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Economy, Business and Development: An International Journal (EB&D)

Provided in Cooperation with:

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Suggested Citation: Andonova, Vesna Garvanlieva (2022) : Public, Private and Foreign Investment Nexus in the Republic of North Macedonia: Crowding-In or Out Effect?, Economy, Business and Development: An International Journal (EB&D), ISSN 2671-3470, Ss. Cyril and Methodius University in Skopje, Faculty of Economics, Skopje, Vol. 3, Iss. 1, pp. 1-13, <https://doi.org/10.47063/ebd.00007>

This Version is available at:

<https://hdl.handle.net/10419/314340>

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ISSN
2671-3462 (print)
2671-3470 (online)

Economy, Business & Development (2022) 3(1), 1-13
DOI: 10.47063/ebd.00007

RESEARCH PAPER

Journal homepage: <https://journals.ukim.mk/index.php/ebd>

PUBLIC, PRIVATE AND FOREIGN INVESTMENT NEXUS IN THE REPUBLIC OF NORTH MACEDONIA: CROWDING-IN OR -OUT EFFECT?

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Abstract

The levels of investments in North Macedonia have been perceived for a long time as sub-optimal, with significant capital budget bias, with regularly overestimated plans vs. outturn. The research problem elaborated is whether the structure of investments matters. Thus the objective of the article is to examine if there is a complementarity or substitutability between public and private investment, as well as the role of foreign direct investments in this nexus. Within the paper the hypothesis of existence of crowding-in or crowding-out effect of the public investment and foreign direct investment exert over private investment in North Macedonia is tested. The crowding-in and -out effect is tested with an autoregressive distributed lag bound testing. The results indicate crowding-out effect of public over private investments, with significance of the foreign direct investments variable and at the same time crowding-in effect of foreign direct investments over private domestic investments. The crowding-out effect is immediate and short run. The results imply of a need for closer examination of the fiscal policies for public investment with efforts for improved public investment performance processes.

Keywords: private investment, public investment, foreign direct investment, crowding-out -in effect, ARDL bound testing

JEL Codes: E22, H54, H11

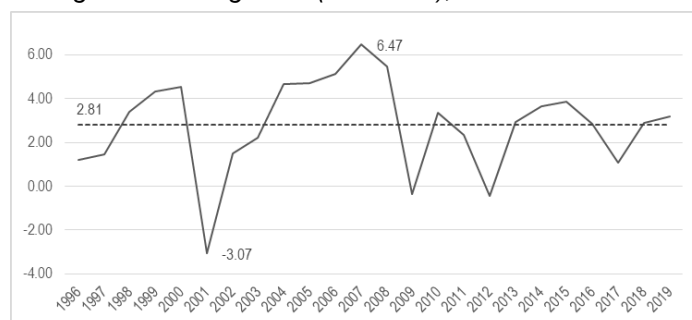
Introduction

The economy of North Macedonia is recording sluggish economic growth in the past two decades with an average real growth rate of 2.8%. Furthermore, the GDP growth rate has been quite volatile (standard deviation of 2.06, and coefficient of variation of 0.72), ranging from highest 6.47% (in Y2007) to lowest -3% (in Y2001). The growth falls were marked with and resulted from significant events such as the 2001 fall which was due to the internal armed conflict, then followed by the global crisis effects with the W shaped double dip noted in Y2009 and Y2012, and then the political crisis in Y2017 (see Figure 1).

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Figure 1: GDP growth (annual %), North Macedonia



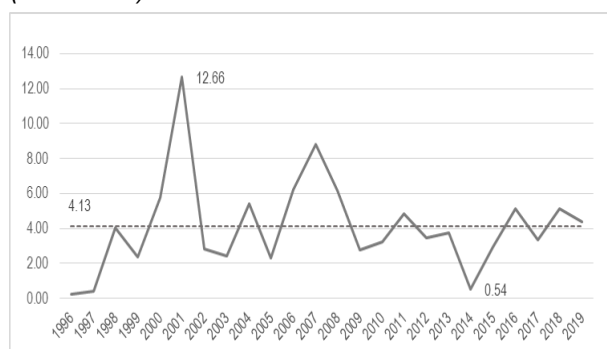
Source: WDI database, World Bank (www. <https://databank.worldbank.org/>)

Over the course of these past two decades, the government's fiscal policy narrative of the budget enactment was presented as 'developmental' however with regularly and significantly overestimated capital budget plans vs. the actual capital budget outturn. The absolute average value of the annual capital investments i.e., capital expenditure budget execution has not surpassed the 20 billion Macedonian denars (MKD) (circa 325 mil EUR), while planned with over 450 mil EUR (see Figure 2&3).

The long-term fiscal planning has been lacking, as a multi annual public investment planning (PIP) has been absent for a long period, reflected on the lack of strategic approach and direction of the public investments' priorities and subsequently the performance of the public investment management process.

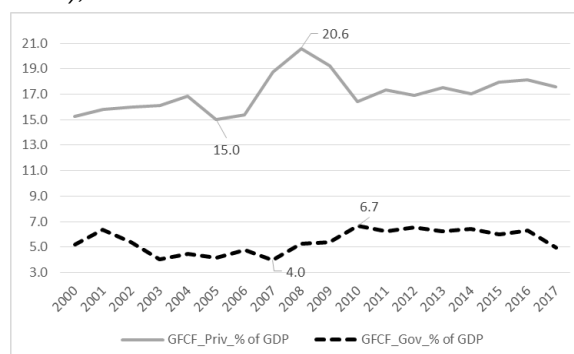
Both the macroeconomic theory and the empirical literature is inconclusive over the stance of the effect the public investments exert over the private investments. It is both argued that public investment can affect private investment either positively or negatively. On one hand, it is debated that an increase in public investment exerts positive effect on private investment. The positive effect of the public investment is channeled through the government/public investments in capital projects such as infrastructure (high-ways, railways, water systems, sewage systems, etc.), as well as through capacity and human development enhancing projects that encourage and attract private investment by enabling conditions for enhancing their productivity, thus resulting in crowding-in effect. Contrary to this view, the other side of the theory predicts opposite long term effects of public investment, which argue that, when the public capital investments are financed by issuing domestic debt, it takes away from the availability of financing funds for the private investment (competing for the same pool of available funds) which as a results puts a pressure on the interest rates to increase and thus discourages and reduces the private investment causing crowding-out effect.

Figure 2: Foreign direct investment, net inflows (% of GDP) North Macedonia



Source: WDI database, World Bank (www. <https://databank.worldbank.org/>)

Figure 3: Gross fixed capital formation, (% of GDP), North Macedonia



Source: WDI database, World Bank (www. <https://databank.worldbank.org/>)

Empirical evidence likewise demonstrates ambiguous results of the crowding-in (such as Mahmoudzadeh et al., 2013; Aschauer, 1989; Greene & Villanueva, 1991 and Blejer & Khan, 1984) or crowding-out (such as Basar & Temurlenk, 2007; Sineviciene, 2015; Adegboye & Alimi, 2017) hypothesis nexus concerning private and public investments.

Besides the effect of public investment over private investment, the literature also detects foreign direct investment as variable and confounding factor with either significant positive or significant negative impact on private investments, as a catalyst for development. The effects of the FDI over the economic growth and the other investments depends significantly on the country's policy for attracting FDIs, the overall business environment and investment climate. Furthermore, foreign direct investments (FDI) in sectors competing with the domestic companies may surprise investment opportunities for the domestic investors.

The paper is organized in the following manner i.e., after the introduction, a short overview of the empirical literature on the international findings and results over the hypothesis is presented. Subsequently, an empirical model is elaborated followed by a discussion of data and methodological issues. Thereafter, the empirical results are analyzed followed by conclusion and possible policy implications.

Literature Review

The hypothesis of crowding-in effects of private investments over the public investment and vice versa has been an interest of various authors for a long period. Nonetheless, the empirical results are inconclusive and ambiguous, so are the divided positions which are depending on numerous factors and variables incorporated in the empirical literature.

The different authors' findings are varying from evidence for crowding-in or crowding-out effects to inconclusive findings. All of these depend largely on the specific country analyzed or the sets of countries, 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.

The significance of public investment is particularly analyzed for its expected positive effects to be exerted over the economic growth of a country and is perceived through the prism of the government's (any level central, regional, or local) budget. Its particular importance and the effects over the sustainability of the state's public finance is demonstrated by the so called 'golden rule' suggesting that the public investment expenditure i.e. capital section of the budget of a country should be financed by issuance of public debt to a degree that it does not surpass the budget deficit (for e.g. Balassone & Franco, (2000); Perotti (2004)). This rule is often formalized throughout many countries by establishing formal budget break. The contribution of the public investments over the economic activity of a country or in a 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 been an interest for quite some period of time.

This has raised particular interest of the Aschauer's (1989) paper discussion 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 the USA (in the period from 1940s to 1980s) conclude that regarding the public investment in the period considered there is 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).

Table 1: Review of selected empirical studies

Author(s)	Time period	Geographical coverage	Approach/ Method	Variables	Crowding-in (+)/ -out (-) or mixed results
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	-
Mitnik & 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, United Kingdom, 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, in average dominates -
Eden & Kraay (2014)	1980 to 2012	39 low-income country	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 the period of time
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

<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>
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

Eden & Kraay (2014) in their empirical study of a selection of almost forty low-income countries find significant positive effects of public investment over the private investment with estimates that one dollar of public investment is associated with two additional dollars of private investment and 1.5 additional dollar output. However, they also note that for specific 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 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 and St. Aubyn (2009) consider 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 with results 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 private and public capital investments and government consumption.

More recently, especially for 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 different time span results. Specifically, for India, they find a crowding-in effect for the period after the 1980s and the reverse effect prior 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 prevailing crowding-in effect and only in couple of countries crowding-out effect.

Mahmoudzadeh et al. (2013) evaluate the effect of fiscal spending disaggregated by 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., crowd-in effect. Furthermore, they find that the crowding-in (complementary) effect is larger among the developing compared to 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.

Other studies, (Voss, 2002) discussed the effects of public investment over the GDP and the crowding-in/out hypothesis with the implementation of a Vector autoregression (VAR) analysis approach According to Voss (2002), the shocks to public investment cause crowding-out of the private investment, for the cases of Canada and the United States. Similar results specifically for Australia, Germany, and the United Kingdom are obtained by the study of Perotti (2004).

The empirical evidence seems to be more conclusive in the case of developed countries, which is not the case with the developing economies, Cavallo and Daude (2011) find mixed results with mostly crowding-out effects in their sample of over a hundred developing countries. Moreover, what is interesting is that these authors (Cavallo & Daude, 2011) found and concluded that the crowding-out effect is weakened and even reversed in the countries with stronger and better-quality institutional set up indicating a higher marginal productivity of public investment, denoting the importance of the institutional and political economy determinants as factors for enhanced public investment productivity.

Demirel et al. (2017) examined the effects of government debt, expenditure, interest rate and growth rate on private investment for the 2000–2015 in the Eurozone and they find that government debt, expenditure, interest rates and budget deficits all affect private investment negatively supporting the hypothesis of crowding-out in 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 a permanent impulse to public investment crowds-out private capital in the long-run when public capital directly augments private capital, and the elasticity of substitution is smaller than one.

Adegboye & Alimi (2017) in the case of Nigeria, using the ARDL estimation approach, suggest crowding-out effect of public investment over private investments, and no complementarity but 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 crowding-out effect and substitutability among the three types of investments however, also strong positive impact of all on the economic growth. The authors employ Vector Error Correction Model (VECM) with simultaneous equations for period of over sixty years.

As for North Macedonia, per se, although not part of the analyzed countries in the empirical studies, there are inferences for possible crowding-out effects. Namely, Fiti et al. (2017) discuss about evidence of negative fiscal multipliers, implying crowding-out effects, as are Koczan (2015), and CEA (2019) on the inefficient usage of public funds, and Eliskovski (2020) who estimated results suggest crowding-out of private loans due to the increasing government borrowing.

Furthermore, Ganic et al. (2021) test the crowding-in/out hypothesis by examining the link between public borrowing and private investments. The authors consider two groups of countries in panel, on one side the transitional and on the other post-transitional European countries. North Macedonia is part of the eight transition countries which are not EU members, vs. nine post-transition countries all EU members. Their results imply that generally there is a long run crowding out effect in both panels, however more specifically, the elasticity of private investment with respect to public debt is greater in the European transition countries, with recommendations for selected countries to reassess their austerity agendas and public debt management.

From the empirical studies reviewed, the conclusions made are a result of the approach, period of time covered, and the variables used. Therefore, although inconclusive the implications lean towards the side that the more developed countries and those with established and stronger state systems seem to be more on the crowding in hypothesis while on the contrary those countries which are still within transitioning systems or weaker states imply a crowding-out results. Therefore, the lack of longitudinal and overall empirical studies for North Macedonia and the region in general is expected to provide a value added to the topic and insights for improvements of fiscal policies improvement towards reaping more benefits of public investments.

Data and Methodology

Due to limitations of data availability and lack of in-year frequency, the data and sample size used, in this paper there are shown the annual data for the period spanning from 2000 to 2017. The current (nominal) data on domestic private investment, public investment, foreign direct investments, and the gross domestic product have been collected from the World Development Indicators (World Bank) as of 2020.

The gross fixed capital formation (GFCF) data prior 2000 are not available thus, the sample period covers annual data from 2000 to 2017. In the second model we use additional variable - foreign direct investment (FDI). The FDI data are used from the same source and for the same period and has been constructed from the percentage of the current GDP, and then deflated, using the reference year 2010 in order to be comparable with the other investment variables expressed as real data.

The constant (real values) of the GFCF, both private and public, as well as FDI and GDP are calculated by deflating the nominal variables by the GDP deflator (reference year 2010), and the variables are in their natural form. In the period 2009-2012 there have been significant changes due to the global financial crisis on the economic situation, thus a dummy variable (dummy) is used in the model. This dummy variable takes a value of zero for the years prior and after the crisis (2000-2008, and 2013-2017) and one for the years 2009-2012.

Econometric Methodology

Prior to running the regression, we test the time series properties for unit roots i.e., for stationary, since regression of non-stationary time series data results in unreliable and spurious results with poor forecasting. Most of the macro-economic variables are expected to be non-stationary and 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 or bound test of cointegration (developed by Pesaran, M. H., Shin, Y., & Smith, R. J. (2001)), used in determining 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 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 in case 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 article adopts an approach in estimating the crowding effect of public investment on private investment which is also often used among authors. The ARDL expression of the private investment models are presented below as Model1 and Model2. The ARDL bound testing is chosen as it is considered to be an approach with advantages over other co-integration tests for several reasons. Namely, the usual co-integration tests demand all variables to be integrated in the same order, while ARDL approach allows to be applied irrespective of whether the variables are only of order I(0), or 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. Next, the variables can take different number of lags in an ARDL model and allows for dummy variable in the model. Furthermore, the bounds testing approach allows for estimates of the long-run and short-run components within the model, resolving for 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:

$$\Delta GFCFPriv_t = \beta_0 + \sum_{i=1}^p \varphi_i \Delta GFCFPriv_{t-i} + \sum_{i=1}^p \theta_i \Delta GDP_{t-i} + \sum_{i=1}^p \lambda_i \Delta GFCFGov_{t-i} + \sum_{i=1}^p \lambda_i \Delta FDI_{t-i} + \delta_1 GFCFPriv_{t-1} + \delta_2 GFCFGov_{t-1} + \delta_3 GDP_{t-1} + \delta_4 FDI_{t-1} + \varepsilon_t \quad (1)$$

Where the variables are in real terms in US dollars, GFCFPriv is the private investment, GFCFGov is the public investments, GDP is the output, FDI is the foreign direct investment, Δ 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). In the latter case, we can conclude that there is an 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). And 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.

If there is evidence of cointegration, we take the following step and estimate the long run relationship based on first step results.

$$GFCFPriv_t = \beta_1 + \sum_{i=1}^l \varphi_{1i} GFCFPriv_{t-i} + \sum_{i=0}^m \theta_{1i} GDP_{t-i} + \sum_{i=0}^n \lambda_{1i} GFCFGov_{t-i} + \sum_{i=0}^q \gamma_{1i} FDI_{t-i} + \varepsilon_{1t} \quad (2)$$

And in the final step we estimate any short run relations based on the ECM.

$$\Delta GFCFPriv_t = \beta_2 + \sum_{i=1}^p \varphi_{2i} \Delta GFCFPriv_{t-i} + \sum_{i=0}^p \theta_{2i} \Delta GDP_{t-i} + \sum_{i=0}^p \lambda_{2i} \Delta GFCFGov_{t-i} + \sum_{i=0}^p \gamma_{2i} \Delta FDI_{t-i} + \Psi ECM_{t-1} + \varepsilon_{2t} \quad (3)$$

The ECM equation coefficients indicate the short-run dynamics, and it shows the convergence i.e., how much of the disequilibrium is being corrected with Ψ , which is the speed of adjustment. A positive coefficient indicates a divergence, and a negative coefficient indicates convergence. The ECMt-1 is expressed as:

$$ECM_{t-1} = GFCFGov_t - \beta_1 - \sum_{i=1}^l \varphi_{1i} GFCFPriv_{t-i} - \sum_{i=0}^m \theta_{1i} GDP_{t-i} - \sum_{i=0}^n \lambda_{1i} GFCFGov_{t-i} - \sum_{i=0}^q \gamma_{1i} FDI_{t-i} \quad (4)$$

Model Results

In step one, unit root test to determine the co-integration test was performed. The unit root test indicates that the three variables Public Investments (GFCFGov), Private Investments (GFCFPriv) and the GDP are all non-stationary at level, and are stationary at level 1 (I(1)) with intercept, while the variable Foreign Direct Investments (FDI) is stationary at level, determined by using the ADF test. The optimal lag length (using the AIC criterion) is lag 2 (for the three variables).

Table 2: Unit Root Test

Unit Root Test

Augmented Dickey-Fuller Test

	Level	1st difference	
Variables	with Intercept	with Intercept	Result
GFCF_Gov	0.2686	0.0081***	I(1)
GFCF_Priv	0.2197	0.0056***	I(1)
FDI	0.03278**	0.0085	I(0)
GDP	0.1401	0.0422**	I(1)

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

Table 3: Lag Order Selection Criteria

Lag	AIC	SC	HQ
0	164.7021	164.8953	164.712
1	163.5319	164.4977	163.5814
2	162.4095*	164.1479*	162.4986*

* indicates lag order selected by the criterion

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

We use the Autoregressive Distributed Lag (ARDL) bound testing approach to cointegration, to examine the long-run and short-run relationship between the private investment, the public investment, and other variables. The ARDL model is adequate considering the advantages over other cointegration tests and the appropriateness given the different levels of stationarity of the variables and the sample size.

We estimate two models for identification of the relation between the variables. Model1 is incorporating the variables for private, public investment and GDP and the Model2 incorporates the FDI in addition to the former. Both models are relatively good fit, as the adjusted R^2 for Model1 is 0.40 and the DW is 2.04, while Model 2 is better fit with adjusted R^2 of 0.74 and DW statistics of 1.94.

The ARDL bounds test indicates existence of cointegration between the variables i.e., short-run or long-run relationship between the variables. The Model1 test indicates no cointegration. In the Model2 when we add the FDI variable, there is a cointegration (the F-value is above the upper bound at I(1) at significance level of 5%). Based on the bounds ARDL model we can conclude that when the Private investments (in both cases) are the dependent variable we can estimate only short-run relation for Model1 and long run relation in Model2.

Table 4: Existence of cointegration and model to estimate

Dependent variable	F value	Cointegration	Models to estimate
GFCF_Priv, Model 1	F=3.238908	No	Estimate Short run ARDL model
GFCF-Priv, Model 2	F= 7.070606	Yes	Estimate ECM, error correction model, long run

In Model1 there is no evidence of cointegration thus we estimate the short-run model for private investments, and we cannot estimate any long-run model. The short-run model is tested for serial correlation, when LM¹ test shows no serial correlation (prob. F (2,4) 0.81), and the stability diagnostics, CUMSUM² and CUSUM squares is within the 5% boundary indicating that the model is stable.

The coefficients of the model indicate that there is a negative relationship between the private and the public investments, i.e., that it implies possible crowding-out effect of the public investments to the private investments however neither of the coefficients shows significance.

Table 5: Estimate of the short run model

Dependent Variable: $\Delta(\text{GFCF_PRIV})$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	22,679,550	46,815,422	0.484	0.645
$\Delta\text{GFCF_PRIV}(-1)$	0.058	0.383	0.152	0.884
$\Delta\text{GFCF_PRIV}(-2)$	-0.446	0.367	-1.214	0.270
$\Delta\text{GFCF_GOV}$	-1.118	0.734	-1.524	0.178
$\Delta\text{GFCF_GOV}(-1)$	-0.155	0.980	-0.158	0.880
$\Delta\text{GFCF_GOV}(-2)$	-0.844	0.788	-1.072	0.325
ΔGDP	0.141	0.091	1.551	0.172
$\Delta\text{GDP}(-1)$	0.017	0.114	0.152	0.884
$\Delta\text{GDP}(-2)$	0.106	0.095	1.117	0.307

In estimating the Model2 with incorporation of 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, we estimate the long run relation as well. The model estimation indicates that there is a significant crowding-out effect of the public over the private investments. The coefficient of public investment is a -1.4, supporting the statement of a crowding-out effect with reverse effect after a lag of one period, i.e., delayed crowding in effect (coefficient 1.86, significant at 5%).

¹ Lagrange Multiplier test – LM

² Cumulative statistics testing stability, if coefficient of regression are changing systemically and suddenly, with CUSUM cumulative sum test and CUMSUM cumulative sum of squares test

On the other hand, there is positive significant crowding-in relationship between the foreign direct investments over the private investments. The coefficient of the FDI is positive 0.57 supporting the statement that there is a positive relation between the two variables and possible crowding-in effect of the public investments.

Table 6: Estimate of the long run Model2

Dependent Variable: GFCF_PRIV

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.01E+08	3.16E+08	1.269	0.251
GFCF_PRIV (-1)	0.956	0.221	4.325	0.005
GFCF_PRIV (-2)	-0.467	0.235	-1.989	0.094
GFCF_GOV	-1.449	0.506	-2.864	0.029
GFCF_GOV(-1)	1.863	0.549	3.394	0.015
GFCF_GOV (-2)	-0.201	0.443	-0.454	0.666
GDP	0.171	0.051	3.333	0.016
GDP (-1)	-0.261	0.081	-3.242	0.018
GDP (-2)	0.074	0.053	1.379	0.217
FDI	0.574	0.180	3.197	0.019
R-squared	0.882			
Adjusted R-squared	0.705			

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 on a short-run there is an immediate negative crowding-out effect (coefficient -1.51, significant at 5%), which is reverse after a lag of one period (coefficient 2.1, significant at 5%). The FDI coefficient is indicating and immediate crowding-in effect (coefficient 0.70, significance at 5%).

The Error Correction Term (ECT) is the adjustment coefficient, and the correction speed in the subsequent periods, with a value of coefficient of -1.14 which indicates a fast adjustment which is in line with the coefficients of the public investments with a lag of one period and two periods, however the significance of the ECT is above 10%. We tested the model stability with the LM serial correlation test indicating there is no serial correlation and the CUSUM test between the 5% boundaries indicating model stability.

Table 7: Estimate of the short run model 2 and Error Correction Term

Dependent Variable: $\Delta(\text{GFCF_PRIV})$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7636878	26692611	-0.286	0.789
$\Delta(\text{GFCF_PRIV} (-1))$	1.109	0.334	3.321	0.029
$\Delta(\text{GFCF_PRIV} (-2))$	-0.284	0.204	-1.390	0.237
$\Delta(\text{GFCF_GOV})$	-1.513	0.411	-3.681	0.021
$\Delta(\text{GFCF_GOV}(-1))$	2.137	0.788	2.711	0.054
$\Delta(\text{GFCF_GOV}(-2))$	0.064	0.485	0.132	0.901
$\Delta(\text{GDP_REAL_USD})$	0.174	0.054	3.254	0.031
$\Delta(\text{GDP}(-1))$	-0.301	0.101	-2.978	0.041
$\Delta(\text{GDP}(-2))$	0.043	0.054	0.806	0.466
$\Delta(\text{FDI})$	0.697	0.182	3.838	0.019
ECM(-1)	-1.142	0.567	-2.015	0.114
R-squared	0.902			
Adjusted R-squared	0.658			

Conclusions & Policy Implications

The central aim of this paper was to investigate whether there is a nexus between private investments and public investments i.e., to test the hypothesis for existence of crowding-in or -out effect among the two in the case of North Macedonia. In testing the hypothesis, the used data are real private investment, real public investment, real foreign direct investments, and real GDP for the period of 2000-2017.

This article explores primarily the existence of complementarity or substitutability nexus between public and private investment, as well as the role of foreign direct investments in this relationship touching upon the economic growth. This article did not consider other elements that are and may be of importance as a factor for the relationship, such as private sector credit, interest rate, comparison with other comparable economies, etc. Thus, further empirical examination to pinpoint relationships and importance of other variables should be considered for future research and are at the same time limitation of this article.

The general Model1 that includes the variables: private investments, public investments, and the economic output give inconclusive results due to the insignificant probability values. However, once the foreign direct investment variable is included as in the Model2, the significance of the variables increases and the cointegration bound testing approach within the ARDL bounds confirms the existence and the intensity of the relation between these variables.

The empirical results of the two models with different specifications show that public investment has a crowding-out effect over the private investment for the concerning period in North Macedonia. When the variable of foreign direct investments is included in the model, the results confirm that there is a significant crowding-out effect of public investments over the private investments while at the same time detect a crowding-in effect of the foreign direct investments over the private investments. This effect is immediate and short-run, as the long run effect is quickly adjusting.

The economic output has a significant long-run and short-run positive effect over the private investments, immediately adjusting, i.e. in the current year of the investment. Moreover, the interaction between the public investment and foreign direct investments over the private investment is significant denoting that public investment has a different and associated effect on private investment together with the foreign direct investment size.

These results indicate a need for consideration in designing the fiscal policy. Primarily, the findings indicate that the public investment in North Macedonia, in the past two decades, crowd-out private investment with an immediate and quite large coefficient - effect. This result may imply that a significant share of the public investments in the past two decades might not have been optimally selected thus resulting in unproductive investments without significant returns (financial and social). Therefore, it should be a signal for the fiscal policy creators to focus and exert efforts for better PIM processes in selection and prioritization for more productive long lasting public investment, offering greater productivity enhancing effects, better rates of returns and overall positive spillover effects. This is especially relevant in circumstances of historical evidence of lack of long-run planning of public investments and lack of performance assessments or selection criteria of the public investments within the country.

Next, the findings indicate that there is a potential for significantly increased effectiveness and efficiency of the executed state budget funds, and assessment for bottlenecks within the public investment processes for possible fund 'leakages'. This may be another flag for attention considering that the infrastructure public sector projects as quite prone to corruption and lack of transparency.

Furthermore, while fiscal policies are aimed at increasing public investment with the objective of accelerating economic growth, in a context of ever-increasing borrowing of the public sector, attention should be paid to avoid negative crowding-out implications over the private sector's access to sufficient financing sources thus curtailing the private investments. This can have a long-term effect by contributing to an economic downturn, less taxes for the public sector, increasing need for more borrowing.

Lastly, the foreign direct investments in North Macedonia are going hand in-hand i.e., are complementary with the private investments, thus the opportunities for acquiring more benefits of the identified long-term positive relations should be assessed by the policy makers with care and with focus on removing administrative or bureaucratic barriers, and alter policies to create competitive business environment, and ensure business predictability for healthier market economy. This also alludes to the need for improved institutional capacities and restored public sector governance to contribute towards a stable and predictable business environment attractive for the private investments.

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