Source: Author's calculation

We performed DEA<sup>22</sup> for Model<sub>1</sub> assuming both constant and variable returns to scale where we use one output and one input. The input for the first model (Model<sub>1</sub>) is the general government expenditure expressed as a percentage of GDP, and as an output we use the overall performance score (PSPI).

The results given in Table 3.5 imply that Albania, Slovenia and Moldova have an efficiency score of 1.00, and can be considered as most efficient countries in terms of overall public expenditure for the overall performance, and these are the three countries placed on the production possibility frontier (Figure 3-6).

<sup>22</sup> DEAP Software (Ver 2.1) used for data envelopment analysis (DEA), written by Tim Coelli from the Centre for Efficiency and Productivity Analysis (CEPA).

Table 3.5 Model 1: Input – Total GG Spending & Output – Overall PSP Scores

	Input-Oriented				Output-Oriented		
	CRS	VRS <sup>23</sup>	Peer	Rank	VRS	Peer	Rank
Albania	0.960	1.000	ALB	1	1.000	ALB	1
Bosnia and Herzegovina	0.668	0.691	MDA, ALB	10	0.801	SVN, MDA	10
Bulgaria	0.878	0.895	MDA, ALB	6	0.918	SVN, MDA	5
Croatia	0.717	0.787	SVN, MDA	7	0.903	SVN, MDA	6
Greece	0.547	0.576	ALB	11	0.738	SVN	11
North Macedonia	0.887	0.924	ALB	5	0.888	MDA, ALB	8
Montenegro	0.719	0.766	SVN, MDA	8	0.895	SVN, MDA	7
Serbia	0.724	0.734	MDA, ALB	9	0.859	SVN, MDA	9
Slovenia	0.785	1.000	SVN	1	1.000	SVN	1
Romania	0.957	0.974	SVN, MDA	4	0.990	SVN, MDA	4
Moldova	1.000	1.000	MDA	1	1.000	MDA	1

Mean	<u>0.804</u>	<u>0.850</u>		<u>0.908</u>
Minimum	<u>0.547</u>	<u>0.576</u>		<u>0.738</u>
Mean EU members	<u>0.777</u>	<u>0.846</u>		<u>0.910</u>
Mean non-EU member	<u>0.826</u>	<u>0.853</u>		<u>0.907</u>

Note: CRS - Constant Return to Scale; VRS - Variable Return to Scale

Source: Author's calculation, DEAP Version 2.1 used in calculation

The least efficient country in the input-oriented analysis is Greece, with an efficiency score of 0.576, indicating that Greece could have obtained the same level of output by reduction of the inputs by 42%. Seen on the graph, it is the country furthest from the production possibility curve.

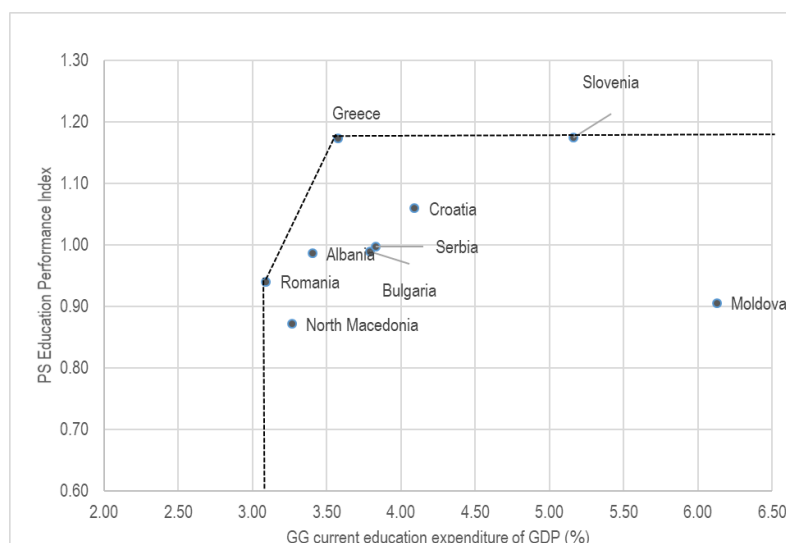
The mean input-oriented efficiency score for the selected SEE group of countries is 0.85, indicating that on average the SEE countries could reduce their inputs by 15% and still attain the same level of output. The mean technical efficiency for SEE which are EU members is 0.846, indicating that their efficiency can be increased by 15% to obtain the same level of output, while the non-EU members are with an average score of 0.853, which indicates an average possibility for efficiency increase by reduced inputs by 15% as well.

The output-oriented results indicate and confirm that Greece is the least efficient country, with a score of 0.738, suggesting that Greece could increase the output levels by 26% while retaining the current level of inputs (public expenditure). The average output-oriented efficiency score for the whole SEE group of countries is 0.908, and on average these countries could increase their outputs – effectiveness by 9% with the same level of input (expenditure). The mean score for the EU members sub-group is almost identical with the non-EU member states of 0.91, indicating that on average there is no difference among the non-EU and EU member countries.

We tested another Model<sub>2</sub>, for a specific sector (the education sector), in which as an output we use the performance of the education sector via the index (PSPI Education), and as an input the government expenditure in education.

<sup>23</sup> CRS - Constant Return to Scale; VRS - Variable Return to Scale. CRS assumes that an increment in inputs results in proportion increment in outputs (i.e. there is no significant relationship between the size of DMU and efficiency). VRS assumes that an increment in inputs results in a disproportionate increment in outputs.

Figure 3-7 Production frontier – Education sector



Source: Author's calculation

In this case, we consider only the education sector and its performance (with VRS): there are three countries on the efficiency frontier, with input-oriented efficiency of 1.00, and these are Greece, Slovenia and Romania, while there is a significant variation between the SEE countries, with mean input efficiency of 0.843 and a minimum of 0.504. This implies that in the education sector, on average the SEE group of countries could overall reduce their inputs by 16% and still attain the same level of output, while with a mean output efficiency score of 0.904, in the education sector, on average these countries could increase their outputs by 10% with the same level of input (public expenditure in education). The mean score for the EU members sub-group (0.950) is quite different when compared to the non-EU member states of 0.846, indicating that on average the performance in education of the EU member states is significantly better than that of the non-EU member countries. The latter can improve the output by 15% with the same public expenditure, which makes them less efficient and effective than their peers in the EU. Thus, the least efficient in the sector are Moldova, Slovenia and Croatia, while at the same time, although with significant expenditure, Slovenia is among the most effective as well. The results indicate that Moldova could improve education quality by over 23% with the same expenditure, and Bulgaria by 15%. On the other hand, these can keep the same quality and education sector performance with less expenditure, i.e. Moldova with less by 50% and Bulgaria with less by 16%.

Table 3.6 Model 2: Input – GG Education Expenditure & Output – Education PSP Scores

	Input-Oriented				Output-Oriented		
	CRS	VRS	PEER	RANK	VRS	PEER	RANK
Albania	0.891	0.940	GRC, ROU	4	0.912	GRC, ROU	4
Bulgaria	0.799	0.843	GRC, ROU	5	0.846	GRC	8
Croatia	0.793	0.818	GRC, ROU	7	0.906	GRC	5
Greece	1.000	1.000	GRC	1	1.000	GRC	1
North Macedonia	0.814	0.945	ROU	3	0.849	GRC, ROU	7
Serbia	0.799	0.840	GRC, ROU	6	0.855	GRC	6
Slovenia	0.694	0.694	GRC	8	1.000	GRC	1
Romania	0.931	1.000	ROU	1	1.000	ROU	1
Moldova	0.449	0.504	ROU	9	0.769	GRC	9

Mean	<u>0.797</u>	<u>0.843</u>		<u>0.904</u>
Minimum	<u>0.449</u>	<u>0.504</u>		<u>0.769</u>
Mean EU members	<u>0.843</u>	<u>0.871</u>		<u>0.950</u>
Mean non-EU member	<u>0.738</u>	<u>0.807</u>		<u>0.846</u>

Source: Author's calculation, DEAP Version 2.1 used in calculation

In the third Model<sub>3</sub>, the performance of the health sector was tested. To rank the efficiency and performance, we use the performance for the health sector measured with its sub-component of health performance index as output, and the government current health spending as percentage of GDP as inputs. There is only one out of eleven countries that show full efficiency in the health sector – Albania. There are significant variations among the most and least efficient; at the bottom in terms of input-oriented VRS is Bosnia, with a value of 0.549, indicating that this country may increase the output (performance and quality) by 45% with the same input – public expenditure in health.

Table 3.7 Model 3: Input – Current Health Expenditure & Output – PSP Health Scores

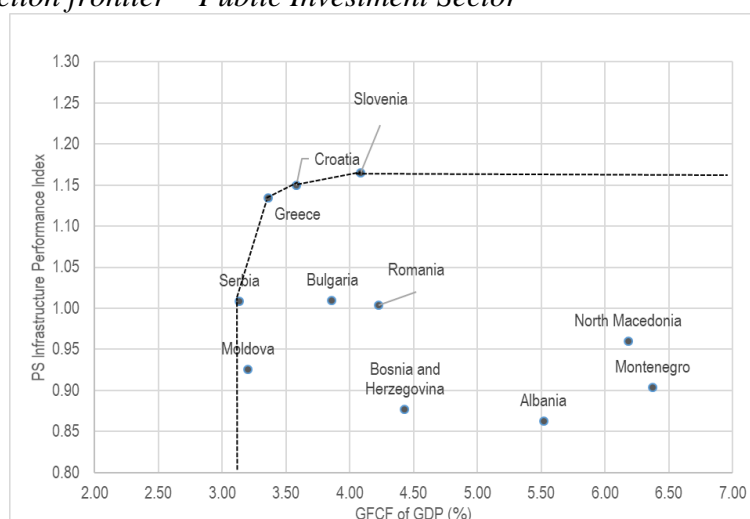
	Input-Oriented				Output-Oriented		
	CRS	VRS	PEER	RANK	VRS	PEER	RANK
Albania	1.000	1.000	ALB	1	1.000	ALB	1
Bosnia and Herzegovina	0.326	0.549	ALB	11	0.593	ALB	9
Bulgaria	0.448	0.688	ALB	5	0.652	ALB	8
Croatia	0.597	0.713	ALB	4	0.837	ALB	4
Greece	0.489	0.600	ALB	8	0.815	ALB	5
North Macedonia	0.557	0.767	ALB	3	0.726	ALB	7
Montenegro	0.445	0.607	ALB	7	0.733	ALB	6
Serbia	0.336	0.567	ALB	10	0.593	ALB	9
Slovenia	0.573	0.595	ALB	9	0.963	ALB	2
Romania	0.904	0.977	ALB	2	0.926	ALB	3
Moldova	0.307	0.619	ALB	6	0.496	ALB	11

Mean	<u>0.544</u>	<u>0.698</u>		<u>0.758</u>
Minimum	<u>0.307</u>	<u>0.549</u>		<u>0.496</u>
Mean EU members	<u>0.602</u>	<u>0.715</u>		<u>0.839</u>
Mean non-EU member	<u>0.495</u>	<u>0.685</u>		<u>0.690</u>

Source: Author's calculation, DEAP Version 2.1 used in calculation

The output-oriented VRS scores in the health sector for the SEE countries and ranking indicates that Moldova can reduce the expenditure to achieve the current performance level, i.e. quality of health outcomes, by 50%. The mean values of the non-EU SEE countries of the input-oriented VRS indicates significant potential above its EU member peers in efficiency and performance when it comes to the quality in health performance in order to reach the mean efficiency and quality of the EU peers in the health sector.

Figure 3-8 Production frontier – Public Investment Sector



Source: Author's calculation

In the fourth Model<sub>4</sub>, the performance of the infrastructure or capital investments was tested. To rank the efficiency and performance we use the performance for the infrastructure – capital investment sector, measured with its sub-component of infrastructure performance index as output, and the government gross fixed capital formation as percentage of GDP as inputs. There are four out of eleven countries that show full efficiency in public infrastructure investments: Croatia, Greece, Serbia, and Slovenia.

Table 3.8 Model 4: Input – GG GFCF Expenditure & Outputs – PSP Infrastructure Components Scores

	Input-Oriented				Output-Oriented		
	CRS	VRS	PEER	RANK	VRS	PEER	RANK
Albania	0.463	0.567	SRB	9	0.741	SVN	11
Bosnia and Herzegovina	0.591	0.707	SRB	8	0.759	SVN	10
Bulgaria	0.778	0.811	SRB	6	0.874	SVN, HRV	6
Croatia	0.955	1.000	HRV	1	1.000	HRV	1
Greece	1.000	1.000	GRC	1	1.000	GRC	1
North Macedonia	0.462	0.506	SRB	10	0.828	SVN	8
Montenegro	0.420	0.491	SRB	11	0.776	SVN	9
Serbia	0.959	1.000	SRB	1	1.000	SRB	1
Slovenia	0.843	1.000	SVN	1	1.000	SVN	1
Romania	0.705	0.742	SRB	7	0.862	SVN	7
Moldova	0.864	0.978	SRB	5	0.889	GRC, SRB	5
Mean	<u>0.731</u>	<u>0.800</u>			<u>0.884</u>		
Minimum	<u>0.420</u>	<u>0.491</u>			<u>0.741</u>		
Mean EU members	<u>0.856</u>	<u>0.911</u>			<u>0.947</u>		
Mean non-EU member	<u>0.627</u>	<u>0.708</u>			<u>0.832</u>		

Source: Author's calculation, DEAP Version 2.1 used in calculation

Once again there are significant variations among the most and least efficient. The least efficient in terms of input-oriented VRS are Montenegro and North Macedonia, with a value of 0.491 and 0.506, indicating that these countries' public investment sectors may

increase the output (performance and quality of their public capital investment) by as much, i.e. 50%, with the same input – public expenditure in fixed capital, as well as Albania and Bosnia, which can increase performance with the same level of public spending by 43% and 29% respectively.

The output-oriented VRS scores in the infrastructure sector for the SEE countries and ranking indicates that Albania can reduce the expenditure to achieve the current performance level, i.e. quality of infrastructure by 26%, Bosnia by 24%, Montenegro by 22%, and North Macedonia by 17%. The mean values of the non-EU SEE countries of the input-oriented VRS indicates significant potential above its EU member peers in efficiency and performance when it comes to public infrastructure.

### ***Public Investment Efficiency Scores vs. Governance Indicators***

The efficiency scores of public investment spending are closely correlated with most of the governance indicators<sup>24</sup>, i.e. the dimensions of Worldwide governance indicators: control of corruption, government effectiveness, political stability, regulatory quality, rule of law, and voice and accountability (see Table 3.8). The correlation is significant predominantly with the output efficiency, i.e. the performance and the quality of the investments. The correlation of the output efficiency indicator scores of the countries in the SEE region may be concluded that it is strong and statistically significant with the government effectiveness, accountability, rule of law, and control of corruption.

Furthermore, and intuitively as expected, input and output efficiency scores are strongly correlated. There is as well a strong significant correlation between the output efficiency scores of public investment spending with the productivity of the economy and the degree of development if measured through the GDP per capita, and with the size of the public sector, i.e. the size of the public spending as part of the GDP.

*Table 3.9 Correlation of Public Investments Efficiency & Governance Indicators*

	PI Input Efficiency	PI Output Efficiency	Control of corruption	Government Effectiveness	Political Stability	Rule of Law	Voice & Accountability	Regulatory Quality	Log GDP per capita	Public Spending of GDP
PI Input Efficiency	1.000	0.881***	0.301	0.349	0.289	0.429	0.532*	0.061	0.480	0.445
PI Output Efficiency	0.881***	1.000	0.541*	0.617**	0.446	0.589*	0.671**	0.342	0.674**	0.550*

Note: \*\*\*0.01 significance level, \*\*0.05 significance level, \*0.1 significance level, and insignificant otherwise. PI is public investment. The sub-indicators for each governance indicators are an average of ten periods, to coincide with the efficiency score period. Data from the World Bank database.

Source: Author's calculation

<sup>24</sup> WGI - Worldwide Governance Indicators report aggregate and individual governance indicators for six dimensions of governance. The WGI are produced by Daniel Kaufmann, President Emeritus, Natural Resource Governance Institute (NRGI) and Brookings Institution and Aart Kraay, World Bank, Development Economics.

### 3.5. Results and Discussion

In the assessment of the public spending for selected SEE countries for the period 2012-2021, by applying the non-parametric approach DEA, significant insights on the different opportunities for increased overall efficiency and specific public sector efficiency as well as performance were gained.

The public sector performance scores suggest that overall, the best performer among the peer countries is Slovenia, followed by Croatia and Montenegro. The bottom performers, on the other hand, are Greece, North Macedonia, and Albania. The ranking compares the countries among themselves, through benchmarking the degree of outcomes i.e. performance given the public services' quality.

Public sector efficiency results, on the other hand, indicate that Romania is the most efficient country in spending public resources, followed by Albania and Moldova, and Greece, North Macedonia, and Serbia are least efficient. The score ranks the countries in their efficiency in resource spending through benchmarking the performance per unit of public expenditure. The efficiency index implies that for the countries with an index score below the average (average PSEI of 1.08) and below the best performers (PSEI for Romania 1.32) spending does not maximize the public sector performance with the given inputs.

The comparison between the PSPI and PSEI results propose that being at the top of the performers' list doesn't automatically mean that the public expenditure is efficiently spent. Slovenia is at the top of the performers' list, while fifth in the efficiency among the peer countries. Romania, on the other hand, shows good results in both cases, as third in effectiveness and first in efficiency, while Greece is at the bottom of both rankings.

The results of the Model<sub>1</sub> with DEA for overall macro efficiency assessment of the public spending show that there are three countries on the efficiency frontier, i.e. the most efficient – Slovenia, Albania, and Moldova. The remaining countries, although with variations, on average can improve their efficiency by decreasing the expenditure by 15% and still attain the same level of performance, or increase the performance by 9% by attaining the same level of public expenditure.

The other three sector models, with DEA efficiency assessment, showed that there are different countries on the efficiency frontier. Namely, the education efficiency frontier is defined by two countries, with an overall average for the group of the countries to be able to decrease the government current expenditure in education by 16% and still achieve the same performance, while improve performance by reduction of expenditure by 10%. The health sector frontier is defined by Albania, and the average possibility to decrease spending in the health sector and still attain the same quality by 30% or increase performance by 24%, given the same sector public expenditure. The infrastructure sector frontier is led by four countries, as well among which Slovenia, and the average possibility to decrease spending in infrastructure and still attain the same quality by 20% or increase performance by 12%, given the same sector public expenditure.

### 3.6. Concluding Remarks

In summary, the results imply that the SEE country members of the EU, and most with larger public sectors in terms of expenditure, are slightly better performers and slightly less efficient, which is primarily due to the larger size of the government. Of course, there are other determinants to be discussed of whether the better-off country the larger the public sector is due to increased service demands or there are other driving factors as well.

It should be emphasized that Slovenia is by far ranking above all the rest from the perspective of performance, both overall and for most of the sector performances.

The findings are largely in line with the findings of Alfonso, Schuknecht, & Tanzi (2005), in terms of lower performance of Greece, as well as the lower effectiveness of the medium-sized governments and efficiency of the small government size, although the time period is different and the sample countries are different.

The input efficiency is lower than the output efficiency scores both overall as well as by sectors. This may indicate that especially the less developed countries in the sample, which at the same time are non-EU member countries, deviate more from the frontier on the input side (public spending) than on the output dimensions. This is indicative as there are differences among the countries and the sub-groups, and as per selected output indicator. Therefore, it is important and instrumental to identify what institutional or other economic factors cause certain countries to be more efficient than others in providing the overall and specific public service.

This conclusion is more pronounced, as the EU member states are more efficient in the specific public sectors considered, i.e. education, health, and public infrastructure, leaving the non-EU member states behind and enough space for improvement both in providing quality services and in better targeting their scarce public resources. A viable explanation for the better specific sector performance of the EU member states in education, health, as well as public investments, may be in the performance achieved over a longer period of time and efforts reflected in the quality and opportunities for the citizens for better public service. On the other hand, the non-members might be more focused on spending public resources on the 'Musgravian' functions of the government as the primary focus on their efforts for accession, i.e. the choice to spend more on stabilization of the economic performance parameters, thus restraining resources for sectors such as education and health. Nevertheless, a higher level of efficiency obtained in the areas with the least investment indicate the existence of lower performance levels. It can be also argued that the 'richer' the country the more it spends in public service provision. Furthermore, it can be asserted that the effectiveness and efficiency improvements of the countries that are already a 'good' performer will need extra per unit expenditure to improve performance than those on the lower part of the performance scale.

The non-EU member countries struggle more with issues related to the good governance principles, including corruption, lack of transparency and accountability, etc., thus the occurring inefficiencies. One proposition is that the less developed economies should concentrate their efforts on increasing the performances in education, health, and investment sectors, where they are not performing at a satisfactory level, even if in the cases where there is higher public sector efficiency. This implies and reaffirms the awareness that it is not enough to direct public resources to a specific area to optimize the available resources, but it also requires efficient public sector management systems.

The correlation test, especially relevant for public investment efficiency scores, indicates a significant correlation pronounced between the output efficiency scores and almost all governance indicators. The correlation test scores confirm the relevance of the good governance principles in effective and efficient public investments. This is a topic that could be further investigated, and the effect of good governance principles and political economy determinants on the size and degree of inefficiencies is to be explored.

The efficiency and effectiveness results need to be carefully interpreted since it is particularly challenging to obtain a precise picture of the performance and efficiency due



to the accuracy and the data availability for the given countries, as these may not always be reported in a standardized manner, in addition to the previously explained limitations posed by the nature of the public sector.

The results require a more in-depth inquiry of the performance of the public policy interventions, especially for the countries with the lower rankings. This is also relevant in the post Covid-19 crisis and disruptions that demanded substantial increases of public expenditure through different large scale fiscal assistances.

The policymakers should consider the findings and conclusions for better public finance management in order to optimize and focus public expenditure towards more efficient and effective policies in conditions of scarce resources.

## **Chapter 4**

# **Efficiency Assessment of the Public Investment**

## **Chapter 4 EFFICIENCY ASSESSMENT OF PUBLIC INVESTMENT EXPENDITURE**

### **Abstract**

This chapter focuses on the assessment of public investment spending efficiency of Southeast European countries (SEE) in the past decade. Most of the SEE countries show a general trend of declining public investment spending (relative to their respective GDP), with the exception of the non-EU members: North Macedonia, Serbia, and Montenegro. The SEE countries are heterogenic, nevertheless they follow the global trends of suppressed public investment, particularly pronounced among the SEE's EU member states. On the other hand, the per capita capital stock is significantly higher among the SEE's EU member states: Croatia, Greece, and Slovenia, with double or more, the values compared to the non-EU member states such as Albania, Bosnia and Herzegovina, North Macedonia, and Montenegro.

The data displays a strong positive correlation between public investment capital stock (per capita), with the quality of infrastructure indicators (with the logistics performance index - correlation of 0.74, and with the infrastructure quality index of 0.86). However, the data also denotes that the largest capital stock increase is not continuously reflected in a proportional increase of infrastructure quality, a situation particularly noticeable in the case of Montenegro.

The quantitative assessment of public investment spending efficiency is performed via the frontier method of data envelopment analysis. The assessment is completed with the usage of a combined indicator composed of a physical infrastructure coverage component and a quality component. The results of the assessment indicate that the average capital investment output efficiency gap among the SEE countries is 9%, while the average input efficiency gap is estimated at 15%. Still, an inter-country comparison marks substantial efficiency gap differences, particularly pronounced in the cases of Montenegro, Albania, and North Macedonia – positioned furthest from the efficiency frontier. These three least efficient economies may decrease their input by a third to almost half of the investment costs (49% in Montenegro, 40% in Albania, 33% in North Macedonia) and still should have been able to achieve the same output – infrastructure quality and quantity. The results are for the most part in line with other researchers' findings of higher efficiencies in public investment among more developed countries compared to the less efficient less developed economies.

A second stage regression analysis was conducted to estimate the effects of governance determinants on public investment efficiency, by proxy indicators for: control of corruption, government effectiveness, regulatory quality, political stability, rule of law, and voice and accountability. The regression results indicate a statistically significant positive association of efficiency with the degree of government effectiveness and corruption control, confirming the gravity that the quality of the public service and the quality of the administrative service have on efficient and effective public investment spending. Remarkably though, the results indicate a negative association of public investment efficiency with the degree of the accountability and political stability indicators. The possible theoretical explanation is that the governments which are sensitive to popular opinion, prone to clientelism and cronyism, and at the same time are politically stable, may be reflection of a complacency and stagnation with the occurrence of the 'stabilitocracy' phenomenon.

Lastly, the regression models for the SEE, imply that public investment levels are determined by the expectations of the future economic growth rather than the historical economic growth, then by the level of past public investments and the ‘signals’ of private investments, however are not determined by the public debt level (statistically not significant).

**Keywords:** public investment spending; capital stock; expenditure efficiency; public sector efficiency; data envelopment analysis (DEA); Southeast Europe

**JEL:** C14, C24, H11, E62

## 4.1. Introduction

Having centralized the theme of this research on public investment efficiency, a deeper dive into the public investment efficiency is to be explored, as a distinct and specific public spending category which concerns various categories of government's functions.

Public investment efficiency or inefficiency has attracted the attention of researchers, especially in the 1990s with the initial work of Hulten (1996), followed by an array of papers by the World Bank, and with a special view from Pritchett (2000). Pritchett (2000) estimated that at the time of their research, one dollar of public investment translated into 50 to 60 cents of public capital, thus implying high global inefficiency in public investment spending. Nevertheless, in their assessment the author makes a distinction between the countries and identifies a lower inefficiency level (higher efficiency) among the developed OECD countries and the fast-growing East Asian countries, compared to higher inefficiency among the developing countries.

More recent estimates (e.g. Miyamoto, 2020) confirm the existence of a significant potential for improvements of public investment efficiency worldwide. The empirical findings of Miyamoto et al. (2020) concur that the less developed and emerging markets are still lagging behind the advanced economies in infrastructure access and quality, despite their larger outflows in the past several decades.

In the same direction, Baum et al. (2020) found efficiency gaps, conditional to the approach and methodologies used by the various researchers; the authors have estimated the efficiency gap to range from 43 to 53 percent among the low-income emerging economies, from 32 to 42 percent among the emerging economies, and from 15 to 27 percent among the advanced economies.

This acute situation is concerning, as the abundance of literature argues and shows that public investment is a driver of economic growth, and even more so a vehicle for enhanced growth and vital recovery in the contemporary constellation of a post-pandemic crisis, energy crisis, and green economic development plans. Therefore, it is not surprising that both efficiency and quality of public investment are highly desired.

The efficiency of public investment is most commonly defined as that portion of the investment spending that is transferred onto the value of public capital, which as demonstrated by Pritchett (2000), differs from the investment cost due to numerous reasons including and not exhaustive of: waste, mistakes, poor project selection, technological changes, prices, insufficient maintenance, corruption, etc. (see more in Berg et al., 2019).

The quantifiable measures of public investment efficiency are comparable with the approaches taken for other public sector spending efficiency assessments by either using parametric and/or non-parametric methods (see a survey detailing the pros and cons of various approaches by Murillo-Zamorano, 2004).

The approach taken in the assessment for the SEE countries, to follow in this chapter, shadows the same principle of the frontier data envelopment method, as in the previous chapter, although it considers public capital spending from a slightly wider aspect and scope.

The usage of frontier methods for assessment of public investment efficiency is empirically not as common as it is for other specific sector estimations<sup>25</sup>, such as health

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<sup>25</sup> Note: the reason for the scarce empirical assessments of capital spending and/or public investment spending may be because capital spending is 'support' spending for provision of adequate public services in many areas, especially health and education, which are most often in the literature a subject of efficiency assessment.

and education, however when available for the most part is regularly used by IMF papers (for example by Schwartz et al., 2015; Baum et al., 2020), and has been noted to be pioneered by Albino-War et al. (2014).

This section continues to focus on the SEE countries, while extending both input and output indicators to achieve an enhanced grasp and widen the scope of the specificities of public sector efficiency, and possibly confirm or see a difference in the benchmarking when compared with the assessments of the countries' total public spending efficiency scores. The assessment considers both input and output efficiency of the public investment in the SEE region's countries for a period covering over a decade. The efficiency score assessed via the output-oriented models is interpreted as the proportional amount by which an output could be increased, while leaving the input consumption unchanged (and vice versa for the input-oriented models). The quality of infrastructure index (compiled and developed by the World Economic Forum) as well as the quantitative indicator of physical infrastructure are used as an output variable, while the input variables are comprised from the estimated public capital stock (as reported by the IMF Fiscal Affairs Department by using the Penn World Tables) on a per capita level, the size of public investment as a percentage of GDP and GDP per capita, is used as an auxiliary input.

## **4.2. Literature Review**

There is large pool of empirical literature pointing to and quantifying the economic importance of public capital. While one main strand focuses on the effects of public capital investment on output production or on cost reduction, another strand of the literature provides for the broader effects of greater public capital on the rest of the economy. The vast empirical literature, however, does not provide a consistent body of evidence always supporting a strong and positive association between increasing public investment and increasing economic growth, though the evidence does show that public investment, particularly in infrastructure, can significantly contribute to the economic growth and improvement of other development outcomes. Even so, for countries to reap the full benefit of their investment spending for attaining growth and developmental goals there is a need for increased efficiency. The public sector should not spare efforts for enhancing efficiency, which may be achieved by reducing cost overruns, completing ongoing projects, eliminating 'white elephants', reducing fraud opportunities, etc. Accordingly, evaluating investment efficiency is essential to assessing whether public investment is yielding its expected results.

The analytical challenges in quantifiably assessing investment efficiency include: ambiguity in defining inputs and outputs, outlier sensitivity, limited consistent cross-country data, etc. Given the challenges authors have still produced empirical literature on public spending and investment efficiency by theorizing, testing, and defining relations with economic output. Below is presented a short overview of a selection of empirical literature (Table 4.1), focusing on public investment spending efficiency. The results exclusively state that regardless of whether the researchers employ a parametric or non-parametric approach in assessing efficiency, there will continuously be someone in the comparison group positioned on the production frontier – as being more efficient, and others below the frontier – as less efficient.

Table 4.1 Review of selected empirical studies

<i>Author(s)</i>	<i>Time period</i>	<i>Geographical coverage</i>	<i>Approach/ Method</i>	<i>Results</i>
Hulten, C. R. (1996)	1970-1990	46 low- and middle-income countries	Augmented Solow model	The author shows that low- and middle-income countries that use infrastructure inefficiently pay a growth rate penalty through much smaller benefit from infrastructure investments. The magnitude of this penalty when growth of Africa is compared with growth of East Asia: over one-quarter of the differential growth rate between these two regions can be attributed to the difference in effective use of infrastructure resources; comparison of high and low growth rate economies indicates that more than forty percent of the growth differential is due to the efficiency effect.
Tanzi, V., & Davoodi, H. (1997)	1980s-1990s	68 countries	Regression methods	Higher corruption is associated with higher public investment, lower government revenues, lower O&M expenditure, lower quality of PI.
Pritchett, L. (2000)	n.a	n.a.	Theoretical discussion on the capital investments and definition of efficiency of capital	Discussion on limitations of empirical estimates of public capital and capital spending productivity and its impact, limitations in making a distinction between low growth because of investments that create no factors and low growth due to slow productivity growth, and limitations of multivariate regressions that do not adequately control capital stock growth.
Puig-Junoy, J. (2001)	1970-1983	48 US states	Trans-log stochastic frontier production	Finds that US states inefficiency is correlated positively with the ratio of public to private capital; public capital devoted to infrastructure is negatively correlated with inefficiency, suggesting the importance of not only the level but composition of investments which is influencing efficiency.
Afonso, A., Schuknecht, L., & Tanzi, V. (2005)	1990-2000	23 industrialized countries	Free Disposal Hull (FDH) analysis	International comparison of public spending efficiency including infrastructure. Authors find that countries with small public sectors report the “best” economic performance, while countries with large public sectors show more equal income distribution.
Kamps, C. (2005)	1960-2001	OECD	VAR	Results suggest that there is evidence for positive output effects of public capital in OECD countries, but hardly any evidence for positive employment effects.
Herrera, S., & Pang, G. (2005)	1996-2002	140 countries	Non-parametric Frontiers Analysis: Free Disposal Hull (FDH) & Data	Results show that countries with higher expenditure levels register lower efficiency scores as well as among countries where wage bill is a larger share of the government’s budget. Countries with higher ratios of public to private financing of the service provision score lower efficiency (as do countries with HIV/AIDS epidemic and higher income inequality, higher aid-dependency).

<i>Author(s)</i>	<i>Time period</i>	<i>Geographical coverage</i>	<i>Approach/ Method</i>	<i>Results</i>
			Envelopment Analysis (DEA)	
Jong-A-Pin, R., & De Haan, J. (2008)	1960-2001	21 OECD countries	VAR	In some countries a shock to public capital has a positive long-run impact on GDP, while in others the long-run impact is zero or even negative. The authors find that variability of public capital and its long-run impact on output are negatively correlated. The 'recursive' VARs suggest that in the majority of countries the effect of a public-capital shock on output has decreased over time. Estimates based on a panel VAR for the OECD area confirm the declining long-run impact of public capital.
Calderon, C., & Serven, L. (2008)	1960-2005	Sub-Saharan Africa	Generalized method of moments (GMM)	The authors assess the impact of infrastructure development on growth and inequality in Africa countries. Their estimates illustrate the potential contribution of infrastructure development to economic growth and equity, across Africa.
Afonso, A., Schuknecht, L., & Tanzi, V. (2010)	1999-2003	Twelve EU member states	DEA	Find that expenditure efficiency across new EU member states is diverse especially as compared to the group of top performing emerging markets in Asia. Econometric analysis shows that higher income, civil service competence and education levels as well as security of property rights facilitate the prevention of inefficiencies in the public sector.
Hurlin, C., & Arestoff, F. (2010)	1980-1994	Latin America: Mexico and Columbia	Non-parametric approach, Efficiency function	Authors find a large discrepancy between the amount of investments and the value of increases in capital stocks in the case countries.
Dabla-Norris, E., J. Brumby, Kyobe, A., Mills Z., & Papageorgiou, C. (2012)	Various periods	71 countries including 40 low-income	Constructed investment efficiency indexes covering institutional and management processes	The authors are benchmarking across regions and country groups for nuanced policy-relevant analysis and identification of specific areas where reform efforts could be prioritized. Generally, the findings are that middle-income countries are top performers, and low-income countries are the worst performers.
Grigoli, F. & Kapsoli, J. (2013)	2001–2010	80 emerging and developing countries	Stochastic frontier model (SFA)	Public health spending is lower in emerging and developing economies relative to advanced economies; health outputs and outcomes need to be substantially improved; increasing public expenditure in the health sector may not significantly affect health outcomes if the efficiency is low. African economies have the lowest efficiency in health spending and could boost life expectancy up to about five years.



<i>Author(s)</i>	<i>Time period</i>	<i>Geographical coverage</i>	<i>Approach/ Method</i>	<i>Results</i>
Grigoli, F., & Mills, Z. (2014)	1984-2008	144 countries	GMM estimator	Authors show that there is an inverse relationship between public investment levels and institutional quality (public investment as a government vehicle for rent seeking); lower quality of governance increases volatility of public investment; a positive relationship between institutional and infrastructure quality.
Calderón, C., Moral-Benito, E., & Servén L. (2014)	1960-2000	88 industrial and developing countries	Panel Production Function, PMG estimator	Long-run elasticity of output with respect to the synthetic infrastructure index ranges between 0.07 and 0.10.
Gupta, S., Kangur, A., Papageorgiou, C., & Wane, A. (2014)	/	71 countries	Panel regression	Based on newly constructed datasets on public and private capital, evidence is provided for the role of capital on output, and inefficiencies of public capital is significantly slower than government spending on investment.
Albino-War, M., Cerovic, S., Grigoli, F., Flores, JC., Kapsoli, J., Qu, H., Said, Y., Shukurov, B., Sommer, M., & Yoon, S. (2014)	2006-2012	MENA and CCA countries, oil and gas exporters	Non-parametric Frontiers Analysis: a) Partial Free Disposal Hull (PFDH) b) Data Envelopment Analysis (DEA)	Substantial room to improve public investment efficiency in MENA countries, and by both methods, the most efficient are the more advanced country groups, followed by emerging and then low-income countries. The median for all countries is an 18% investment efficiency gap.
International Monetary Fund (IMF). (2015)	1960s to 2012	134 countries	PIMA framework IMF	Economic and social impact of public investment critically depends on its efficiency. Comparison across countries reveals average inefficiencies in public investment processes of around 30 percent. The most efficient public investors get twice the growth for their public investment than the least efficient.
International Monetary Fund (IMF). (2015)	1960s to 2012	G-20 countries	Case studies in 20 countries PIM assessments	Links public investment management (PIM), institutions and the efficiency of public investment, and finds that better PIM enhances public infrastructure quality, and pinpoints key institutional reforms needed to boost public investment efficiency. Identified efficiency gap of G-20 countries of 22%.
De Jong, J., Ferdinandusse, M., Funda, J., & Vetlov, I. (2017)	1963-2013	12 EU countries	VAR, Structural model	For most of the sample EU countries, the long-run impact of a shock from public capital on GDP is positive. Increase in public investment will have the strongest short-term demand effects, while the longer-term positive effects on the economy's potential output crucially depend on the effectiveness of investments.
De Jong, J., Ferdinandusse, M., Funda, J. (2017)	1960-2014	20 OECD countries	VAR, recursive	The level of public investments does not pose an immediate threat to potential output. Positive spill overs of public capital shocks between European countries identified.

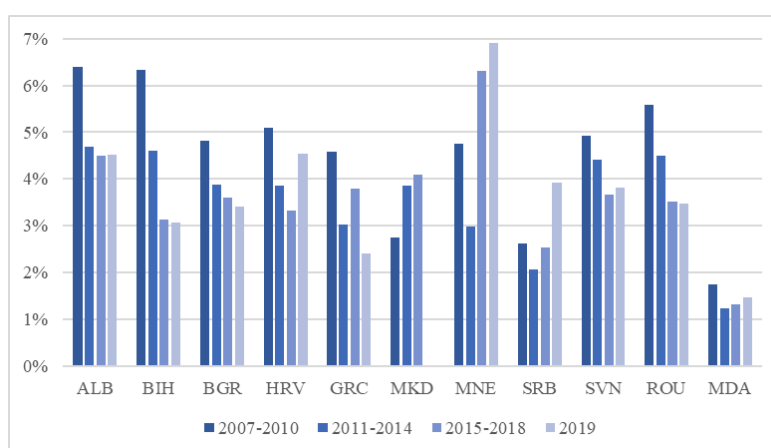
<i>Author(s)</i>	<i>Time period</i>	<i>Geographical coverage</i>	<i>Approach/ Method</i>	<i>Results</i>
Barhoumi, K., Vu, H., Towfighian, S. N., & Maino, R. (2018)	1990-2015	Sub Saharan countries	Efficiency frontier Analysis – DEA	There is substantial scope to improve efficiency under three different estimations of efficiency scores. Sub-Saharan African countries could increase their average investment efficiency by 20 to 54 percent with the same investment amount.
Berg, A., Buffie, E. F., Pattillo, C., Portillo, R., Presbitero, A. F., Zanna, L. F. (2019)	n.a	n.a.	Theoretical paper	Authors show that in a simple standard model, increases in public investment spending in inefficient countries do not have a lower impact on growth than in efficient countries via cross-country regression. The results are counter-intuitive in contrast with Pritchett (2000) and recent policy analyses, follows directly from the standard assumption that the marginal product of public capital declines with the capital/output ratio. Authors argue that both efficiency and the rate of return need to be considered together in assessing the impact of increases in investment, and blanket recommendations against increased public investment spending in inefficient countries need to be reconsidered.
Miyamoto, H., Gueorguiev, N., Honda, J., Baum, A., and Walker, S. (2020)	n.a.	44 countries, advanced, emerging and low-income	Impulse response function	The strength of infrastructure governance plays a critical role in determining the macroeconomic effects of public investment. Countries with stronger governance achieve a stronger output impact of public investment than do countries with weaker governance. Stronger infrastructure governance helps public investment yield a higher growth dividend by improving investment efficiency and productivity, and it stimulates private sector investment. In contrast, in countries with weak infrastructure governance, crowding out of private investment, higher debt-to-GDP ratios, and significant waste of public money can lead to a negative impact on output even after public investment has been increased.
Baum, A., Mogues, T., & Verdier, G. (2020)	2015-2019 and other	62 to 130 countries	DEA & regression	Authors find that on average, low-income developing countries face an efficiency gap of 53 percent, emerging markets have a gap of 34 percent, and advanced economies a gap of 15 percent. The range between top and bottom performers declines as income rises. Better infrastructure governance would raise the efficiency of public investment spending and improve infrastructure outcomes.

*Source: Author's compilation*

### 4.3. Trends in Public Investment Spending & Capital Stock Levels

The SEE region countries' public investment spending (relative to their respective GDP) follow the general global long-term declining trend, with signals for recovery in recent years for some of the countries<sup>26</sup>. Throughout the past fifteen years, the SEE countries show an overall trend of decline in the relative public investment size, except in the cases of North Macedonia, Serbia, and Montenegro. This trend is comparable with the advanced economies, where in the last decade there has been a steady public investment decline, whilst it is in contrast to the trends in the emerging markets and low-income countries, where the public investments which have initially peaked during the last decade stabilized. Hence, the overall SEE as a group, although heterogenic within, generally reflect and follow the global trend of suppressed public investment relative to their GDP. The latter is applicable without an exception for those economies that are categorized as developed countries and at the same time EU member states, while investments are more pronounced among the emerging economies of the SEE groups which are not yet EU members (see Figure 4-1).

Figure 4-1 Public Investment Trends (in percentage of GDP)



Source: Author's calculation, based on data from the IMF database on Capital and Capital Stock

Although public investment is typically expressed and measured via general government gross fixed capital formation (GFCF), to capture the fixed assets attainment during a specific (one) accounting period<sup>27</sup>, there is another significant measure of public capital, and that is the stock of public capital.

Public capital stock is a much more difficult value to be precisely measured, since *public capital stock*<sup>28</sup> represents the accumulated value of public investments over a long period of time, adjusted downwards for an appropriate depreciation rate. Public capital stock is considered to be an input factor for a country's production function, contributor to productivity and thus to an economy's growth, improved living conditions and enhanced business environment. The trends in the change of public capital stock per

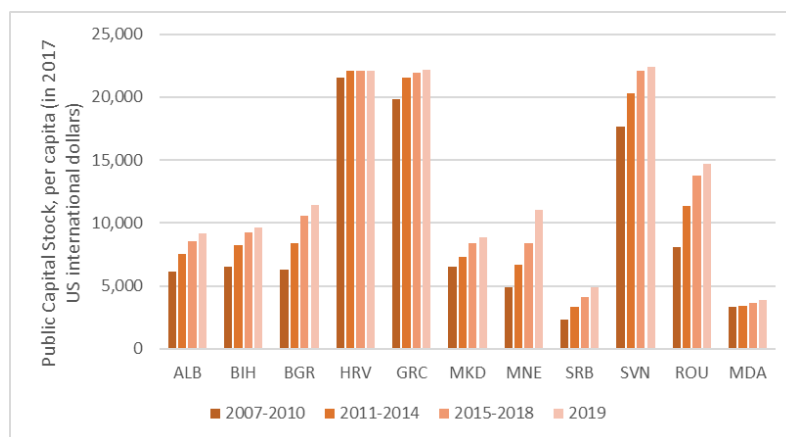
<sup>26</sup> Note: We are aware that depending on the data source, the relative measure of public investment to GDP may vary to a degree due to different methodologies and definitions, including the indicator for coverage of public investment.

<sup>27</sup> Fiscal year

<sup>28</sup> Note: There is scarce and limited data on individual countries' public capital stock. The available and most often used, here as well, is the IMF's database on capital and capital stock compiled from the comprehensive World Penn Tables. For more details on the estimation of the capital stock value and detailed assessment methodology, please see the elaborate methodology description of the IMF Capital and capital stock database.

capita in the SEE countries reasonably indicates that among those countries with more intense (annual) public investment, there is evident growth of the public capital stock level. On the other hand, there are substantial differences among the countries of the level of accumulated per capita capital stock. On one hand, there are much higher values of per capita capital stock in countries such as Croatia, Greece and Slovenia, with more than double the value of Albania, Bosnia, Bulgaria, North Macedonia and Montenegro, and even more the value in Serbia and Moldova (Figure 4-2). There is a ‘gap’ between the non-EU and EU member states which corresponds with the quality of infrastructure.

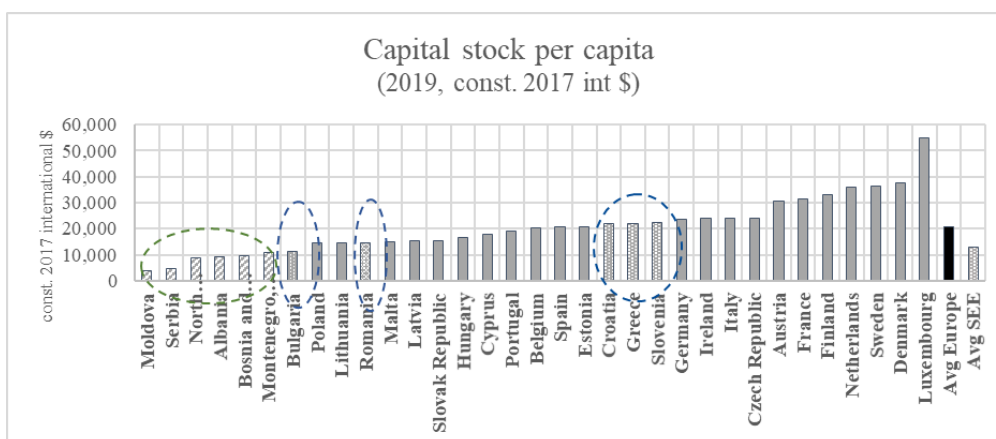
Figure 4-2 Public Capital Stock Trends (per capita)



Source: Author’s calculation, based on data from the IMF database on Capital and Capital Stock

This depicts the context that even though the public investment follows the trend of increased public investments, the capital stock per capita of the non-EU members remains much lower and lagging behind the advanced economies, below the region’s average (Figure 4-3).

Figure 4-3 Public Capital Stock per capita in European countries



Note: Data for Y2019 (except for North Macedonia, Cyprus and Malta, whose data are for Y2018); Capital stock per capita calculated by dividing total general government capital stock by number of population.

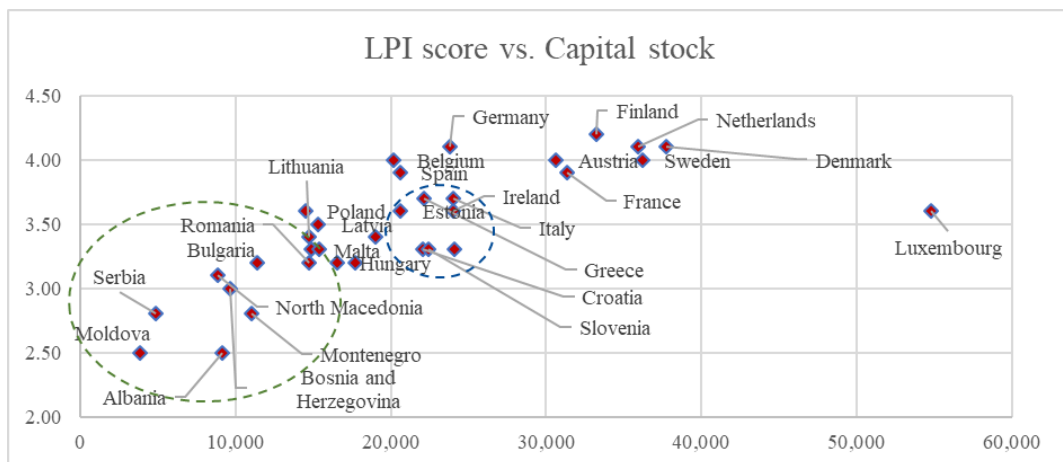
Source: based on the IMF Investment and Capital Stock Dataset, 1960-2019 (World Penn Tables)

Specifically, Moldova, Serbia, North Macedonia, Albania, Bosnia, and Montenegro have the lowest per capita capital stock among all European countries, with less than half

of the average European per capita capital stock. The situation with Bulgaria and Romania, although member states, is similar as the non-members (with a relatively low capital stock). The EU member states, on the other hand, such as Croatia, Greece and Slovenia can be placed in the middle of the array and very close to slightly above the average European level.

The cumulated level of a country’s public investment capital stock is closely correlated with the quality of the infrastructure of the country. For example, one of the several indicators of the investment quality is the logistics performance index (LPI). For the sample countries, the LPI is correlated with the capital stock per capita with a relatively high correlation coefficient of 0.74, indicating the strength of the relationship between these two variables (Figure 4-4). Once again it can be noted that the non-EU member states in the Western Balkans with a lower capital stock per capita and lower LPI are on the left side of the axis (lower end), while the better ranked EU members in the SEE group – Croatia, Slovenia and Greece – with a higher capital stock and performance are to their right on the axis.

*Figure 4-4 Logistics performance index vs. Capital Stock per capita in European countries*

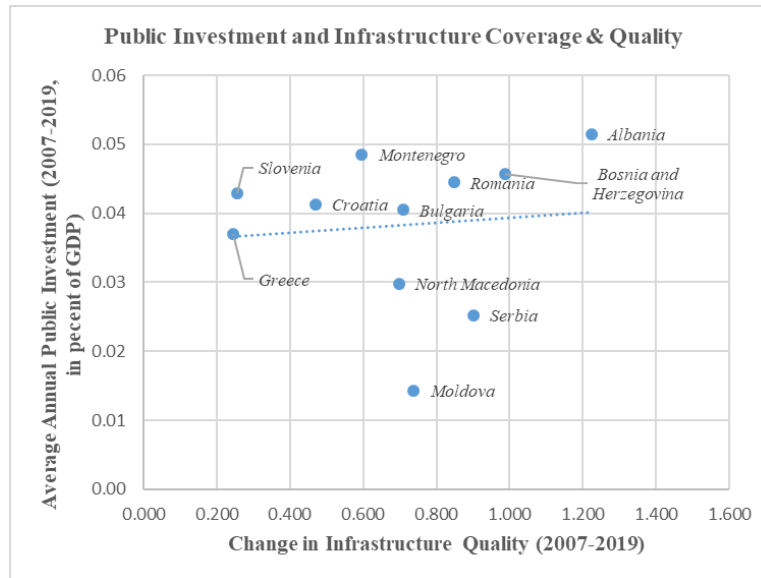


Note: Data for capital stock per capita 2019 and Logistics Performance Index score 2023 (range 1 to 5)

Source: Author’s calculation based on the IMF Investment and Capital Stock Dataset, 1960-2019 (World Penn Tables) and Logistics Performance Index Data sets (World Bank, 2023)

Furthermore, the improvements of infrastructure coverage and its quality in the SEE countries, as measured with the Infrastructure Quality Index (of the World Economic Forum Competitiveness index second pillar), indicate that there is a weak but positive correlation between the size of the public investment (as percentage of GDP) and the improvement (positive change) of the quality of infrastructure.

Figure 4-5 Public Investment Coverage and Quality



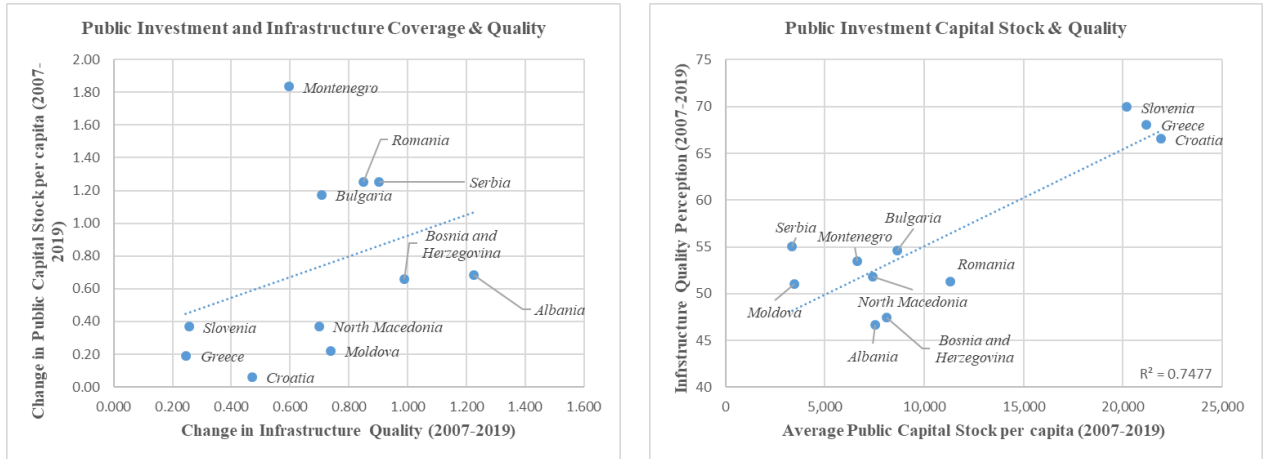
Source: Author's calculation, based on data from Global competitiveness databases, and the IMF international database of investment and capital stock database, World Development Indicators

Figure 4-5 depicts the relationship between a lagged measure of public investment and the change in perception of quality and coverage of public investment. The weak correlation (correlation of 0.10) between the average annual public investment and the perceived improvement of the infrastructure quality may suggest a considerable capacity for potential efficiency enhancement in public investment in most of the SEE countries. Likewise, plotting of the change in infrastructure quality perception and the change in public stock per capita indicate a somewhat stronger, nonetheless still relatively weak, correlation (0.33). There is a much stronger correlation between the average value of public capital stock per capita and the average quality (0.86) as with the other index.

These basic correlations suggest that there is an association between the perceived infrastructure quality within the country and all the past public investments that have throughout time generated the status of the country's public infrastructure assets. This confirms not only the prolonged but also the long-term effects of any current capital spending on the future development of a country. Yet, the largest positive change (increase) of per capita capital stock is not always reflected in proportionally large quality changes, signifying movement towards potential inefficiencies and ineffectiveness (e.g. Montenegro<sup>29</sup>) (Figure 4-6). Connected to the DEA model<sub>4</sub> in the previous chapter, the results also coincide with the estimates that the upper right corner countries (Figure 4-6, panel 2) – Slovenia, Greece and Croatia – are the frontrunners in efficiency of public investment spending.

<sup>29</sup> Note: Montenegro ranks last (14<sup>th</sup>) in input technical efficiency and 9<sup>th</sup> out of 11 in output efficiency (See Table 3.8).

Figure 4-6 Public Investment Coverage and Quality



Source: Author's calculation, based on data from Global competitiveness databases, and the IMF international database of investment and capital stock database, World Development Indicators

#### 4.4. Estimation of Public Investment Efficiency among SEE Countries

To estimate the country's public infrastructure or public investment efficiency there is first and foremost a need for an indicator which signifies a comprehensive measure of how much a country gets back from its public investments. Thus, for the SEE countries of interest, we compose an index to capture the infrastructure coverage and infrastructure quality for a given level of public capital stock, annual investments, and income per capita.

To cross compare the SEE countries, an output DEA model is applied, and the results may be interpreted as the proportional amount of infrastructure quality of each country, which could potentially be increased, whilst using the public capital (and other inputs) unchanged (same level). The following equation is used in the following section and presents Bankers' et al. (1984) model for technical efficiency:

$$\begin{aligned}
 & \max \theta \\
 & \text{subject to} \\
 & \sum_{j=1}^n \lambda_j x_{ij} \leq x_{i0} \quad i = 1, 2, 3, \dots, m \\
 & \sum_{j=1}^n \lambda_j y_{rj} \geq \theta y_{r0} \quad r = 1, 2, 3, \dots, s \\
 & \sum_{j=1}^n \lambda_j = 1 \\
 & \lambda_j \geq 0 \quad j = 1, 2, 3, \dots, n
 \end{aligned}
 \tag{Eq. 4.1}$$

Where  $DMU_0$  represents one of the  $n$  DMUs under evaluation;  $x_{i0}$  and  $y_{r0}$  are the  $i$ -th input and  $r$ -th output for  $DMU_0$ , respectively;  $\lambda_j$  are unknown weights, where  $j = 1, 2, 3, \dots, n$  represents the number of DMUs. The optimal value of  $\theta^*$  represents distance from the efficient frontier, and hence the most technically efficient country will

have  $\theta^*=1$  and the inefficient countries will exhibit  $\theta^*<1$ . The VRS model is considered a better representation of efficiency analysis under the assumption that output levels cannot be reduced proportionately with the levels of input. By solving the above mathematical programming problem, it is feasible to estimate the public investment spending efficiency scores for each country.

The model for estimation of the public investment efficiency is primarily focused on infrastructure *output*, which is designed as a combination of two components. The first component captures the physical infrastructure, and the second captures the qualitative aspect of quality perception. The physical indicator component of the index is a purely quantitative indicator and is generated as public investments in hard construction infrastructure (as in Calderon & Serven, 2004; 2008), including the social service provision infrastructure (for health and education) (as in Schwartz et al. 2015, and in other IMF empirical publications on this matter). The physical infrastructure indicator considers the quantitative volume measures: length of road network, access to water, electricity production, secondary school teachers, and hospital beds (principally expressed on a per capita level). The absolute values of the variables are then averaged for the period from 2007 to 2019 (in certain instances the period may be slightly different due to missing data depending on the country's data availability), then these are standardized, as they are measured in different scales, and finally equal weights are applied to obtain the overall physical indicator component. The physical infrastructure data provide information on and capture the aspect of primary infrastructure coverage, while it does not though capture the quality aspect of infrastructure. Therefore, a qualitative component of the index is assembled, which is fully based on the quality perception indicator representing the second component of the outcome. The qualitative indicator of infrastructure quality is based on the quantifiable scores as per the second pillar of the Global Competitiveness Index (GCI). These values are then averaged for the same time period and rescaled. Finally, based on the two components, a composite indicator is generated, with equal weights applied for the physical and the quality indicator.

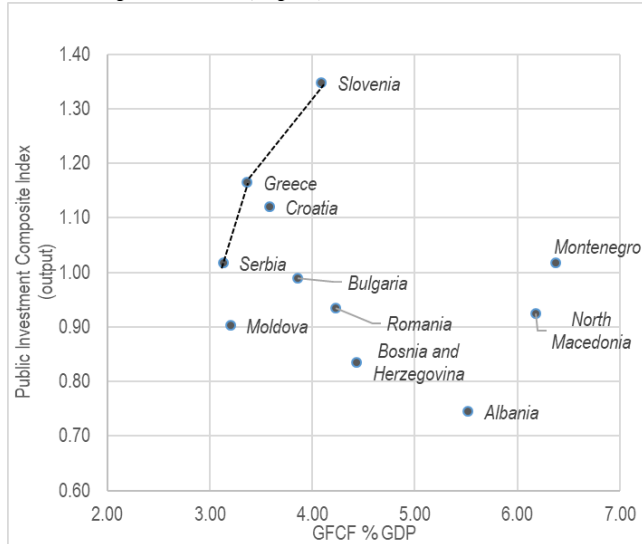
On the other side, there are three *input* variables used: public capital stock per capita, gross fixed capital formation, and considering there is input shortcoming (based on the assumption of factor homogeneity – quality of inputs similar within the group), a third input variable as a control variable – GDP per capita, is added.

Applying the approach by constructing a Public Investment Index, there are notable indications suggesting an opportunity for efficiency improvement among the SEE countries when compared among each other. The efficiency improvements are applicable with a different degree among the countries and without a doubt these are expected to be larger when compared to countries with a higher development level. The average output efficiency gap (inefficiency) among the SEE countries is estimated at 9%, while the average input efficiency gap is estimated at 15%. Inter-country comparison points to some efficient countries, while as well to other countries with larger efficiency gaps, which are especially pronounced in the cases of Montenegro and North Macedonia (placed furthest from the efficiency frontier) (See Figure 4.7).

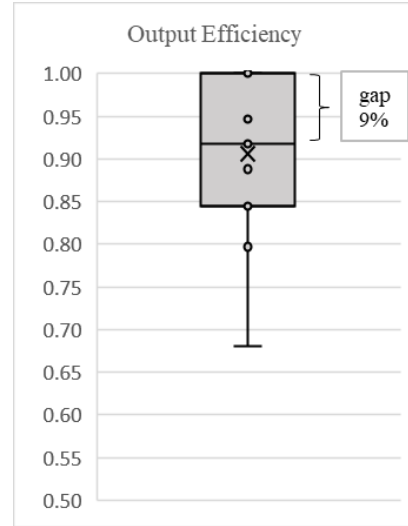


Figure 4-7 Public Capital Performance

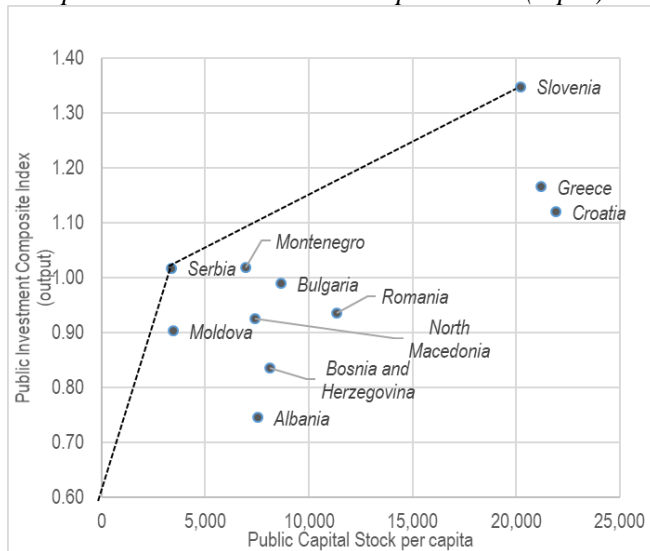
Public Investment Efficiency Frontier  
 Composite indicator & Gross Fixed Capital Formation  
 Public capital stock (input)



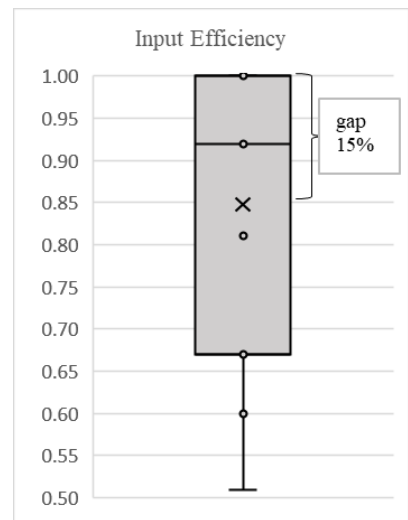
Public Investment Efficiency Index  
 (Output efficiency gap)



Public investment Efficiency Frontier  
 Composite indicator & Public capital stock (input)



Public Investment Efficiency Index  
 (Input efficiency gap)



Source: Author's calculation, based on data from Global competitiveness databases and the IMF international database of investment and capital stock database, World Development Indicators

The application of a data envelopment model confirms the substantial scope for improvement of public investment efficiency for most of the countries in the SEE region when compared among each other. As illustrated in Figure (4-7) and quantified in the input- and output-oriented model (Table 4.2), there are several efficient countries, and although the average input efficiency gap is 15%, Bosnia, Greece, Serbia, Slovenia and Moldova can be ranked as more efficient (with efficiency scores of 1.00), while others have substantially lower efficiencies, especially in the case of Montenegro, Albania and North Macedonia. The efficiency gap with production frontier is measured as a distance between the country's assessment and the frontier line, given the inputs: level of public capital stock, average public investment spending, and income per capita. For the least

efficient three, this means that they may decrease the input (public expenditure) by the size of the input gap (49% Montenegro, 40% Albania, 33% North Macedonia) and still achieve the same output (infrastructure quality).

The size of the input gap may be considered possibly as more relevant from a policy aspect, as the inputs are more controllable and can be affected by the policy side. It is also interesting to see that the gap is not always shrinking with the increasing size of the capital stock per capita or with the average GFCF, as in the case of both Serbia and Moldova, which although have among the lowest per capita public stock and do not excel in the public investment ratios, still have better efficiency scores.

The output-oriented model indicates better efficiency scores with an average gap of 10%. Once again, there are variations within the countries, with quite output efficient countries, providing good infrastructure quality and coverage (with a score of 1.00 for Bosnia, Serbia and Slovenia), while others with possibilities for significant improvements, especially pronounced with larger output efficiency gaps for Albania, Romania and North Macedonia. The output gap can be interpreted as these countries may significantly increase the output, i.e. achieve better quality and coverage (Albania by 32%, Romania by 20% and North Macedonia by 15%) without changing the level of inputs.

The mean values of the non-EU SEE countries of both input- and output-oriented models point to available space (by 10pp, and 3pp) to increase the quality in public investments in infrastructure and/or reduce public spending in order to reach the mean scores of their EU member peers in the region (Table 4.2).

*Table 4.2 Model: 3 Inputs – Public Capital Stock, Gross Fixed Capital Formation, GDP & 1 Output – Public Investment Composite index*

	<i>Input-Oriented</i>				<i>Output-Oriented</i>		
	<i>CRS</i>	<i>VRS</i>	<i>PEER</i>	<i>RANK</i>	<i>VRS</i>	<i>PEER</i>	<i>RANK</i>
Albania	0.446	0.600	GRC, SRB, BIH	10	0.680	SRB, SVN	11
Bosnia and Herzegovina	1.000	1.000	BIH	1	1.000	BIH	1
Bulgaria	0.778	0.811	SRB	8	0.888	SRB, SVN	7
Croatia	0.906	0.919	SRB, SVN	6	0.918	GRC, SVN	6
Greece	1.000	1.000	GRC	1	1.000	GRC	1
North Macedonia	0.649	0.670	SRB, BIH	9	0.845	SVN, SRB	9
Montenegro	0.500	0.509	SVN, SRB	11	0.947	SVN, SRB	5
Serbia	1.000	1.000	SRB	1	1.000	SRB	1
Slovenia	1.000	1.000	SVN	1	1.000	SVN	1
Romania	0.719	0.814	SRB, SVN, GRC	7	0.797	SVN, SRB	10
Moldova	0.888	1.000	SRB	1	0.888	SRB	7
<i>Mean</i>	<i>0.808</i>	<i>0.848</i>			<i>0.906</i>		
<i>Minimum</i>	<i>0.446</i>	<i>0.509</i>			<i>0.680</i>		
<i>Mean EU members</i>	<i>0.881</i>	<i>0.909</i>			<i>0.921</i>		
<i>Mean non-EU members</i>	<i>0.747</i>	<i>0.797</i>			<i>0.893</i>		

Note: CRS - Constant Return to Scale; VRS - Variable Return to Scale

Source: Author's calculation, DEAP Version 2.1 used in calculation

#### 4.5. Public Investment Efficiency & Governance

Subsequently to estimating the public investment efficiency score, a second stage regression analysis is included to estimate the effects of governance and political economic determinants on the efficiency of the sector's public investment spending by estimating regression where the efficiency score is the dependent variable.

As the analysis with the composite indicators of DEA implicitly assume that expenditure efficiency is purely a result of discretionary inputs (policy and spending), it does not consider other environmental factors which are exogenous and non-discretionary. However, these exogenous factors may play an important role in determining diversity across countries and influence performance and efficiency. Non-discretionary factors can have economic and non-economic origin (see more on the subject in Afonso, Schuknecht, & Tanzi, 2006). As non-discretionary and discretionary factors jointly contribute to a country's performance and efficiency, in the literature there are several proposals on how to deal with this issue, usually by the usage of a two-stage analysis (see for example Ruggiero, 2004; Simar & Wilson, 2004). Using DEA output efficiency scores computed in the previous section, we evaluate the significance of several non-discretionary factors in our country sample. The relationship between efficiency of public investment spending is modelled in a Tobit model setting. The Tobit model includes a 'censored' dependent value within set boundaries due to the censored nature of efficiency scores, as they take the values between zero and one, based on equation (4.2). The output efficiency scores are regressed,  $\delta_i$ , on a set of non-discretionary inputs,  $Z$ , as follows:

$$\delta_i = f(Z_i) + \varepsilon_i \quad (Eq. 4.2)$$

Previous research on the performance and efficiency of the public sector and its functions that apply non-parametric methods (as named extensively, mostly used either FDH or DEA) find significant inefficiencies in many countries. For example, studies on education include Gupta & Verhoeven (2001), Clements (2002), St. Aubyn (2003), then overall public spending by Afonso, Schuknecht, & Tanzi (2005), Afonso & St. Aubyn (2005a, b) for efficiency in providing health and education. Furthermore, De Borger et al. (1994), De Borger & Kerstens (1996), and Afonso & Fernandes (2006) find evidence of spending inefficiencies for the local government sector. Dabla-Noris et al. (2012) investigate the relation between public investment efficiency and institutional environment and public investment management. Afonso & St. Aubyn (2005) undertook a two-step DEA/Tobit analysis, in the context of a cross-country analysis of secondary education efficiency. Ou et al. (2020) with DEA/Tobit two-stage explore the determining effects of spending structure on efficiency among Chinese provinces, then Cincera et al. (2009) conducted DEA/Tobit for R&D spending and their determinants among EU countries. Furthermore, Brini & Jemmali (2015) analysed the efficiency of general administration, health, education and infrastructure in the Middle East and North Africa (MENA), modelling in a two-stage with the Tobit analysis the efficiency scores and political stability, voice and accountability, democracy, trade, money growth, economic growth, etc.

Following a DEA/Tobit two-stage approach, in this section we are using the DEA output efficiency scores and evaluating the importance of non-discretionary inputs via Tobit regression, where output efficiency scores are regressed on six exogenous, non-

discretionary factors, which are the components of the World governance index (WGI<sup>30</sup>): control of corruption, government effectiveness, regulatory quality, political stability, rule of law, and voice and accountability.

- *Control of corruption* – as an indicator is used as a proxy of the degree a country has established mechanisms for control of corruption. Corruption's negative impact on public policy and its efficiency has been empirically researched (for example Mocetti & Orlando, 2019; Monte & Papagni, 2001; Sinha et al., 2019; Dabla-Noris et al., 2012, etc.) as a cause of degradation and decreased efficiency. Besides inefficiencies arising from poorly executed and ineffective projects resulting in waste, public investment spending compared to other public spending is more frequently associated with possibilities for corruption due to the complex nature of the projects, their relatively larger size, the longer cycles and thus the additional possibilities for fraudulent activities throughout the investment stages (project appraisal, selection, implementation, and evaluation). Consequently, corruption is expected to be negatively associated with efficiency, i.e. better control of corruption indicator is expected to be positively associated with investment efficiency.
- *Government effectiveness* – is an indicator used as a proxy for the quality of public services. The indicator captures (by design) the perceptions of the quality of all public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to the policies. It is expected that government effectiveness is to be positively associated with efficiency (see more in Montes et al., 2018; Ranjkumar et al., 2008, Chan et al., 2012, etc.)
- *Regulatory quality* – captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. It should also be expected to be positively associated with technical efficiency.
- *Political stability* – the index combines several sub-indicators to measure perception of the likelihood that the current government in power will be destabilized or overthrown by non-institutional (and violent) means; captures possible compromised governance quality. Hence, better political stability is expected to be positively associated with efficiency.
- *Rule of law* – this indicator measures the extent to which agents have confidence in and abide by the rules of society. Including the effectiveness and predictability of judiciary and enforceability of contracts, i.e. the measure of success a society is in developing an environment with predictable and fair rules for economic and social interactions.
- *Voice and accountability* – indicates (assesses) various aspects of political processes, civil rights, and political rights, i.e. the extent to which the citizens in a country are able to participate in the selection of the government.

Exogenous factors could also include other factors that could be detrimental or favourable to efficiency, for which economically meaningful hypotheses are less readily obtainable, thus such variables are not included in our analysis.

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<sup>30</sup> More information on the composition, methodology and the like for the WGI's components can be retrieved from <https://info.worldbank.org/governance/wgi/>

The regression results confirm the relevance of several of our hypotheses, that each of the dimensions of governance indicator has a positive association with the public investment efficiency as variables chosen to be tested. The Tobit regression results suggest that accountability, government policy effectiveness and political stability have a statistically significant effect when all the WGI indicators are modelled jointly (regression column 1, in Table 4.3). After conducting a test on the redundant variables, which are without statistical significance for the sample of SEE countries, these have been excluded from the model. Namely, regulatory quality and rule of law although positive association coefficient, have not been found to display a statistically significant influence on public investment efficiency, thus the variables have been excluded in the second model.

The second model regression specification suggests that besides accountability and voice, government effectiveness and political stability (the three variables being robust over the two specifications), corruption control, as well as being an EU member (dummy) display statistical significance as variables in determining and predicting the output efficiency of public investments in the SEE region countries.

As expected, there is a significant and positive association between the estimated efficiency level of public investment in the SEE countries with the government effectiveness, and corruption control. The improvement and the better quality of the public service, coupled with the quality of the administrative service provided by the public sector, has a positive effect on a more efficient and more effective public investment spending. The quality of the service and the administrative process for management of the public investment processes are complex and long-term processes that demand efficient and coordinated administrative processes essential for providing quality services in the area of public investment. The commitment of the government in proper implementation of the public investment programs and strategies is by all means a reflection of the effectiveness of a government and has a positive correlation among the SEE countries.

*Table 4.3 Censored normal Tobit results (dependent variable: public investment output efficiency score)*

<i>Censored normal Tobit results (dependent variable: output efficiency score)</i>						
	<i>1</i>			<i>2</i>		
Accountability	-0.425	(-4.352)	***	-0.432	(-4.327)	***
Government effectiveness	0.137	(2.311)	**	0.131	(2.158)	**
Political stability	-0.477	(-3.647)	***	-0.431	(-5.197)	***
Regulatory Quality	0.033	(0.199)				
Rule of law	0.108	(0.775)				
Corruption control	0.210	(1.068)		0.321	(3.715)	***
Dummy EU member	0.334	(4.154)		0.328	(4.475)	***
C	2.015	(7.448)	***	2.040	(7.646)	***
S.D. dependent var.	0.102			0.102		
no. observations	11			11		

*note: t-statistics in parenthesis, \*\*\*, \*\*, \* statistical significance at 1%, 5% and 10% respectively*

*Source: Author's calculation*

Furthermore, corruption is detrimental for public investment proper selection, implementation, and assessment. Thus, although expectation for full eradication is

utopian, at least better control of the ‘flourishing’ corruption among the SEE<sup>31</sup> (as one of the major obstacles in governance and development of these countries) as expected is significantly and positively associated with the efficiency in public investment.

On the contrary, and unlike the expectation of positive association of public investment efficiency with accountability and political stability indicators, the model results give a different image, i.e. there is a significant negative association with efficiency levels. The possible explanation for the negative sign with these variables can be possibly explained through several theories. Namely, it is expected that a higher degree of *voice and accountability* indicates that citizens are in a position to select their own government, and hence the government is expected to be cautious in spending, leading to higher public spending efficiency. Nevertheless, higher voice and accountability and lower civil liberty might also reduce government efficiency, especially in the cases of developing countries, as greater civil liberties may signal that the government is more sensitive to popular opinion, societies may be prone to clientelism, cronyism, etc., and as an effect may refrain from enacting necessary and optimal public sector reforms. Lack of trust may also result in voter preference for current expenditure spending rather than capital expenditure spending due to the delayed and long-term benefits of the latter compared to the immediate gains the current expenditure offer. In addition, it may imply that government officials respond to numerous and diverse entities in a scattered and non-systematic approach. The caveats argued by some authors that are along these lines is that in addition to citizens’ access to information (for example see Kolstad & Wiig, 2009), people need the ability to process this information, act on it, and to be incentivised to do so. Adequate and detailed information for the citizens is essential to proper accountability systems. Furthermore (see more in Carlitz, 2013), institutional capacity to realise the benefits of transparency and accountability, and mechanisms to punish corrupt behaviour are required. The presence of multiple principals and the resulting array of targets may halt public sector reforms as well (as explained by Rayp & Sijpe, 2007, for the case of developing countries), as the internal monitoring mechanisms of government are seldom able to effectively track the outcomes of its policies and programs.

On the other variable of political stability, it is intuitively expected that uncertainty associated with an unstable political environment may reduce investment (and economic growth and development). On the other hand, poor economic performance may lead to government collapse and political instability. However, political stability can be also based on complacency and stagnation, or having a political party in place that does not have to compete to be re-elected. In these cases, political stability is expected to have the opposite effect on economic performance, and thus public spending efficiency. While an environment of political stability is the desired state, it could also become a ground for cronyism with impunity and politically stable autocracies (Husain, 2014). Political stability in the form of complacency and stagnation, which does not allow for real political competition, creates governing elites and a ‘politically stable’ system with barriers to freedom, power abuse, and corruption. The captured institutions and state capture phenomenon of at least the Western Balkan countries have been qualifications received from several international sources (for more details see Bak, 2019), and thus the coining

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<sup>31</sup> On the different assessments, rankings and corruption indexes, see Transparency International’s Corruption Perception Index, World Governance Indicators dimension on corruption control, Eurobarometer on Corruption, etc.

the term for the phenomenon of ‘*stabilitocracy*’<sup>32</sup> (see more in Kmezic & Bieber, 2017; Zweers et. al., 2022; Bieber, 2017; Richter & Wunsch, 2020).

#### 4.6. Public Investment in a Fiscal Policy Reaction Function

To examine the association of public investment level and the variables of economic growth, public debt, and private investment, we draw on fiscal policy reaction functions literature (Bohn, 1998) and design regression specification. In the fiscal policy reaction function, public spending is a function of public finance condition proxied by the public debt level (lagged), the cyclical macroeconomic conditions (usually measured via the output gap), and other controls. A simple parsimonious specification is used for predicting public investment level though inclusion of variables of economic growth, lagged level of public debt (% GDP), and other controls. Since identification of an output gap is challenging for the purposes of cyclical macroeconomic conditions, a lagged GDP growth is used, as well as expectation for contemporaneous growth. In addition, lagged public investment is included to account for persistence, and country/time fixed effects account for unobserved heterogeneities across countries and over time. The regression specification tested is as follows:

$$pub\_inv_{i,t} = \beta pub\_inv_{i,t-1} + \sigma debt_{i,t-1} + \theta growth_{i,t-1} + \mu growthforc_{i,t-1} + \rho priv\_inv_{i,t-1} + \gamma EU\_HIC_{i,t} + \alpha_i + \varphi_i + \varepsilon_{i,t} \quad (Eq. 4.3)$$

Where  $pub\_inv_{i,t}$  refers to public investment as a share of GDP; and lagged,  $debt_{i,t-1}$  is the debt-to-GDP ratio;  $growth_{i,t-1}$  denotes output growth;  $growthforc_{i,t-1}$  is the expectation about the current economic activity (proxied by GDP growth forecasts for the year as of October the year before, by the IMF’s WEO);  $priv\_inv_{i,t}$  refers to private investment as a share of GDP; EU\_HIC is a dummy variable for EU membership, and  $\alpha_i, \varphi_i$  are the country and time fixed effects, respectively. The investment regression results are presented in Table 4.4.

Starting with column one towards column six, the dependent variable public investment and the regression specifications are presented from left to right, first without lagged public investment and without lagged private investment and not accounting for any effects. The subsequent columns account for fixed effect and include the lagged variables of public and private investment.

The regression coefficient of the lagged level of public debt, unlike the expectation of being negative, has a positive sign in five of the six regression specifications. It is expected that higher public debt (in the previous year) will determine lower levels of public investment (in the current year), however all other things being equal, in the case of SEE and for the concerning period, a positive association is indicated, yet it is statistically significant exclusively in combination with the private investment variable. This might imply that there is a low to no dependence of public investment level on the previous year’s debt level, i.e. the debt level does not determine the relative values of public investment. Furthermore, it also indicates the significance of a relationship with private investment level and their confounding effect. The results are not consistent with

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<sup>32</sup> A term that indicates hybrid, semi-authoritarian regimes with evident democratic shortcomings and autocratic tendencies, which claim to offer pro-EU regional stability (Bieber, 2017).

the majority of findings for developed countries, which find that as the public debt rises, the government spending declines, however for the SEE as a group and for the period in case, these countries are inclined towards a period of increased public investment accompanied with increasing public debt (driven by debt), as a possible indicator of the presence of possible procyclical fiscal policy.

*Table 4.4 Public Investment Regressions*

Dependent variable: Public investment	No fixed effects			With Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Constant</i>	2.399 ** (1.097)	0.021 (0.752)	-1.171 (0.98)	5.809 *** (0.967)	0.461 (0.539)	-0.632 (0.707)
<i>Lagged public investment</i>		0.726 *** (0.084)	0.677 *** (0.087)		0.762 *** (0.058)	0.718 *** (0.061)
<i>Lagged public debt</i>	0.009 (0.006)	0.006 (0.004)	0.009 ** (0.004)	-0.012 (0.01)	0.004 (0.003)	0.007 ** (0.003)
<i>Lagged GDP growth</i>	0.289 (0.185)	0.099 (0.12)	0.030 (0.123)	-0.161 (0.106)	-0.005 (0.088)	-0.061 (0.09)
<i>Forecast of GDP growth (period before)</i>	0.346 (0.237)	0.276 ** (0.151)	0.249 * (0.148)	0.090 (0.131)	0.224 ** (0.106)	0.208 * (0.105)
<i>Lagged private investment</i>			0.089 * (0.048)			0.078 ** (0.033)
<i>Income level/EU member</i>	-1.029 ** (0.462)	-0.513 * (0.301)	-0.447 (0.296)	-0.759 (0.898)	-0.496 ** (0.203)	-0.435 *** (0.203)
Observations	55	55	55	55	55	55
R-squared	0.211	0.686	0.707	0.291	0.727	0.743

Standard errors in parentheses ( ). \*\*\* p<0.01, \*\*p<0.05, \*p<0.1

Source: Author's estimates

In addition, public investment is not found to be associated with a lagged GDP growth rate with statistical significance. However, as it is expected and is in line with other empirical findings, public investment is positively associated and determined with the expectations for economic growth. Almost without significant differences in the specifications (without and with fixed effects), the expected growth rate is positively associated and statistically significantly with the level of public investments of the current year. Consequently, the coefficient is implying the relevance of the growth expectations, which are affecting the public investment level, unlike the previous period's achieved economic growth.

The lagged private investment level is another variable that we control, with a positive and statistically significant association with the public investment, indicating that the public investment receives the signal and follows the private investment trend. Lastly, the dummy variable for the income group the country belongs to, which at the same time coincides with the EU membership (the EU members are at the same time categorized as high-income countries, while the non-member countries are middle-income countries), indicates a strong negative association between public investment size and the income level, indicating that investment level vary across income groups, namely with more intense public investment among the middle-income and non-member countries, which has been shown as well with the descriptive statistics on the investment trends among the SEE countries. The inclusion of lagged public investment as a control qualitatively affects



the results, as it interacts with other variables. When a country and time fixed effects are considered, lagged GDP growth still does not indicate significantly an association with public investment; lagged public investment retains the sign and the statistical significance; lagged public debt retains the positive sign and becomes statistically significant only when private investment variables are part of the regression specification, while GDP growth forecast retains its significance. The dummy on income level retains the same sign and is still statistically significant. This suggests that the higher public investment observed in the non-member states relative to the other member countries, is mainly driven by differences across countries and time (heterogeneity of the countries in the sample) rather than by within-country variations in growth performance expectations.

#### **4.7. Concluding Remarks**

Most of the SEE countries, throughout the last fifteen years, show an overall trend of decline in their relative public investment, except for North Macedonia, Serbia and Montenegro. The general SEE trend, although heterogenic, reflects and follows the global suppressed public investment, which is especially pronounced among the developed EU member states, unlike the emerging economies, which are not EU members.

On the contrary, the per capita capital stock is significantly higher in Croatia, Greece and Slovenia, double the values in Albania, Bosnia, Bulgaria, North Macedonia and Montenegro, and more than double compared to Serbia and Moldova. The public investment capital stock is strongly correlated with the quality of the infrastructure (logistics performance index 0.74, and infrastructure quality index 0.86).

The largest increases of the capital stock per capita though are not always reflected in proportionally large quality changes, particularly noticeable in the case of Montenegro, indicating for potential inefficiencies and ineffectiveness of public investment spending. The country is also assessed as the least input efficient country, with a score of 0.509, implying that Montenegro can reduce its investment spending by almost half and still achieve the same output.

In estimating public investment efficiency by data envelopment analysis, where output is a combination of index capturing physical and quality aspects, and input is a combination of the capital stock, gross fixed capital formation and income level, it is estimated that the average output efficiency gap (or inefficiency level) among the SEE countries is 9% and the average input efficiency gap is estimated at 15%.

The SEE inter-country comparison marks differences and large efficiency gaps especially pronounced in the cases of Montenegro and North Macedonia – positioned furthest from the efficiency frontier, in comparison to the other countries in the group. The assessment indicated that the least three public investment efficient countries may decrease their input by a third or almost half (49% in Montenegro, 40% in Albania, 33% in North Macedonia) and still achieve the same output – infrastructure quality. The mean values of the non-EU member SEE countries via both input- and output-oriented models point to available space (by 10pp, and 3pp) to increase the quality in public investments in infrastructure in order to reach the mean scores of their EU member peers in the region.

The results are in most part in line with the findings of Baum et al. (2020) and Myamoto et al. (2020), as the lowest performing countries' in public investment efficiency correctly placed in the range of the emerging markets group, while even those that are not on the frontier and are more advanced (higher income) can also achieve efficiencies of around 20% or less (input efficiency gap for Bulgaria of 19%, Croatia 8%, Romania 9%).

Comparison of the efficiency of public investment spending with the overall public spending efficiency (in chapter two) notes some similarities in efficiencies, but also some significant differences. For example, while Albania is among the most efficient (output efficiency) in total public spending, it is at the same time least efficient in public investment; the opposite holds for Greece – while it is on the bottom of overall public spending efficiency, it is among the most efficient in public investment spending, as is similarly the case of Serbia. Slovenia, on the other hand, indicates consistency in being the best performer in the region with highest efficiency both in overall spending as well as in public investment and in other public sectors. In the case of North Macedonia, the country is consistently among the lowest rankings with significant possibilities for increased public spending efficiency compared to its regional peers.

The second stage regression analysis, estimating the effects of governance determinants on the public investment efficiency, was conducted through using as variables the indexes of control of corruption, government effectiveness, regulatory quality, political stability, rule of law, and voice and accountability. The coefficients indicate a statistically significant and positive association of public investment efficiency with government effectiveness and corruption control. These confirm the importance of quality of the public service and quality of the administrative service on the efficient and effective public investment spending. Interestingly, the negative association of public investment efficiency with accountability and political stability indicators as noted, is consistent with the possible explanation of governments, which are sensitive to popular opinion, prone to clientelism, cronyism, etc., and political stability that may be based on complacency and stagnation, which may also become a ground for cronyism with impunity and politically stable autocracies, with the occurrence of the phenomenon of ‘stabilitocracy’.

Lastly, the chapter regression models for determining public investment levels among the SEE imply it is determined by the expectation for economic growth rather than the achieved economic growth; by the level of past public investments as well as the signals of the private investments in the period prior; however, it is not significantly determined by the public debt level. Furthermore, public investment in the non-member states relative to the member countries is mainly driven by differences across countries and time rather than by within-country variations in growth performance expectations.

## **Chapter 5**

# **Public Investment Impact in Economic Output & the Nexus with Private Investment & Public Debt**

## **Chapter 5 PUBLIC INVESTMENT IMPACT ON ECONOMIC OUTPUT AND THE NEXUS WITH PRIVATE INVESTMENT AND PUBLIC DEBT**

### **Abstract**

Theory stipulates that like other government spending, public investment spending provides short-term boosts to the economy, however it is also expected that public investments through the cumulated capital stock provide a long-term effect by raising the total productive capacity of the economy.

This chapter explores the existence of a long-term relationship between the public investment, on the one hand, and private investment, economic output, public debt and interest rates, on the other hand, among the SEE countries as a group. With solving a cointegration equation, it was identified that there is an existence of a long-term positive link between public investment and private investment and economic output, while public investment size is negatively associated with increasing public debt to GDP ratio. This finding is complementary with the theory and most empirical studies, indicating that public investments are boosted by increased economic activity, which in turn increases fiscal capacity and incentivizes more private investments.

There is a moderate difference detected when comparing EU and non-EU member states of the SEE group, whereby among the EU member states the crowding-in hypothesis holds with statistical significance, while it does not hold with statistical significance for the non-EU countries. By employing panel VECM, an error correction term was estimated and the long-term relationship of public investment and the other variables (GDP, private investment, public debt and interest rate) was determined, and recognised that any disequilibrium in the short run is corrected every period following any disturbances (shock) with adjustment speed of 3% per year.

In the short run, the results indicate that the current year's public investment is affected downwards by the past year's public investments, *ceteris paribus*, suggesting that although in the long run the public investments may exert an increasing trend, in a short run, public investment is dependent on the last year's investments, implying that governments are generally not inclined towards continuous increases. The last is pronounced among the non-EU sub-sample countries, in line with the regular occurrences of capital expenditure budget cuts with the supplemental budgets.

Economic output and private investment are not statistically significant determinants for public investment in the short run, however increases in public debt to GDP and interest rates is associated with decrease in public investment. The results have an implication for a need for improved design for future public investment programs, design of austerity programs for possible debt predicaments, a need for closer examination of private investment response drivers, and stronger efforts for spending efficiency and effectiveness within the public investment management processes, which may be contributing to restricted private investment and GDP growth.

**Keywords:** public and private investment; economic output

**JEL:** H54, E22, O40

## 5.1. Introduction

There is a general consensus among both economists and policymakers of the relevance of the investments in a country's economic progress and performance, however there is no consensus on the relative importance of the investment's private and public component on economic growth nor on their optimal level or mix.

The macroeconomic theory on the public component of investment states that it stimulates the economic activity through short-term effects on aggregate demand and it increases the productivity of the already existing private capital (physical or human). Then, the crowding-in hypothesis supporters argue that public investment encourages new private investment as the private sector benefits from the higher productivity created, increasing the country's economic growth (for example see Barro, 1990; Barro & Sala-i-Martin, 1992; Futagami, Morita, & Shibata 1993; Glomm & Ravikmur, 1994; Turnovsky, 1997, etc.)

The theory stipulates that public investments affect economic growth through two channels. One, efficiency – how much a given amount of public investment provides in physical infrastructure, and two, productivity – how the created physical infrastructure affects economic growth.

When it comes to efficiency, not all the absolute amount of public investment spending is translated into an equal and the same amount of physical capital in the capital stock, as many countries will receive less value-for-money compared to a situation if the resources have been used more efficiently. Productivity is the other channel since not all physical capital has the same productive impact on the economy. Even though capital stock can be accumulated through time, its productivity can be eroded by numerous factors including poor project selection with little growth contribution or lack of good governance infrastructure, which when enhanced could have led to a better quality investment and to greater benefits.

Another group of authors also argue that the positive relationship between public investment and economic growth after a certain point could reverse to become negative, primarily due to the weight posed by the financing burden of public capital outlays (Barro, 1990) or due to occurrence of a crowding-out, i.e. when public investment crowds out private investment (for example Aschauer, 1989; Fosu, Getachew, & Ziesemer, 2016, etc).

Therefore, public investment, especially in hard infrastructure, like recurrent government spending, is deemed to provide short-term economic boosts through the short-term fiscal multiplier on aggregate demand. Nevertheless, besides the short-term effect, it is expected that public investment spending also provides a long-term effect on the supply side, as the higher public capital stock accumulated will raise the productive capacity of the economy. Warner (2014) for example in the IMF study, reports no significant evidence in support of the position that public capital promotes growth in the long term, i.e. the effect halts solely on the short-term demand.

The strength of the long-run effect will however depend on the absorptive capacity, the strength of the investment process, which will determine and affect the competent selection of capital projects, their implementation, and monitoring. If inefficiencies thrive within the processes, then only a fraction of the investment amount will add to the actual capital base of the country (see for example Presbitero, 2016). There are abundant reports confirming that the long-term effect of public investment on growth very much depend on the overall management of the process and strength on the institutions in the

governance structure (see for example Gupta et al., 2014; IMF, 2015; Miyamoto et al., 2020).

The role of capital investments as well may depend on the level of a country's development stage. Low-income countries transition to middle-income country status through sectoral shifts, moving from low-productive agriculture to higher-productivity manufacturing, and by adopting new technology. These sources of growth, however, dissipate once the status of middle-income country is reached, particularly upper middle income, since the pool of underemployed labour shrinks, causing wage rises and competitiveness decline, placing the country in a 'middle-income trap'. Consequently, at that point maintaining growth becomes increasingly difficult, unless other productivity raising factors exist to enable a shift towards higher value-added products and services, determined by innovation supportive investments. This places importance on the necessity for supportive capital investments. Thereby, one can hypothesize that the capital investment requirements of a country evolve as the country develops, moving from the more rudimentary and basic hard infrastructure such as water, sanitation and basic transport, which is critical in earlier stages of development, to more sophisticated infrastructure during industrialization and innovation, such as ICT, research and development, etc. Consequently, it can be hypothesized that the countries which are 'better' in providing necessary and adequate infrastructure should have better performing economies.

In the context of economic growth as an indicator of economic performance it should be noted that although in the past it received much more attention, nowadays more attention is paid on the quality of governance, and democratic processes and respect of all rights, as premises of the public choice school. Thus, regardless of the public policy choices, the government's intervention should promote efficient use of scarce resources, contributing to both economic and social welfare of the citizens, and single variable indicators, such as economic growth, are not the most desirable performance indicator as perceived as too narrow an indication and not reflecting the diversity of the countries. In the public finance literature this has been discussed by line of authors, for example Newbery & Stern (1987), Tanzi (1991), Dzhumashev, (2014), etc.

Considering the theory and the empirical evidence on the interaction of the public investment and economic output, the goal of this chapter is to identify if there is significance in the existence of a long-term relationship between economic output and public investments, and strength for the case of SEE countries as a group. In order to proceed with identification of the interrelation of the public capital investments and the economic output in the countries of interest, we examine the interaction effects of public investment and economic output in the past three decades in the selected countries, and proceed with adequate estimation model. The following sections provide a short empirical literature review on the interaction between the variables, after which the data and methodology used for design of a model is presented. The model results are then discussed and conclusions are offered.

## **5.2. Literature review**

The empirical literature on the theory for public investment as a stimulator for the country's economic activity is vast in assessing the macroeconomic effects. Despite the numerous studies, there is uncertainty on the extent of the effect of public investment and output. The empirical relationship of economic output growth and investment is influenced by the work of Aschauer (1997), when he places the capital stock as a

momentous variable in the empirical literature. Although the studies on the impact of investment on economic growth are extensive, these predominantly place an emphasis on the impact of public investment, while to a lesser extent on the interaction with private investment.

The selection of empirical studies listed (Table 5.1) present the differing conclusions and the disparate body of articles covering different periods, data sets, investment proxies, countries and country groups, statistical and econometric approaches applied. The pool of articles thus leads to an assortment of empirical results, which consequently does not enable a unified one-size-fits-all policy recommendation. Researchers have also undertaken surveys of empirical literature on the nexus between public investment and economic output or growth, covering and comparing the results of the empirical literature on the subject. For instance, Romps & De Haan (2005) in their survey article systematize the empirical literature by the approaches used, i.e. production function, cost function, VAR/VECM, and cross-sectional approach. Their concluding comments point to a growing inclination of the empirical literature of the positive and enhancing role of public investments on economic growth, with more moderate predictions for their impact, and they reaffirm the heterogeneity of the findings due to numerous factors.

More recently, Pereira & Andr az (2013) surveyed the literature comprehensively as well, covering the publishing period of two decades, from the 1990s to the 2010s, and have systematically presented the empirical literature aggregately, regionally, and on an industry focus level, then further systematized the publications by the econometric approaches used by the researchers as well, by production function, VAR and behavioural approach. Their concluding remarks are in the same line as the former, confirming that there is a little consensus about the magnitude of the public investment effect, although it is generally positive and stresses the past overestimated impact assessments. They also stress the differences of the magnitude of the effect of public investment between developed and less developed economies, being less pronounced in the latter. Furthermore, in the same survey article, the authors note the unbalanced public private investment nexus and the regional – beyond a country – spill over effects, as well as the array of methodological approaches used.

Table 5.1 Review of selected empirical studies

<i>Author(s)</i>	<i>Time period</i>	<i>Geographical coverage</i>	<i>Approach/ Method</i>	<i>Results</i>
Warner, A. (2014)	Post 1990	5 countries: Bolivia, Mexico, the Philippines, China, and South Korea.		Weak evidence of positive effect of public capital on GDP or GDP growth
Aubyn, M. S., & Afonso, A. (2008)	different	Developed countries in Europe, plus Japan and USA	VAR	Public investment more important than private investment
Belloc & Vertova (2006)	1970-1999	7 countries	VECM	In most of the sample countries there is a positive effect of public investment on output
Pina, A., & St. Aubyn, M. (2006)	1956-2001	USA	VAR	Public investments are crowding out private investments and lowering the rate of return of public investments
Agénor, P., Nabli, M. K., & Yousef, T. M. (2005)	1965-2002	Tunisia, Egypt, Jordan	VAR	Weak short-lived insignificant effect of public on private capital
Kamps (2005)	1960-2001	22 OECD countries	VECM	Positive effects on growth in most countries
Moreno, R., López_Bazo, E., & Artís, M. (2003)	1980-1991	Spain, regions	Translog	Public and private investments are substitutes, public capital and labour are complements
Stephan, A. (2003)	1970-1996	Germany, 11 regions – federal states	Cobb Douglas, production function	Public capital is a significant input for production in the manufacturing sector, differences in public capital endowment, and productivity gap between East and West Germany. Noted positive effects of public capital on private production, but not sufficient for concluding that public investments should be boosted.
Ramirez, M. D., & Nazmi, N. (2003)	1983-1993	9 Latin American economies	Cobb Douglas	Both private and public investment have a positive impact on growth
Kemmerling & Stephan (2002)	1980, 1986, 1988	Germany, 87 cities	Cobb Douglas Simultaneous-equation	Public capital is a significant factor in private production. Simultaneity between output and public capital is weak
Ligthart (2002)	1925-1989	Portugal	VAR	Public capital has a positive effect on output
Mallick, S. K. (2002)	1950-1993	India	VAR	Public investment higher impact than private investment
Voss (2002)	USA: 1951-1997; Canada 1951-1996, quarterly	USA and Canada	VAR	Public investment crowds out public investment
Pereira & Roca-Sagales (2001)	1970-1993;	Spain, national and sectoral	VAR	Public investment has positive and significant long-run effects on output, employment and private capital



Ghali, K. H. (1998)	1963-1993	Tunisia	VECM	Public investment slows down economic growth
Aschauer, D. (1997)	1970-1990	46 middle income countries	Extended growth model Solow Swan production function	Strong positive relationship between public capital and GDP growth
Crowder, W. & Himarios, D. (1997)	1947-1989	USA	VECM	Public capital more important to growth than private capital
Lau, S. & Sin, C. (1997)	1925-1989	USA	VECM	Elasticity smaller than typical values obtained in single-equation studies, spill over effects of private capital is positive but low
Khan, M. S. & Kemal, A. R. (1996)	1970-1990	96 developing countries throughout Africa, Asia, Latin America, Europe, and the Middle East	Extended neoclassical growth Solow model with two stage LS	Substantial difference in the impact of private and public sector investment on growth, with private investment having a larger impact than public investment; regional variations across income groups
Evans, P. & Karras, G. (1994)	1970-1986	USA	Cobb Douglas	Public capital has a negative impact on output
Serven, L. & Solimano, A. (1993)	/	Cross section on developing economies	Private investment model	Private investment contributes more than public investment to growth
Munnell, A. (1992)	1963-1988	7 OECD countries	Cobb Douglas	Public investment in hard infrastructure essential for growth
Coutinho, R. & Gallo, G. (1991)	1970-1988	33 developing economies	Cobb Douglas	Private investment has a more pronounced effect on growth than public investment
Munnell, A. H. (1990)	1948-1987	USA	Production function	States that have higher capital investments tend to have greater output, more private investment, and higher employment growth.

*Source: Author's compilation*

### 5.3. Data and Methodology

In the following section we use annual data for the period 1990-2019, for eleven SEE<sup>33</sup> countries and a selection of variables. The variables used are: GDP, public investment, private investment, public debt, and real interest rates. Where  $Y$  is real GDP (in bil. const. 2017 int. dollars),  $I_g$  is real public investment (in bil. const. 2017 int. dollars), and  $I_p$  is private investment (in bil. const. 2017 int. dollars). The gross fixed capital investments are in log form. Furthermore, the public (<sub>g</sub>) and private (<sub>p</sub>) capital stock cumulated is noted with  $K_g$  and  $K_p$ , accordingly, and also in their log form.  $D_g$  as public debt to GDP ratio and  $R_i$  real interest rates expressed in their percentage forms.

For the purposes of data consistency and comparability, the same source for the variables is used to the degree available. The first five variables are taken from IMF's Investment and Capital Stock Dataset 1960-2019 (ver. May 2021), for the period from Y1990 to Y2019. Debt to GDP ratios is extracted from the IMF Datamapper database (general government gross debt as percent of GDP, 2023); the real interest rate data are extracted from two sources, the IMF's International Finance Statistics database, deflated or the EUROSTAT for some of the EU member states where the data was missing in the former database<sup>34</sup>. For some of the variables there is certain annual data unavailable, thus making the panel unbalanced.

As some of the determinants of investments are considered to endure robustness, following the example of other empirical research on the subject, the variables debt and real interest rates are included as proxy for source of financing and cost for financing, respectively. Specifically, some authors have noted that government debt ratio as a determinant could explain investments in public or private sector, as the increase of debt worsens the financial conditions via higher real interest rates and could restrict future demand as investors may fear stronger efforts for fiscal consolidation in the coming periods. Authors have empirically reported that the increasing and high public debt has a negative effect on public investment in EU countries (for e.g. see Mehrotra & Valila, 2005; Brautzsch & Dreger, 1999; Dreger & Reimers, 2015, etc.).

Provided that the VAR methodology is often used for analysing interactions and effects of the economic policies and enables detection of the effects, interaction, and transmissions of the shocks of economic policies by impulse response function, it is the choice methodology as well. The approach does not impose the need to include many restrictions and enables the data to manifest the mutual dynamics and transmissions among the variables. In the VAR models all variables are treated as endogenous and dependent in both static and dynamic sense. The panel VAR models have the same structure as the basic VAR models, by adding a dimension to the model though a cross-section component. Primarily, the interactions between economic output and public investments, and then including private investment and debt & interest rates, in the following section model specification are analysed via panel VAR framework. The panel VAR accounts for individual country heterogeneity while allowing for dynamic relationships between the multiple endogenous variables. In general, VAR models have been found to be a useful tool to estimate dynamic interactions between endogenous variables of interest.

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<sup>33</sup> Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, North Macedonia, Montenegro, Serbia, Slovenia, Romania, Moldova.

<sup>34</sup> In some instances, there are some minor differences in real interest rates noted between the two datasets.

On the other hand, empirical macroeconomic applications need sufficiently long data, which is typically a constraint, and ‘the curse of dimensionality’ (Richard Bellman) frequently becomes a problem. Therefore, when setting up a model the focus needs to be limited to a possibly small number of variables conveying the dynamics of interaction with a joint estimation, such as by pooling all countries in the sample in a panel VAR framework, which also generally improves estimation quality by increasing the cross-sectional dimension.

### *Descriptive statistics and variable correlation*

In Table 5.2 the descriptive statistics and correlations of the variables used in the econometric models prior their transformation in logarithmic form, in their natural and absolute form is presented. The descriptive statistics shows that there is a large variability and heterogeneity among the sample countries starting from the size of the economy to the generated capital stock to their indebtedness levels.

*Table 5.2 Descriptive Statistics & Correlation*

	<b>I<sub>g</sub></b>	<b>I<sub>p</sub></b>	<b>D<sub>g</sub></b>	<b>Y</b>	<b>I<sub>r</sub></b>	<b>K<sub>g</sub></b>	<b>K<sub>p</sub></b>
<b>Mean</b>	3.76	15.45	56.44	104.48	4.74	51.08	171.01
<b>Median</b>	1.72	5.97	43.10	56.52	5.06	21.50	73.42
<b>Maximum</b>	27.26	129.62	224.80	578.53	21.36	285.19	1,171.09
<b>Minimum</b>	0.05	0.24	12.40	4.31	-47.98	1.80	7.15
<b>Std. Dev.</b>	5.14	22.15	37.81	123.28	6.89	64.49	229.92
<b>Skewness</b>	2.27	2.56	1.85	1.71	-2.67	1.90	2.10
<b>Kurtosis</b>	7.92	9.98	6.94	5.05	20.57	5.91	7.15
<b>Jarque-Bera</b>	611.95	1,023.15	302.57	218.94	2,894.98	314.44	477.52
<b>Probability</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Sum</b>	1,233	5,067	13,998	34,477	977	16,805	56,261
<b>Sum Sq. Dev.</b>	8,632	160,366	353,162	5,000,240	9,744	1,364,117	17,339,569
<b>Observations</b>	328	328	248	330	206	329	329

	<b>I<sub>g</sub></b>	<b>I<sub>p</sub></b>	<b>D<sub>g</sub></b>	<b>GDP</b>	<b>I<sub>r</sub></b>	<b>K<sub>g</sub></b>	<b>K<sub>p</sub></b>
<b>I<sub>g</sub></b>	1.00						
<b>I<sub>p</sub></b>	<b>0.93</b>	1.00					
<b>D<sub>g</sub></b>	0.13	-0.02	1.00				
<b>GDP</b>	<b>0.94</b>	<b>0.94</b>	0.20	1.00			
<b>I<sub>r</sub></b>	-0.07	-0.09	-0.09	-0.12	1.00		
<b>K<sub>g</sub></b>	<b>0.87</b>	<b>0.81</b>	0.38	<b>0.93</b>	-0.05	1.00	
<b>K<sub>p</sub></b>	<b>0.91</b>	<b>0.92</b>	0.22	<b>0.98</b>	-0.10	<b>0.94</b>	1.00

Source: Author's calculation using Eviews 10

As a first insight into the data, it is noticeable that there is a strong correlation between the investments and the stock of investments. However, not only between those of the same source, which is logically determined (increased investments lead to increased accumulation of capital stock), but also there are correlations of the opposite sources, i.e. private investment with public capital stock and vice versa (correlation coefficients 0.81 and 0.91 accordingly). This indicates potential existence of causal relationships we attempt to determine in the following section with the econometric model and the possible crowding-in/-out of private and public investment. Furthermore, the positive and strong correlation of GDP with the public investments (0.94) and capital stock (0.93) implies the

possible determination link of investments to the economic activity or vice versa or even simply moving in the same direction.

#### 5.4. Model estimation

##### *Cointegration equation*

To proceed and investigate a long-run relationship between public investment and economic growth, Fully Modified Ordinary Least Squares (FMOLS) is employed, and an Error Correction Method (ECM) has been used to investigate the short-run dynamics nexus, in a panel construction.

For determining the stationarity of the variables, Augmented Dickey-Fuller and Phillips-Peron unit root tests statistics are used, with the number of lags determined by Akaike criterion. The results (Table 5.3) show the non-stationarity of the variables. According to the unit root tests, the capital stock, both private and public, have two unit roots. The interest rate is the sole stationary at level variable, while the remaining variables are stationary at their first differences (integrated of order one I (1)).

*Table 5.3 Test for integration properties ADF*

	Levels	First difference	Decision
$K_g$	8.13101 (0.9968)	32.7119 (0.0660)	I(2)
$K_p$	13.9671 (0.9026)	30.2212 (0.1132)	I(2)
$Y$	18.5772 (0.6713)	111.931 (0.0000)	I(1)
$I_g$	19.8365 (0.5933)	124.463 (0.0000)	I(1)
$I_p$	26.4313 (0.2336)	132.295 (0.0000)	I(1)
$D_g$	28.5086 (0.1594)	47.4680 (0.0013)	I(1)
$R_i$	36.6209 (0.0260)	114.730 (0.0000)	I(0)

Note: 11 SEE countries. Selection of lags based on Akaike criterion. Table entries are test statistics, p-values in parentheses. Tests conducted with Eviews10.

A next step in specifying the model is to proceed with panel cointegration test for the variables integrated at order one (Pedroni, 2001) for several variable combinations. The majority results of the seven test statistics traced an existence of unique cointegrating vectors suggesting an existence of a cointegration or long-run relationship. Furthermore, trace and maximum eigenvalue cointegration tests indicates one and two cointegration equations accordingly (at significance level  $p < 0.05$ ).

The table below holds the cointegration properties for a number of combinations of variable subsets, with the aim to identify a suitable cointegration environment. The standard determinants for public investment are related to the economic activity and cost of capital, measured with GDP and real interest rates, accordingly. Moreover, the variables private investment and debt to GDP ratio are added and determined that the cointegration property is not lost, implying that both private investment and public debt are relevant determinants of public investment in the panel country group.

Table 5.4 Test for cointegration properties, selection

	Panel statistics (ADF)	Group statistics (ADF)
$K_p K_g$	0.420974 (0.6631)	1.732267 (0.9584)
$I_g Y$	-5.105689 (0.0000)	-4.151621 (0.0000)
$I_g I_p$	-7.360653 (0.0000)	-5.388104 (0.0000)
$I_g I_p Y$	-5.776358 (0.0000)	-3.917840 (0.0000)
$I_g I_p Y D_g$	-5.481585 (0.0000)	-5.462985 (0.0000)
$I_g I_p Y R_i$	-7.275387 (0.0000)	-8.078176 (0.0000)
$I_g I_p Y D_g R_i$	-5.932257 (0.0000)	-4.882007 (0.0000)

Note: SEE countries. Selection of lags based on Akaike criterion. Table entries are test statistics, p-values in parentheses. Tests conducted with Eviews10.

Both private and public capital stock in their log form are I (2) as per the panel and group statistic tests, indicating that they are not connected in the long-run (the null hypothesis that there is no cointegration cannot be rejected; coefficient 0.421 with a p-value of 0.663 for panel statistics, indicates no cointegration; for group statistics, coefficient 1.732 with a p-value of 0.958, also suggests no cointegration for individual groups).

Therefore, a long-run relationship or dynamism between the two capital stock variables cannot be determined. Due to the above, we proceed with a model including the five variables: public investment, private investment, economic output, public debt and interest rate ( $I_g, I_p, Y, D_g, R_i$ ) all integrated at I(1) and I(0), where public investment ( $I_g$ ) is the dependant variable. After employing FMOLS (panel fully modified least squares, grouped) the following relation is determined:

$$I_{g\ t} = 0.241I_{p\ t} + 0.171Y_t - 0.007D_{g\ t} + 0.003R_{i\ t}$$

(0.0894)\*\*\*    (0.0663)\*\*\*    (0.0014)\*\*\*    (0.0054)

(Eq. 5.1)

Standard errors in parentheses ( ). \*\*\* p<0.01, \*\*p<0.05, \*p<0.1

Source: Author's estimates. Tests conducted with Eviews10

All independent variables, but interest rate -  $R_{it}$ , are statistically significant in determining public investment and have the expected signs (Eq. 5.1). Public investments are stimulated by private investment and GDP growth in the long run, while restrained by increasing public debt. What is unexpected though is the positive sign of interest rates, however the variable is not statistically significant for the existence of a long-term relationship with the interest rates, for the given period in the SEE region as a group.

In order to determine sub-sample differences, the full sample has been divided in EU-member and non-EU member states. In the sub-sample panel regression, in determining the long-term relationship of the public investments and the remaining variables, there are indications of certain differences. For the EU member states sub-sample, GDP (Y) or R are not statically significant, as a stimulus for the public investment ( $I_g$ ), however the  $I_p$  remains positively associated and statistically significant, as is the public debt with

negative association. For the non-EU group of the sample, the  $I_p$  becomes a variable which is not statistically significant, however  $Y$  is statistically significant and positive, and debt remains significant with a negative impact on the public investment size. This implies the more coordinated track direction of the policies and the pronounced crowding-in effect of public to the private investment among the EU member states, which is not explicit in the case of the non-EU members of the SEE country group, where the overall economy growth via the economic activity is a more significant signal for public investment.

$$I_{p\ t} = 0.136I_{g\ t} + 0.603Y_t - 0.005D_{gt} - 0.024R_{it}$$

(0.0487)\*\*\*    (0.0225)\*\*\*    (0.0009)\*\*\*    (0.0036)\*\*\*

(Eq. 5.2)

Standard errors in parentheses ( ). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Author's estimates. Tests conducted with Eviews10

Reversed specification, where the  $I_p$  (private investment) is the dependent variable, and the other variables are independent variables, identifies that all variables are statistically significant and with anticipated signs (Eq. 5.2). The coefficients indicate that in the long run, private investment flow of the SEE countries as a group will be stimulated positively by increased public investment and higher economic activity (GDP). This confirms the theory that public investment creates opportunities for increased productivity of the private sector, thus generating a boost to the economic output. In contrast, a rise in the interest rates will trigger decline in the private investment size, as an increased cost for capital makes the borrowing more expensive for the private sector investors. Furthermore, a rise in the public debt will result in triggering lower private investment likely due to the expectations of the private investors for a forthcoming period of public spending consolidation and restrained spending or more moderate investments.

The division into sub-samples of EU and non-EU member states implies minor differences solely in the intensity. Namely, for the EU member states sub-sample, the significance of the public investment for stimulating the private investment is larger, as is the impact, compared to the non-EU, where the size of the impact and the significance is less intense, again confirming the intensity of the link and coordination between the two sectors. The other variables show no significant difference in association with the  $I_p$ , regardless of the subsample the countries belong to.

While such a cross-section analysis provides a simple indication of the relationship between the dependent and independent variables, it has its shortcomings as it ignores the time series information contained in the data. In order to integrate this information, one needs to adopt an approach of panel data modelling. The analysis of the time series characteristics of the data as we have already identified indicates the presence of unit roots. As a consequence, the bivariate relationships are estimated in a panel cointegration framework, and thus the inclusion of other macroeconomic fundamentals in the model.

The results of the panel Johansen Fisher cointegration confirms the cointegration relationship between the variables with existence of 2 cointegrating equations, and with one per sub-sample divided between members and non-EU members.

Table 5.5 Johansen Fisher Panel Cointegration Tests

Johansen Fisher panel cointegration tests for model 1				
Hypothesized	Fisher stat			
no. of CE(s)	trace test	prob.	max-Eigen test	prob.
<b>ALL</b>				
None *	106.73	0.0000	50.52	0.0002
At most 1 *	56.21	0.0068	30.47	0.0207
At most 2	25.74	0.1366	18.78	0.1034
<b>EU</b>				
None *	83.52	0.0027	40.42	0.0072
At most 1	43.10	0.1301	25.02	0.1027
At most 2	18.08	0.5603	12.24	0.5242
<b>non-EU</b>				
None*	73.08	0.0268	32.74	0.0678
At most 1	40.34	0.2105	21.54	0.2450
At most 2	18.80	0.5071	12.43	0.5057

Source: Author's estimates. Tests conducted with Eviews10

Having determined that the variables are stationary at first difference, and there is at least one cointegration equation, we proceed with identification of a VECM model to determine both short-run and long-run dynamics with the use of a two-step technique (as explained by Granger & Engle, 1987, two-step technique).

The order of the variables within the model ( $I_g$ ,  $Y$ ,  $I_p$ ,  $D_g$ ,  $R_i$ ) is chosen under the following economic logic. An increase of public investment if effective, stimulates increased economic activity and economic output, generating opportunities for increased productivity of the private sector and thus encouraging private investment as well, which also contributes to higher productivity, again boosting growth. Public debt as a variable is included to test the link of public investment financed through public debt and their interrelation is expected to indicate the effect (positive or negative) of debt financing and thus to imply the efficiency of debt financing. The interest rates variable is included as a proxy for the price of capital effects.

The general representation of the long-run cointegration regression model (Eq.5.3) and the lagged residual (cointegrating equation, and VEC model, Eq. 5.4) are given below:

$$Y_{it} = \beta_{0i} + \beta_{1i} X_{it} + \varepsilon_{it} \quad (\text{Eq. 5.3})$$

$$\varepsilon_{it-1} = ECT_{it-1} = Y_{it-1} - \beta_{0i} - \beta_{1i} X_{it}$$

$$\Delta Y_{it} = \alpha_i + \sum_{k=1}^p \beta_i \Delta Y_{it-k} + \sum_{k=0}^q \delta_i \Delta X_{it-k} + \varphi_i ECT_{it-1} + \mu_{i,t} \quad (\text{Eq. 5.4})$$

Where:  $ECT_{it-1}$  is the error correction term (the lagged OLS residual from the long-run model;  $\varphi_i$  is the speed of adjustment,  $i$  refers to each subject,  $k$  is the number of lags. Solving the cointegration equation and long-run model (Table 5.6) we get the following equation coefficient:

$$ECT_{it-1} = 1.000 \ln I_{g-1} + 1.205 \ln Y_{-1} - 1.8112 \ln I_{p-1} - 0.0102 D_{p-1} + 0.2234 R_{r-1} - 2.4433$$

Table 5.6 Cointegration equation – long-run model

Cointegrating Eq:	CoIntEq1
$\ln I_{g-1}$	1.000000
$\ln Y_{-1}$	1.204875 (0.62882) [ 1.91610]
$\ln I_{p-1}$	-1.811723*** (0.53042) [-3.41561]
$D_{p-1}$	-0.010204*** (0.00505) [-2.01941]
$R_{r-1}$	0.223400*** (0.03460) [ 6.45718]
C	-2.443258

Notes: Standard error in ( ), t-statistic in [ ], statistical significance \*\*\* p<0.01, \*\*p<0.05, \*p<0.1  
Source: Author's estimates. Tests conducted with Eviews10

In estimating the equation for VECM effects on public investment by GDP, private investment, debt, and interest rate, jointly the following estimations have been derived. The long-run component, which is the adjustment coefficient ( $\varphi_i$  of  $ECT_{it-1}$ ) is -0.03, satisfies the condition of being as expected negative and statistically significant (p<0.05), thus inferring that there is a long-run and positive relationship between public investment and the other variables (GDP, private investment, public debt and interest rate), indicating that in the long run GDP, private investments, public debt and interest rate, jointly Granger cause public investment ( $I_g$ ) and there is a long-run positive causal relationship running from Y,  $I_p$ ,  $D_g$ ,  $R_r$  to  $I_g$ . In other words, any disequilibrium in the short run is corrected every period (year), restoring to equilibrium following any disturbances (shock). As the coefficient of ECT (with dependent variables in the order of  $I_g$ , Y,  $I_p$ ,  $D_g$  and  $R_r$ ) is negative and statistically significant, shows the convergence rate of the short-run dynamics towards long-run equilibrium, where the adjustment coefficient for the dependent variable  $I_g$  (public investment) is 3% per period – year, i.e. the previous year's deviation from the long-run equilibrium is corrected in the current period as an adjustment speed at 3% (See Table 5.8 first row).

Furthermore, in the short-run, each explanatory variable with its lag and jointly are tested with coefficient Wald test to determine their significance. The short-run coefficients indicate that on average, for the full country sample, the current year's public investment ( $I_g$ ) is significantly but negatively determined by last year's public investments ( $I_{g,t-1}$ ), i.e. a percentage change in last year's  $I_g$  will be associated with a 0.19% decrease this year (ceteris paribus) in the short run. On a sub-sample level it is evident that the group coefficient is driven by the non-EU countries in the SEE group, and it is not the case for the EU member countries, where there is an incremental increase of public investments in the short run. Likewise, for the whole SEE group, a percentage change in GDP or  $I_p$  is associated with decrease in  $I_g$ , however both coefficients for GDP and  $I_p$  test with no statistical significance in their association with  $I_g$  on a short run.



Table 5.7 Short-Run and Long-Run relationships between the investments and GDP for three groups of countries

<i>Short-run</i>	<i>ALL</i>		<i>EU</i>		<i>non_EU</i>	
	Coef.	prob.	Coef.	prob.	Coef.	prob.
<i>d.ln_ig</i>						
<i>d.ln_ig(-1)</i>	<b>-0.198</b>	0.004	<b>0.285</b>	0.013	<b>-0.342</b>	0.000
<i>d.ln_gdp(-1)</i>	-0.078	0.918	0.419	0.648	0.600	0.640
<i>d.ln_ip(-1)</i>	0.187	0.257	0.191	0.426	0.111	0.620
<i>d.Dg(-1)</i>	<b>-0.009</b>	0.000	0.000	0.898	<b>-0.008</b>	0.002
<i>d.Rr(-1)</i>	<b>-0.008</b>	0.015	-0.005	0.535	-0.005	0.258
<i>cons</i>	0.037	0.137	-0.005	0.869	0.046	0.292
<b><i>Long-run</i></b>						
<i>ln_ig</i>	Coef.	t-stat >2	Coef.	t-stat >2	Coef.	t-stat >2
<i>ln_gdp</i>	-1.205	1.916	<b>0.846</b>	3.363	-1.638	0.957
<i>ln_ip</i>	<b>1.812</b>	3.416	0.060	0.261	0.238	0.187
<i>d_g</i>	<b>0.010</b>	2.021	0.000	0.283	0.030	1.496
<i>r_i</i>	<b>-0.223</b>	6.457	<b>0.037</b>	2.491	<b>-0.520</b>	5.609

Note: reversed sign of the normalization equation of long-run coefficients inserted for interpretation, t-stat calculated by division of coefficient with standard error.

Source: Author's calculation with EViews 10

Additionally, in the short run a percentage point increase in public debt to GDP is associated with a decrease in  $I_g$  of 0.87% ((exp. (-0.008779)-1)\*100), and a percentage point increase in interest rates is associated with  $I_g$  decrease of 0.84% (((exp. (-0.008451)-1)\*100)). The statistical significance of the short-run association in the model where  $I_g$  is the dependent variable is valid only for lagged public investment, public debt and interest rates, and there is no significant and short-run causality of public investment ( $I_g$ ) with GDP ( $Y$ ) nor with private investment ( $I_p$ ) (see Table 5.7).

Overall this is an indication that although in the long run the public investments may exert a slight increasing trend, it is primarily driven by the EU member countries, nonetheless in the short run, public investment is dependent on last year's size of investments and that governments are generally not inclined towards large continuous increases of public investment, while precautionary decrements are taking place if at a certain point there has been an extra 'generous spending', which is the case of the non-EU sample and not for the EU SEE subsample. The austerity in public spending cuts is practiced via the capital expenditure budget, which is consistent with the regular practices of supplemental budgets mostly affecting downward capital budget cuts for the case of the non-member countries.

$$\Delta I_{g t} = -0.0303 ECT_{it-1} - 0.1979 \Delta I_{g t-1} - 0.0827 \Delta Y_{t-1} + 0.1891 \Delta I_{p t-1} - 0.0088 \Delta D_{g t-1} - 0.0085 \Delta R_{r t-1} + 0.0369$$

(Eq. 5.5)

Table 5.8 Estimate of the Error Correction Model

Variable	$\Delta \ln I_g$
CointEq1	-0.030281*** (0.01523) [-1.98859]
$\Delta \ln I_g t_{-1}$	-0.197879*** (0.06824) [-2.89973]
$\Delta \ln Y_{t-1}$	-0.082686 (0.76240) [-0.10845]
$\Delta \ln I_p t_{-1}$	0.189110 (0.16547) [ 1.14287]
$\Delta D_q t_{-1}$	-0.008779*** (0.00197) [-4.45423]
$\Delta R_r t_{-1}$	-0.008451*** (0.00343) [-2.46128]
Constant	0.036927 (0.02495) [ 1.48020]
R <sup>2</sup>	0.384574

Notes: Standard error in ( ), t-statistic in [ ], statistical significance \*\*\* p<0.01, \*\*p<0.05, \*p<0.1  
Source: Author's estimates with EViews 10

### Variable Response to a Public Investment Shock

After establishing the long-run cointegrating relationship between the public investment and the remaining independent variables, the coefficients are transformed into an impulse response of the independent variables to a shock on the public investments.

As it can be seen from the impulse response function for the group of countries, a shock of  $I_g$  (Figure 5-1; Table 5.9) on itself will have only an initially mildly strong effect, which dies out quickly and fades away with small intensity. A shock of  $I_g$  on GDP indicates an increase with weak intensity, starting from the period following the shock with an increasing and lasting effect from the second period onwards, however overall with mild intensity. The  $I_p$  follows the impulse of  $I_g$  not immediately but after the first period and is stronger in the period to follow, lasting a long period.

The response of  $D_g$  on an impulse of  $I_g$  is contemporaneous and strong in the second and third period, after which it subsides and converges towards stability in the long run, consistent with the expectation for the financing of public investments with debt which will increase debt immediately but then will contribute to its decrease under the expectation of a satisfactory return. The response of  $R_r$  on an impulse of  $I_g$  is strong in the second period, after which it drops and is stabilized in the long run.

Figure 5-1 Impulse response of variables by a public investment shock (1sd)

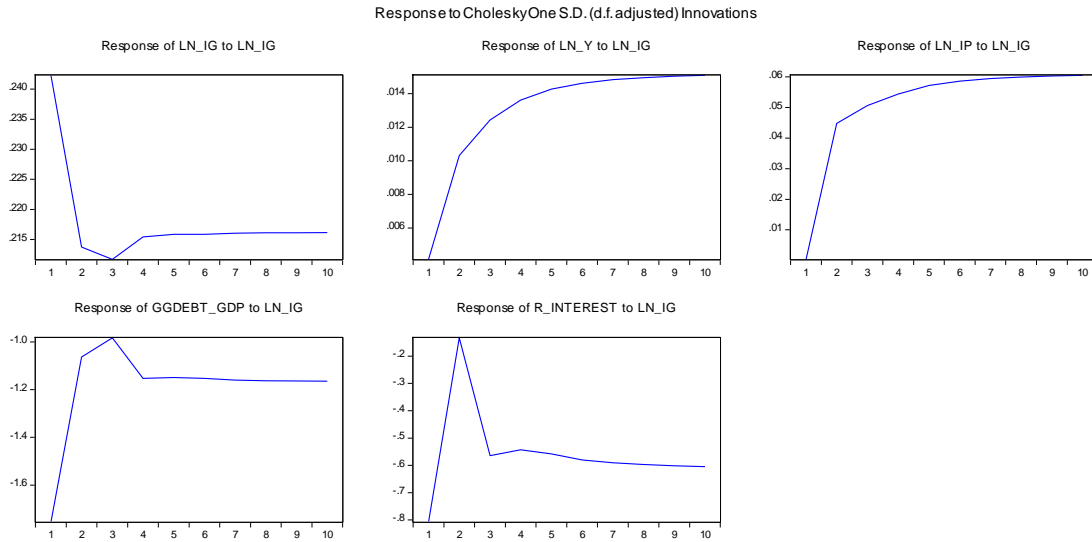


Table 5.9 Impulse response

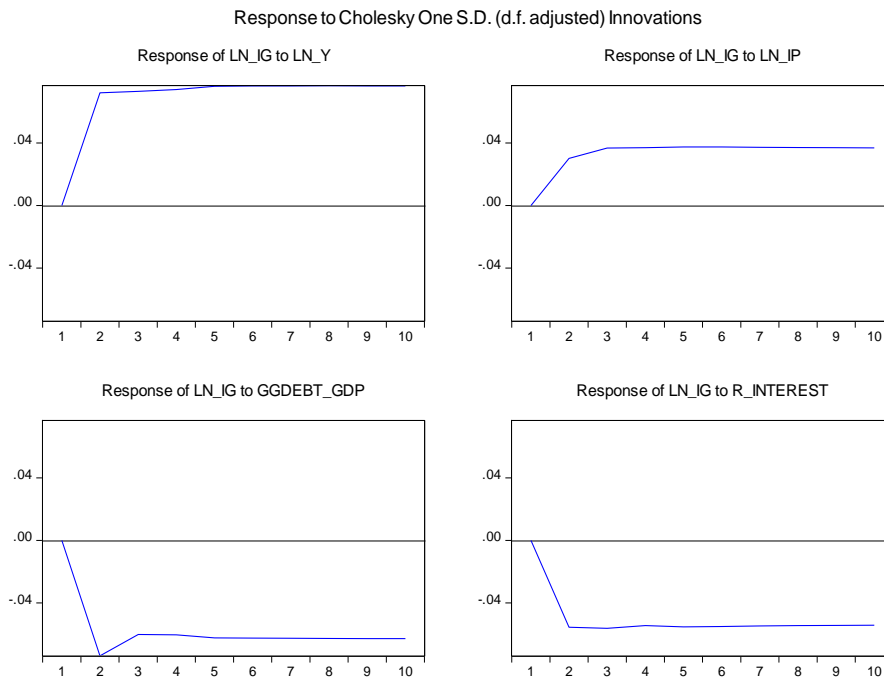
Period	Ln Ig	Ln Y	Ln Ip	D	Ir
1	0.242296	0.004136	0.000414	-1.753679	-0.806382
2	0.213746	0.010314	0.044779	-1.063314	-0.133326
3	0.211707	0.012431	0.050636	-0.983367	-0.564026
4	0.215406	0.013617	0.054347	-1.152441	-0.542632
5	0.215858	0.014269	0.057194	-1.149459	-0.557963
6	0.215857	0.014625	0.058613	-1.152752	-0.579844
7	0.216021	0.014834	0.059420	-1.159845	-0.590395
8	0.216088	0.014962	0.059939	-1.162393	-0.596894
9	0.216118	0.015041	0.060259	-1.163751	-0.601468
10	0.216138	0.015091	0.060460	-1.164732	-0.604364

Cholesky Ordering: Ln Ig, Ln Y, Ln Ip, D, Ir

Source: Author's estimates with EViews 10

A reverse response of public investment with a shock on the other variables is exerted (Figure 5-2), confirming the expectation that there is no contemporaneous effect on the public investment with any variables' shock, but rather effects are most evident from the second period, followed by a stabilization onwards. As expected,  $I_g$  will respond positively on a GDP increase following two periods and maintain the effect, and will respond in compliance with the private investors' reactions with some delay.

Figure 5-2 Impulse response of public investment to other variables' shock (1sd)



Source: Author's estimates with EViews 10

### Robustness Check

To test the strengths of the results obtained in the original VECM model described above, two other models were tested: Model<sub>2</sub> with variable order  $I_p$ ,  $Y$ ,  $I_g$ ,  $D_g$ , and Model<sub>3</sub> with variable order  $I_p$ ,  $Y$ ,  $I_g$ ,  $D_g$ . The second model<sub>2</sub> confirms the existence of a long-run relationship and statistically significant effects of private investment and economic output on public investment ( $I_p$  and  $Y$  on  $I_g$ ), in the case when interest rate and debt ratio are not included in the model. The ECT adjustment coefficient is negative -0.01, indicating that a previous term's deviation from long-run equilibrium is corrected in the current period with a speed of 1%, indicating that the adjustment speed is boosted by the debt financing and the cost of capital (compared to model<sub>1</sub>).

The short-run coefficients indicate that in the short run, a percentage change in private investment ( $I_p$ ) in the current year is associated with a decrease of public investment ( $I_g$ ), on average ceteris paribus, and a percentage change in GDP is associated with percentage point increase in public investment ( $I_g$ ), however once the significance is checked neither the adjustment coefficient nor the  $I_p$  coefficient are statistically significant in the short-run.

In Model<sub>3</sub> the order of the variables is reversed, where  $I_p$  is the dependent variable, followed by the independent variables:  $Y$ ,  $I_g$ ,  $D_g$  and  $R_r$ , and an estimate of the long-run relationship with ECM. The results indicated both correct sign and statistical significance, displaying that there is a cointegration of the  $I_p$  with the rest of the variables, and the deviation from the long-run equilibrium is adjusted with a speed of 6% per year. The short-run relationship in the same model indicates that a percentage point increase in past period private investment ( $I_p$ ) is associated with 19% increase in the current period  $I_p$ , while the GDP increase in the past year, although positively associated in the short run, is not statistically significant for the  $I_p$ . Nevertheless, an increase in the past year's  $I_g$  is

statistically significant and associated with 13% increase in  $I_p$  the current year. As expected, the past year's public debt ratio and interest rate increase is statistically significant and negatively associated with private investment size. The short- and long-run relationship of the private investment with the public sector indicators and their significance confirms the importance of the response of the private sector that follows the signals and the policies of the public finance sector and responds appropriately and fast, unlike the public sector, which responds more sluggishly and slowly.

### **5.5. Concluding Remarks**

This chapter explored the existence of a long-term relationship between the public investment, and private investment and economic output in the SEE countries, for the past three decades, as well as the strength of a short-term relationship. In the onset, an attempt was made to test for a long-term relation with the investment stock and flow of investments, however evidence of cointegration was not found for the two capital stock variables.

In employing the appropriate panel techniques for the variables, it was set that the cointegration regression model coefficients and tests indicate that public investment in the SEE countries is determined and positively associated with both private investment and the economic output (positively and statistically significant), while negatively affected by the increasing debt to GDP ratio. The finding is complementary with the theory and most of the empirical studies of other authors confirming that public investments are stimulated by the increasing economic output as well as a crowding-in effect of the private-public investment. The interest rate as a variable does not have a significant effect on determining the public investment in the SEE countries. The findings are thus in line with the economic theory that public investment is affected positively via both channels, as they are boosted with increased economic activity, which in turn increases the fiscal capacity, motivating increased supply of public investments and by increased private investment. Moreover, increased public debt reduces the fiscal space for more robust public investments.

When comparing the EU and non-EU member states in the sample a difference in behaviour can be detected. While for the EU member states the crowding-in hypothesis (public investment is complementing private investment) holds with statistical significance, for the non-EU countries, private investment coefficient although positive is not statistically significant thus the hypothesis cannot be confirmed. The reverse relationship is found between public investment with economic output. While economic output is a relevant (statistically) stimulus for the non-EU sample countries' public investments, it is not so in the case for the EU countries. This may be understood as an indication that there might be and a more coordinated track-direction of the policies and thus the pronounced crowding-in effect of public to the private investment among the EU member states, and not explicitly in the case of the non-EU members of the SEE country group.

In a reversed order (specification), the private investments are encouraged more intensely by the expectations for an 'impulse' of increased public investment's benefits and increasing economic output. However, private investment in the long run is depressed by an increasing public debt, due to the investors' expectations of fiscal consolidations in the foreseeable future. Private investments are as well disincentivized by increasing interest rates, as these increase the price and cost of the capital.

In estimating the error correction term for determining the long-term relationship of public investment with the remaining variables, we can infer that there is a long-run and positive relationship between public investment and the other variables (GDP, private investment, public debt and interest rate). In other words, in the long run GDP, private investments, public debt and interest rate, jointly Granger cause public investment, and any disequilibrium in the short run is corrected towards long-run equilibrium with an adjustment speed of 3% per period (year), restoring to a state of equilibrium after any disturbances (shocks).

The short-run coefficients indicate that the current year's public investment is significantly affected by last year's public investments, on average negatively (a percentage change increase in  $I_g$  will be associated with 19% less in the next period), *ceteris paribus*, in the short run. This suggests that although in the long run the public investments may exert an increasing trend, nonetheless in the short run, public investment is dependent on last year's size of investments, indicating that the governments are generally not inclined towards larger increases of public investments, but towards more precautionous decrements if at a certain year more 'generous spending' has occurred. This is driven by the group of the non-EU countries and is in line with the regular occurrences of spending cuts often practiced via the capital expenditure budget within the supplemental budgets, especially among the non-EU sub-sample countries. On the contrary the short run coefficient only for the EU countries is positive, and indicates less variability and more consistency among the latter.

Furthermore, the association of GDP and  $I_p$  with  $I_g$  is statistically not significant in the short run. However, on the contrary, in the short run an increase in public debt is associated with decrease in  $I_g$  (0.87%) in the following period, and an increase in interest rates is associated with  $I_g$  decrease (0.84%) in the following period. Both negative association of the public investment with debt and interest rates indicate that the primary source of financing is through new debt and increasing interest rates makes the financing of public capital more expensive.

The results have a solid implication for the need for improved design for future public investment programs, austerity programs for possible debt predicaments, and closer examination of the private investment response drivers in the short run. Improved monitoring process and overall investment cycle management, especially planning for individual countries, should encourage higher investment activities, especially for those that show signs of healthy public finances and low public investment rates towards a path of stronger and more sustainable GDP growth in the future.

## **Chapter 6**

# **The Nexus Between Public & Private Investments: North Macedonia**

## **Chapter 6 THE NEXUS BETWEEN THE PUBLIC AND PRIVATE INVESTMENTS: NORTH MACEDONIA**

### **Abstract**

Public capital investments in North Macedonia are perceived to be sub-optimal, by regular overestimation of plans compared to actual outturns, supplemented with capital budget bias. This chapter examines whether the structure of the investments matters and tests for complementarity or substitutability of public and private investments. The hypothesis is the existence of a crowding-in effect of public over private investment in North Macedonia, with an autoregressive distributed lag bound testing.

The results of the cointegration bounds test suggests a crowding-out effect of public over private investments. The employed ARDL models imply that private domestic investments are positively and significantly influenced by the size of the current economic output and negatively influenced by the size of public investment. Private investments are positively affected by the current economic outlook and the instantaneous governmental operations, which may indicate a reluctance in private sector planning in an absence of predictable public sector expectations – contributing to the substitutability.

Designing the future fiscal policy should consider that the public investments in North Macedonia in the last two decades may have crowded out private investments with the lack of long-term planning and lack of optimally chosen endeavours, bearing limited financial or social return. With the public sector increasingly relying on borrowing, there is a risk of affecting the private sector, limiting their access to funds, which could in the long term aggravate economic downturn, reduce tax revenue, and induce greater borrowing needs. Public investment efficiency improvement is vital in minimizing the negative impact on private investment, including streamlining bureaucracy, improved project selection criteria, and enhanced project management for optimal utilization of public resources.

**Keywords:** private investment; public investment; crowding-out effect; crowding-in effect; ARDL bound testing

**JEL:** E22, H50



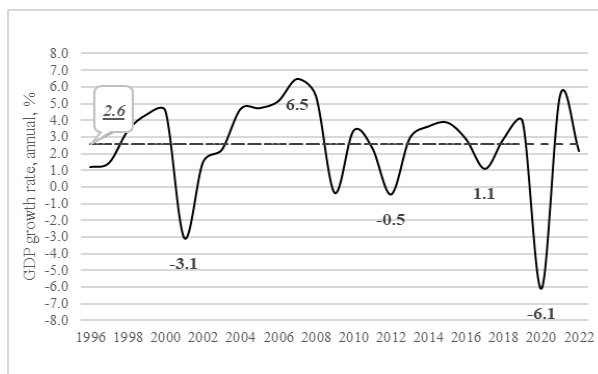
## 6.1. Introduction

In both macroeconomic theory and empirical literature, as already elaborated in details throughout the previous chapters, findings remain inconclusive on the effect of public investments on private investments without a clear consensus on the size of the impacts. There is an ongoing debate on whether public investment has a positive or negative impact on private investment. Some argue that an increase in public investment has a positive effect on private investment, facilitated through government-funded capital projects like infrastructure development and projects (highways, railways, water systems, sewage systems, etc.) and through enhanced capacity and human development, whereby creating conditions that attract and encourage private investment by increased productivity – ‘crowding-in effect’. The opposing views in the theory predict long-term effects of public investment that are opposite to the crowding-in effect, and these theories argue that when public capital investments are financed through domestic debt, it reduces the availability of funding for private investment, as they compete for the same pool of available funds, leading to increased interest rates, discouraged and reduced private investment – ‘crowding-out effect’.

The economy of North Macedonia in the past two decades has had a slow and fluctuating economic growth, with an average real growth rate of 2.6%. The GDP growth rate has exhibited significant volatility (a standard deviation of 2.7 & a coefficient of variation 1.04), which has resulted in both higher than average growth rates, reaching 6.5% in 2007, and severe declines, with as low as a negative 3% in 2001 and a negative 6% in 2020. These periods of serious growth declines have been attributed to both domestic and externally induced events, including the internal armed conflict in 2001, the global economic crisis experienced in 2009 and 2012 ("W" shaped double dip), the domestic political crisis in 2017, and the global Covid-19 crisis in 2020 (see Figure 6-1).

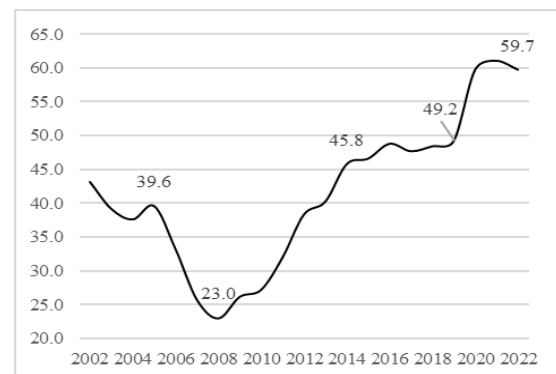
Throughout these two decades, particularly after 2008, there was a rapid surge in public debt in the country, placing pressure on the government's finances and raising concerns about the economy's fiscal stability and sustainability. Another increase of public debt is noticeable during the Covid-19 health crisis in 2020 due to the large economic output drop and simultaneously sizable financial assistance programs for coping with the crisis. The public debt increase has been primarily induced by the budget deficits that were not matched by equivalently proportionate increases in public investments (see Figure 6-2).

Figure 6-1 GDP growth (annual %), North Macedonia



Source: WDI database, World Bank

Figure 6-2 Public debt (% GDP), North Macedonia

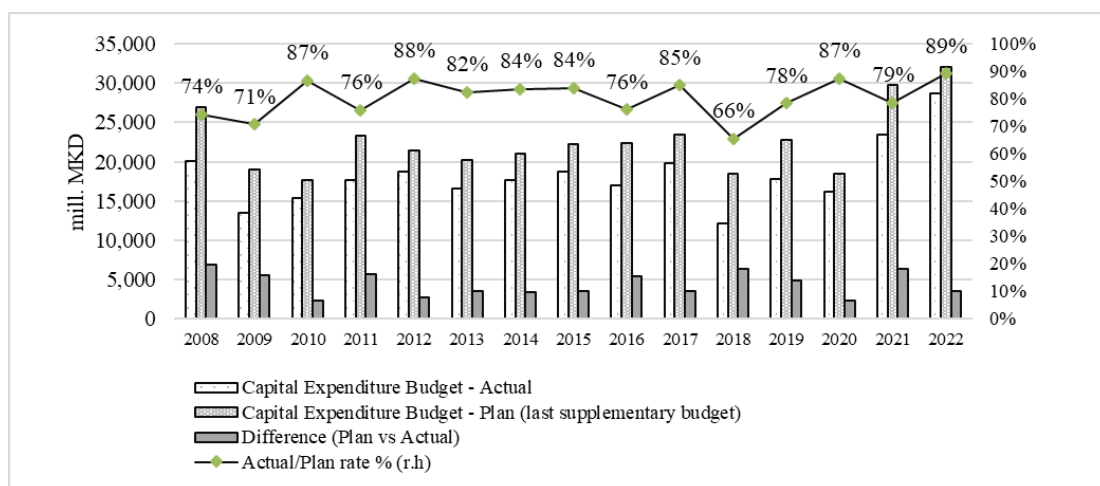


Source: Ministry of Finance of North Macedonia, stock of debt database

However, the central government's fiscal policy discourse regarding annual budgets has consistently been framed as 'developmental', emphasizing financial allocations that prioritize investments in various sectors. Specifically, the budgetary focus has been on enhancing physical public infrastructure, albeit accompanied by a recurrent trend of capital budget plans being overestimated and actual expenditure falling short of projections. Over the years, the average annual value of public capital investments as indicated by the execution of capital expenditure state budgets, has consistently remained below 20 bn. denars (MKD) or approximately 325 million EUR (except for 2021 and 2022). This is significantly lower than the initially budgeted amounts reaching over 450 million EUR, and then consistently reduced with the supplementary budgets within the year (Figure 6-3). On average, the rate of execution, comparing planned versus actual capital budget, has been around 80%.

There has been absence of long-term fiscal planning, without a multi-year public investment planning (PIP) in place for quite some time. This has impacted the strategic focus and direction for prioritizing public investments and ultimately, it has impacted the effectiveness of the public investment management process. Without a multi-year PIP, governments often make decisions on public investments based on short-term considerations, rather than on a long-term vision, leading to a fragmented approach and investments out of alignment with broader goals and objectives. The absence of long-term fiscal planning also hinders the ability to prioritize public investments effectively, thus governments may end up allocating resources inefficiently, without a clear understanding of which projects will deliver the greatest value and generate the highest economic and social returns. Furthermore, the lack of strategic focus and direction can result in duplication of efforts, wastage of resources, and missed opportunities for synergies and collaboration between different sectors and entities, becoming challenging to identify and prioritize critical infrastructure projects, social programs, and public services that address the most pressing needs of the society.

Figure 6-3 Capital Budget of North Macedonia, planned vs. actual (2008-2022)



Source: Author, based on data from Ministry of Finance of North Macedonia

Overall, the absence of a long-term fiscal planning and multi-year PIP hinders the effectiveness of the public investment management process. It results in a lack of strategic direction, inefficient allocation of resources, and missed opportunities for long-term economic and social development. Governments should prioritize the development and

implementation of a comprehensive and forward-looking multi-year PIP to ensure effective use of public funds and maximize the impact of public investments.

The balance between public and private capital investments is deemed as a requirement for a well-functioning economy in support of sustainable growth and development. The trends of public versus private gross fixed capital formation can vary significantly and are shaped by both macroeconomic factors and sector-specific dynamics. While public gross fixed capital formation refers to the investment made by the government in the form of infrastructure development, public facilities, and other capital assets (such as construction and maintenance of roads, bridges, schools, hospitals, and other public amenities), private gross fixed capital formation refers to the investment made by the private sector in the expansion and improvement of productive assets (such as factories, machinery, equipment, etc.). The trends in a country's public gross fixed capital formation tends to be influenced by government policies and priorities, which is a subject to fluctuations depending on the political context, economic conditions, as well as specific agendas of the executive power.

The general trend for public capital expenditure indicates that the governments often increase public investment during economic downturns or to address infrastructure gaps, thus leading to an increase in public gross fixed capital formation, while during economic upturns or periods of fiscal consolidation, public investment may decline. Private gross fixed capital formation, on the other hand, is driven by the private sector's decisions and market dynamics, influenced by business confidence, market demand, profitability expectations, and access to financing. During periods of economic growth and a favourable business environment, private investment tends to increase as the businesses expand their productive capacity to meet growing demand, while during periods of economic uncertainty or market downturns, private investment may decline as businesses become more cautious and delay investment decisions.

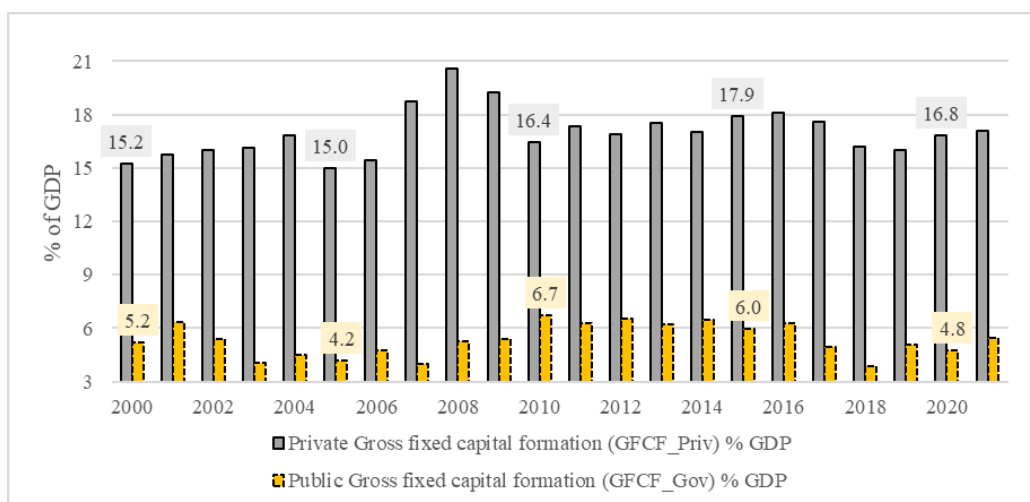
The gross fixed capital formation trends in North Macedonia over the past twenty years show a consistently stable level of private investments, with an average of 17% of GDP per year. However, there have been fluctuations with a maximum of 20.6% in 2008 and a minimum of 15% in 2005. On the other hand, the public gross fixed capital formation trends have shown slightly larger variations, averaging at 5.4% of GDP. The lowest recorded percentage was 3.9% in 2008, while the highest was 6.3% in 2001 (see Figure 6-4).

Another important component of the investments besides the private and public investments as forms of domestic investments, are the foreign direct investments made by foreign entities on the domestic market. Foreign direct investments (FDI) are likewise considered to be an important variable for economic development as it is expected to 'import' financial funds, and technological expertise and innovation, knowledge and create jobs. The interplay between private domestic investments, public investments, and FDI is complex and influenced by numerous factors, such as government policies, economic conditions, and institutional frameworks.

The theories that explore the nexus between private domestic investments, public investments, and foreign direct investment revolve around understanding how the different forms of investments interact and affect economic growth and development. This is among the many, related to the crowding-in and -out theory of private domestic and foreign investments together with public investments, then complementarity between public investments and private investments (public investments by providing necessary

conditions and an ambiance to enhance the attractiveness of an economy to both domestic and foreign investors).

Figure 6-4 Gross fixed capital formation (% of GDP), North Macedonia



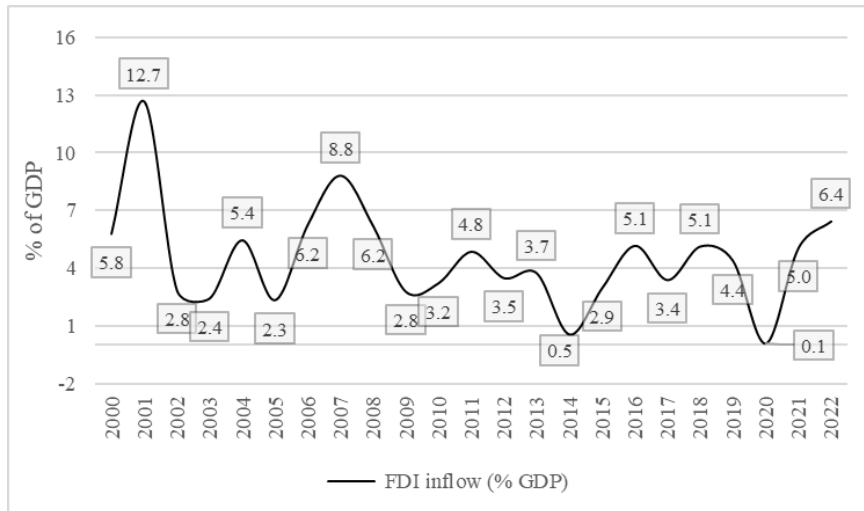
Source: Author, based on data from WDI database, World Bank

Furthermore, institutional and governance theory focusing on the role of institutions and governance influencing the relationship between the different type of investments, revolve around the notion that stronger institutions and practicing the good governance principles create a stable and predictable business environment (i.e. reducing uncertainty) for domestic and foreign investors, thus public investments can contribute to institutional development and improved governance. Moreover, productivity spillover theory argues that foreign direct investments are associated with productivity spillover effects, which can positively influence private domestic investments as they bring into the host economy new technologies, managerial skills, knowledge and benefit domestic firms through forward and backward linkages, positively affecting the productivity and competitiveness of the private sector.

Over the last two decades, the trend of net inflow of foreign direct investment in North Macedonia has been fluctuating in relation to its GDP, with an annual average of 4.5% of GDP. There have been notable fluctuations such as peaks of nearly 13% in 2001 and 9% in 2007, as well as lows of below 1% in 2014 and 2020 (see Figure 6-5).

Concerning the issue of interplay between the public in private investment, the empirical evidence likewise demonstrates ambiguous results for the existence of a crowding-in effect (such as Mahmoudzadeh et al., 2013; Aschauer, 1989; Greene & Villanueva, 1991; Blejer & Khan, 1984), or others that provide empirical evidence of a crowding-out effect (such as Basar & Temurlenk, 2007; Sineviciene, 2015; Adegboye & Alimi, 2017). Besides the effect of public investment over private investment, the literature also detects foreign direct investment as a factor, with either a positive or negative impact on private investments, as a catalyst for development. The effects of the FDI over the economic growth and the other investments depend on the country's policy for attracting FDIs, the overall business environment and investment climate. On the other hand, foreign direct investments in sectors competing with the domestic companies, may suppress investment opportunities for the domestic investors.

Figure 6-5 Foreign direct investment, net inflows (% of GDP) North Macedonia



Source: Author, based on data from WDI database, World Bank

This chapter focuses on identifying the significance and strength of the impact of public investment on private investment in North Macedonia and determining whether there is a complementarity or substitutability relationship between public and private investment, afterwards testing if foreign direct investments play a role in influencing this relationship. This chapter has two contributions: firstly, it contributes for further studies on the influence and determinants of public investment in North Macedonia, and secondly, it contributes to the existing literature in this field. Ultimately, the findings will serve the purpose to inform public policy decisions regarding investment spending and highlight the importance of designing and assessing appropriate policies.

This chapter addresses a gap in the empirical research for North Macedonia, as there is limited research available on the relationship between public and private investment specific to the country, as the long-term effects of public capital on private capital (hypothesis of 'crowd-in/-out' effect) have not been thoroughly investigated. Additionally, there are scarce studies that investigate the impact of foreign direct investment on the domestic private and public investment nexus. The last is substantial for North Macedonia, as the country had made consistent efforts over the past decades to attract more FDI inflows through generous policies with state aid packages. Consequently, it is important to determine whether these policies are in harmony with or competing against the formation of the domestic private sector capital.

The chapter has the following structure: it begins with an introduction, which is followed by a brief summary of the international research findings and results. Then, an empirical model is explained, data and methodological issues are discussed. Next, the empirical results are examined, and finally, the chapter concludes with possible policy implications.

## 6.2. Literature Review

The hypothesis of crowding-in or -out effects of private investments over the public investment and vice versa, has been of interest and has attracted the attention of many scholars for a considerable time. Nonetheless, the empirical results are inconclusive and ambiguous, leading to divergent viewpoints that rely on multiple factors and variables considered in the existing empirical literature. The different authors' findings vary, with

evidence for crowding-in, crowding-out effects, and inconclusive findings. All these depend largely on the specific country or sets of countries analysed, the methodologies and models used, the multiple combinations of variables used, and the time intervals considered. Below we present a selection of the literature and the findings on the subject matter.

Public investments are particularly analysed for their expected positive effect exerted over the economic growth of a country, perceived through the prism of the government's (any level: central, regional or local) budget. The public investments' particular importance and the effects over the sustainability of the state's public finance is demonstrated by the 'golden rule'. It suggests that the capital section of a country's budget, which includes public investment expenditure, should be financed through public debt issuance as long as it does not exceed the budget deficit (see more in e.g. Balassone & Franco, (2000); Perotti (2004)). This rule is often formalized through the establishment of a formal budget breaks in many countries.

The contribution of the public investments over the economic activity of a country or in particular sector and its quantification, accompanied by assessment of existence of a nexus of crowding-in or crowding-out between the private and public investment has raised particular interest with Aschauer's (1989) discussion paper on the productivity of public expenditure, including the elasticity of the economic output in relation to non-military public capital stock. The results of the research of Aschauer (1989) for USA (in the period from the 1940s to the 1980s) indicate that the public investment has a crowding-in effect over the private investment and could be observed as complementary (although his findings have been later criticized). His empirical calculations find that public capital stock contributes positively and significantly to productivity (0.38 to 0.58). Hence, an appropriate policy question that arises is whether (or not) public investment is productive and to what degree it contributes positively to growth, and whether this contribution is directly or indirectly induced through the decisions of the private investment(s).

Eden & Kraay (2014), in their empirical study covering a selection of forty low-income countries, find significant positive effects of public over private investment, with estimates that one dollar of public investment is associated with two additional dollars of private investment, and a 1.5 additional dollar output. However, they also note that for particular countries in the panel, which already have high rates of public investment, the rate of return on these investments is below the global interest rate. Argimón et al. (1997) in the same vein, among a panel of fourteen OECD countries, present evidence that support the existence of a crowding-in effect of private investment by public investment, especially pronounced through public infrastructure investments.

Afonso & St. Aubyn (2009) consider a selection of European developed countries, including the USA and Japan, and their findings indicate mixed results for different countries, i.e. crowding-in effects of public investment in eight, and crowding-out effects in the nine developed countries of the panel. Chaudhry et al. (2013), by estimating an autoregressive distributive lag (ARDL) approach, examine the relationship between FDI and economic growth of China, and conclude that there is a positive relationship among FDI and economic growth. Furthermore, their model illustrates the importance and long-run relationship not only between GDP and FDI, but also for private and public capital investments and government consumption. More recently, for the developing countries, the findings of Bahal et al. (2018) for India indicate an overall crowding-in effect of the public over the private investments, however with varying results in different time spans,

where they find a crowding-in effect only for the period following the 1980s, while a reverse effect prior to the 1980s.

Delidi et al. (2020) consider the effects of private and public investment in the energy sector in seventeen countries and do not find conclusive evidence. Alfonso and St. Aubyn re-evaluate their study (2018) and again find overall mixed effects, while the crowding-in effect is prevalent and only in couple of countries is the crowding-out effect noted. Mahmoudzadeh et al. (2013) evaluate the effect of fiscal spending disaggregated by the category of consumption, capital formation and budget deficit, and the effects they have on private investment in developed and developing countries. Their results indicate that the elasticity of private investment to government capital formation is positive among both developing and developed countries, i.e. the crowd-in effect. Furthermore, they find that the crowding-in complementary effect is larger among the developing than among the developed countries.

Espinosa et al. (2020) find that public investment can help boost private investment, yet the strength of corporate balance sheets plays an important role in that effect. Other studies (Voss, 2002) discuss the effects of public investment over GDP and the crowding-in/out hypothesis with employing vector autoregression (VAR). According to Voss (2002), the shocks to public investment cause crowding-out of private investment for the cases of Canada and United States. Similar results are obtained by Perotti (2004) for Australia, Germany, and United Kingdom.

Table 6.1 Review of selected empirical studies

<i>Author(s)</i>	<i>Time period</i>	<i>Geographical coverage</i>	<i>Approach/ Method</i>	<i>Variables</i>	<i>Crowding-in (+)/ - out (-) or mixed results</i>
Aschauer (1989)	1940s to 1980s	USA	general equilibrium / structural econometric model	public investment; private investment; government consumption	+
Voss (2002)	1940s to 1990s	USA, Canada	VAR	public investment; private investment	-
Mittnik & Neumann (2001)	1950 to 1990s	six industrialized economies: Canada, France, Great Britain, Japan, The Netherlands, Germany	VAR	GDP, private investment, public investment and public consumption	Mixed, generally inclined +
Perotti (2004)	1960s to 2000s	five countries: Australia, Canada, Germany, the United Kingdom, the United States	VAR	government investment, government consumption, net taxes, and GDP	Mixed
Afonso & St. Aubyn (2009)	1960s to 2005	14 European developed countries including the USA and Japan	VAR	GDP, private, public investment, taxes, interest rates	Mixed depending on country + or -
Alfonso & St. Aubyn (2018)	1960-2014	17 OECD	VAR	GDP, gross fixed capital formation public and private, taxes, interest rate	Mixed depending on country + or -
Abbas & Ahmed (2019)	1960-2015	Pakistan	VECM	private, public and foreign investments, real interest rates	-
Chaudhry et al. (2013)	1985-2009	China	ARDL	private and public capital investments, government consumption, FDI, economic growth	+
Argimón et al. (1997)	1979-1988	fourteen OECD countries	overlapping-generations model	private investment and public spending	+
Cavallo & Daude (2011)	1980 and 2006	116 developing countries	GMM estimators	investments private and public, GDP	Mixed, on average dominates -



<i>Author(s)</i>	<i>Time period</i>	<i>Geographical coverage</i>	<i>Approach/ Method</i>	<i>Variables</i>	<i>Crowding-in (+)/ - out (-) or mixed results</i>
Eden & Kraay (2014)	1980 to 2012	39 low-income countries	CES production function	government investment, total investment, GDP, private investment	+
Adegboye & Alimi (2017)	1981-2015	Nigeria	ARDL	public investment, private investment; financial sector credit	-
Bahal et al. (2018)	1996-2015	India	VECM	public investment, private investment, and output	+ and - depending on time period
Demirel et al. (2017)	2000–2015	14 Eurozone countries	panel cointegration tests	government debt, expenditure, interest rate and growth rate; private investment	-
Delidi et al. (2020)	2004-2014	17 countries	GMM estimators	GDP, interest rate, private investment, energy investments,	Inconclusive
Mahmoudzadeh et al. (2013)	2000-2009	developing vs developed countries	panel regression	consumption, capital formation and budget deficit, private investment	+
Ganic et al. (2021)	2000-2019	17 transitional and post-transitional European countries	ARDL	public borrowing and private investments	Mixed, conflicting
Espinosa et al. (2020)	2010-2017	49 countries, over 400 thousand firms	Local projection estimator	public investment, private investment, corporate debt, GDP	+

*Source: Author's compilation*

The empirical evidence seems to be more conclusive in the case of developed countries, unlike the developing economies. Cavallo & Daude (2011) find mixed results with mostly crowding-out effects in their sample of over a hundred developing countries. Moreover, what is interesting as well is that they find that the crowding-out effect is weakened and even reversed in countries with a stronger and better-quality institutional set-up, indicating a higher marginal productivity of public investment, and denoting the importance of the institutional and political factors determining enhanced public investment productivity.

Demirel et al. (2017) examined the effects of government debt, expenditure, interest rate and growth rate on private investment in the Eurozone for 2000-2015, and they find that government debt, expenditure, interest rates and budget deficits all negatively affect private investment, supporting the hypothesis of crowding-out for the geographical area in the given period. Bom (2017) investigates the dynamic effects of public investment on private capital formation in a general equilibrium macroeconomic model, allowing for factor-biased public capital by combining asymmetric factor-augmentation, showing that a permanent impulse to public investment crowds-out private capital in the long-run, when public capital directly augments private capital, and that the elasticity of substitution is smaller than one. Adegboye & Alimi (2017), in the case of Nigeria, using the ARDL estimation approach, suggest a crowding-out effect of public investment over private investments, and no complementarity but a substitution effect between the two variables. Abbas & Ahmed (2019) examine the nexus between the three categories of investments: private, public and foreign investments for Pakistan. Their findings suggest a crowding-out effect and substitutability among the three types of investments, however a strong positive impact of all on the economic growth. The authors employ a vector error correction model (VECM) with simultaneous equations for a period of over sixty years.

As for North Macedonia, although not part of the analysed countries in the empirical studies mentioned above, there are inferences for possible crowding-out effects, such as Fiti et al. (2017), who discuss evidence of negative fiscal multipliers, then Koczan (2015), and CEA (2019) on the inefficient usage of public funds, and Eliskovski (2020), whose estimates suggest crowding-out of private loans due to increasing government borrowing. Ganic et al. (2021) test the crowding-in/-out hypothesis between public borrowing and private investments. They consider two country groups in a panel setting – on one side the transitional, and on the other side the post-transitional European countries. North Macedonia is part of the eight transitional non-EU countries vs. nine post-transitional EU countries. Their results imply that generally there is a long run crowding-out effect in both panels, however the elasticity of private investment with respect to public debt is greater in the European transitional countries, with recommendations for selected countries to reassess their austerity agendas and public debt management.

Based on the reviewed empirical studies, the conclusions are a combination of the assessment approach employed, the time period covered, and the grouping of the variables used. Therefore, although in totality inconclusive, the implications lean towards the conclusion that more developed countries with established and stronger state systems seem to be in support of the crowding-in hypothesis, while on the contrary, the countries still within transitioning systems or weaker states incline towards crowding-out results. Therefore, the lack of longitudinal and overall empirical studies for North Macedonia and the wider region in general is expected to provide an added value on the subject and the topic and insights for improvements of fiscal policies improvement towards reaping more benefits of public investments.

### 6.3. Data and Methodology

The data covers a period of slightly over twenty years, from 2000 to 2021, with annual dataset, due to limited availability for a longer period or shorter intervals, for some of the variables. The variables used are domestic private investment, public investment, foreign direct investments, and gross domestic product, all of which have been collected from the World Development Indicators (World Bank) as of 2023. During the testing phase, an additional variable that potentially impacts the hypothesis was identified. Therefore, the variable foreign direct investment is also included, covering the same period and from the same source. All variable datasets, including private and public gross fixed capital formation (GFCF), FDI, and GDP, are expressed in absolute terms in their natural form, which are later used in their logarithmic form. The time period from 2009 to 2012 notes significant changes in the country's economic situation due to the global financial crisis, therefore a dummy variable (dummy) is introduced in the model. The dummy variable has a value of zero for the years before and after the crisis (2000-2008 and 2013-2022) and a value of one for the years 2009-2012, as well as 2020.

#### Econometric Methodology

The modelling technique used is the ARDL, which is based on the cointegrated approach proposed by Pesaran & Shin (1999). This technique involves using standard least squares regressions with lagged variables as regressors of both the dependent variable and explanatory variables (Greene, 2008). ARDL models have been used in econometrics for a long time, but they have gained popularity again recently for examining cointegrating relationships between variables (Pesaran & Shin (1998) and Pesaran et al. (2001)). ARDL models have several advantages, among which the ability to examine short-term and long-term relationships between dependent and explanatory variables; estimation of a single long-term equation (Hamuda et al., 2013); suitability for cointegration analysis with small sample sizes; applicability to non-stationary or mixed stationary/non-stationary variables in level I(1) or I(0); and it is accommodating by allowing variables to have a different optimal lagged period. The generalized ARDL (p,q), as per the work of Pesaran & Shin (1996), is specified by the following equation:

$$Y_{it} = \sum_{j=1}^p \varphi_{ij} Y_{i,t-j} + \sum_{j=0}^q \delta_{ij} X_{i,t-j} + \vartheta_i + \varepsilon_{it} \quad (Eq. 6.1)$$

Where  $Y_t$  is vector and the  $X_t$  are the regressors with  $i = 1, 2, \dots, k$ ,  $p, q$  are optimal lag orders,  $\varphi$  and  $\delta$  are coefficients,  $\vartheta$  is the constant,  $\varepsilon_{it}$  is the vector of error terms;  $t = 1, \dots, T$  is time;  $j$  is the number of lags;  $X_{i,t}$  is the vector of the variables.

The ARDL model estimation process involves performing a bound test to determine cointegration, then the lagged periods of variables by using benchmarks (like SBC or AIC), running the ARDL model with the determined lagged periods to test the long-term relationship, employing model diagnostic tests, and assessing the long-term and short-term impact of variables using the error correction model (ECM) on the ARDL approach to cointegration. Prior to running the regression, the time series are tested for properties of stationary, since regression of non-stationary time series data results in unreliable and spurious results with poor forecasting. Most macro-economic variables are expected to

be non-stationary, and the most commonly used test is the Augmented Dickey-Fuller (ADF) test. Once the time series are tested for stationarity, we use the Autoregressive Distributed Lag (ARDL) cointegration technique bound test of cointegration (developed by Pesaran, M. H., Shin, Y., & Smith, R. J. (2001)), in determining the long-run relationship between series that are non-stationary, and then parametrized to an Error Correction Model (ECM) to examine the long-run and short-run relationships between private investment and public investment, and private investment and foreign direct investments.

The approach is based on the work of Pesaran et al. (2001), which apply the testing for existence of a level relationship between a dependent variable and a set of regressors, when it is not known with certainty whether the underlying regressors are trend- or first-difference stationary. The bound testing is based on standard F- and t-statistics to test the significance of the lagged levels of the variables in a univariate equilibrium correction mechanism. The approach used in estimating the crowding-in/-out effect of public investment on private investment is often used among authors as an appropriate technique given the characteristics of the variables. The ARDL expression of the private investment models are presented below as Model<sub>1</sub> and Model<sub>2</sub>. The ARDL bound testing is chosen as it is considered to be an approach with advantages over other cointegration tests for several reasons. Namely, the usual cointegration tests demand all variables to be integrated in the same order, while the ARDL approach allows them to be applied irrespective of whether the variables are only of order I(0), only of I(1), or are mutually integrated. If there is a cointegrating vector identified, the ARDL model is reparametrized into ECM calculating the short-run dynamics. The variables in an ARDL model can also take a different number of lags and the model allows for a dummy variable. Furthermore, the bounds testing approach allows for estimates of the long-run and short-run components within the model, resolving problems of autocorrelation or omitted variables. The ARDL bound testing approach, based on the ordinary least square (OLS) estimation with conditional unrestricted Error Correction Model (ECM) for our model is expressed as follows:

$$\begin{aligned} \Delta \ln\_priv\_i_t = & \beta_0 + \sum_{i=1}^p \varphi_i \Delta \ln\_priv\_i_{t-i} + \sum_{i=1}^p \theta_i \Delta \ln\_gdp_{t-i} + \sum_{i=1}^p \lambda_i \Delta \ln\_gov\_i_{t-i} \\ & + \sum_{i=1}^p \lambda_i \Delta \ln\_fdi_{t-i} + \delta_1 \ln\_priv\_i_{t-i} + \delta_2 \ln\_gov\_i_{t-1} + \delta_3 \ln\_gdp_{t-1} \\ & + \delta_4 \ln\_fdi_{t-1} + \varepsilon_t \end{aligned} \quad (Eq. 6.2)$$

Where the variables in their log forms are  $\ln\_priv\_i$  is private investment,  $\ln\_gov\_i$  is the public investments,  $\ln\_gdp$  is the output,  $\ln\_fdi$  is the foreign direct investment,  $\Delta$  is the first difference, and  $p$  is the maximum lags.

The equation estimated with the ARDL bound testing uses F-test for the joint significance of the coefficient of the lagged level variables of the models. According to Pesaran et al. (2001), the bound testing gives two sets of critical values for F-test, lower and upper critical bound. The lower critical bound assumes that all of the variables are I(0) (meaning that there is no cointegration among the underlying variables) and the upper critical bound assumes that all independent variables are I(1) (meaning that there is cointegration among the underlying variables). Only in the latter case can we conclude that there is evidence of a long-run relationship among the variables regardless of the

order of integration of the variables. However, if the F-statistic is below the lower bound critical value, then the  $H_0$  cannot be rejected (there is no cointegration among the variables). Lastly, if the F – statistic is between the lower and upper bound, the result of the inference is inconclusive and depends on the order of integration of the underlying regressors. When there is evidence of cointegration, we proceed to estimate the long-run relationship based on first step results, otherwise only the short-term relationship is estimated.

$$\ln\_priv\_i_t = \beta_1 + \sum_{i=1}^l \varphi_{1i} \ln\_priv\_i_{t-i} + \sum_{i=0}^m \theta_{1i} \ln\_gdp_{t-i} + \sum_{i=0}^n \lambda_{1i} \ln\_gov\_i_{t-i} + \sum_{i=0}^q \gamma_{1i} \ln\_fdi_{t-i} + \varepsilon_{1t} \quad (Eq. 6.3)$$

Finally, if and when there is a cointegration, i.e. a long-term relation detected, the error correction term is estimated with the error correction model (ECM).

$$\Delta \ln\_priv\_i_t = \beta_2 + \sum_{i=1}^p \varphi_{2i} \Delta \ln\_priv\_i_{t-i} + \sum_{i=0}^p \theta_{2i} \Delta \ln\_gdp_{t-i} + \sum_{i=0}^p \lambda_{2i} \Delta \ln\_gov\_i_{t-i} + \sum_{i=0}^p \gamma_{2i} \Delta \ln\_fdi_{t-i} + \Psi ECM_{t-1} + \varepsilon_{2t} \quad (Eq.6.4)$$

The ECM equation coefficients indicate the (short-run) dynamics and the convergence, i.e. how much of the disequilibrium is being corrected with  $\Psi$ , which is the speed of adjustment. A positive coefficient indicates a divergence, and a negative coefficient indicates convergence. The  $ECM_{t-1}$  is expressed as:

$$ECM_{t-1} = \ln\_gov\_i_t - \beta_1 - \sum_{i=1}^l \varphi_{1i} \ln\_priv\_i_{t-i} - \sum_{i=0}^m \theta_{1i} \ln\_gdp_{t-i} - \sum_{i=0}^n \lambda_{1i} \ln\_gov\_i_{t-i} - \sum_{i=0}^q \gamma_{1i} \ln\_fdi_{t-i} \quad (Eq.6.5)$$

#### 6.4. Model Results

To determine variables' stationarity, a unit root test is performed with the ADF test, to ascertain that none of the variables are integrated of order 2 as it excludes criteria for the implementation of the chosen ARDL technique. The unit root test indicates that three out of four variables are stationary at first difference, while one is stationary at level. The variables' public investments ( $lngov\_i$ ), private investments ( $lnpriv\_i$ ), and gross domestic product ( $lngdp$ ) are all non-stationary at level, and are stationary at first level (I(1)), while the foreign direct investments ( $lnfdi$ ) are stationary at level (I(0)). The optimal lag length (using the AIC criterion) is lag 1 for three of the four variables.

Table 6.2 Unit Root Test Augmented Dickey-Fuller Test

Variables	Level	1st difference	
	with Intercept (t-stat)		Result
Ingov_i	-0.902214	-6.044258***	I(1)
Inpriv_i	-1.720861	-4.480258***	I(1)
Infdi	-5.134205***	-4.510691***	I(0)
Ingdp	-1.481204	-4.847521***	I(1)

\*\*\*, \*\*, \*, denotes significance at, 1%, 5%, 10% accordingly

Table 6.3 Optimal lag length selection criteria

Variables	AIC	SC	HQ	Lag (p, q)
Ingov_i	-0.579892*	-0.480319*	-0.560454*	1
Inpriv_i	-1.145699*	-1.046284*	-1.128874*	1
Infdi	3.052920*	3.102627*	3.061332*	0
Ingdp	-4.307471*	-4.208056*	-4.290646*	1

\* indicates lag order as selected by the criterion

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

The ARDL bound testing approach is used to test for cointegration, as to determine the existence of a long-run and/or only short-run relationship between the private investment, the public investment, and other variables. Two variable combination specifications for identification of the relation between the variables are selected: Model<sub>1</sub> incorporates the variables private, public investment and GDP, and the Model<sub>2</sub> incorporates the FDI variable in addition to the former in Model<sub>1</sub>. The ARDL bounds test indicates the existence of cointegration between the variables, i.e. a short-run or long-run relationship (Table 6.4). The Model<sub>1</sub> and Model<sub>2</sub> test indicates cointegration when the private investment is dependent variable, and no cointegration when the public investments are dependent variable. In the Model<sub>2</sub>, the FDI variable is included and indicates that there is a cointegration as well and it possibly pertains, thus the significance of this variable will be explored.

Table 6.4 Existence of cointegration and model to estimate – Bounds test results

Dependent variable	F Statistics t- stat (at 5% significance)	Bounds at 5%	Cointegrati on*	Models to estimate
Inpriv_i, Model 1 (1.1)	F Inpriv_it= 6.157581 t-stat -3.629731	I(0) 3.79 & I(1) 4.85	<b>YES</b> cointegration	<b>ECM</b> long-run model
Ingov_i, Model 1 (1.2)	F Ingov_it= 2.757241 t-stat -2.821313	I(0)-2.86 & I(1) -3.53	<b>NO</b> cointegration	<b>ARDL</b> short-run model
Inpriv_i, Model 2 (2.1)	F Inpriv_it= 4.547134 t-stat -3.563048	I(0) 3.23 & I(1) 4.35	<b>YES</b> cointegration	<b>ECM</b> long-run model
Ingov_i, Model 2 (2.2)	F Ingov_it= 2.624608 t-stat -2.475683	I(0) -2.86 & I(1) -3.78	<b>NO</b> cointegration	<b>ARDL</b> short-run model

\*denotes bounds test cointegration at 5% significance

<i>Long run – levels equation</i>	<i>Model 1</i>	<i>Model 2</i>
Dependent variable: Private investment	Coefficient	
Variable		
LNNOM_GDP	1.665482*** [0.308587]	1.686992*** [0.318376]
LNNOM_GOV_I	-0.492155** [0.221441]	-0.499944** [0.227082]
LNNOM_FDI		0.019867 [0.032523]
Model 1: EC = LNNOM_PRIV_I - (1.6655*LNNOM_GDP -0.4922*LNNOM_GOV_I)		
Model 2: EC = LNNOM_PRIV_I - (1.6870*LNNOM_GDP + 0.0199*LNNOM_FDI - 0.4999*LNNOM_GOV_I)		

[ ] standard error, \*\*\*, \*\*, \*, denotes significance at, 1%, 5%, 10% accordingly

Model<sub>1</sub> indicates that changes in private investment in the long run are influenced by changes in nominal GDP and changes in government investment. The coefficient for GDP is positive and statistically significant (at the 1% level), indicating that an increase in nominal GDP leads to an increase in private investment. The coefficient for government investment is negative and statistically significant (at the 5% level), suggesting that an increase in government investment reduces/disincentivizes private investment.

Model<sub>2</sub>: In addition to nominal GDP and government investment, this model also includes foreign direct investment as a predictor of private investment. The coefficient for nominal GDP remains positive and statistically significant (at the 1% level), indicating that an increase in nominal GDP still leads to an increase in private investment. The coefficient for FDI is not statistically significant at conventional levels, suggesting that it does not have a significant long-run relationship with private investment. The coefficient for government investments remains negative and statistically significant at the 5% level, indicating that an increase in government investment still reduces private investment.

Based on the bounds test for cointegration, when the private investment (in both cases) is the dependent variable, then a long-run relation can be estimated. The ARDL models estimation (Table 6.5) indicate that the private domestic investments are positively and significantly influenced by the size of the economic output of the current year (1.19), and they follow the economic outlook of the country while reacting to the context robustly and immediately, thus shaping the private investment reaction (there is no statistical significance in conventional levels in the association with the lagged private investment variable). However, given our primary interest and hypothesis for existence of a nexus or long-term relation between the public and private investment, there is a significant indication that there is a crowding-out effect of the public over the private sector investments.

*Table 6.5 Estimate of the ARDL models*

<i>Dependent Variable</i>	<i>Ln_priv_i</i>	
<i>Independent Variables</i>	Model 1	Model 2
	ARDL (1,0,0)	ARDL (1,0,0,0)
<i>LNNOM_PRIV_I(-1)</i>	0.285221 [0.196923]	0.285296 [0.200588]
<i>LNNOM_GDP</i>	1.190452*** [1.190452]	1.205701*** [0.333617]
<i>LNNOM_GOV_I</i>	-0.351782*** [0.13577]	-0.357312*** [0.138583]

<i>LNNOM_FDI</i>		0.014199
		[0.022897]
<i>C</i>	-5.400227	-5.916869
	[3.480243]	[3.641586]
<i>R-squared</i>	0.82616	0.83024
<i>Adjusted R-squared</i>	0.795482	0.7878
<i>Prob(F-statistic)</i>	0.000001	0.000005
<i>Durbin-Watson stat</i>	1.513765	1.558472

[ ] standard error, \*\*\*, \*\*, \*, denotes significance at, 1%, 5%, 10% accordingly

Contrary to the initial expectation, the lags of the independent variable do not influence the private investments significantly, suggesting that the current and recent stock of investments are with higher impact than the past investments of the private sector. Furthermore, coupled with the implication that the economic outlook of the country may be perceived as relatively unpredictable, and the private sector is influenced by the instantaneous governmental operations, it is reluctant or disadvantaged by stable expectations that may enhance more long-term planning of the private sector investments.

The coefficient of public investment variable (*LNNOM\_GOV\_I*) is negative and highly significant (significant at 5%) in both Model<sub>1</sub> and Model<sub>2</sub>, with values of -0.35 and -0.36, respectively. This suggests that an increase in government investments is associated with a decrease in the dependent variable – private investment. The impact of public investment on the private investment with a negative sign implies that there is crowding-out occurring and there might be a potential competition for the available investment funds. The implication of this finding is that private investment flows are affected by the present level of public investment and in the long run there is a negative relation for North Macedonia. The lack of long-term public investment planning and the predictability of the investment operations of the public sector may be an important policy variable that may as well be influencing the crowding-out effect. Therefore, the lack of PIP may pose a significant stifling effect on the private sector and their investment planning in a strategical and coordinated manner.

In estimating the specification with incorporating the variable foreign direct investments, there is a cointegration identified, implying a correlation and a long-term relationship between the variables in the model. Thus, a long-term estimation is also conducted. There is a positive crowding-in relationship between the foreign direct investments over the private investments, suggesting complementarity, with coefficient of the FDI of positive 0.01 supporting the statement that there is a positive relation between the two variables and a possible crowding-in effect of the public investments, however in the given combination it is not statistically significant.

Both model specifications are tested for serial correlation (LM test), confirming that there is no existence of serial correlation, and they are tested for stability (CUSUM and CUSUM of squares) with satisfactory results of being stable models. The model specifications are a relatively good fit, with R<sup>2</sup> for Model<sub>1</sub> of 0.83 and the DW is 1.51, while Model<sub>2</sub> is with R<sup>2</sup> of 0.83 and DW statistics of 1.56 (suggesting that there is no significant autocorrelation present in the residuals).

After identification of the long-run model, we estimate the error correction Model (ECM) to make a combination of the short-run and long-run relation. The short-run estimation indicates that in a short run there is an immediate negative crowding-out effect,



which is reversed after a lag of a little over one period (coefficient -0.84, significant at 5%).

Table 6.6 Estimate of the Error Correction term

<i>Dependent Variable:</i> <i>D(LNNOM_PRIV_I)</i>		
	<i>Model 1</i>	<i>Model 2</i>
<i>Variable</i>		
<i>C</i>	-0.010076 [0.035262]	-0.058564 [0.060699]
<i>D(LNNOM_GOV_I(-1))</i>	-0.176649 [0.178483]	-0.275026 [0.223994]
<i>D(LNNOM_GDP(-1))</i>	2.263285* [1.082317]	3.336176* [1.825035]
<i>D(LNNOM_FDI(-1))</i>		-0.02005 [0.034783]
<i>ECM_I1(-1)</i>	-0.837795*** [0.255432]	
<i>ECM_I2(-1)</i>		-0.85009*** [0.346923]
<i>R-squared</i>	0.416618	0.343304
<i>Adjusted R-squared</i>	0.307234	0.155677
<i>F-statistic</i>	3.808758	1.829713
<i>Prob(F-statistic)</i>	0.031025	0.179237
<i>Durbin-Watson stat</i>	1.787310	1.997361

[ ] standard error, \*\*\*, \*\*, \*, denotes significance at, 1%, 5%, 10% accordingly

The error correction term is the adjustment coefficient and the correction speed in the subsequent periods, with a value of coefficient of -0.84, indicating an adjustment which is in line with the coefficients of the public investments with a lag of one period, and in both cases is significant at 5%. For instance, as the estimated ECM coefficient is -0.84, it suggests that about 84% of any deviation from the long-run equilibrium will be corrected within a certain time frame (typically within a year). This means that if private investments are currently higher than its long-run equilibrium, the ECM coefficient indicates that it will decrease by 84% per period to gradually converge towards the equilibrium value. The ECM coefficients in an ARDL model signifies the presence of an adjustment mechanism that helps the dependent variable correct any deviations from its long-run equilibrium, necessary and important for understanding the short-run dynamics and the speed at which the variable returns to its equilibrium level. The model is tested for stability with the LM serial correlation test, indicating there is no serial correlation and the CUSUM test between the 5% boundaries indicating model stability.

## 6.5. Concluding Remarks

The central aim of this chapter was to investigate whether there is a nexus between private investments and public investments, and to test the hypothesis for existence of a crowding-in or -out effect among the two in the case of North Macedonia. In testing the hypothesis, the data on private investment, public investment, foreign direct investments and gross domestic product covers the period of 2000-2021. The chapter primarily investigates whether public and private investments are complementary or substitutable, and also explores the role of foreign direct investments in this relationship, also with regards to economic growth. The article does not take into account other factors that may

be important in understanding this relationship, such as private sector credit, interest rates, comparisons with similar economies, etc. Thus, it is suggested that future research should include further empirical examination to identify specific relationships and the significance of other variables, acknowledging the limitations of this article.

The Model<sub>1</sub> that includes the variables: private investments, public investments, and economic output, gives conclusive results with significant probability values, confirming the intensity of the relation between these variables and the crowding-out effects of the public on private investments in North Macedonia for the given period. This effect is immediate and short-run, while the long-run effect is relatively quickly adjusting. The economic output has a significant long-run and short-run positive effect over the private investments. Moreover, the interaction between the public investment and foreign direct investments over the private investment is positive, however not statistically significant (under conventional limits), indicative of the positive complementary effects the FDI has on private investment. Overall, these findings highlight the importance of considering the nexus between public, private and foreign investments in planning public policies in North Macedonia.

The results suggest a need for consideration in designing the future fiscal policy, as public investment in North Macedonia over the past two decades may have crowded out private investments by a selection of public investments which may not have been optimally chosen, bearing limited financial or social return. As a result, it is important for fiscal policy creators to focus on improving the processes for selecting and prioritizing public investments in order to promote more productive and long-lasting investments that offer greater benefits, such as increased productivity and positive spillover effects. This is particularly relevant given the historical lack of long-term planning (PIM) and performance assessments for public investments. The absence of strategic planning for public investments has as well contributed to a mismatch with private investment and a lack of stability and predictability of the investment environment.

Furthermore, the study suggests that there is a possibility to greatly enhance the effectiveness and efficiency of the state budget funds that are being utilized. It is important to identify any bottlenecks in the public investment processes that could potentially lead to funds being misused or improperly allocated. This is particularly significant in the infrastructure public sector projects, which are more often susceptible to corruption and a lack of transparency.

Moreover, as fiscal policies aim to increase public investment and accelerate economic growth, it is crucial to consider the potential negative impact on the private sector's ability to access adequate financing. With the public sector increasingly relying on borrowing, there is a risk of crowding-out, which could result in long-term consequences such as economic downturn, reduced tax revenue, and a greater need for borrowing. Also, it is recommended for policymakers to prudently assess the benefits of foreign direct investments in North Macedonia, as they complement private investments. Efforts should be made to remove probable administrative and bureaucratic barriers; create a competitive business environment and ensure business predictability. This requires strengthening institutional capabilities and improving public sector governance to foster a stable and reliable business environment that is attractive to private investors.

The finding should be taken into consideration for improvement of the future policy design and implementation for reversing the current nexus between the private and public investment. This entails multiform actions, starting with improved governmental fiscal discipline to endure that public spending is efficient and targeted, avoiding excessive

borrowing that can lead to increased interest rates and limiting the private sector of investment opportunities. Another avenue for improvement is the encouragement of partnerships between the public and private sectors as to leverage private capital for public projects, with expectations of private sector efficiency and reduced public investment burden.

Infrastructure investment planning and overall management process enhancement is to be prioritized, as government investment should be carefully planned, with projects which are well-aligned with economic priorities and long-term growth prospects, prioritizing sectors where private investment is lacking, and avoid directly competing with private investors, to reduce or even reverse the substitutability effect. Public investment efficiency improvement is vital in minimizing the negative impact on private investment, including streamlining bureaucracy, improved project selection criteria, and enhanced project management for optimal utilization of public resources.

## **Chapter 7**

# **Local Public Investments as Determinants of Local Revenue Mobilization**

## **Chapter 7 LOCAL PUBLIC INVESTMENT AS DETERMINANTS IN LOCAL REVENUE MOBILIZATION**

### **Abstract**

Local governments in the Western Balkan countries are heavily dependent on central governments' transfers, with low fiscal autonomy and limited efforts for own-source revenue mobilization. The chapter identifies determinants of own-source local revenues through a panel regression model. Besides central government transfers, other factors determining local revenue generation include central and local public investment expenditure, current expenditures, human development index and population density, all statistically significant in determining own-source revenues.

Municipal own-source revenues are adversely affected by the intergovernmental transfers, implying their de-incentivizing effect in collecting local revenues. The de-incentivizing effect of intergovernmental transfers on local revenue mobilization underscores the need for reforms in the fiscal relationship between central and local governments. Local capital expenditure is a significant and strong determinant of municipal fiscal autonomy, with a higher strength than central government investments, suggesting the importance of local investments as well as the complementarity with centrally financed investments.

The larger magnitude of local capital investment to central governments' investments effect might be an argument for proceeding with an advanced decentralization process in the region and consideration of new local government assignments. It also implies that local governments should increase their efforts to mobilize local revenues since the ability to invest in local capital hinges on the mobilization of local own revenues. Only the goods and services portion of the repetitive current expenditure are positively associated with municipal own-source revenue mobilization although there is no proof for the substitution effect of current to capital expenditure.

The human development index as a composite measure, unlike GDP per capita, is statistically significant and positively affecting variable in enhancing the fiscal autonomy of the municipalities, suggesting that the combined knowledge, living standard, and health of the citizens is a more valid and comprehensive measure compared to the narrower measure of GDP.

**Keywords:** local public investment; municipal own-source revenues; intergovernmental transfers; local governance; local expenditure structure.

**JEL:** H71, H72, H77, E62, H54

## 7.1. Introduction

The process of fiscal decentralization has generated a vast array of economic debates and research. Stemming from the public finance theory and fiscal efficiency, fiscal decentralization is far from a new concept (Buchanan, 1950; Tiebout, 1956; Musgrave, 1959; Furniss, 1974; Oates, 1993; Oates, 1999), yet it is still perceived as a ‘solution’ to governmental inefficiencies in providing public goods and services (Trenovski, 2022), abiding by the concept of subsidiarity.

Boye (2018), in critically reviewing the first and second-generation fiscal federalism theories, argued that for reasons of efficiency, the higher tier of government should provide public goods and services that are non-congestible, i.e. available to all inhabitants, while lower-level government for the same efficiency reason, should provide the specific local services that bring benefit for local consumers – citizens. In those situations, when positive externalities are generated, subsidies and grants internalize the benefits (Oates, 1972). McLure (2001) points to the ‘tax assignment problem’ – the need for subnational governments to have revenue streams adequate to finance the assigned expenditures, and discusses which government tier should cover what tax powers. As Musgrave (1959) suggests, the redistribution of income is to be assigned to the first government tier, consequently the corporate taxes and progressive personal income taxes, as the main instruments for revenue redistribution, are assigned to the highest governmental level, while the taxes with little or no impact on macroeconomic stability are to be assigned to the sub-state lower governmental level(s).

The second generation of fiscal federalism theory maps a new direction by emphasizing the sub-national governments’ reliance on their own source revenues (OSR), for their functioning. Thus, the higher-tiered government should refrain from interfering in both taxing and spending decisions, as the fiscal interventions policy instruments from the central governments, inhibit the development of a competitive and efficient economy. These interventions, termed ‘soft budget constraints’, are causing sub-national governments to spend excessively, and exert continuous dependence on the ‘centre’ for more support (for example see McKinnon & Nechyba, 1997). Kornai (1980; 1986) explained the concept of ‘soft budget constraint’ as the practice whereby public enterprises/local government units perpetually generate losses and are always ‘bailed out’ through state funds, operating at chronic losses, and these expectations define the behaviour of the local governments’ top management (Kornai et al., 2003).

When sub-national government is discussed, it refers to the specific institutions created by the constitution, ordinary legislation, or under executive power to provide a range of services in a minor geographical area, while when it comes to the governance of the local units, it is a broader concept defined as the formulation and implementation of collective action at the local level (Boadway & Anwar, 2009; Papcunova et al., 2020). The structure of sub-national self-government (local and/or regional) in Europe varies among the countries, depending on the country’s constitution, historical development, size, etc. Thus, there are a variety of models and tiers of sub-national governments throughout. Within the EU, nine countries have one level of sub-national authority, twelve EU countries have two levels of sub-national authority, municipalities and regions, and the remaining have three levels below the national level: municipalities, regions, and another intermediary level (Halásková & Halásková, 2015).

For the countries of the Western Balkans (WB), the fiscal decentralization process is a relatively ‘new’ and ongoing concept in development which has undergone a series of

changes from its onset until today. Nevertheless, there are intercountry differences in the systems, services provided, and financing sources when comparing these countries' local government units (LGUs), attesting for the heterogeneity of the region in both the setting up and the development of the fiscal decentralization processes among the countries. The process of decentralization among the WB countries has been initiated around the early 2000s, however unlike for example Albania, the other ex-Yugoslav countries, have had experience in a decentralized system (although in an entirely different context, political and governance system, see more in Nikolov, 2013). Thus a proper comparative ex-post analysis among the Western Balkan countries poses limitations and challenges arising from these differences.

Understandably, revenue disparities among the WB countries and within the municipalities of each country are also expected. The disparities stem from different development levels, as there are significant interregional development gaps, and also from the differences in the fiscal decentralization systems. Furthermore, not only the local level development, but also the types of function delegations and capacities of the local units among the countries vary. Therefore, dissimilarities are expected when it comes to the degree of fiscal autonomy of the LGUs – the degree to which a municipality is more or less successful in collecting and generating local own-source revenues.

Regardless of the number of sub-national tiers, the budget document is the key economic instrument in fulfilling the objectives of fiscal decentralization and in the provision of local services via both budget spending and revenue mobilization. The local government budget can be comprehended both from the expenditure and the revenue side, and while on the revenue side, the municipal revenue diversification and impact is often explored, the impacts of the revenue structure on the expenditure structure and vice versa is less frequently discussed on a local level (Sekula & Basinska, 2016). What's more, the subject is even less explored for the specific Western Balkan countries, hence the raised interest for the particular geographical area.

The local governments of the WB countries, depending on their degree of decentralization, are still to a large extent dependent on the 'higher' government tier's transfers and grants, which may contribute to the possible problems arising from 'soft budget constraint' (Kornai, 1986), and the fiscal responsibility of the sub-national governments under the expectations of central level bailouts (see more in Crivelli, 2011), causing distortions of the optimal public spending composition.

Considering that currently there is a high intergovernmental transfer dependency and limited fiscal autonomy among the lower tier governments in the WB countries, aggravated by regular occurrences of financial distress when central governments are the regular salvage points, it further increases the interest in exploring the issue. Besides, specific studies and published work on the subject of revenue and expenditure structure and their determinants, are scarce for the WB region countries. In this chapter, we explore whether the degree of fiscal autonomy of the WB municipalities, measured through their own source revenues, is affected and depends on the central government transfer revenue, and the structure of the budget expenditures.

Further devolution and decentralization of powers from the central governments to lower levels of government is another development expected to follow among the WB countries. This is will simultaneously mean greater municipal responsibility for direct provision of public services, which will translate into an inherent need for local budget growth. Consequently, there are expectations for pursuit for revenue diversification strategies and increased own revenue autonomy, for the municipalities to be able to take

on the burden of increasing public expenditures. Hence, the increasing pressure for improved fiscal autonomy and better mobilization of Own Source Revenues (OSR) among the local governments.

The primary question explored in this chapter is the nature of the relationship between the WB local government's fiscal autonomy and its expenditure structure, with a particular focus on local capital expenditure (public investment). It is expected that as local governments tend to be more autonomous in spending the revenues collected, they will initiate and focus on greater investments for heightening long-term local economic development. We further explore the degree to which the municipal own source revenues are affected by the central government transfers and the central-level public investments. We expect that in a situation of a 'relaxed' syndrome to OSR collection and transfer dependency, the local government's responsiveness to local needs to be weakened, and capacity for local investments to be diminished, which may potentially lead to inefficiencies and lower accountability.

Having in mind that local expenditure structure/function delegation is inevitably affecting the local revenue mobilization, we will further explore the effects on municipal own source revenue generation caused by current expenditure, economic output (measured through GDP per capita) and human development (measured through the human development index).

The wider purpose beyond answering the research questions, is to provide insights aimed at the decentralization subject of policymakers among the WB countries, and to motivate a systemic exploration of the potentials, needs and readiness for decentralization process redesign and further development. The indications for possible stagnation of efficiency and effectiveness benefits and potentials for amplified fiscal autonomy of the LGUs though better local revenue mobilization directed towards local public investments could be seen as a catalyst for enhanced local and regional development.

These questions are explored by panel data analysis of annual local finance national-level data, collected for the period 2008-2019 covering the six Western Balkan countries. In predicting the performance of WB countries' municipal own source revenue, we employ information on the level of local capital investment, central government investments, size of intergovernmental transfers, current expenditures, and the national GDP and include human development index and population variables.

The chapter is structured as follows – in the following section, there is a short literature overview of the existent literature with a focus on the region, proceeding with an explanation of the econometric model and elaboration of model results. Finally, the concluding remarks and implications of the findings are discussed.

## **7.2. Literature review**

In this section, a brief overview of the related empirical literature for the topic of interest is presented, although it must be emphasized that though there are numerous local level studies, there is a scarce range of studies encompassing more than one country (i.e. municipal indicators as a set of more countries grouped into a macroregion). Most of the empirical studies are focused on comparison and analyses based on a selection of local government units within a country or selection of self-governance units based on a specific characteristic such as rural vs. urban, metropolitan, comparable population size, etc.

The decentralization process, for the achievement of fiscal autonomy of the local self-government units, is a long-run process that encompasses constant reinvention and



alteration. The subject of fiscal autonomy and the capacity of own source mobilization determinants is especially relevant for developing countries, including the WB as a group of countries. The WB countries (with some exceptions) came out of a different political system with experience in a decentralized system, and initially went through the phase of ‘centralization’<sup>35</sup>, to reach the repeated process of a ‘different’ type of decentralization.

Generally, the process of leaving the centralized towards a more decentralized fiscal system is encompassed with high dependency on intergovernmental transfers in an intermediary phase that lags the fiscal independence and is a matter of negotiation between the central and local authorities (as stated by Oates, 1993). The achievement of desirable and potentially optimal fiscal autonomy is dependent on the underlying structural characteristics of the local units. A group of authors compare rural-urban differences (for example Bahl, 1999), arguing that urban areas unlike rural areas, can better achieve local revenue mobilization by relying on local taxes, and thus are less dependent on intergovernmental transfers and grants. Other authors have explored differences arising from political features, geographical characteristics, population density, etc. However, as it is not our focus to assess the determinants of fiscal decentralization in general or the structural characteristics and the fiscal autonomy, the focus of the following text is the identification of a relationship between local fiscal autonomy and any interlinkage with revenue and expenditure structure. The special interest for the WB countries is to identify whether the own source revenue collection of the municipalities is affected by the degree of local investments, central government investments, and intergovernmental transfers and additionally if there is any significant impact exerted by the size of current expenditures, economic development, or population.

In this line of discussion, it is inevitable to consider the flypaper theory (Henderson, 1968; Gramlich, 1969), which suggests that intergovernmental revenue (transfers) and public spending have importance and are determinants of local capital spending. The research by Henderson (1968) and by Gramlich et al. (1978) show that not only is public spending driven by socio-economic characteristics, but governmental grants have a large impact on spending as well. Boadu (2020) identified the presence of the flypaper effect specific to the capital budget spending in selected USA urban cities. They found that intergovernmental revenues are positively associated with and stimulate local per capita capital spending. Furthermore, Boadu (2020) finds that there is a substitution effect between current expenditure and capital outlays. As for the population as a variable, they find that the concentration rather than the population change affects the local capital spending per capita.

Tiebout’s hypothesis (1956) argues that households will move to areas that best maximize their preferences for a tax mixture and public services. Thus, for cities – as local governments – to remain competitive and attractive to keep the households, they must provide both quality public infrastructure and quality public services (Yusuf & Srithongrung, 2017).

Melo (2002) uses a panel data regression method to analyse local governments in Colombia and finds evidence that the flypaper effect is more pronounced as local governments increase their dependence on intergovernmental revenue. Similarly, Dahlberg et al. (2008), for the case of Sweden, find that an increase in federal grants is associated with a local spending increase. In Hounmenou et al. (2021), covering selected municipalities in Benin, the authors find a positive and significant impact of own

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<sup>35</sup> Referring to the countries of former Yugoslavia after the break-down.

resources, state transfers, and demographic variables on the local investments' expenses, however, it is also shown that the central government transfers play a key role in financing local investments even in a decentralized context.

Triyanto et al. (2017), for the selection of Indonesian municipalities explore fiscal decentralization economic efficiency and the effect of capital expenditure on the local own-source revenues and the regional gross domestic product. The findings show that size of regional gross domestic product has an effect on the components of local own-source revenue, and capital expenditures have an indirect effect on local own-source revenue. The authors used path analysis as a method for the research.

For the Western Balkans, as a macro-region, there is evident research deficiency on the subject, especially when it comes to more recent knowledge and information. There is to a certain degree availability of WB country-specific empirical evidence from a descriptive aspect, the most recent being the OECD (2023) Sigma report, which provides a contemporary and relevant presentation of the multi-level government systems in the Western Balkan countries and the process of decentralization development, illustrating the heterogeneity of the processes.

For some of the countries, Merkaj et al. (2017) on the decentralization process in the Western Balkans, with a focus on Albania, analyses the evolution of the process and discovers that, among other things, hampering determinants of local government performance are the non-transparent governmental grant transfers system and the level of political clientelism. Radosavljevic (2017), for the case of Serbia, considers the relation between local development and decentralization, and finds a modest positive impact of fiscal decentralization on local economic growth in the early 2000s. Although the focus of the article is on employment, the author empirically finds that there is a low positive impact of own source revenue growth and investments in Serbia, with better performance among the towns compared to the other local governments. The author's suggestions on the subject point towards the need for increased fiscal autonomy of the LGUs for improved and optimal local investment.

On the cases of Serbia and Montenegro, Kmezic et al. (2017), from a legal perspective, present research on the development of the decentralization process through the cases of the two countries, and among the abundance of findings, conclude that the fiscal decentralization in Serbia has gone through different stages with significant legal changes, which have resulted in diminished local economic development causing a restrictive approach to local investments. On the other hand, the same authors note that the legal changes concerning fiscal decentralization in Montenegro (primarily starting in 2009) motivated the local governments to increase their efficiency in own source revenue collection, while at the same time increasing the LGUs' dependency of shared taxes.

In the case of Albania, Zhllima et al. (2020) explore the links of the central government grants and political affiliation, noting dependence between the two variables. In the relatively early onset of the fiscal decentralization in Albania, Schroeder (2007) points to the risk associated with the system design in discouraging local governments from generating own source revenues.

As for North Macedonia, Nikolov (2013) in their research finds that besides other things, the municipals' own per capita tax revenues and population density are negatively correlated with municipal efficiency. On the same subject, Trenovski et al. (2022) for North Macedonia find that capital expenditure, municipal transparency, and the level of development are all significant determinants of the municipal capacity to generate own source revenues.

### *Local Revenue Coverage in the Western Balkan Countries*

Local governments of the WB countries, despite the two decades into the decentralization process, remain financially heavily dependent on intergovernmental transfers, thus remaining with moderate municipal fiscal autonomy and limited efforts for amplified own source revenue (OSR) collection and mobilization, and performance. Based on to the NALAS observatory database on local public finance data, it can be determined that local government revenues as % of the GDP (for 2019) amount to an average of 5.4%, ranging from lowest 3.6% in Albania to highest 6.5% in Montenegro, while at the same time in the SEE the average is 5.9%, the EU-28 average is 10.6% and 15.9% among the OECD-35.

During the last decade, the WB countries' local government revenues relative to their respective GDP indicates stagnant levels, and in certain cases it even shrinks. The gap between the WB and the EU member states in terms of local revenue contribution is evidently significant due to both EU countries' larger public sector as well as the wider range of decentralized local revenues. Likewise, the OSR of the WB countries contributes to an average of 39% of their total local government revenues, ranging from the highest – 66% in Montenegro – to the lowest – 14% in Kosovo. On a per capita level the differences are even wider, e.g. for 2019, the WB average local per capita revenue is 134 EUR, ranging from lowest 43 EUR per capita in Kosovo, 72 EUR in Albania, 92 EUR in North Macedonia, 166 EUR per capita in Serbia, to 344 EUR in Montenegro, while the SEE average is 172 EUR.

The challenges for mobilizing local own source revenues are numerous (frequent regulatory changes, outdated fiscal registers, to weak tax compliance and enforcement), while the remaining 'gap' of financing needs is 'filled up' with central government transfers, through shared taxes, general grants, block grants, and investment grants. The size of the per capita transfers varies for each country, depending on the municipal legally assigned responsibilities. Furthermore, in a context of their autonomous decision-making for public expenditure the municipalities have discretion over the use of their own source revenues and some discretion over assigned revenues, however much less or no discretion over the use of revenues transferred from higher tier government.

The structure of the municipal OSR indicates that these are particularly dependent on the property tax revenues, which are relatively stable, constant and repetitive, and at the same time the most visible tax source for financing local public services. The contribution of the property taxes within the total local revenues is on average 10.5% (WB), while it ranges from the lowest at 5% in Kosovo, to the highest at 19.1% in Montenegro (for 2019), and has generally seen significant improvements in their share within the OSR in the last decade among all six countries.

### **7.3. Data and Methodology**

To answer the research questions on the nature of the relationship between the local governments' fiscal autonomy and their expenditure structure, particularly of local capital investments and the effects of governmental transfers, a panel regression method is used. The panel regression model allows for cross-sectional and time series data to determine correlations and predict trends of determinants. The general form of the regression takes the following form:

$$Y_{it} = \alpha + \beta X_{it} + u_i + \lambda_t + v_{it}$$

(Eq.7.1)

Where  $u_i$  accounts for the unobserved individual effects (as it is presumed that units are not homogenized in reality) with  $i=1,2,3\dots N$ , and the  $\lambda_t$  is the unobserved time-specific effect where  $t=1,2,3\dots T$ . These parameters with the random error of  $v_{it}$  can be represented with innovation  $\varepsilon$ . Depending on the previously described, the general effects of the panel regression model can be represented as:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it}$$

$Y_{it}$  – the dependent variable

$\alpha$  – constant intercept

$\beta$  – is the (kx1) matrix of coefficients

$X_{it}$  – time-variant (1xk) regressor vector

$\varepsilon_{it}$  – the error term where  $\varepsilon \sim N(0, \sigma^2)$

The data used are annual data series for the period 2006-2019 covering the six Western Balkan countries (North Macedonia, Serbia, Bosnia & Herzegovina, Kosovo, Montenegro, and Albania). The data is retrieved from the datasets available from the Network of Associations of Local Authorities of South East Europe (NALAS)<sup>36</sup> local public finance observatory database. The data compilation, selection and time period depends on the availability and data comparability from a single source.

The data for the local governments are on a per capita basis decomposed on own revenues, shared taxes, and intergovernmental transfers. The intergovernmental transfers are further disaggregated into general grants, block grants, and investment grants. The local expenditures data is as well expressed on per capita basis, as current expenditures on the aggregate level as well as disaggregated in categories: salaries and wages, goods and services, and other expenditures, while capital expenditures are on aggregate per capita level. For consistency we use the same database for total population and municipal population density. Variables used from other data sources are GDP per capita extracted from the World Bank database, public investment on a central level is derived from the IMF's Investment and capital stock database, and Human development index from the UNDP index database. Some variables have missing data<sup>37</sup> for some of the years, making the panel unbalanced.

### ***Model Specification and Estimation***

We design a model specification to estimate the significance and strengths of the determinants of own source revenues (OSR) as a dependent variable in relation with a set of independent variables as potential predictor variables as listed.

We are interested in predicting the performance of WB municipalities in generating own source revenue, using the dependent variables on local *capital investment, central government investments, size of intergovernmental transfers, current expenditures and GDP, human development index and population*. The dependent variable for this model is average per capita *own-source revenue in EUR* (OSR) extracted on a country level in

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<sup>36</sup> NALAS database availability of local finance data for WB countries is dated until 2019, furthermore, to explore the trend and real effects among the variables of interest, the period of the Covid-19 pandemic and energy-economic crisis with significant (temporary) distortions in the variables of interest are not included.

<sup>37</sup> Note: the missing data refer to the case of Kosovo for general government public investment and the human development index.

the concerning period. The independent variables with the expectation of a relation with the dependent variables are as follows. A variable of special interest is the size of the *municipal per capita capital investments*, expressed as the average on a country level (CAPEX). It is expected that there is a positive association between local investments and local revenue mobilization, as it is anticipated that the efforts for local investments depend on the revenues which are at municipal's disposal. Another variable is the size of *central level investments*, and it is anticipated that greater central government's public investment expenditure (PIGG) is complementary and further boosts local OSR via the country's economic output.

As the municipalities in the countries are beneficiaries of rather significant intergovernmental transfers – including conditional, unconditional, and investment grants – the average per capita *intergovernmental revenue* (IGT) is another independent variable, and it is likewise expected to have a positive relationship with the municipal own-source revenues. If the case proves to be the opposite and there is a negative relationship, it may be argued that the dependency on the central government transfers diminishes the efforts of local governments to efficiently collect their local revenues, and reduces their fiscal autonomy by increased dependency and reliance on the central government (flypaper effect).

Recurrent per capita expenditure (CEX) is an independent variable of interest as it is the major component of the municipal's spending, and is considered to be in contrast with municipal capital expenditure. However, within its structure it is recurrent expenditure which typically encompasses maintenance and operations costs for the existing capital stock, thus it is expected that OSR generation will be complementary with the capital expenditure. Lastly, it is expected that the higher the development, both measured through economic output (GDP per capita) and the human development output (human development index), will have a positive association with the municipal own revenue generation.

In order to test the hypothesis that municipal fiscal autonomy depends on the revenues sources, the structure of the budget expenditures, and development level (human development index and per capita GDP) we estimate the equation in the following form:

$$OSR_{it} = \alpha + \beta_1 CAPEX_{it} + \beta_2 CEX_{it} + \beta_3 IGT_{it} + \beta_4 PIGG_{it} + \beta_5 GDP_{it} + \beta_6 HDI_{it} + \beta_7 POP_i + \varepsilon_{it}$$

(Eq.7.2)

After performing the necessary testing for the selection of the appropriate model (Breuch-Pagan test) it is decided that the POLS – no effect model is most appropriate to be used.

Table 7.1 Model Results: Dependent variable: Own source revenues, per capita

Variable	Coefficient	t-Statistic	Prob.
C	-422.592*** (96.326)	-4.387	0.000
Local Capital Expenditure ( <i>per capita</i> )	0.670*** (0.083)	8.031	0.000
Central Government Public Investment ( <i>per capita</i> )	0.064*** (0.018)	3.489	0.001
Local Current Expenditures ( <i>per capita</i> )	0.461***	5.017	0.000

	(0.092)		
Intergovernmental Transfers ( <i>per capita</i> )	-0.430*** (0.071)	-6.045	0.000
GDP ( <i>per capita</i> )	-0.012*** (0.004)	-2.477	0.016
Human Development Index	866.250*** (149.476)	5.795	0.000
Population density ( <i>sq. km</i> )	-2.211*** (0.183)	-12.087	0.000
<i>R-squared</i>	0.966		
<i>Adjusted R-squared</i>	0.961		
<i>F-statistic</i>	239.957		
<i>Prob(F-statistic)</i>	0.000		

Note: standard error in parentheses; p<0.01\*\*\*, p<0.5\*\*, p<0.1\*

#### 7.4. Results and Discussion

The results of the model specification panel regression on the WB countries' municipal OSR determinants provide insightful dependencies and implications. Firstly, there is a significant and strong association between the municipal OSR and both local capital investment and general government public investment. The municipal OSR is positively affected by the size of the public investments, at the significance level of 1%. This indicates that the size of the public investments contributes considerably to the improvement of the fiscal autonomy of the municipalities. The degree of the impacts though is more pronounced with the local capital investments, and the increase of the locally targeted capital investments of 1 EUR (per capita) may result in an average of an additional 0.67 EUR OSR.

Furthermore, the OSR is dependent on and heightened by the central government's public investment size, with a coefficient of positive 0.06. The coefficient values demonstrate the higher significance of the locally initiated capital investments since they are theoretically more responsive to specific local needs. This affiliation implies that locally driven capital investments are important in contributing to the fiscal independence of the municipalities, with a more pronounced effect compared to the central governments' capital investments. Both variables for public investments affecting the OSR positively implies that there is complementarity between the central and local government investments.

Comparing the magnitude of local capital investment and central governments' investments effect might be an additional argument for the need of proceeding with an advanced decentralization process in the WB. The two-decade process in its current form may have been exhausted, so it might be ready for reinvention, and the LGUs may be prepared for new assignments and for more amplified fiscal autonomy. In addition, it may be argued that the enhanced efforts for increased and more efficient local public investments may contribute positively to potentially reducing the regional development disparity gaps which are widely present in the region.

Secondly, the coefficient of the intergovernmental transfers has a negative sign and is statistically significant, indicating the negative association with municipal OSR. As previously noted, the transfers from the central government constitute a large source of revenue for the local governments in the WB. The negative coefficient of 0.43 indicates that an increase of 1 EUR transfer from the central government will reduce the municipal own source revenues by 0.43 EUR. This suggests that the intergovernmental transfers

significantly disincentivize local resource mobilization and weaken the LGUs efforts to collect their potential local revenues. This goes in line with the literature that highlights the *disincentivizing effect of the government transfers on local revenue mobilization*. Consequently, discouragement or idleness of local government to collect their own revenue may adversely affect their financial autonomy and inevitably the accountability towards the citizens. High transfer dependency is likely to induce a lack of fiscal discipline among local governments as well. Although upper-tier governmental transfers are often linked to specific projects, limiting the decision-making responsibilities of local authorities has been argued to stimulate local revenue mobilization in cases when the transfer distributional formula encompasses the local tax effort as a variable in determining the amount of the transfers.

Furthermore, there is a statistically significant and positive association between per capita OSR with per capita *current expenditure* (regression coefficient 0.46). The recurrent expenditures are the main portion of the local budget ensuring operations and provision of local services. The generalization of the derived conclusion, though, should be considered with care, as local inter-municipal differences and characteristics will certainly have an impact, depending on the local context. Although on average there is a positive relationship between the municipal OSR and the recurrent expenditures, to get a closer view we separately modelled the current municipal operating expenditures on a disaggregated level: wages and salaries, goods & services, and other current expenditures. In the disaggregated sub-model, the empirical results indicate that all three current expenditure categories have a positive effect, however, only the goods & services portion has a statistically significant effect on OSR (at 5% significance level). The goods and services expenditures typically encompass substantial expenditures for maintenance costs of already existing local infrastructure stock, therefore it could be argued that it is closely related to the local investments and highlights the importance of maintaining the quality of existing public capital stock.

Finally, there are opposite correlations derived from the two different development variables. While the human development index is a positively and statistically significantly associated predictor of municipal OSR, the GDP per capita is negatively associated with the OSR. The positive association between the human development index and own revenues per capita suggests that the development of the country solely measured by the economic growth (GDP) does not completely cover the relevance of human capabilities as critical criteria for assessing the development of a country. The human development index encompasses diverse aspects including standard of living, health, and knowledge. The positive sign of the coefficient indicates the importance of the overall human development and the necessary investments in the overall human development, as a determining factor for providing an opportunity for enhanced local revenue mobilization, unlike exclusively GDP per capita, which has limitations. Furthermore, as we are limited by not having a local economic output measure, it may be inferred that the result may be affected by the regional and local development imbalances, as the economic output (GDP) of the WB countries is largely unbalanced and centralized around specific sectors and in the urban centres, thus reducing its importance in strengthening fiscal autonomy (OSR) of the local governments.

Lastly, population density although expected to have a positive coefficient sign, as that greater density is likely to provide a larger tax base for the local taxes collection, in this specification the coefficient is negative, implying a negative association with the OSR (for the given period). This might be different in specific ranges of possible 'optimal'

density and differences in demographic characteristics of the municipalities, thus for a more relevant conclusion more in-depth density ranges per municipality should be explored.

### **7.5. Concluding Remarks**

This chapter examines the municipal fiscal autonomy determinants measured through the local government's own revenues, for the period 2008-2019 for the six Western Balkan countries. There is a particular focus on the relationship between own source revenues, on the one hand, and the intergovernmental transfers and local capital expenditures, on the other, while also examining including the relation with central government investments, municipal current expenditure, and the level of development.

This chapter examines the channels affecting municipal own revenues towards enhanced local revenue mobilization, by particularly considering intergovernmental transfers, as a significant local funding source, and the local capital investment as essential expenditures for development, which have been frequently and repeatedly subject to budget cuts. To the best of our knowledge, this is the first attempt that considers in unison all WB local governments in examining fiscal autonomy determinants by looking into the upper-tier government transfers and public investments.

One of the principal findings is that in the current local financing set-up, the OSR in the WB countries is adversely affected by the intergovernmental transfers, while it is significantly positively affected by local capital investment. The findings are in line with the theory that local governments which are less reliant on governmental transfers can achieve better autonomy, thus contribute more effectively in the local development. The interaction of the intergovernmental transfers and municipal own revenues implies of possible existence of a flypaper effect consistent with the fiscal decentralization theory and empirical evidence in other territories.

Furthermore, fiscal autonomy of the municipalities in the WB, measured through the size of their own source revenues per capita, is supported by local investments. The empirical evidence for these countries' local governments confirm that local investments exert positively and statistically significant effects. This may be explained by the channel of effect that capital investments contribute to improving the living circumstances and citizens' quality of life as well as the advancement of a business environment, which ultimately has a positive effect on increasing the tax base and local tax revenue sources. The significance of the public investments from the central governments also positively affects municipal revenues, however to a lesser effect compared to the local capital investment, implying the significance of the locally designed investments which are specifically responding to the needs of the community. This goes in line with the subsidiarity principle of decentralization. Thus, the above implies that the local governments of the WB countries should increase their vital efforts to mobilize local revenues since the ability to invest in local capital hinges on the mobilization of their local own revenues.

In the empirical analysis, we did not determine the expected 'substitution' effect of the current municipal expenditure, however, when disaggregated, the portion of the recurrent expenditure for procurement of goods and services is the sole part of the current expenditures which is statistically significant and may likely be due to the capital related component that encompasses the maintenance of the existing capital stock of the local governments.



The decentralization of the LSGUs in the WB is for most of the countries still a process in progress, as a good portion of the services is financed via fund transfers from the upper-tier government. The negative impact of the transfers on the mobilization of local revenue confirms the disincentivizing effect, as local governments are likely to be discouraged from local revenue collection and face reduced fiscal autonomy without using their full potential (moral hazard). This finding is consistent with the theory on the concept of 'soft budget constraint' (Kornai, 1986), implying that local governments that are more upper-tier government dependent, may define their behaviour as such. Furthermore, it may as well be an indication that the current fiscal decentralization set-up in these countries has exhausted its benefits and the municipalities are ready for providing additional and different local services with new levels of fiscal autonomy. This dependency may also imply and motivate further exploration of the existence of a 'flypaper effect', suggesting that increased transfers may lead to greater overall public spending, and that the local governments may see more immediate and targeted results by investing in key areas such as infrastructure, public services, and community development projects.

Detailed determinants on a more localized and country-specific investigation of the effects may provide more specific recommendations for stimulation of local revenue mobilization through rethinking distributional formulas for the intergovernmental transfers, often encompassing the local tax efforts as an incentivizing variable.

As for the degree of development, the results indicate that the human development index has a positive and significant effect on the fiscal autonomy of the municipalities in the WB, thus knowledge, living standard, and health of the citizens is a more valid and comprehensive measure when compared to the narrower measure of GDP. These findings as well go in line with the economists' discussion of the GDP as a measure that falls short in capturing the overall well-being and welfare (for example Stiglitz, Sen, & Fioussi, 2009).

The conclusions indicate the investments and state of the capital stock of the municipalities in the WB are directly related to both the fiscal autonomy and the fiscal efforts of the local administration to rising own sources, as well as the overall fiscal outlook of the countries. The economic welfare of the municipality is inseparably interdependent on capital investments, as the municipalities' own sources impact the investment outlays. Therefore, municipalities need to maximize their effort for local revenue mobilization to sustain and improve economic growth and development.

Efforts for increasing and redesigning the fiscal decentralization process should have a positive impact on improved local development, both from the aspect of moving to a more effective decentralization (from deconcentration and devolution) as well as to redesigning the intergovernmental transfer models towards a more conducive to more efficient and effective local development. Thus, additional research should be considered to explore the further possibilities for redesigning intergovernmental transfers that are conducive to and facilitate local revenue mobilization channels through models for fiscal stimulus, improved public services, and better tax enforcement efforts.

Without a doubt, other determinants, not explored here, which is a limitation, may also affect the OSR mobilization, such as geography, education, unemployment, population, economic (in)activity, political variables and an array of other determinants. Nonetheless, the specificities of each country and the heterogeneity of the municipalities within the countries, could be further explored and determine specific features, opening the discussion for the decentralization evolution, which calls for careful considerations in

approaching the issue and for allowing an efficient and accountable provision of local public goods and services.

Considering that the empirical literature in this area for the specific geographical region is scarce, this discussion paper can be a foundation or incentive for other research aspects that may cover a deeper and wider scope of determinants specific to countries, groups of comparable local government units, or another form of clustering.

## **Chapter 8**

## **Conclusions**

## Chapter 8 CONCLUSIONS

The governments' role and participation in the economies have been continuously increasing throughout the past. The public spending over the decades globally has risen manifold, and the heterogeneous mix of SEE has not been an exception. Combined and driven by various affecting events, the economies undertook expansionary policies leading to an enduring proliferation of the public expenditure that remained permanent. The changes in the role of the government due to the assumed public roles and responsibilities have had a major role in the government spending size. Public finance theory reasons that the public sector involvement within an economy of a country is motivated primarily by the principles of efficient resource allocation, equal income and wealth distribution, and economic activity stabilization, thus higher efficiency and equity in the provision of the public goods to the citizens leads to enhanced welfare.

Public investment as one component of public spending supports the delivery of key public services, connects citizens and firms to economic opportunities, and can serve as an important catalyst for economic growth. The decades long global public investment decline shows signs of recovery among the developing and emerging markets while it remains low among advanced economies. However, the economic and social impact of public investment critically depends on its efficiency. As adequately efficient and effective infrastructure is expected to have a positive effect, inadequate public infrastructure can impede economic growth and development. The public capital compared to the coverage and quality across countries reveals strong indications of inefficiencies in public investment processes. Thus, enhancement of both the efficiency and effectiveness of public expenditure should be placed high on the economic and political priority list of countries' agendas.

The primary contribution of the research lies in exploring and assessing the public spending efficiency in the SEE with specific focus on public investment spending efficiency and the case of North Macedonia. The discussion is further extended in exploring the interrelation of public investment and the economic activity, the private investments, as well as the impact of certain socio-economic and institutional variables. Overall, the research contributes significantly to the existing literature on public spending efficiency in SEE countries, with a specific emphasis on public investment spending. By highlighting the linkages between public investment, economic activity, private investments, and socio-economic factors, the research provides a nuanced understanding of the challenges and opportunities in maximizing the impact of public expenditure for inclusive and sustainable development in the region.

This dissertation at the start provides a theoretical review of public spending with the aim of exploring the developed underlying theories, explaining the motivations for the increasing government role, and thus public spending, government size, etc. The theory section concludes that although it is an appealing fiscal policy topic there is no settling on one comprehensive theory for optimal and adequate public sector size; furthermore, concludes that although the public investment spending is perceived as a catalyst for growth and development, there is no certain stance on the magnitude of the effects exerted on the economy, which is especially ambiguous for the developing regions. The description of the public pending trends detects a strong heterogeneity and specificities of the countries in the SEE macro region with varying public spending composition, coupled with sporadically diverging or converging capital spending policies and fiscal behaviour of the separate economies. The subsequent chapters of the dissertation expound

on individual research queries and themes in the format of self-contained essays. Each subsequent chapter delves into a distinct investigation and subject, presenting an autonomous essay that addresses a question pertaining to the efficiency of public expenditures. These essays are structured around a specific hypothesis, methodology, data sets, modelling techniques, and ultimately the results and findings.

The key findings of *the assessment of public spending performance and efficiency of Southeast Europe's countries* indicate:

- There are significant overall public spending size inter-country differences in the macroregion as well as differences in public spending efficiency, resulting in varying public sector performances. The public sector performance index (PSPI) indicates that the best performer among the peer countries is, by far, Slovenia, while the public sector efficiency index (PSE) indicates that Romania is the most efficient in spending its public resources.
- Cross-country comparison reveals that the most effective allocation of public funds may not always be the most efficient. While there are differences in the efficiency and effectiveness rankings, Greece stands out as the least efficient and least effective country in terms of using public resources to deliver public services in the macroregion.
- The more developed EU member economies, compared to the non-member economies have larger public sectors (in terms of expenditure with >45% of GDP), and in average demonstrate slightly lower efficiency however higher performance levels, primarily attributed to the larger size of their government. The presence of a larger government size allows for more resources to be allocated towards public services, resulting in better overall performance outcomes. However, the trade-off is often a decrease in efficiency due to the challenges associated with managing and coordinating larger government structures.
- On average, countries in the SEE macroregion have the potential to improve their efficiency by making adjustments to their public spending. They could achieve this by decreasing public spending by 15% and still maintain the same output level. Alternatively, they could increase the effectiveness of their public resources spent by 9% while keeping their current level of spending unchanged. These findings highlight the opportunities for SEE countries to enhance the efficiency and effectiveness of their public expenditure, potentially leading to better utilization of resources and improved outcomes for their citizens.
- In the public sector education, the most effective countries are Slovenia, followed by Greece while at the same time both have demonstrated highest efficiency in spending public resources in the education sector. The SEE countries' mean potential for improvement of education sector performance is 10% with the same inputs, or decrease input by 16% and achieve same level of performance in education. Mean education output efficiency of the EU subgroup is 0.95, while for the non-EU subgroup is 0.85.
- In the SEE public health sector (with significant variations), the leading performer is Albania, followed by Slovenia, while Albania is at the same time the most efficient. The countries, on average, have potential for improvement of the health sector's performance by 24% with same inputs, or decrease input by 30% and achieve the same performance. In the health sector, the EU member countries in the wider macroregion are by far more effective and efficient in spending public health resources (0.84), compared to the non-EU countries (0.69).

- In the realm of public infrastructure, some of the countries led by Slovenia, then Serbia, Greece, and Croatia stand out as the strong performers in the group. On average, the SEE countries had the potential to enhance the quality of public infrastructure by 12% without increasing the level of spending – input, and on average, the countries could have spent 20% less and offer the same level of infrastructure services quality. In comparison, EU member countries significantly outperform non-EU member countries in terms of efficiency and effectiveness in delivering high-quality infrastructure.
- North Macedonia has underperformed compared to its peer countries in the region in terms of overall public sector performance and efficiency of public spending (over the past decade), ranking second only to Greece. On average, the country could have obtained the same outcomes with 8% less public spending or could have achieved 12% improved results with the level of spending that was allocated.
  - In the education sector, North Macedonia could have attained at least 15% better performance in reaching educational objectives with the allocated education budget, and attained 28% better performance and services in the public health sector. These suggests that there are opportunities to enhance the efficiency and effectiveness of public education and public health expenditure to deliver better education and health outcomes and services to the population.
  - Moreover, the country's public infrastructure performance is significantly low, with an input efficiency score of 0.51, revealing the low efficiency of public capital expenditure, which could have been almost 50% less for fixed capital investments.
- There is a strong positive correlation (statistically significant) between the public infrastructure efficiency scores and the specific governance indicators: government effectiveness, accountability, rule of law, and corruption control.

The focal **recommendation** that can be inferred is that countries outside the European Union and within SEE should particularly prioritize enhancing their public finance management as a way to better utilize limited resources. By identifying and addressing inefficiencies, these countries can optimize their public spending and focus on more effective and efficient allocation of resources which is especially important during times of crisis, which often necessitate increased fiscal interventions and adjustments that come with significant public expenditure adjustment costs. Furthermore, simply increasing the budget may not be the most effective approach to enhance the quality of public services. This suggests that certain countries' governments are relatively inefficient in providing services like healthcare and education compared to other countries in the region, thus merely inflating the budget in these sectors will not guarantee improved social outcomes unless the fundamental inefficiencies in expenditure are identified, addressed and corrected. By adopting a holistic approach that addresses not only the funding levels but also the governance and institutional factors influencing service delivery, countries can enhance the quality of public services in a sustainable and impactful manner. Effective budget allocation, coupled with good governance practices, is essential for achieving meaningful improvements in the delivery of public services and promoting overall socioeconomic development.

From a public policy perspective, it is essential to distinguish between the technically efficient level of spending and the desired level of spending. As we demonstrated, a country may be considered efficient yet may still need to increase its public spending to reach the desired performance levels (e.g. infrastructure quality, education, or health

indicators). This is particularly the case for those countries with low spending and low performance indicators, placed close(r) to the origin of the efficiency frontier, in which case there is a need to expand their operations within the bounds of efficiency. If there is a gap between the technically efficient level of spending and the desired level of spending, policymakers may need to consider increasing investments in areas that are critical for socioeconomic development and well-being.

Main findings of the assessment specific to *public investment spending efficiency* are:

- With the exception of North Macedonia, Serbia, and Montenegro, most of the SEE countries have a decreasing trend in public investment in the last decade. Despite their heterogeneity, these countries follow a global pattern of suppressed public investment, which is especially pronounced among the EU member states. While the relative size of the capital expenditure is declining, the per capita cumulated capital stock is multiple times larger among the EU member states compared to the non-members. Member states like Croatia, Greece, and Slovenia have per capita capital stock that is considerably higher, double or even higher compared to non-EU member states such as Albania, Bosnia and Herzegovina, North Macedonia, and Montenegro.
  - The data demonstrates that the past investments in public infrastructure and the maintenance of the capital stock, has built a valuable base among the EU member states, which at the same time are more developed economies, widening the gap between the member and the non-members, reflected in difference in both quality and quantity of infrastructure, and less than satisfactory convergence path.
- There is a strong positive correlation of public investment capital stock per capita with the quality of infrastructure indicators (with logistics performance index: 0.74, and with infrastructure quality index: 0.86), confirming the long-term effects and the need for long-term strategic planning processes for PIP.
  - However, there are cases where the largest capital stock increase is not always reflected in proportional increase of infrastructure quality, a situation particularly noticeable in the case of Montenegro, indicating towards the existence of inefficiencies and sources of ineffectiveness in investment spending.
- The average output investment efficiency gap among the SEE countries is 9%, while the average input efficiency gap is estimated at 15%. A sub-group intercountry comparison marks substantial investment efficiency gap differences, pronounced in the cases of Montenegro, Albania, and North Macedonia – positioned furthest from the efficiency frontier.
  - The three least efficient countries may have decreased their input by a third or almost half of the public investment expenditure, specifically Montenegro by 49%, Albania by 40%, and North Macedonia by 33%, and still achieve the same output – infrastructure created and quality attained. The results are for the most part in line with the other research findings that the efficiency in public investment is higher among more developed compared to less developed economies in SEE.
- North Macedonia specifically underperforms in public investment compared to its peer countries in the macroregion and is among the bottom ranked countries.

- On average, the country could have obtained the same investment quantity and quality with 33% less spending or could have achieved 15% better public investment results with the level of spending that was allocated. In layman terms, a third of the decade allocated capital expenditure has been squandered.
- Second stage regression results indicate a statistically significant and positive association of the technical output efficiency with the governance indicator composite sub indicators, specificity with:
  - Degree of government effectiveness and corruption control, confirming the importance that quality of the public service and quality of the administrative service have on efficient and effective public investment spending. The commitment of the government in proper implementation of the public investment programs and strategies is by all means is a reflection of the effectiveness of a government and thus the significant and positive association.
  - Unexpectedly, the results also indicate a negative association of the level of public investment efficiency with accountability and political stability indicators, with a possible explanation that the governments which are sensitive to popular opinion, prone to clientelism, cronyism, and at the same time politically stable governments may be a reflection of complacency and stagnation, and thus the phenomenon of ‘stabilitocracy’ occurs; coined to explain the political context of the Western Balkan region countries, having the opposite effect on economic performance and spending efficiency.
- Finally, it is suggested that the level of public investment in the SEE is influenced by expectations for economic growth (statistically significant) rather than the actual economic growth (statistically not significant).
  - This indicates the significance of growth expectations on public investment, which is greater than the significance of the actual achieved economic growth.
  - The association between the lagged private investment level and public investment is positive and statistically significant, suggesting that public investment (policymakers) follows the trend set by private investment.
  - Public investment in the region, though, are not determined by the public debt levels (no statistical significance), implying that the SEE-s are inclined towards an increased public investment with increasing public debt, as a likely indicator of procyclical fiscal policy.

***Impact of public investments on economic output.*** Theory stipulates that like other government spending, public investment expenditure provides short-term boosts to the economy, nevertheless it is further expected that public investment provides a more intense long-term effect as it raises the productive capacity of the economy through cumulated capital stock . The strength of the long-run effect will however depend on the absorptive capacity, the strength of the investment process, which will determine and affect the competent selection of capital projects, their implementation and monitoring. If inefficiencies thrive within the processes, then only a fraction of the investment amount will add to the actual capital base of the country. The key findings for the SEE countries are as follows:

- There is a difference detected when comparing the EU vs. non-EU members in SEE, whereby among the EU member states the crowding-in hypothesis of private-public investment holds with statistical significance, while does not hold statistical significance for the non-EU countries in the SEE (positive coefficient but not



statically significant at conventional levels). This implies the more ‘coordinated’ and long term track of public policies and the pronounced complementarity or crowding-in effect of public to the private investment among the EU member states, which is not explicitly the case of the non-EU members, where the economic activity is a more significant signal for public investment.

- The reversed specification, where private investment is the dependant variable, indicates that in the long-run, private investment flow of the SEE countries jointly will be stimulated positively by increased public investment and by higher economic activity. This is in line with the theory that public investment creates opportunities for increased productivity of the private sector, thus generating a boost to the economic output.
  - For the EU member states SEE sub-sample, the significance of the public investment for stimulating the private investment is larger, as is the impact, compared to the non-EU, where the size of the impact and the significance is less intense, again confirming the strength of the link/coordination between the two sectors, which is related to the stable and predictable environment.
  - In contrast, a rise in the interest rates triggers decline of private investment size, as an increased cost for capital is making the borrowing more expensive for the private sector investors.
  - A rise in the public debt results in triggering lower private investment possibly due to the expectations of the private investors for a forthcoming period of public spending consolidation. In a sample division in EU and non-EU member states, there are solely minor differences in the intensity.
- Testing the cointegration for a long-term link between public investment and private investment, and between public investment and the economic output, is complementary with the theory (and most empirical studies), and is demonstrating that public investment is boosted by increased economic activity, which in turn increases fiscal capacity, and incentivizes more private investment. By employing panel VECM, an error correction term is estimated in determining the long-term relationship of public investment and the other variables (GDP, private investment, public debt and interest rate), inferring that there is a long-run and positive relationship between public investment and the other variables (GDP, private investment, public debt and interest rate).
  - In the short run, the results indicate that the current year’s public investment is affected downwards by past year’s public investments, suggesting that although in the long run the public investments may exert an increasing trend, while in the short run, governments are generally not inclined towards continuous increases. The latter is pronounced among the non-EU subsample countries, in line with the regular occurrences of capital expenditure budget cuts with supplemental budgets.
  - In the short run, economic output and private investment are not associated with statistical significance, however increased public debt to GDP and interest rates are statistically significant predictors for decreased public investment.

The primary recommendation arising from the empirical findings is that there are solid implications for the need for proper design for future public investment programs, austerity programs for possible debt predicaments, and closer examination of the private investment response drivers behind the non-significance of the association with the public investments in the short run, once again pointing towards the issue of stronger efforts for

efficiency and effectiveness performance of the region within the processes and the programs for public investments, which may contribute to restricted private investment and GDP growth. An improved monitoring process and overall investment cycle management, especially planning for individual countries, should encourage higher continuous investment activities, especially for those that show signs of healthy public finances and low public investment rates towards a path of stronger and sustainable GDP growth in the future.

The *nexus between public and private investments in North Macedonia* – the public capital investment level in North Macedonia is perceived to be sub-optimal for quite some period, which has been coupled with capital budget bias. Furthermore, there has been a long-term lack of a PIP process impacting the strategic focus and direction in prioritizing public investment, the main findings indicate that for North Macedonia:

- The cointegration testing indicates that there is a long-term relation (with statistical significance) only in a set-up when the private investment is dependent variable and not vice versa. Concerning the long-term nexus, there is an indication that the private domestic investments are positively and significantly (statistically) influenced by the size of the economic output of the current year and they follow the economic outlook of the country while ‘reacting’ to the context robustly and immediately, thus shaping the private investors’ reaction.
- Through testing the hypothesis for existence of a nexus or long-term relation between the public and private investment, there is a statistically significant indication that there is a crowding-out effect of the public over the private sector investments.
  - The empirical testing provides sufficient evidence that points to existence of a crowding-out effect of public over private investments with coefficient of public investment variable (in the long-run ARDL models) is -0.35, supporting the statement of a crowding-out effect (significant at 5%). Furthermore, the impact of public investment on the private investment with negative sign implies that there might be possible competition for the investment funds availability. The lack of long-term public investment planning and the predictability of the investment operations of the public sector may be an important policy variable that may be influencing the crowding-out effect.

Recommendations arising from the findings are that there is a need for closer examination of the fiscal policies for public investment with efforts for improved public investment performance processes. Public investment efficiency improvement is vital in minimizing the negative impact on private investment, including streamlining bureaucracy, improved project selection criteria, and enhanced project management for optimal utilization of public resources. As the findings suggest, there is a possibility to greatly enhance the effectiveness and efficiency of the state budget funds utilized for public investments.

It is important to identify any bottlenecks in the public investment processes that could potentially lead to funds being misused or improperly allocated, often associated as susceptible to corruption and a lack of transparency. The findings should be taken into consideration for improvement of the future policy design and implementation for reversing the current nexus between the private and public investment. This entails multiform actions, starting with improved governmental fiscal discipline to endure that public spending is efficient and targeted, and avoiding excessive borrowing that can lead to increased interest rates and limit the private sector of investment opportunities. Another avenue for improvement is the encouragement of partnerships between the public and

private sectors so as to leverage private capital for public projects, with expectations of private sector efficiency and reduced public investment burden.

The *interplay between the local and central government investments* in the Western Balkan countries. As theory suggests, as local governments tend to be more autonomous in spending their revenues, as they will initiate and focus the revenues on greater investment for heightening long-term local economic development. In circumstances whereby the local governments are financially highly dependent on central government transfers, the occurrence of a ‘relaxed’ syndrome to own revenue collection, as well as the local government’s responsiveness to local needs is expected to be weakened, the capacity for local investments is diminished, potentially leading to inefficiencies. The main findings regarding the specific question are:

- Local governments in the Western Balkan countries remain heavily dependent on central governments’ transfers, with low fiscal autonomy and limited efforts for own-source revenue mobilization. Besides central government transfers, other factors determining own source revenue collection (fiscal autonomy) include central and local public investment, current expenditures, human development, and population density.
- One of the principal findings is that in the current local financing set-up, the own source revenues in the Western Balkan countries is adversely affected by the intergovernmental transfers (negative coefficient), while significantly positively affected by local capital investment. The findings are in line with the theory that local governments which are less reliant on governmental transfers can achieve better autonomy, thus contribute more effectively to the development. The interaction of the regression coefficients of the intergovernmental transfers and municipal own revenues implies a possible existence of a ‘fly paper’ effect consistent with the fiscal decentralization theory and empirical evidence. The local revenue mobilization efforts and fiscal autonomy among the WB countries are disincentivized by the reliance on the sizable central government’s transfers to the local governments (coefficient -0.43).
- Secondly, fiscal autonomy of the municipalities in the WB – measured through the size of their own source revenues per capita, is supported by local investments. The empirical evidence for these countries’ local governments confirms that local investments have both statistically and sizeably significant effects. This may be explained by the channel of effect that capital investments contribute to improving the living circumstances and quality of the citizens as well as the advancement of the business environment, which ultimately has a positive effect on increasing the tax base and local tax revenue sources.
- The significance of the public investments from the central governments as well positively affects own sources, however with a lesser effect compared to the local capital investment (coefficient 0.06 vs. 0.67), implying the significance of the locally designed investments, which are specifically responding to the needs of the community. This goes in line with the subsidiarity principle as one of the principles of decentralization as a process.
- There is no ‘substitution’ effect of the current municipal expenditure, however, when disaggregated, the portion of the recurrent expenditure for procurement of goods and services is the sole part of the current expenditures which is statistically significant, as it may likely be due to the capital related component, which encompasses the maintenance of the capital infrastructure stock of the local governments.

- Human development index has a positive and significant effect on the fiscal autonomy of the municipalities in the WB, thus knowledge, living standard, and health of the citizens is a more valid and comprehensive measure when compared to the narrower measure of GDP. These findings as well go in line with the economists' discussion of the GDP as a measure that falls short in capturing the overall the well-being and welfare.

Recommendations stemming from the findings: the decentralization of the LGUs in the WB is for most of the countries still a process in progress, as a good portion of the services is financed via fund transfers from the upper-tier government, demonstrates indication for the need to expedite this process to empower local governments, thus providing greater decision-making authority and fiscal autonomy which can help improve the efficiency and effectiveness of public investments in infrastructure. The negative impact of the transfers on the mobilization of local revenue confirms the disincentivizing effect, as local governments are likely to be discouraged from local revenue collection and face reduced fiscal autonomy without using their full potential. To address this issue, incentives should be introduced to encourage local governments to enhance their revenue collection efforts, which can provide them with greater financial independence and autonomy. Furthermore, the larger impact of the local compared the central governments' investments may be an indication that the current fiscal decentralization set-up in these countries, has exhausted its benefits and the municipalities are ready for providing additional and different local services with new levels of fiscal autonomy. Strengthening the fiscal decentralization framework and giving municipalities more freedom to allocate and manage their resources can lead to improved infrastructure development and service delivery at the local level.

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## ANNEXES

## 8.1. Annex: CHAPTER 3

Table 0.1 Opportunity Indicators – Normalized

Opportunity Indicators																				
	Administration				Education						Health				Public Infrastructures					
	Corruption	Red tape	Quality of Judiciary	Social Capital	Sec. school enrolment	Tert. school enrolment	Quality of Edu / Skillset	PISA results	Quality of Math & Science	Completion rate (upper secondary)	Human Capital Index	Life expectancy	Infant Mortality	Healthy life expected adj.	Mortality rate of specif. dis.	Quality of infrastructure	new Quality of infrastructure	Quality of infrastructure-transport	Quality of infrastr.-utility	Logistics performance
<b>Albania</b>	0.96	1.45	0.85	0.93	0.99	0.92	1.12	0.96	1.00	0.95	0.97	1.02	0.54	1.01	1.06	1.03	0.84	0.70	0.91	0.84
<b>Bosnia and Herzegovina</b>	0.95	0.90	0.96	0.99	0.92	0.71	0.88	0.92	0.97	1.10	0.93	1.00	0.91	1.00	0.99	0.80	0.90	0.76	0.98	0.96
<b>Bulgaria</b>	0.95	1.08	0.94	0.96	1.02	1.06	0.96	0.99	0.91	0.98	1.00	0.97	0.72	0.98	0.77	0.96	1.02	1.03	1.01	1.02
<b>Croatia</b>	1.00	0.70	0.96	0.89	1.03	1.02	0.96	1.09	1.08	1.13	1.11	1.01	1.18	1.01	1.06	1.23	1.12	1.24	1.06	1.11
<b>Greece</b>	0.97	0.79	1.17	0.97	1.08	2.00	0.96	1.05	0.96	1.10	1.06	1.06	1.33	1.06	1.49	1.13	1.11	1.19	1.07	1.17
<b>North Macedonia</b>	1.10	1.15	0.96	1.03	0.84	0.63	1.02	0.88	0.94	0.95	0.83	0.99	0.59	0.99	0.88	1.01	0.95	0.89	0.99	0.96
<b>Montenegro</b>	1.20	1.25	1.23	1.06	0.95	0.88	1.09	0.96	1.03	1.01	0.96	1.00	1.49	1.00	0.88	0.93	0.91	0.78	0.98	0.92
<b>Serbia</b>	0.92	0.82	0.88	0.97	0.99	0.95	0.97	1.02	0.99	0.94	1.12	0.98	0.90	0.99	0.91	0.85	1.06	1.17	1.00	0.96
<b>Slovenia</b>	1.20	0.92	1.20	1.21	1.14	1.27	1.18	1.16	1.18	1.08	1.21	1.05	2.33	1.04	1.43	1.26	1.12	1.16	1.10	1.19
<b>Romania</b>	0.97	0.96	1.17	0.94	0.97	0.78	0.93	0.99	1.03	0.96	0.91	0.98	0.65	0.98	0.85	0.90	1.03	1.07	1.00	1.01
<b>Moldova</b>	0.80	0.99	0.69	1.03	1.06	0.79	0.92	0.97	0.90	0.81	0.90	0.93	0.36	0.95	0.68	0.89	0.95	1.02	0.91	0.86
<b><u>AVERAGE</u></b>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>

Table 0.2 Musgravian Indicators – Normalized

<i>Musgravian Indicators</i>						
<i>Distribution</i>	<i>Stability</i>			<i>Economic Performance</i>		
<i>Gini index</i>	<i>Coef. of variance of economic growth</i>	<i>Std. deviation of inflation rate</i>	<i>GDP per capita</i>	<i>rGDP rate</i>	<i>Unemployment rate</i>	
Albania	1.03	0.76	0.60	0.62	1.19	0.72
Bosnia and Herzegovina	1.01	0.76	0.86	0.66	1.09	0.46
Bulgaria	0.87	0.97	1.10	1.03	0.82	1.28
Croatia	1.06	1.97	0.92	1.29	0.73	0.84
Greece	0.95	-0.08	0.77	1.37	-0.29	0.47
North Macedonia	0.93	1.05	0.90	0.74	0.89	0.44
Montenegro	0.87	2.23	1.01	0.91	0.96	0.58
Serbia	0.87	0.76	1.55	0.82	1.12	0.66
Slovenia	1.32	1.11	0.68	1.74	1.01	1.44
Romania	0.92	0.52	1.43	1.28	1.70	1.80
Moldova	1.19	0.97	1.18	0.54	1.77	2.31
<b>AVERAGE</b>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>

*Table 0.3 Public Expenditure % GDP (ten-year average) – Input Indicators*

Public Expenditure (% GDP)	General Government: Final Consumption	Government Expenditure: Education	Government Expenditure: Current Health	Government Expenditure: Gross Fixed Capital Formation	Government Expenditure: Subsidies & Other Transfers	TOTAL General Government Expenditure	Rank by Total GG (Descending)
Albania	11.35	3.40	5.06	5.52	14.74	29.79	11
Bosnia and Herzegovina	21.18	n.a.	9.21	4.43	20.58	43.73	5
Bulgaria	16.96	3.79	7.36	3.86	15.55	34.72	7
Croatia	21.49	4.09	7.10	3.58	20.71	47.73	3
Greece	20.92	3.58	8.43	3.36	22.72	51.73	1
North Macedonia	16.18	3.27	6.60	6.18	22.30	32.24	10
Montenegro	19.63	n.a.	8.34	6.37	n.a.	46.75	4
Serbia	17.09	3.83	8.92	3.13	26.62	42.94	6
Slovenia	19.26	5.16	8.50	4.09	22.00	48.84	2
Romania	15.89	3.09	5.18	4.22	11.87	34.13	8
Moldova	15.48	6.13	8.18	3.20	18.91	32.36	9
<b>AVERAGE</b>	<i>17.76</i>	<i>4.04</i>	<i>7.53</i>	<i>4.36</i>	<i>19.60</i>	<i>40.45</i>	

n.a. – data not available

Table 0.4 Variables & Data Sources – public spending

	<i>Indexes/variables</i>	<i>Sources, notes</i>	<i>Series and explanation</i>
Administrative	Corruption	WEF, Global Competitiveness Index, section 2. Ethics and corruption	Editions 2010-2011, to 2016-2017, and backcast 2017, 2018 and 2019 Average of last ten periods available on a country level; Values on a 1-10 scale for comparison prior normalization
	Red Tape	WEF, Global Competitiveness Index, section 1.09 Burden of government regulation	Editions 2010-2011, to 2016-2017, and backcast 2017, 2018 and 2019 Average of last ten periods available on a country level; Values on a 1-10 scale for comparison prior normalization
	Quality of Judiciary	WEF, Global Competitiveness Index, section 1.06 Judicial independence	Editions 2010-2011, to 2016-2017, and backcast 2017, 2018 and 2019 Average of last ten periods available on a country level; Values on a 1-10 scale for comparison prior normalization
	Social Capital	WEF, Global Competitiveness Index, Social Capital	Editions 2010-2011, to 2016-2017, and backcast 2017, 2018 and 2019 Average of last ten periods available on a country level; Values on a 1-10 scale for comparison prior normalization.
Education	Secondary School Enrolment	World Development Indicators (WDI), World bank, indicator: School enrolment, secondary (% gross)	2011-2020, ten year average per country, exception for Bosnia and Herzegovina, source from World Atlas/Knoema
	Tertiary School Enrolment	World Development Indicators (WDI), World bank, indicator: School enrolment, tertiary (% gross)	2011-2020, ten year average per country, exception for Bosnia and Herzegovina, source from World Atlas/Knoema
	Quality of Education / Skillset	World Development Indicators (WDI), World bank, indicator: Quality of the education system and Skillset of secondary-education graduates	2010-2019, ten year average per country, based on Global Competitiveness Index, 2011-2017 Quality of education, for 2017-2019 Skillset of Secondary Education
	Education Achievement	PISA results (2015 and 2018)	Simple average of 2015 and 2018 of scored for mean performance in reading, mathematics and science, values expressed as 1-10 prior normalization
	Quality of Math & Science	World Development Indicators (WDI), World bank, indicator: Quality of the math and science education	2010-2018, average for last 9 years of available data per country, based on Global competitiveness index
	Completion Rate WPIA	World Development Indicators (WDI), World bank, indicator: Completion rate, lower secondary education, adjusted wealth parity index (WPIA)	2010-2019, average for years of available data per country, different years for different countries available

	Human Capital Index	World Development Indicators (WDI), World bank, indicator: Human Capital Index	2017-2020, average for last 4 years of available data per country
Health	Life Expectancy	World Development Indicators (WDI), World bank, indicator, Life expectancy at birth, total (years)	2011-2020, ten year average per country
	Infant Mortality	World Development Indicators (WDI), World bank, indicator, Mortality rate, infant (per 1,000 live births)	2011-2020, ten year average per country, reciprocal value 1/x
	Healthy Life Expectancy	Global Competitiveness Index (GCI) 2019 data set	2017-2019, average for last three years of available data per country
	Mortality Rate of Specific Disease	World Development Indicators (WDI), World bank, indicator, Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70 (%), World Health Organization, Global Health Observatory Data Repository	2010-2019, average for years of available data per country, different years for different countries available, reciprocal value 1/x
Public infrastructure	Quality of infrastructure/New Quality of infrastructure	WEF, Global Competitiveness Index, section, 2.01 Quality of overall infrastructure	Editions 2012-2017, average available for each country; Values expressed on a 1-10 scale prior normalization Editions, 2017-2019, average
	Quality of Infrastructure - Transport	WEF, Global Competitiveness Index, section, infrastructure - transport	Editions 2017-2019, average for the last three periods available for each country, Values express on a 1-10 scale f prior normalization
	Quality of infrastructure.- utility	WEF, Global Competitiveness Index, section, infrastructure -utility	Editions 2017-2019, average for the last three periods available for each country, Values expressed on a 1-10 scale f prior normalization
	Logistics performance index	World Development Indicators (WDI), World bank, indicator, Logistics performance index: Quality of trade and transport-related infrastructure	2010-2018, average of available data per country, Value expressed on a 1-10 scale
Income Distribution	Gini index	World Development Indicators (WDI), World bank, indicator, Gini index (World Bank estimate)	2010-2019, average of available data per country, reciprocal 1/x, exception for BiH, last reported in 2015 used
Economic stability	Coefficient of Variance of Growth	GDP growth (annual %), World Bank national accounts data	2012-2021, coefficient of variance for ten years, reciprocal 1/x

	Standard Deviation of Inflation	World Development Indicators (WDI), World bank, indicator Inflation (annual %)	2012-2021, coefficient of variance for ten years, reciprocal 1/x
Economic performance	GDP per capita	World Development Indicators (WDI), World bank, indicator, GDP per capita, PPP (current international \$)	2012-2021, average for the ten years
	Real GDP growth rate	GDP growth (annual %), World Bank national accounts data	2012-2021, average for the ten years
	Unemployment rate	World Development Indicators (WDI), World bank, indicator, Unemployment rate	2012-2021, coefficient of variance for ten years, reciprocal 1/x
Administrative efficiency	Goods and services expenditure	World Bank National Accounts Data, General Government Final Consumption Expenditure (% of GDP)	2012-2021, average for the period
Education efficiency	Education expenditure	World Development Indicators (WDI) Adjusted savings: education expenditure (% of GNI)	2011-2020 exceptions Bosnia and Herzegovina and Montenegro missing data
Health efficiency	Current health expenditure	World Development Indicators (WDI) Current health expenditure (% of GDP)	2010-2019, average for the period
Public investment efficiency	Gross public capital formation	World Bank, Investment and Capital Stock Dataset, 1960-2017, version 2019, Gross Fixed capital formation (% of GDP)	2010-2019, average for the period
Distribution efficiency	Subsidies and transfers	World Development Indicators, Subsidies and other transfers (% of expense)	2011-2020, the subsidies and transfers and % expense are expressed as % of GDP
Economic performance efficiency	General government total expenditure	IMF, World Economic Outlook Database, General government total expenditure as % of GDP	2011-2020, average for the period



## 8.2. Annex: CHAPTER 4

Table 0.5 Capital stock per country (2015-2019) in constant 2017 billion int. \$

Country	2015	2016	2017	2018	2019
Moldova	9.9	10.0	10.1	10.2	10.3
Serbia	26.6	28.1	29.8	31.2	33.7
North Macedonia	16.5	17.0	17.8	18.4	18.4
Albania	23.6	24.2	24.7	25.4	26.2
Bosnia and Herzegovina	31.9	32.0	32.1	32.2	32.5
Montenegro	4.6	4.9	5.3	6.0	6.9
Bulgaria	69.6	76.2	77.2	77.8	79.8
Poland	464.6	489.8	501.9	521.0	551.5
Lithuania	36.1	37.6	38.6	39.8	41.1
Romania	253.7	268.4	277.0	280.6	285.2
Malta	6.9	7.3	7.4	7.5	7.5
Latvia	24.1	25.4	26.1	27.4	29.4
Slovak Republic	71.4	77.9	79.7	81.4	83.9
Hungary	132.8	144.0	145.9	151.8	161.8
Cyprus	22.0	21.8	21.7	21.8	21.8
Portugal	208.2	205.9	201.5	198.2	195.3
Belgium	217.0	220.6	223.9	227.1	231.6
Spain	997.7	995.9	985.1	975.9	970.2
Estonia	23.1	24.1	24.8	26.2	27.4
Croatia	92.9	92.1	91.3	90.0	89.8
Greece	235.0	235.9	235.8	238.6	237.5
Slovenia	44.7	45.9	46.0	46.2	46.9
Germany	1,962.6	1,961.7	1,964.1	1,969.3	1,979.0
Ireland	113.0	113.8	115.0	116.3	118.7
Italy	1,485.7	1,475.4	1,464.1	1,451.1	1,436.9
Czech Republic	240.5	248.7	249.8	251.8	257.5
Austria	264.7	266.1	267.6	269.8	271.8
France	2,104.4	2,107.2	2,109.0	2,110.0	2,113.4
Finland	174.9	176.2	178.6	180.9	183.5
Netherlands	609.4	612.8	616.0	619.3	623.0
Sweden	351.9	355.3	359.9	365.5	372.1
Denmark	216.2	217.0	218.4	218.7	219.2
Luxembourg	29.5	30.6	31.6	32.8	34.0
<b>Avg Europe</b>	<b><u>320.17</u></b>	<b><u>322.71</u></b>	<b><u>323.57</u></b>	<b><u>324.86</u></b>	<b><u>327.20</u></b>
<b>Avg SEE</b>	<b><u>73.53</u></b>	<b><u>75.88</u></b>	<b><u>77.01</u></b>	<b><u>77.88</u></b>	<b><u>78.82</u></b>

Note: General government capital stock (constructed based on general government investment flows), in billions of constant 2017 international dollars; General government investment (gross fixed capital formation), in billions of constant 2017 international dollars.

Source: IMF Investment and Capital Stock Dataset, 1960-2019, Version May 2021

*Table 0.6 Gross fixed capital formation per country (2015-2019) in constant 2017 billion int. \$*

	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Moldova	0.50	0.42	0.47	0.52	0.58
Serbia	2.46	2.70	2.53	3.68	4.81
North Macedonia	1.19	1.34	1.30	n.a.	n.a.
Albania	1.44	1.43	1.62	1.73	1.68
Bosnia and Herzegovina	1.26	1.29	1.27	1.41	1.39
Montenegro	0.46	0.61	0.92	1.08	0.92
Bulgaria	9.15	3.81	3.40	4.79	5.51
Poland	47.30	35.11	43.16	55.86	54.19
Lithuania	3.21	2.70	3.08	3.22	3.24
Romania	24.09	18.35	13.61	14.89	20.14
Malta	0.73	0.45	0.46	n.a.	n.a.
Latvia	2.47	1.90	2.57	3.26	2.96
Slovak Republic	9.95	5.42	5.53	6.35	6.32
Hungary	17.56	8.65	12.95	17.36	18.59
Cyprus	0.76	0.96	1.08	n.a.	n.a.
Portugal	7.25	5.09	6.06	6.40	6.60
Belgium	13.73	13.65	13.79	15.33	15.51
Spain	44.17	35.31	36.84	40.31	39.39
Estonia	2.07	1.92	2.54	2.46	2.43
Croatia	3.47	3.45	3.01	3.97	5.08
Greece	11.73	10.86	13.96	10.15	7.69
Slovenia	3.32	2.27	2.30	2.89	3.09
Germany	89.68	93.74	97.53	103.05	106.82
Ireland	6.07	6.53	6.66	8.00	10.43
Italy	58.09	57.10	55.38	54.17	58.71
Czech Republic	19.40	12.69	13.78	17.79	19.29
Austria	13.61	13.95	14.82	14.83	14.94
France	99.99	99.95	100.02	103.31	111.28
Finland	9.40	10.66	10.71	11.24	11.40
Netherlands	31.64	31.86	32.28	33.03	33.32
Sweden	19.69	21.26	22.65	24.05	24.37
Denmark	10.84	11.49	10.60	10.87	10.89
Luxembourg	2.43	2.53	2.71	2.73	2.94
<b>Avg Europe</b>	<b>17.25</b>	<b>15.74</b>	<b>16.35</b>	<b>18.67</b>	<b>20.15</b>
<b>Avg SEE</b>	<b>5.37</b>	<b>4.23</b>	<b>4.04</b>	<b>4.51</b>	<b>5.09</b>

Note: General government capital stock (constructed based on general government investment flows), in billions of constant 2017 international dollars; General government investment (gross fixed capital formation), in billions of constant 2017 international dollars.

Source: IMF Investment and Capital Stock Dataset, 1960-2019, Version May 2021

*Table 0.7 Gross fixed capital formation % of last year capital stock and capital stock annual change*

		MDA	SR	MKD	ALB	BIH	MNE	BG	ROU	HR	GRC	SLV
2016	PI <sub>t</sub> as % K <sub>t-1</sub>	4.2	10.2	8.2	6.1	4.0	13.2	5.5	7.2	3.7	4.6	5.1
	% change of K <sub>t</sub> to K <sub>t-1</sub>	1.4	5.6	3.6	2.5	0.4	6.3	9.4	5.8	-0.9	0.4	2.7
2017	PI <sub>t</sub> as % K <sub>t-1</sub>	4.7	9.0	7.6	6.7	4.0	18.7	4.5	5.1	3.3	5.9	5.0
	% change of K <sub>t</sub> to K <sub>t-1</sub>	0.6	5.9	4.2	2.3	0.4	8.7	1.4	3.2	-0.9	0.0	0.3
2018	PI <sub>t</sub> as % K <sub>t-1</sub>	5.1	12.4	n.a	7.0	4.4	20.4	6.2	5.4	4.3	4.3	6.3
	% change of K <sub>t</sub> to K <sub>t-1</sub>	1.1	4.8	3.6	2.9	0.4	13.4	0.8	1.3	-1.4	1.2	0.3
2019	PI <sub>t</sub> as % K <sub>t-1</sub>	5.7	15.4	n.a	6.6	4.3	15.3	7.1	7.2	5.6	3.2	6.7
	% change of K <sub>t</sub> to K <sub>t-1</sub>	1.4	8.0	n.a	3.1	0.7	14.1	2.5	1.7	-0.3	-0.5	1.5

Note: K value is General government capital stock (constructed based on general government investment flows), in billions of constant 2017 international dollars; PI is General government investment (gross fixed capital formation), in billions of constant 2017 international dollars. t is the year indicated, t-1 is previous year

Source: Based on data from IMF Investment and Capital Stock Dataset, 1960-2019, Version May 2021

*Table 0.8 World Governance Index, for SEE per country*

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Albania</b>	2007	-0.71	-0.43	0.03	-0.20	-0.66	0.11
	2008	-0.61	-0.37	0.14	-0.03	-0.60	0.17
	2009	-0.55	-0.25	0.24	-0.05	-0.49	0.14
	2010	-0.53	-0.28	0.23	-0.19	-0.39	0.12
	2011	-0.70	-0.20	0.28	-0.28	-0.44	0.06
	2012	-0.78	-0.27	0.24	-0.14	-0.52	0.02
	2013	-0.75	-0.32	0.25	0.09	-0.52	0.05
	2014	-0.59	-0.05	0.28	0.49	-0.31	0.14
	2015	-0.52	0.06	0.19	0.35	-0.30	0.16
	2016	-0.45	0.06	0.20	0.34	-0.30	0.17
	2017	-0.46	0.13	0.23	0.38	-0.40	0.20
	2018	-0.52	0.11	0.27	0.37	-0.40	0.18
	2019	-0.54	-0.03	0.29	0.11	-0.40	0.14
	2020	-0.55	-0.12	0.24	0.09	-0.35	0.09
	2021	-0.56	0.00	0.19	0.11	-0.26	0.09

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Bosnia &amp; Herzegovina</b>	2007	-0.37	-0.86	-0.29	-0.63	-0.47	0.13
	2008	-0.36	-0.60	-0.18	-0.54	-0.41	0.02
	2009	-0.38	-0.72	-0.11	-0.67	-0.36	0.00
	2010	-0.34	-0.74	-0.12	-0.69	-0.36	-0.08
	2011	-0.33	-0.73	-0.06	-0.82	-0.33	-0.16
	2012	-0.31	-0.45	-0.06	-0.54	-0.20	-0.10
	2013	-0.24	-0.43	-0.07	-0.40	-0.14	-0.12
	2014	-0.30	-0.49	-0.04	-0.02	-0.13	-0.07
	2015	-0.39	-0.59	-0.17	-0.40	-0.24	-0.10
	2016	-0.46	-0.41	-0.13	-0.40	-0.17	-0.13
	2017	-0.53	-0.48	-0.04	-0.35	-0.18	-0.21
	2018	-0.58	-0.64	-0.13	-0.40	-0.21	-0.27
	2019	-0.63	-0.67	-0.11	-0.42	-0.20	-0.24
	2020	-0.62	-1.04	-0.17	-0.44	-0.29	-0.32
	2021	-0.64	-1.04	-0.18	-0.38	-0.28	-0.31

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Bulgaria</b>	2007	-0.23	-0.13	0.64	0.36	-0.06	0.69
	2008	-0.27	-0.18	0.73	0.37	-0.12	0.58
	2009	-0.23	0.07	0.69	0.35	-0.04	0.56
	2010	-0.24	-0.07	0.68	0.36	-0.10	0.53
	2011	-0.27	-0.08	0.55	0.30	-0.14	0.45
	2012	-0.28	-0.03	0.57	0.38	-0.12	0.40
	2013	-0.33	-0.02	0.55	0.17	-0.15	0.34
	2014	-0.30	-0.11	0.59	0.08	-0.08	0.37
	2015	-0.32	0.02	0.59	0.02	-0.14	0.43
	2016	-0.24	0.12	0.71	0.08	-0.12	0.40
	2017	-0.17	0.13	0.67	0.33	-0.11	0.43
	2018	-0.16	0.14	0.62	0.46	-0.09	0.36
	2019	-0.16	0.20	0.54	0.58	-0.01	0.36
	2020	-0.30	-0.18	0.47	0.42	-0.11	0.26
	2021	-0.24	-0.14	0.45	0.46	-0.04	0.29

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Croatia</b>	2007	0.06	0.46	0.41	0.61	0.04	0.52
	2008	-0.05	0.58	0.41	0.57	0.03	0.47
	2009	-0.09	0.59	0.47	0.61	0.04	0.49
	2010	0.02	0.59	0.49	0.61	0.08	0.48
	2011	0.03	0.51	0.44	0.62	0.11	0.52
	2012	-0.03	0.68	0.35	0.61	0.15	0.54
	2013	0.11	0.68	0.37	0.64	0.18	0.51
	2014	0.20	0.68	0.28	0.62	0.22	0.51
	2015	0.23	0.49	0.25	0.59	0.15	0.56
	2016	0.18	0.45	0.25	0.66	0.36	0.53
	2017	0.09	0.57	0.31	0.69	0.33	0.48
	2018	0.07	0.55	0.50	0.80	0.32	0.44
	2019	0.08	0.49	0.56	0.69	0.37	0.46
	2020	0.20	0.46	0.37	0.61	0.26	0.58
	2021	0.06	0.59	0.50	0.71	0.30	0.61

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Greece</b>	2007	0.26	0.55	0.89	0.52	0.86	0.98
	2008	0.13	0.58	0.88	0.27	0.85	0.93
	2009	0.06	0.61	0.83	-0.21	0.65	0.89
	2010	-0.06	0.49	0.64	-0.13	0.58	0.90
	2011	-0.10	0.45	0.49	-0.10	0.53	0.82
	2012	-0.19	0.28	0.52	-0.22	0.39	0.70
	2013	-0.08	0.36	0.63	-0.17	0.47	0.69
	2014	-0.14	0.30	0.33	-0.14	0.37	0.62
	2015	-0.09	0.18	0.41	-0.23	0.27	0.65
	2016	-0.11	0.16	0.14	-0.12	0.13	0.67
	2017	-0.09	0.27	0.24	-0.07	0.07	0.66
	2018	-0.03	0.29	0.41	0.17	0.13	0.73
	2019	0.04	0.34	0.53	0.18	0.18	0.81
	2020	0.06	0.44	0.55	0.13	0.32	0.97
	2021	0.21	0.44	0.44	0.15	0.35	0.96

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>North Macedonia</b>	2007	-0.39	-0.24	0.04	-0.43	-0.42	0.28
	2008	-0.21	-0.10	0.12	-0.30	-0.32	0.20
	2009	-0.15	-0.14	0.19	-0.30	-0.29	0.17
	2010	-0.09	-0.19	0.24	-0.52	-0.30	0.11
	2011	-0.11	-0.23	0.22	-0.62	-0.27	-0.04
	2012	-0.05	-0.22	0.26	-0.49	-0.25	-0.03
	2013	-0.06	-0.17	0.25	-0.42	-0.23	-0.06
	2014	-0.03	0.02	0.42	0.26	-0.06	-0.14
	2015	-0.24	0.00	0.37	-0.29	-0.22	-0.18
	2016	-0.27	0.00	0.39	-0.35	-0.33	-0.23
	2017	-0.30	0.02	0.45	-0.25	-0.29	-0.14
	2018	-0.37	0.09	0.52	-0.21	-0.29	-0.03
	2019	-0.43	-0.10	0.45	0.00	-0.28	-0.02
	2020	-0.47	0.06	0.45	0.11	-0.08	0.06
	2021	-0.35	-0.08	0.42	0.12	-0.08	0.14

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Montenegro</b>	2007	-0.38	-0.29	-0.13	0.11	-0.19	0.26
	2008	-0.24	-0.01	-0.07	0.77	-0.09	0.24
	2009	-0.22	-0.01	0.03	0.82	-0.02	0.24
	2010	-0.25	0.13	-0.01	0.58	-0.06	0.19
	2011	-0.22	0.08	0.00	0.57	-0.06	0.21
	2012	-0.13	0.12	0.03	0.60	-0.06	0.22
	2013	-0.29	0.15	0.09	0.50	-0.03	0.18
	2014	-0.08	0.29	0.18	0.22	0.01	0.16
	2015	-0.09	0.20	0.24	0.14	-0.02	0.14
	2016	-0.05	0.17	0.24	0.28	-0.12	0.08
	2017	-0.06	0.20	0.34	-0.06	-0.09	0.12
	2018	0.01	0.12	0.40	0.04	0.02	0.05
	2019	0.00	0.14	0.41	0.07	0.02	0.02
	2020	-0.02	-0.07	0.44	-0.06	-0.01	0.04
	2021	-0.02	0.01	0.43	-0.15	-0.06	0.17

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Serbia</b>	2007	-0.34	-0.26	-0.44	-0.59	-0.46	0.31
	2008	-0.30	-0.26	-0.39	-0.54	-0.49	0.28
	2009	-0.32	-0.07	-0.18	-0.48	-0.47	0.33
	2010	-0.32	-0.08	-0.07	-0.42	-0.43	0.29
	2011	-0.30	-0.14	-0.02	-0.28	-0.33	0.28
	2012	-0.36	-0.18	-0.07	-0.22	-0.33	0.20
	2013	-0.33	-0.18	-0.06	-0.08	-0.30	0.29
	2014	-0.25	0.00	0.18	0.18	-0.09	0.21
	2015	-0.29	0.02	0.15	0.24	-0.06	0.23
	2016	-0.36	-0.01	0.03	0.14	-0.11	0.20
	2017	-0.41	0.10	-0.03	0.09	-0.16	0.12
	2018	-0.37	0.11	0.11	0.01	-0.15	-0.02
	2019	-0.43	0.02	0.11	-0.07	-0.12	-0.05
	2020	-0.43	-0.01	0.09	-0.16	-0.10	-0.12
	2021	-0.44	0.05	0.05	-0.13	-0.09	-0.12

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Slovenia</b>	2007	1.01	0.89	0.80	1.10	0.95	1.06
	2008	0.94	1.12	0.85	1.15	1.01	1.02
	2009	1.05	1.15	0.91	0.94	1.07	1.06
	2010	0.92	1.02	0.76	0.87	1.00	1.05
	2011	0.94	0.98	0.69	0.97	1.05	1.06
	2012	0.83	1.02	0.63	0.94	1.01	1.00
	2013	0.72	1.01	0.62	0.88	0.99	1.00
	2014	0.72	1.00	0.66	0.97	1.00	0.96
	2015	0.77	0.97	0.62	0.95	0.97	0.99
	2016	0.82	1.12	0.64	0.99	1.08	1.01
	2017	0.81	1.17	0.58	0.87	1.02	1.01
	2018	0.87	1.12	0.65	0.90	1.05	0.96
	2019	0.92	1.08	1.01	0.81	1.11	0.98
	2020	0.80	1.16	0.92	0.71	1.06	0.94
	2021	0.72	1.18	0.83	0.76	1.03	0.91

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Romania</b>	2007	-0.23	-0.36	0.51	0.20	-0.11	0.50
	2008	-0.19	-0.37	0.60	0.18	-0.02	0.51
	2009	-0.31	-0.37	0.62	0.36	0.05	0.46
	2010	-0.35	-0.12	0.67	0.27	0.11	0.43
	2011	-0.33	-0.20	0.69	0.19	0.10	0.38
	2012	-0.38	-0.17	0.56	0.08	0.09	0.32
	2013	-0.30	0.14	0.63	0.18	0.19	0.31
	2014	-0.22	0.23	0.60	0.05	0.24	0.43
	2015	-0.14	0.13	0.58	0.19	0.23	0.49
	2016	-0.15	-0.04	0.58	0.28	0.47	0.54
	2017	-0.12	-0.06	0.45	0.06	0.46	0.60
	2018	-0.20	-0.15	0.42	0.05	0.39	0.52
	2019	-0.21	-0.19	0.46	0.56	0.44	0.52
	2020	-0.07	-0.26	0.36	0.53	0.39	0.59
	2021	-0.04	-0.13	0.31	0.53	0.41	0.60

	Year	Control of Corruption: Estimate	Government Effectiveness: Estimate	Regulatory Quality: Estimate	Political Stability and Absence of Violence/Terrorism: Estimate	Rule of Law: Estimate	Voice and Accountability: Estimate
<b>Moldova</b>	2007	-0.66	-0.83	-0.28	-0.01	-0.51	-0.29
	2008	-0.63	-0.79	-0.20	-0.27	-0.42	-0.31
	2009	-0.70	-0.56	-0.14	-0.58	-0.43	-0.30
	2010	-0.67	-0.66	-0.13	-0.38	-0.36	-0.06
	2011	-0.63	-0.61	-0.10	-0.05	-0.33	0.05
	2012	-0.61	-0.56	-0.12	0.05	-0.32	-0.03
	2013	-0.75	-0.40	-0.09	0.00	-0.37	-0.07
	2014	-0.85	-0.41	0.01	-0.16	-0.24	0.01
	2015	-0.92	-0.65	-0.06	-0.33	-0.36	0.03
	2016	-0.96	-0.63	-0.12	-0.30	-0.50	-0.01
	2017	-0.80	-0.53	-0.03	-0.32	-0.42	-0.02
	2018	-0.73	-0.47	-0.02	-0.40	-0.42	-0.12
	2019	-0.62	-0.41	-0.04	-0.39	-0.43	-0.10
	2020	-0.55	-0.51	0.00	-0.35	-0.47	-0.04
	2021	-0.45	-0.40	0.01	-0.21	-0.33	0.05

Note: Six dimensions of governance for the SEE countries, each index can range between -2.5 to +2.5.

Source: All tables are compiled from the World Governance Indicators Database, available at: <https://info.worldbank.org/governance/wgi/>



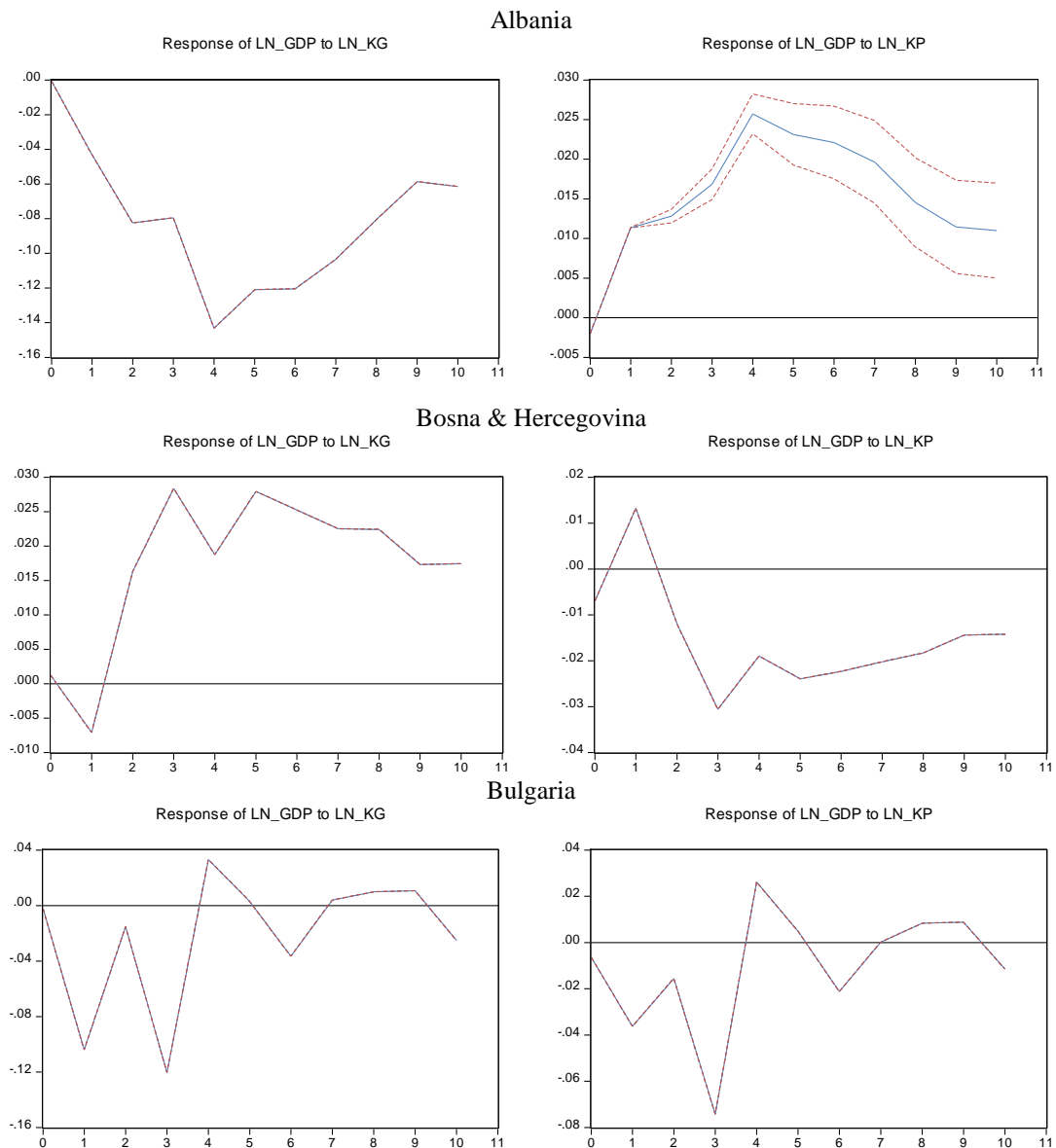
Table 0.9 Variables & Data Sources – public investment spending

<i>Input - Output indicator(s)</i>	<i>Indexes/variables</i>	<i>Sources, notes</i>	<i>Series and explanation</i>
Physical indicator - output	Length of road network (per 1000 population) – pure infrastructure	International road federation, World road statistics, Datawarehouse	Total Road Network - All Road Types - Total – Kilometres, deducted per 1000 population by population number from World Development Indicators for the countries, 2015-2020
	Access to water (% of population national) – pure infrastructure	JMP global database, WASH database, of World health organization and UNICEF	Joint Monitoring Programme for Water Supply, Sanitation and Hygiene, country files for each country, 2007-2020 in percentage
	Electricity production as kWh per 1000 persons– pure infrastructure	Ember data catalogue; Ember Electricity Data	Electricity production, in TWh data deducted per 1000 persons by population number from World Development Indicators for the countries
	Secondary teachers per 1000 persons - social infrastructure	UNESCO Institute for Statistics (UIS). UIS.Stat Bulk Data Download Service	Secondary education teachers include full-time and part-time teachers, 2007-2020, data deducted per 1000 persons by population number from World Development Indicators for the countries
	Hospital beds per 1000 persons - social infrastructure	World Bank Indicators, from World Health Organization, supplemented by country data.	Hospital beds data from WHO, data from 2007-2018 depending on availability shorter series for some country
Qualitative indicator - output	Quality of overall infrastructure	WEF, Global Competitiveness Index, second pillar	Editions 2012-2017, average available for each country; Values expressed on a 1-10 scale prior normalization Editions, 2017-2019, average
Input indicators	Public capital stock per capita	IMF Investment and Capital Stock Dataset, 1960-2019	Public capital stock per capita in 2017 US international, 2007-2019, depending on availability shorter series for some country, rescaled on per capita by population number from World Development Indicators for the countries
	Public investment	IMF Investment and Capital Stock Dataset, 1960-2019	General government investment - gross fixed capital formation, in billions of constant 2017 international dollars 2007-2019, depending on availability shorter series for some country, rescaled on per capita by population number from World Development Indicators for the countries
	GDP per capita	GDP per capita current USD	GDP per capita current USD, World Development Indicators for the countries, 2007-2019

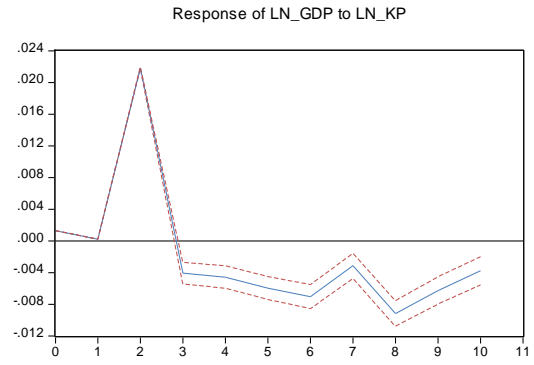
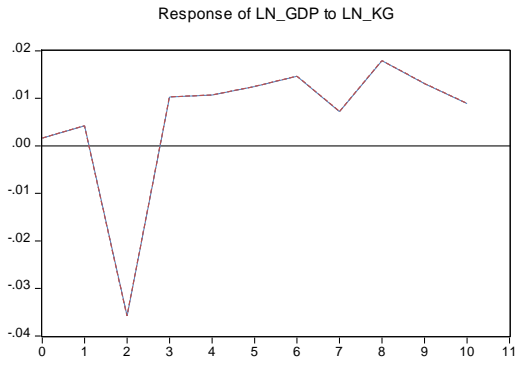
### 8.3. Annex: CHAPTER 5

Table 0.10 Local Projection - Impulse Response Function

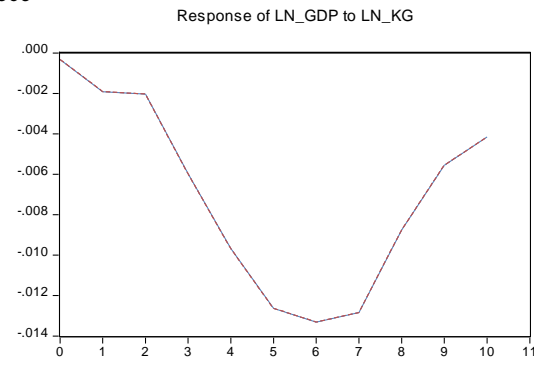
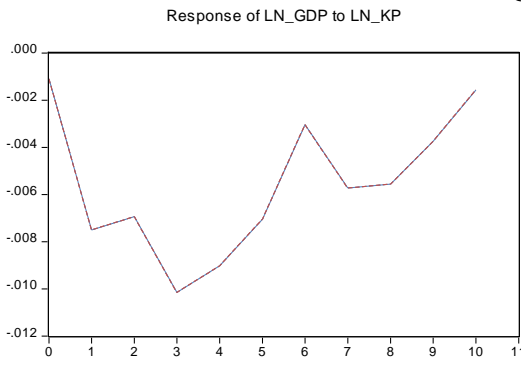
Local Projection - Impulse Response Function, Per country, Response of GDP to a shock (1sd) public capital stock (Kg) & private capital stock (Kp) – illustration of heterogeneity of the countries and different responses



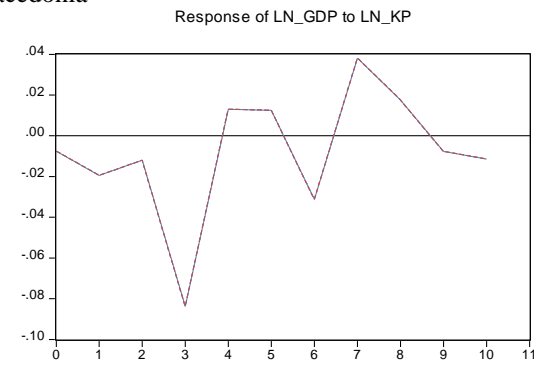
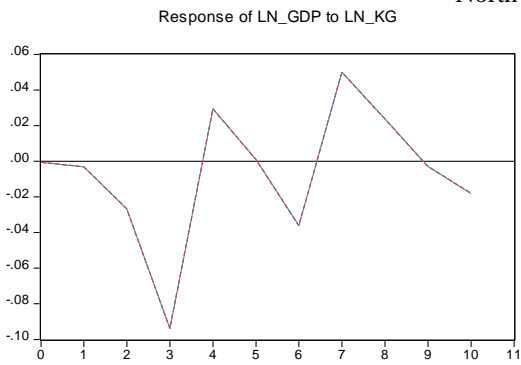
Croatia



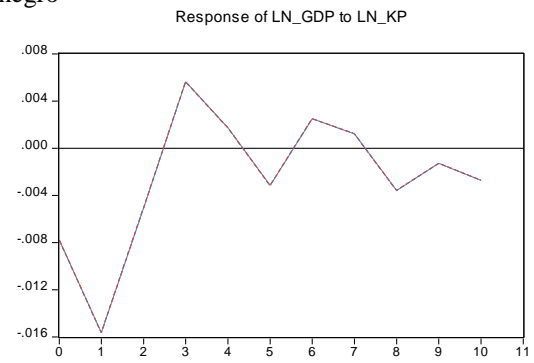
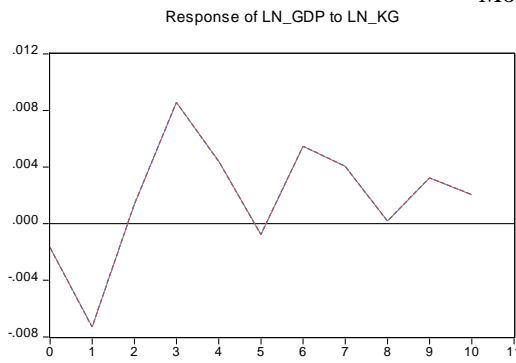
Greece



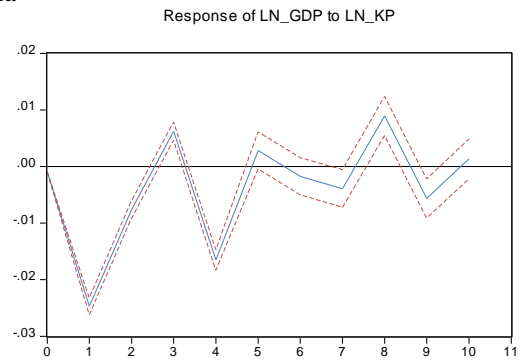
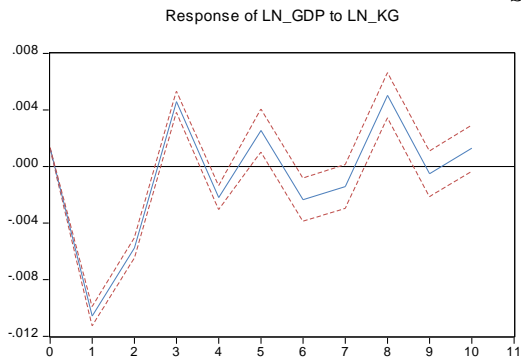
North Macedonia



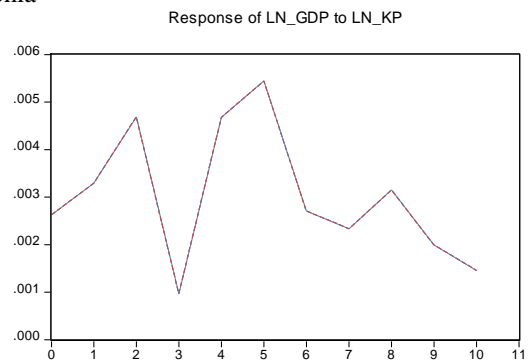
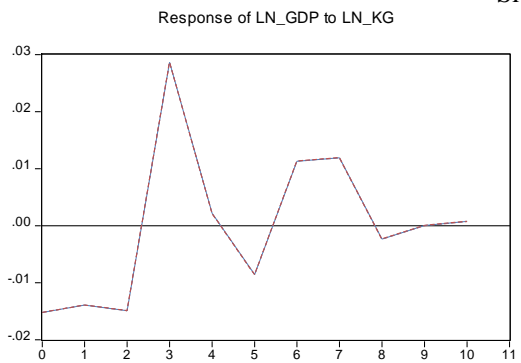
Montenegro



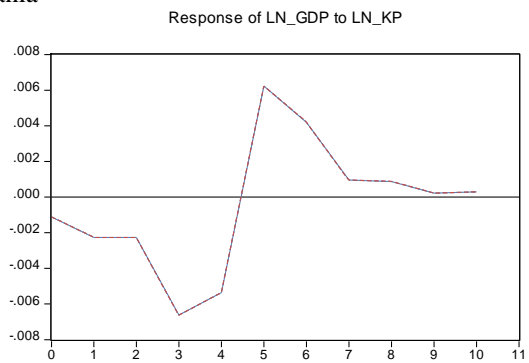
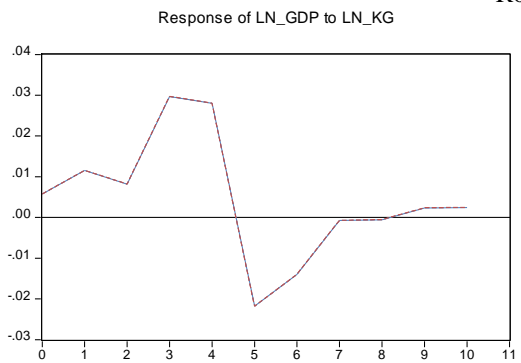
### Serbia



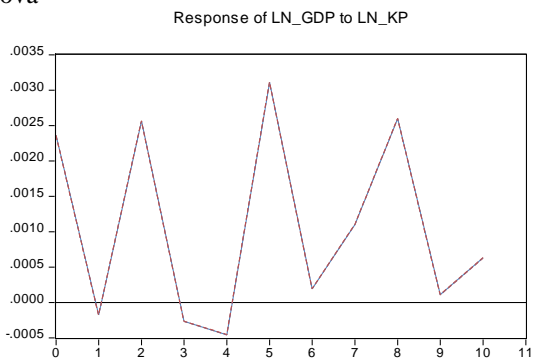
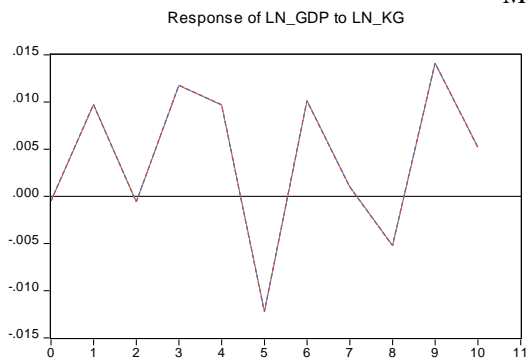
### Slovenia



### Romania



### Moldova



## 8.4. Annex: CHAPTER 6

Table 0.11 ARDL Model outputs

Model 1:

Dependent Variable: LNNOM\_PRIV\_I  
 Method: ARDL  
 Date: 08/09/23 Time: 15:26  
 Sample (adjusted): 2001 2021  
 Included observations: 21 after adjustments  
 Maximum dependent lags: 1 (Automatic selection)  
 Model selection method: Akaike info criterion (AIC)  
 Dynamic regressors (1 lag, automatic): LNNOM\_GDP LNNOM\_GOV\_I  
 Fixed regressors: C  
 Number of models evaluated: 4  
 Selected Model: ARDL(1, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNNOM_PRIV_I(-1)	0.285221	0.196923	1.448384	0.1657
LNNOM_GDP	1.190452	0.326631	3.644633	0.0020
LNNOM_GOV_I	-0.351782	0.135770	-2.591024	0.0190
C	-5.400227	3.480243	-1.551681	0.1392

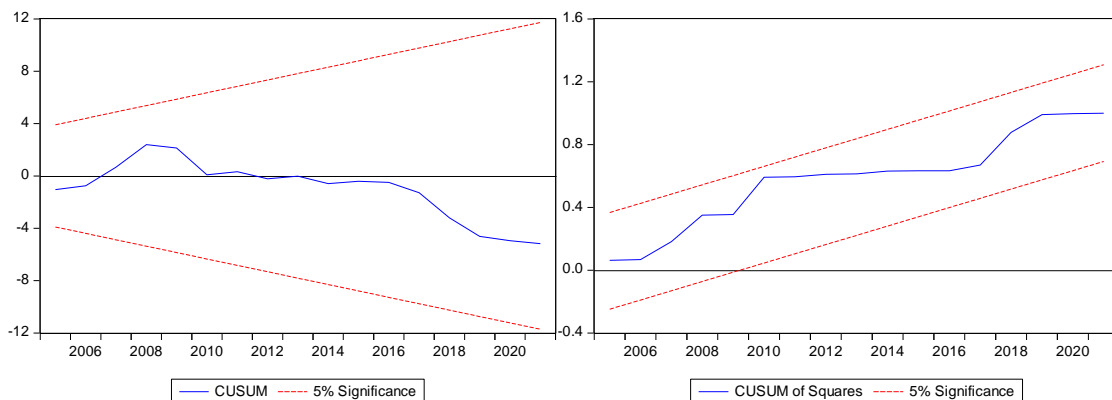
  

R-squared	0.826160	Mean dependent var	20.74869
Adjusted R-squared	0.795482	S.D. dependent var	0.234163
S.E. of regression	0.105897	Akaike info criterion	-1.483058
Sum squared resid	0.190641	Schwarz criterion	-1.284101
Log likelihood	19.57211	Hannan-Quinn criter.	-1.439879
F-statistic	26.93030	Durbin-Watson stat	1.513765
Prob(F-statistic)	0.000001		

\*Note: p-values and any subsequent tests do not account for model selection.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.845661	Prob. F(2,15)	0.1920
Obs*R-squared	4.147260	Prob. Chi-Square(2)	0.1257



## Model 2

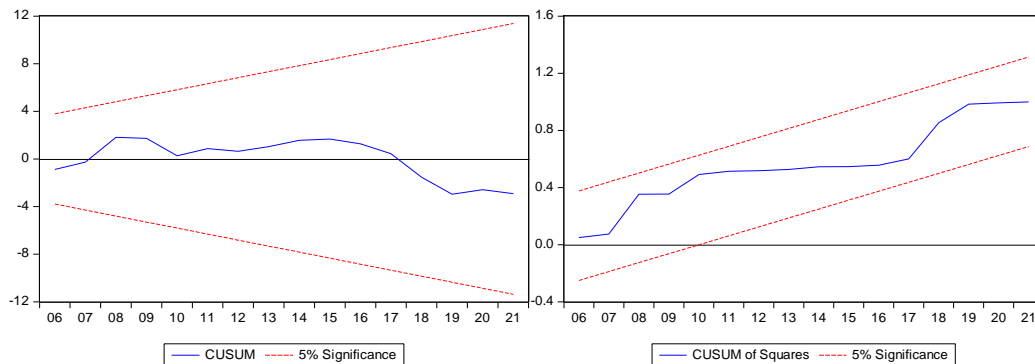
Dependent Variable: LNNOM\_PRIV\_I  
 Method: ARDL  
 Date: 08/09/23 Time: 15:25  
 Sample (adjusted): 2001 2021  
 Included observations: 21 after adjustments  
 Maximum dependent lags: 1 (Automatic selection)  
 Model selection method: Akaike info criterion (AIC)  
 Dynamic regressors (1 lag, automatic): LNNOM\_GDP LNNOM\_FDI  
 LNNOM\_GOV\_I  
 Fixed regressors: C  
 Number of models evaluated: 8  
 Selected Model: ARDL(1, 0, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNNOM_PRIV_I(-1)	0.285296	0.200588	1.422298	0.1741
LNNOM_GDP	1.205701	0.333617	3.614028	0.0023
LNNOM_FDI	0.014199	0.022897	0.620126	0.5439
LNNOM_GOV_I	-0.357312	0.138583	-2.578321	0.0202
C	-5.916869	3.641586	-1.624805	0.1237
R-squared	0.830240	Mean dependent var		20.74869
Adjusted R-squared	0.787800	S.D. dependent var		0.234163
S.E. of regression	0.107867	Akaike info criterion		-1.411570
Sum squared resid	0.186166	Schwarz criterion		-1.162875
Log likelihood	19.82149	Hannan-Quinn criter.		-1.357597
F-statistic	19.56265	Durbin-Watson stat		1.558472
Prob(F-statistic)	0.000005			

\*Note: p-values and any subsequent tests do not account for model selection.

### Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.330901	Prob. F(2,14)	0.2957
Obs*R-squared	3.354851	Prob. Chi-Square(2)	0.1869



## 8.5. Annex: CHAPTER 7

### *Model 1 Regression: Dependent variable Municipal Own Source Revenues*

Dependent Variable: R\_OS  
 Method: Panel Least Squares  
 Sample: 2006 2019  
 Periods included: 14  
 Cross-sections included: 5  
 Total panel (unbalanced) observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-422.5916	96.32625	-4.387087	0.0000
EX_CAPEX	0.669812	0.083403	8.031031	0.0000
EX_CURRENT	0.461420	0.091980	5.016538	0.0000
R_INTERGOVTRANSFERS	-0.430158	0.071162	-6.044772	0.0000
GDP_CAP_EUR	-0.011626	0.004693	-2.477298	0.0161
HDI_UN	866.2498	149.4759	5.795248	0.0000
POP_DENS_NAKM	-2.211021	0.182925	-12.08700	0.0000
PI_GG_CURR_USD_PERCAP	0.063721	0.018262	3.489263	0.0009
R-squared	0.965511	Mean dependent var		102.1559
Adjusted R-squared	0.961488	S.D. dependent var		82.58368
S.E. of regression	16.20669	Akaike info criterion		8.518856
Sum squared resid	15759.41	Schwarz criterion		8.779975
Log-likelihood	-281.6411	Hannan-Quinn criter.		8.622320
F-statistic	239.9573	Durbin-Watson stat		2.124191
Prob(F-statistic)	0.000000			

### *Sub-model Regression: Dependent variable Municipal Own Source Revenues*

Dependent Variable: R\_OS  
 Method: Panel Least Squares  
 Sample: 2006 2019  
 Periods included: 14  
 Cross-sections included: 5  
 Total panel (unbalanced) observations: 68

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	315.5801	148.5186	-2.124852	0.0380
EX_CAPEX	0.743794	0.104836	7.094818	0.0000
EX_GOODSSERVICES	0.570889	0.229391	2.488713	0.0158
EX_SALARY	0.175200	0.398867	0.439243	0.6622
EX_OTHER	0.300658	0.204669	1.468993	0.1474
R_BLOCK_GRANTS	-0.225307	0.252147	-0.893554	0.3754
R_GEN_GRANTS	-0.458040	0.236142	-1.939679	0.0575
R_INV_GRANTS	0.137443	0.510617	0.269171	0.7888
GDP_CAP_EUR	-0.010878	0.005691	-1.911534	0.0611
HDI_UN	701.3455	234.8630	2.986189	0.0042
POP_DENS_NAKM	-2.063430	0.441052	-4.678433	0.0000
PI_GG_CURR_USD_PERCAP	0.050449	0.024093	2.093934	0.0408
R-squared	0.968733	Mean dependent var		102.1559
Adjusted R-squared	0.962591	S.D. dependent var		82.58368
S.E. of regression	15.97276	Akaike info criterion		8.538431
Sum squared resid	14287.22	Schwarz criterion		8.930109
Log likelihood	-278.3067	Hannan-Quinn criter.		8.693626
F-statistic	157.7303	Durbin-Watson stat		2.123424
Prob(F-statistic)	0.000000			