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Crowding-in and Crowding-out Effects of Public Investments in Poland and Portugal: a Comparative Study

Introduction

The fiscal policy (as one of the two macroeconomic policies apart from monetary policy) constitutes one of the fundamental factors that determine macroeconomic performance of every country. A wide range of particular goals and instruments of this policy includes i.a. stimulating production growth through extra public spending which boosts total investments and creates an additional demand for goods, services and new jobs used in the investment processes, increasing people's disposable income by social transfers, reforming the tax system to enhance companies' effectiveness and promote social responsibility of business, improving exports performance, and attracting foreign investment by extra tax allowances or subsidies. Irrespective of the type of goal or scale of using those tools, the eventual effect of fiscal actions translates into the country's macroeconomic results in a direct or indirect way. However, different economic schools represent various opinions as to the real impact of expansionary fiscal policy on the main macroeconomic indicators, like output, interest rate, private investments or exchange rates; according to different economists, those effects are not always and not undoubtedly positive, i.e. stimulating for the economy. This concerns in particular the expected impacts of increasing govermental expenditures on private investments which are considered to bring both crowding-in or crowding-out effects.

   This paper aims to analyse the effects of public spending in Poland and Portugal on the comparative basis in the period 1996–2017. It is decidedly unreasonable to use any earlier data. Poland became market economy only in the early 1990s and any study or comparison based on Polish macrodata from the earlier

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time is useless for many reasons, among which the key one is the lack of the reliable and comparable statistics for the time when the country's economy was governed by the communist, centrally-planned system. Poland started to adjust its statistics to international standards (allowing to include data on Poland in databases, e.g. for cross-country comparisons) only in about mid 1990s, so suitable data for the ealier period do not usually exist in international databases (or there are lots of gaps making econometric analysis impossible).

In particular, this study focuses on crowding-in and crowding-out effects of the government expenditures on investments in the physical capital (real economy). A large increase in those expenditures resulted in both countries from joining the European Union which brought about new public projects cofinanced with the EU structural funds. However, as we analyse the period from before Portugal's and Poland's EU accesion dates, in order to make the anlysis more comprehensive I compare the results obtained for Portugal to those obtained Andrade and Duarte (2016) who used the data for 1960–2017. At least in the parts devoted to Portugal this study constitutes an extention of of the above quoted analysis. It is methodologically and empirically based on that research and in some of the conclusions it refers to their results.

The paper is composed of three sections, apart from this introduction and conclusions. Section 1 presents the empirical perspective of the study. Section 2 provides a review of the literature concerning the crowding-in and crowding-out effects of private and public investments. Section 3 presents the econometric strategy adopted for the empirical analysis and the data sources, and then it discusses the results obtained. For more transparency, tables and figures presenting numerical results of the estimated models are included in the Appendix at the end of the paper.

1. Empirical perspective of the study

Poland has the biggest economy among the countries of the former Eastern Bloc (eighth largest economy in the European Union). The country became market economy only in the early 1990s1. Since 1990 Poland has pursued a policy of economic liberalization, privatization of the formerly state-owned enterprises and opened its market for foreign investors. However, the initial few years of transformation from the centrally-planned economy into market structures, i.e the time of building the normally functioning market fundamentals, were marked with substantial economic chaos and lots of severe disturbances[2]. The system of collecting the macroeconomic data consistent with international standards was

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[1] The communist regime collapsed in the political sense in 1989, but major economical changes started a few months later.

[2] Some mistakes of the transformation policy led to socially painful problems like pauperization of some parts of the Polish society and deepening gaps in the level of economic development and living standards between different regions.

also created in the early 1990s. The international statistical databases quote such data for Poland usually only from 1995 and it is hardly possible to find any earlier data (the only available information covers the most basic categories, like GDP or GDP per capita). This is why it turned necessary to refer to period 1996–2017 for Poland. This fact does not infringe the legitimacy and relevance of the comparison made between Poland and Portugal.

The accession of Poland to European Union in 2004 has highly contributed to solving early-transformation problems. Especially the EU funds from cohesion policy and other programs helped a lot. Poland has been the biggest beneficiary of the EU funding in all its financing perspectives; also in net terms. It was also granted EU support in the pre-accession period (PHARE, SAPARD, ISPA); in 1990–2003 Poland got ca. 3.9 billion EUR from PHARE. In the financing perspective 2007–2013 EU allocated 67.3 billion EUR for Poland and in 2014–2020 – 105.8 billion EUR. Within first 10 years of memberhip the country got net (minus its contribution to the EU budget) totally 250.5 billion PLN (61.4 billion EUR)[3]. Partly thanks to the EU funds the Polish government could realize hudge investments in the transport infrastructure (numerous expressways and highways on the whole country's road transport network), co-financed with big allocations from the central budget (on the average, the EU funds covered 60% of the cost of the project)[4].

Historically, the Portuguese economy, similarly as the Polish one, has been characterised by severe economic growth problems, particularly evident when its performance is compared in terms of per capita GDP with its major trading partners within the current European Union (EU-28). Those negative determinants are characterized by Andrade and Duarte (2016) who point out i.a. at the existence of serious distortions in financial markets, which led to a reduced volume of private investment before Portugal's accession to the EEC, deficient transportation infrastructure which made it difficult to trade and develop the industry as well as the persistence of successive fiscal imbalances. We can see that the factors negatively affecting the Portugese economy before its EU accession were similar to those that hampered Poland's growth in the 1990s.

A special turning point for Portugal is the year 1986 when the country joined European Economic Community (EEC), implemented major reforms in the goods and services and job markets, and started to conduct huge investment projects in order to develop modern physical infrastructure, such as roads, highways, ports, airports and railways, all essential for the desired growth of the national output. The co-financing and transfer programmes coming to Portugal from the EU made it possible to make structural improvements in the country's economy,

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[3] It means that for each zloty paid to the EU budget (31 bn EUR) Poland got back ca. 3 zlotys.

[4] As an example, between 2004 and 2014 ca. 680 km highways and 808 km expressways were constructed (some of them modernized). In that period over 177 800 projects were carried out, totally worth PLN 558.2 bn, of which PLN 311.2 bn was co-financed by the EU. Numerous infrastructure projects (mainly in transport and sport facilities) were realized in 2009–2012 due to the preparation for hosting football championship "Euro 2012".

especially after 1989, thus representing a big opportunity for both private and public investment, and simultaneously promoting the desired output growth (see Andrade, Duarte 2016).

Although Poland and Portugal have historically different experiences and accessed the EU in different years, there is no reason to think that this fact may change the way in which the extra fiscal expenditures (money from own state budgets), complementary to big, mainly infrastructural projects financed by the EU funds, influenced both economies. Therefore, the macroeconomic effects of government expenditures in these two countries can be analysed within the same theoretical framework. On the other hand, Poland and Portugal differ in respect of the size and structure of their economies and this fact may contribute to some differences in individual effects of fiscal expansion on macroeconomic growth in both countries. This makes an analysis even more interesting.

To sum up, not only 'in spite of' but even 'because of' the differences in the macroeconomic situation of Poland and Portugal, it is justified to compare the results of public spendings as to their impact on the key macroeconomic indicators like GDP, private investments, interest rates and real exchange rates. Based on the econometric behaviour of these variables, it should be possible to discover whether private and public investment are substitutes or complementary and how they affect the output growth and to compare the results for both countries.

2. Crowding-in and crowding-out effects: a literature review

The impact of public and private investment on the economy is determined by two counteractive effects: crowding-out and crowding-in. The crowding-out emerges in a situation when after the increase in public investment there is a reduction in private investment and other components of aggregate expenditure, caused by the changes in interest rates (financial crowding-out). The main reason for that effect is that resources are scarce and there exists in the economy a transmission mechanism between financial markets and goods' markets. When policy-makers increase their spending (or reduce taxes), this leads to the rise in aggregate expenditure and contributes to pushing up the prices. As demand for money increases, this in turn causes an increase in short-run nominal interest rates. The increase in interest rates is always detrimental to private investment and other components of aggregate expenditure and it hinders the economic growth (Blanchard 2008).

On the contrary, when we have to do with the crowding-in effect (Aschauer 1989a, Hatano 2010) there is a multiplied growth in private investment as a result of increased public investment. It is usually achieved by the construction or improvement of physical infrastructure, such as public premises (hospitals, new schools, public buildings) as well as roads, highways, ports, airports, and railways.

In recent years there has been a renewed and growing interest in the study of these phenomena, mainly because of active fiscal policy tools that have been used by developed countries to counteract the negative consequences of 2008+ crisis.

Applying a VAR analysis, in his pioneering work Aschauer (1989a) investigated the effects of public investment on aggregate economic activity (output) as well as the impacts of public investment on private investment in the United States and he concluded that public investment has a crowding-in effect on private investment and that public and private investment (capital) are complementary. Aschauer (1989b) argues also that the observed decrease in productivity in the United States in the 1970s was largely due to the decline in public investment. This idea is also shared by Mundell (1990) as well as Argimon et al. (1997) who also highlighted a positive impact of infrastructure investment on the productivity of private capital formation.

Mittnik and Neumann (2001) estimated a VAR model with GDP, private investment, public investment, and public consumption for six industrialised countries and evidenced that public investments tend to have positive effects on the output, without the presence of crowding-out effects. Contrary to that Voss (2002) found that shocks in public investment in the United States and Canada in the period 1947–1996 had crowding-out effects on private investment. Kamps (2004) and Perotti (2004) analysed not only the effects of public investment on output, but also on the labour market, concluding that the presence of crowding-in effects is seen especially in employment.

Among other authors who investigated the impact of public investment on private investment we can mention also e.g. Hatano (2010) for Japan, Berndt and Hansson (1992) for Sweden, Heintz (2010) for USA, Shah (1992) for Mexico, Lynde and Richmond (1993) for the UK, Seitz (1994) for Germany, Sturm and de Haan (1995) for the Netherlands, Otto and Voss (1996) for Australia, Pereira and Sagalés (1999) for Spain, Creel and Poilon (2008) for Austria, Belgium, France, Germany, Italy, and the Netherland, Furceri and Sousa (2009) for a panel of 145 countries in the period 1960–2007, Haque and Kneller (2015).

In relation to the studies concerning the Portuguese economy, those conducted in the last 15 years by Esteves (1998), Pereira (2000, 2001), Pereira and Andraz (2001, 2003, 2005), Afonso and Aubyn (2008), and Afonso and Sousa (2009) are of interest. For example, Pereira and Andraz (2005) investigate the effects of public investment in transportation infrastructures (such as national roads, municipal roads, highways, ports, airports and railways) on output, private investment, and employment in Portugal in the period 1976–1998, i.e. in the post-revolution of 1974 period to the date when Portugal joined the euro zone. The authors conclude that public investments have a strong positive effect on output, private investment, and employment.

Afonso and Aubyn (2008) showed that public investment had supressing effects on output in a part of countries analysed in their study (particularly in Belgium, Canada, the Netherlands, Ireland, and the UK), but there were also expansionary (crowding-in) effects on private investment in some of them.

Furceri and Sousa (2009) assessed the impact of changes in government spending/GDP ratio on the short–term growth rates of private consumption and investment for a panel sample of 145 countries from 1960 to 2007. They suggested that government spending produced important crowding–out effects, by negatively affecting both private consumption and investment. In addition, according to their study, effects of government consumption on private consumption and investment do not depend on the phase of the business cycle, but differ substantially among regions. In their later study, Furceri and Sousa (2011) have taken up a similar problem basing on theoretical and empirical literature and they provided some new empirical evidence on the effect of changes in government spending on private consumption and investment by using a panel of 145 countries from 1960 to 2007. According to this study, government spending crowds out both private consumption and investment, and this result does not depend on the phase of the business cycle, but differs substantially among regions.

Using a Bayesian Structural Vector Autoregression (B-SVAR) approach, Afonso and Sousa (2012) analysed the macroeconomic effects of fiscal policy in the US, the UK, Germany, and Italy. According to their results, government spending shocks, in general, have a small effect on GDP, leading to important 'crowding-out' effects; sudden changes in government spending have a varied impact on housing prices and may generate a quick fall in stock prices.

Snyder (2011) analysed the US $700 billion bailout plan to stimulate the U.S. economy after the 2008+ crisis. He examined the impacts of fiscal deficits on investment, consumption and output basing on error correction vector autoregression model (VECM) and concluded on lack of crowding-out effects. According to Snyder, „while interest rates appear to respond very little to deficits, reductions in taxes or increases in government spending appear to cause a relatively small increase in private investment, suggesting that the Keynesian multiplier effect outweighs or at least offsets any type of crowding out".

Valla, Brand and Doisy (2014) in their study on public investment in the European countries concluded that in medium term, public investment does not hinder and fosters the quantity and efficiency of private investment. Moreover, fiscal multiplier for public investment they obtained is significantly stronger than those for other fiscal instruments. As the authors point out, these two findings suggest that the public sphere would be well advised to tilt spending towards investment in areas such as infrastructure and human capital, which represent an investment for future generations. The paper discusses also the authors' own interesting advice for EU policy as to create the Eurosystem of Investment Banks (ESIB) for achieving the desired strategic economic goals.

Agnello, Furceri and Sousa (2013) used their own newly elaborated empirical approach to assess the effect of discretionary fiscal policy on private spending and found that an expansion in discretionary fiscal policy boosts growth in the short term, but is detrimental in the medium term. Their empirical findings suggest also that the effect of discretionary fiscal policy on private spending varies across regions and income groups, and depends on countries' economic characteristics,

such as the level of economic development, trade openness, government and country size (see also literature overview elaborated by Andrade and Duarte 2016).

Željko (2015) analysed the determinants of public expenditure effects in transitional countries. He elaborated on a theoretical basis an empirical analysis of crowding-out and crowding-in effects by referring those effects to public expenditure structure, sources of financing and economic situation of the countries. Dreger and Reimers (2014) in turn explored the long run relationship between public and private investment in the euro area in terms of capital stocks and gross investment flows, concluding that the lack of public investment might have restricted private investment and GDP growth in the euro area in the studied period. Şen and Kaya (2014) analysed empirically the effects of government spending on private investment in Turkey in the period 1975–2011 in order to detect the existence of crowding-out and crowding-in effects. Basing on Aschauer's (1989) model they showed that government current transfer spending, government current spending, and government interest spending crowd out private investment, whereas government capital spending crowds in private investment in Turkey.

Sonaglio, Braga and Campos (2010) observed the existence of crowding-out effects (substitution) between public investment and private investment in the Brazilian economy for the period 1995–2006. Using a Vector Error Correction (VEC) method, the authors found that interest rate, tax rate, and average price of capital goods had a negative effect on investment, thus indicating that fiscal policies that aim at reducing taxation, promotion of capital goods production, and reduction of interest rates may positively influence investment and promote sustained economic growth.

Hur, Mallick and Park (2014) concentrated on the effects of fiscal policy in developing Asia, but they found no clear evidence of either crowding out or crowding in. They also postulate possible use of fiscal policy to help remove structural impediments to private consumption and investment. Also Eden and Kraay (2014) focused on low-income countries. They used the data on fluctuations in a component of disbursements on loans from official creditors to developing country governments as an instrument to grasp fluctuations in public investment in a sample of 39 low-income countries. The analysis brings another evidence of crowding in: „an extra dollar of government investment raises private investment by roughly two dollars, and output by 1.5 dollars". According to the authors, for most countries in the sample, the returns to government investment exceed the world interest rate. However, for some countries that already have high government investment rates, the return to further investment is below the world interest rate.

An interesting theoretical review on the subject was presented by Balcerzak and Rogalska (2014) who studied the determinants of counter-cyclical effectiveness of fiscal policy, with special concentration on crowding-out and crowding-in effects. They also confronted the theoretical analysis with empirical papers based on the experiences of developed countries. Interesting results as to the impacts of fiscal spending disaggregated into public consumption, capital forma-

tion and budget deficit in developed and developing countries were obtained by Mahmoudzadeh and Sadeghi (2013) who evidenced i.a. positive eleasticity of private investment with respect to government capital formation expenditure in both groups (complementary or crowding-in effect, which was stronger in developing countries). Crowding-out or substitution effect found for government consumption spending was larger in developed countries.

Xu and Yan (2014) investigated the influence of government capital expenditures divided into investment that serves to provide public goods and infrastructure and investment in private industry and commerce on private investment in China concluding on opposite effects of the two different types of public spendings. Bahal, Raissi and Tulin (2018) re-examined the public and private investment relationship in India and checked whether public investment in recent years has become more or less complementary to private investment in comparison to the period before 1980. They have also decomposed shocks into those with transitory and permanent effects. Their results suggest that while public investment crowded out private investment in India over the period 1950–2012, the opposite is true when the sample is restricted to post-1980 period or the analysis is conducted on a quarterly basis since 1996.

3. Empirical analysis

3.1. Methodology and data

In order to analyse the crowding-in and crowding-out effects of public investment on private investment and GDP in Poland and Portugal, the behaviour of respective variables, such as GDP, private and public gross fixed capital formation (GFCF), and the real effective exchange rate based on unit labour costs (as a proxy of the economy's competitiveness) was examined. Additionally, I am also considering the nominal short-run interest rate in order to evaluate the cost of financing.

The methodology is partly based on the approach applied by Andrade and Duarte (2016) as to the choice of macroeconomic indicators and the structure of the relations between them assumed in the regressions. They based their research on the ADL (Autoregressive Distribute Lag) models using the methodology proposed by Hendry and Krolzig (2001, 2005) and Hendry and Doornik (2014) as an econometric strategy alternative to the commonly used VAR approach. They estimated direct effects of public and private investments on themselves and also on a system of simultaneous equations by using instrumental methods to correct the problems of endogeneity of variables. The authors have additionally calculated the multipliers of the exogenous variables, represented by the short-run nominal interest rate and public debt ratio.

Following (to some extent) their approach in this comparative analysis of the issue for Poland and Portugal is essentially justified. Using the set of ADL mod-

els captures the essence of the analysed matter and enables us to detect the key features of the macroeconomic relations when studying the wider (i.e direct and indirect) effects of public spendings. Moreover, the results of their regressions proved the methodological correctness, i.e consistency with the theory and statistical significance of the proposed models. The same concerns the results of the tests checking my own regressions.

However, I have introduced a few modifications of the econometric strategy, so it cannot be said that I am using the identical models[5]. I have built a set of ADL equations where the endogenous variables are: output (*y*), private investment (*ip*), public investment (*ig*), and real exchange rate (*tcr*) against the series of variables, some of them lagged, where _(*t*), for *t* = 1, 2, 3 represent polynomials lags, to probe into the issue of the public investments effects in the analysed economies. Real exchange rate may have a negative influence on output, leading to the presence of the Dutch-disease phenomenon in the economy. In the last model, i.e model 5, the real exchange rate is an exogenous variable and not an endogenous one as in the first model (see also Andrade and Duarte 2016).

With the estimation of the models presented in Appendix (Tables 1–5 for Portugal and Tables 6–11 for Poland) I wished to reply to the question of substitution or complementarity between private and public investment in the analysed countries. I estimated the equations of the aggregate output, private and public investment, and real exchange rate. It is assumed that output depends on public and private investment, the level of competitiveness of the economy measured by the real exchange rate, and financing costs represented by the interest rate (model 3). Private investment is considered to be dependent on the interest rate, burden of the public debt and *ip* lagged by 1 year (model 4). In the public investments regression equation *ig* is a function of *ip* and *ig* with polynomial lags (model 1). Similar approach was taken to detect the crowding-in and crowding-out effects in model 2. In these two equations the explained variable is defined in terms of of its own lagged values and the values of the other variable. Finally, the real exchange rate was taken to be determined by the level of investment, exchange rate and interest rate with polynomial lags (model 5).

To sum up, we are using a set of five models, the same for Portugal and Poland for the period 1996–2017 showing the analysed functional relations.

Model1Port/Model1Pol – Impacts on public investments:

$$igPort/ipPol \ (state \ GFCF) =$$
$$= f(ipPort\_1/ipPol\_1/, \ igPort\_1/igPol\_1, \ igPort\_2/igPol\_2)$$

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[5] The differences in the study for Poland result mainly from the problems in finding some of the data which are equivalent to those used for Portugal by Andrade and Duarte (2016). The variable called 'external funds', which was used by these authors, is the sum of the structural and cohesion funds with remittances. The Polish Central Statistical Office (GUS) is not collecting such aggregated data for Poland; the information on this subject comes from different sources and it will require a lot of additional work to gather all the required data and collect them in an ordered and unified way.

Model2Port/Model2Pol – Impacts on private investments (crowding-in vs crowding-out effects):

$$ipPort/\ ipPol = f(igPort/igPol\_1,\ ipPort\_1/ipPol\_1)$$

Model3Port/Model3Pol – Output estimation:

$$yPort/\ yPol = f(ipPort/ipPol,\ ipPort\_1/ipPol\_1,\ igPort/igPol,\ igPort\_1/igPol\_1,$$
$$tcrPort/tcrPol,\ etjPort\_1/etjPol\_1,\ yPort\_1/yPol\_1)$$

Model4Port/Model4Pol – Private investment estimation:

$$ipPort/\ ipPol = f(etjPort\_1/etjPol\_1;\ Dport/Dpol,\ ipPort\_1/ipPol\_1)$$

Model5Port/Model5Pol – Real exchange rate estimation:

$$tcrPort/tcrPol = f(ipPort\_1/ipPol\_1,\ igPort\_1/igPol\_1,\ etjPort/etjPol,$$
$$tcrPort\_1/tcrPol\_1,\ tcrPort\_2/tcrPol\_2,\ tcrPort\_3/tcrPol\_3)$$

where:
igPort/igPol – log of state GFCF with lags (respectively for Portugal and for Poland),
ipPort/ipPol – log of GFCF of the private sector with lags,
yPort/yPol – log of GDP,
tcrPort/ tcrPol – log of the real effective exchange rate based on unit labour costs,
etjPort/ etjPol – log of the nominal short-run interest rate,
DPort/DPol – log of the ratio of public debt to GDP.

The values of the variables for Poland and Portugal have been taken from the macroeconomic database of the European Commission AMECO. Some additional data for Portugal come from the statistics of the Bank of Portugal while the additional data for Poland come from Central Statistical Office and National Bank of Poland (NBP).

The variables that ultimately act in my models are: *ig*, public investment – logarithm (log) of GFCF; *ip*, private investment – log of private GFCF; *y*, output – log of GDP; *tcr*, real exchange rate – log of the real effective exchange rate based on unit labour costs; *etj*, interest rate = $(1 + r)$, with r denoting the nominal short-run interest rate; and *D* – the percentage ratio of public debt to GDP. All the variables except the interest rate are measured at constant prices. We put the values into logarithms to avoid the problem of non-stationarity of data.

3.2. Econometric results

The graphs 1–10 show the fitted values and actual values of the estimated variables for Poland and for Portugal. The models were checked against the set of tests traditionally used for testing the correctness of ADL regressions, like RESET (Ramsey's Regression Equation Specification Error), Breusch–Godfrey LM for

first-order autocorrelation OLS (no auto-correlation of errors), *F*-test with the square and cube of the fitted values, as well as Wald's χ-squared test (test of the null of all regression coefficents in the equations). There was also Variance Inflation Factors (VIF)[6] analysis made for each of the equations to check the possibility of multiple correlation between the explanatory variables. All other necessary tests were also carried out, like ADF Dickey–Fuller tests of data stationarity/ non-stationarity, Hansen test of autocorrelation of errors and of correlation between the instruments and the errors.

As we see from the numerical results presented in the tables, in most of estimated models the null hypothesis of coefficients is always rejected for an appropriate level of significance and there occured no problems of serial or auto-correlation and misspecification of the equations. What should be also stressed is that all the coefficents gained the expected signs, consistent with the economic theory. Wald's and Ramsey's tests[7] of the regressed equations proved statistical significance of the explanatory variables and general correctness of the models. However, in one of the models for Poland (Model5Pol) there emerged the problem of autocorrelation of variables; this issue should be taken into consideration in our further research. The same model specification for Portugal (data from the same period) brought the proper results of Wald's test but, on the other hand, it revealed the presence of (at least first-order) residual component autocorrelation. There were also some unsatisfactory results as regards variance inflation factors in a few of estimations. According to the Breusch–Godfrey test there were no problems of autocorrelation of residuals (we cannot reject the null hypothesis of no errors'auto-correlation of order 1).

Additionally, referring to Poland the Chow test was used in order to conclude whether the year 2005 (as a beginning of implementing the EU programs) marked some substantial „structural break" in the Polish economy. For Portugal I checked 2009 as a probable turnover year marking the negative impact of the global crisis 2008+ on the economy (Poland is considered to be one of a few countries in the world which have not experienced recession during this crisis)[8].

According to the results of the model 1 for Poland (see Appendix), there is a positve relation between public investments in Poland in the analysed period and the lagged values of this variable and private investments, with 1 year lag having the biggest impact. However, more interesting for us are the results concerning the elasticity of private gross capital formation (*ip*) in relation to government investment spending (*ig*) in Model2Pol. In both models there is no problem of collinearity of variables (VIF for *ig_1* ad *ip_1* are around 2).

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[6] $VIF(j) = 1/(1 – E(j)^2)$, where $E(j)$ is the multiple correlation coefficient between variable *j* and other independent variables. Variance Inflation Factors minimum possible value = 1.0 (values > 10.0 may indicate a collinearity problem); $VIF(j) = 1/(1 – R(j)^2)$, where $R(j)$ is the multiple correlation coefficient between variable *j* and the other independent variables.

[7] Ramsey's RegressionEquation Specification Error F-test with the squared and cube of the fitted values.

[8] Chow test for structural break at observation 2009 for Portugal and 2005 for Poland.

When comparing the results of model 1 for Poland and Portugal we see they are consistent with the economic theory. The estimations of this model show stronger dynamic effects of the lagged values of public gross capital formation on its own value in Poland (coefficient = 0.8) as compared with Portugal (0.74), but those values are in fact very close to each other (maybe indicating a little bit more stable business environment in Poland in the analysed period). Moreover, in Poland *ig* lagged by 2 years has on the average a positive impact on public investments (coefiicent equals to ca. 0.06) while in Portugal this impact is negative with coefficent amounting to ca. –0.23. The more long-lasting macroeconomic effect of public investment spending in Poland probably indicates or even reflects stable and sta- bilizing role of large investments projects cofinanced by the EU funds which were realized on a large scale in Poland in the analysed period. On the other hand, in Portugal private investments have a stronger positive influence on public invest- ment spending than in Poland (coefficient for Portugal = 0.81, for Poland = 0.06).

The results of model 2 show some opposite effects of the public spendings in the compared economies. It should be noted that in terms of this equation *ig_1* (lagged by 1 year) in Portugal has a negative (–0.036) effect, but in Poland this effect is positive (!). This would indicate the presence of crowding-out effects of public spending in Portugal in the analysed period and completely opposite, crowding-in (i.e. stimulating) effects of it in Poland.

This result counteracts the conclusion from Andrade and Duarte (2016, pp. 10–11) who – using the data of 1960–2013 rejected any idea of substitutability between private and public investment in Portugal. The authors underlined that negative values of private and public lagged coefficients reflect the dynamic ef- fect of these variables on output, and the sum of the two coefficients, current and lagged, is positive. The lagged private investments – not surprisingly – have sub- statial positive impact on *ip* in both countries; coefficent for Portugal is ca. 0.97 and 0.55 for Poland.

Considering the crowding-in effects observed in Poland, this result may in- dicate that in the analysed period big public investment projects stimulated (by public-private partnerships or public procurement system) the investment activ- ity of the Polish private sector, even though a substantial negative role of the in- terest rate in explaining private investment has also been confirmed in this study. The positive macroeconomic influence of government expenditures in Portugal in the period 1960–2013, as evidenced by Andrade and Duarte (2016), which resulted from the country's entry into EU in 1986, has probably gradually disap- peared and was pushed-out by the opposite negative effects. Modest effects of public spending can be also connected with the later economic slugishness in the EU (especially within the eurozone) due to the post-2008+ crisis recession con- sequences when public investment outlays were not able to activate the private companies enough.

The results of model 2 are visibly confirmed by the estimations of model 3 for both countries where I am checking the eventual impact of public and private in- vestment spending on GDP. The regression coefficients for Portugal show a neg-

ative dynamic impact of government expenditures on total output: *ig* lagged by one year brings GDP growth slowdown by 0.06% what confirms the crowding-out mechanism found in model 2. Private investment spending contributes obviously to GDP growth in Portugal, but the dynamic effect is negative. The last result is not consistent with economic intuition but in this model we see relatively high variance inflation factor of *ip_1* variable which indicates strong correlation of this variable with other variables in the model (probably *ip* itself), meaning the possibility of some misspecification of the model. Such problems could be avoided by using quarterly data which are unfortunately not available in international databases.

Identical problems occured in model 3 for Poland (too high VIF for both *ip_1* and *ig_1*). The same concerns *y_1* for Portugal and lagged output for Poland in this regression specification. However, in line with economic theory, the estimations show negative (and comparable as to the strength) relations between interest rate and output growth in Portugal (coefficient = –0.0036) and in Poland (–0.0044). When we look at the estimations of model 3 for Poland, we see that the impact of private investments in physical capital on output growth was stronger than in Portugal, so we can conclude about a more more stable positive influence of private investments on GDP in Poland (0.495 compared to 0.137).

An increase in public debt (the ratio of public debt is treated as a proxy for private investors' confidence and a restriction on public investment, i.e. excessive public debt is a burden on the economy) lowers – according to model 4 – the dynamics of gross capital formation of the private sector in both countries, yet this effect is stronger in Poland than in Portugal. Referring to the study of Andrade and Duarte (2016), they got similar results in the short- and long-run period and attached more importance to the long-run effect as „more important in terms of public than private investment". According to the evidently negative influence of financial costs, interest rate negatively affects investment spending of the private sector in both countries, with higher elasticity against this variable found for Portugal. This difference might again result from big public investment projects implemented in Poland (with public sector investor and private firms as contractors), which mitigated business cycles and made companies less vunerable to other macroeconomic factors (VIF was between 1.4 to 3.7 for this equation excluding the problem of multicollinearity). This is quite consistent with the results obtained by Andrade and Duarte who based on the data for Portugal when it realized its EU-cofinanced infrastructural programs (i.a. in transport infrastructure).

Referring to model 5, the obtained results confirm the theory, e.g the exchange rate was negatively influenced by government investment (lagged one year, a 10% increase in public GFCF (*ig*) decreased it by 0.6%) and positively by private investments (by 2.2%). This can be referred to the quantity theory of money. However, the tests' results are not always satisfactory, so this issue needs some deeper econometric insight.

With reference to Chova tests' results (the time series for Poland were split into two subperiods: i.e before 2005 and after this date as a date of putting the „accession into practice"; for Portugal, as already mentioned, the turning point

was 2009 for the reasons clarified above. The year 2005 has brought some statistially significant structural change for Poland only in two specifications: model 1 (with public investments as the explained variable) and model 5 (exchange rate).

Conclusions

Since the fiscal policy in general, and public sector investments in particular, are one of the key issues of economic policy, the impact of investment spending financed by the government (and in fact by all economic agents through the taxes and other payments made to the state budget) on the condition and performace of domestic economy is always in the focus of economists and politicians. In the simplest way, they all ask the question whether public expenditures are good for the economy and for the society's wellbeing (i.e. have positive effect) or bad, and in consequence whether we should opt for more or less state in the market economy. This wide and multiform issue was to some extent more precisely defined by distinguishing the crowding-in and crowding-out effects of public spending on private spending.

In this study I have analysed the effects of public and private investment spending on output and other macroeconomic variables as well as their mutual interdependent relations (by modelling public and private investment against each other with dynamic models), on the example of Poland and Portugal for the sample period 1996–2017. I have also used interest rates as financial costs and real exchange rates as key macroeconomic variables. Since I was using the methodology partly similar to the model specification used by Andrade and Duarte (2016) in their study concerning Portugal, I have confronted the obtained results of my regressions' estimations with some conclusions of their study.

The empirical comparative study carried out confirms the presence in the Polish economy of a complementarity (crowding-in) effect between private and public investment, and not a substitutability (crowding-out) effect in the analysed period. However, contrary to the analysis for Portugal made by Andrade and Duarte, I have not found any positive macroeconomic influence of government investment expenditures in that country in the analysed period. This might indicate that the stimulating effects of EU structural and cohesion funds and domestic public spending observed before have a long-run tendency to disappear and turn into crowding-out of private spending. However, this can be also connected with the later economic slugishess of the EU (especially most of eurozone) due to the post-2008+ crisis recession consequences when even large public expenditures were not able to activate the private companies enough. Financial costs represented by the nominal interest rate played also an important role in explaining private investment in both Poland and Portugal, having therefore also an impact on the evolution of national output.

I have not found the Dutch-disease phenomenon which was claimed in the mentioned study by Andrade and Duarte for the Portuguese economy, according to which the appreciation of the real exchange rate did not have an impact on private or public investment, but rather led to a long-lasting negative effect on

output. Public investment in both countries was not affected by the increase in interest rate whereas – in accordance with economic theory – private investment's response to that was negative.

My regressions' results confirmed the presence of a crowding-in effect of public investment on gross capital formation in the private sector in Poland and, as a consequence, its positive effect on output. Another interesting result is the absence of negative effects of public investment on economic competitiveness measured by the real exchange rate.

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Appendix

Table 1

Impacts on public investments: Portugal

Specification	Coefficient	Std. Error	*t*-ratio	*p*-value
const	−0.8338	0.3610	−2.310	0.0337
ipPort_1	0.8177	0.3136	2.608	0.0184
igPort_1	0.7420	0.2286	3.246	0.0048
igPort_2	−0.2301	0.2490	−0.924	0.3683

Model diagnostics

Mean dependent var.	0.7758	S.D. dependent var.	0.1627
Sum squared resid.	0.0927	S.E. of regression	0.0739
R-squared	0.8248	Adj. *R*-squared	0.7939
F (3, 17)	26.6855	*P*-value (*F*)	1.17e-06
Log-likelihood	27.1375	Akaike criterion	−46.2750
Schwarz criterion	−42.0970	Hannan-Quinn	−45.3684
Rho	−0.1927	Durbin-Watson	2.1911

Notes: Model 1Port: OLS, using observations 1996–2017 ($T = 22$); dependent variable: *igPort*.

Source: own calculations.

Figure 1

Public investment (actual & estimated): Portugal (*igPort*)
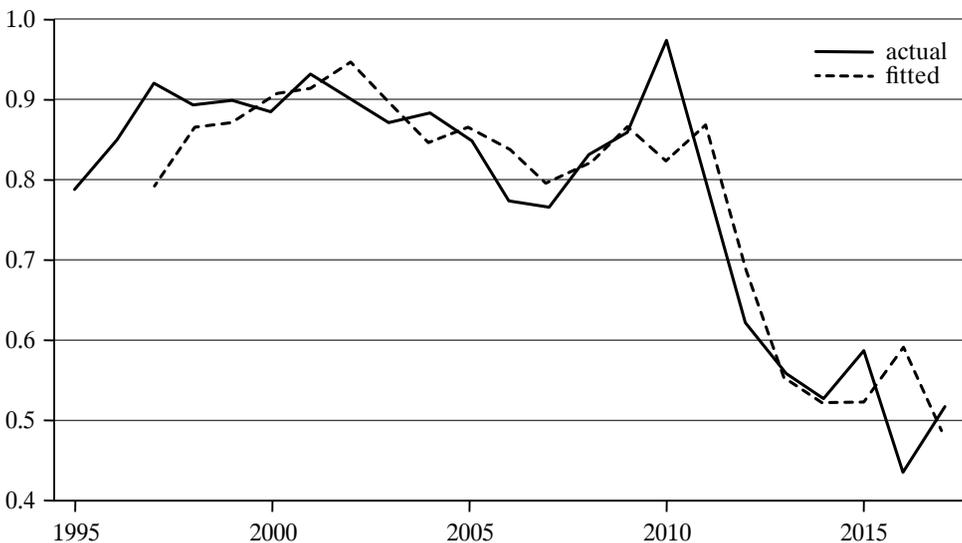
Source: own calculations.

Table 2

Impacts on private investments (crowding-in vs crowding-out effects): Portugal

Specification	Coefficient	Std. Error	t-ratio	p-value
const	0.0758	0.1626	0.466	0.6463
igPort_1	−0.0366	0.0777	−0.471	0.6426
ipPort_1	0.9684	0.1386	6.986	<0.0001

Model diagnostics

Mean dependent var.	1.4753	S.D. dependent var.	0.0832
Sum squared resid.	0.0221	S.E. of regression	0.0341
R-squared	0.8477	Adj. *R*-squared	0.8316
F (2, 19)	52.8656	P-value (F)	1.72e-08
Log-likelihood	44.6934	Akaike criterion	−83.3869
Schwarz criterion	−80.1137	Hannan-Quinn	−82.6158
Rho	0.6145	Durbin's h	3.7939

Notes: Model 2Port: OLS, using observations 1996–2017 (T = 22); dependent variable: *ipPort*.

Source: own calculations.

Figure 2

Private investment (actual & estimated): Portugal (*ipPort*)
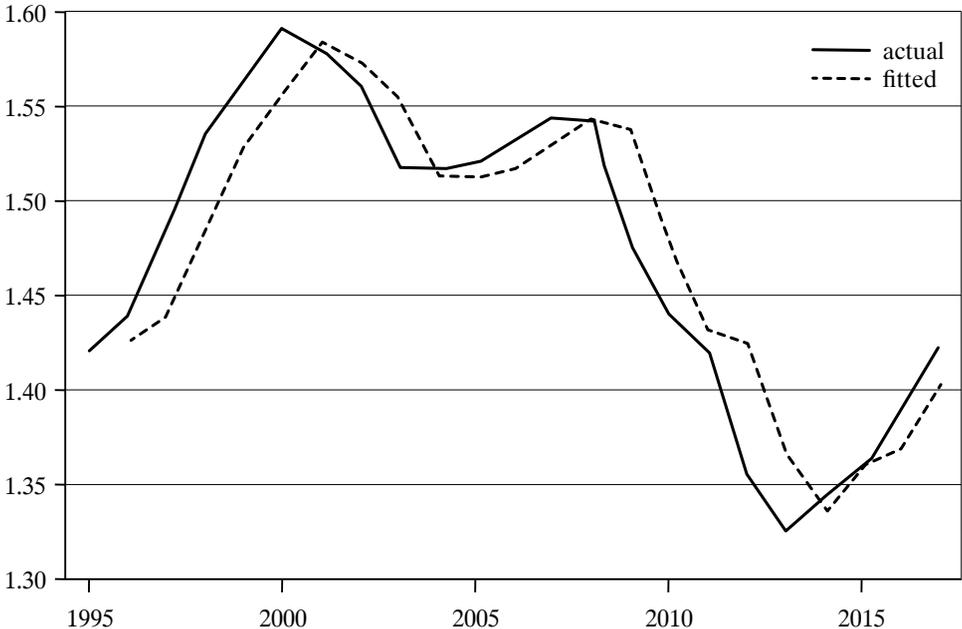
Source: own calculations.

T a b l e   3

Output estimation: Portugal

Specification	Coefficient	Std. Error	t-ratio	p-value
const	0.2037	0.1585	1.285	0.2197
import	0.1374	0.0535	2.566	0.0224
ipPort_1	–0.0440	0.0690	–0.637	0.5340
import	0.0304	0.0212	1.429	0.1749
igPort_1	–0.0608	0.0180	–3.366	0.0046
tcrPort	0.1625	0.1302	1.248	0.2324
etjPort_1	–0.0035	0.0012	–3.034	0.0089
yPort_1	0.7201	0.0806	8.937	<0.0001

Model diagnostics

Mean dependent var.	2.2145	S.D. dependent var.	0.0454
Sum squared resid.	0.0004	S.E. of regression	0.0056
R-squared	0.9898	Adj. R-squared	0.9848
F (7, 14)	194.8070	P-value (F)	7.41e-13
Log-likelihood	87.7989	Akaike criterion	–159.5978
Schwarz criterion	–150.8694	Hannan-Quinn	–157.5416
Rho	–0.2146	Durbin's h	–1.0874

Notes: Model 3Port: OLS, using observations 1996–2017 ($T = 22$); dependent variable: *yPort*.

Source: own calculations.

F i g u r e   3

Output (actual & estimated): Portugal (*yPort*)
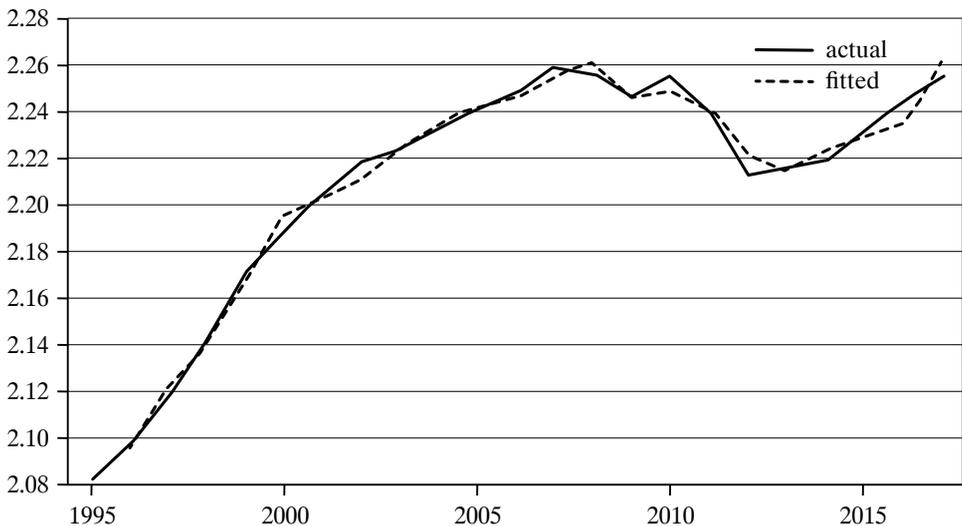
Source: own calculations.

T a b l e 4

Private investment estimation: Portugal

Specification	Coefficient	Std. Error	t-ratio	p-value
const	1.1960	0.2232	5.357	<0.0001
etjPort_1	−0.0094	0.0034	−2.758	0.0130
Dport	−0.2220	0.0447	−4.969	<0.0001
ipPort_1	0.3401	0.1233	2.757	0.0130

Model diagnostics

Mean dependent var.	1.4753	S.D. dependent var.	0.083214
Sum squared resid.	0.0086	S.E. of regression	0.021942
R-squared	0.9404	Adj. *R*-squared	0.930474
F (3, 18)	94.6818	*P*-value (*F*)	3.25e-11
Log-likelihood	55.0167	Akaike criterion	−102.0335
Schwarz criterion	−97.6693	Hannan-Quinn	−101.0054
Rho	0.5754	Durbin's *h*	3.308873

Note: Model 4Port: OLS, using observations 1996–2017 (*T* = 22); dependent variable: *ipPort*.

Source: own calculations.

F i g u r e 4

Private investment (actual & estimated): Portugal (*ipPort*)
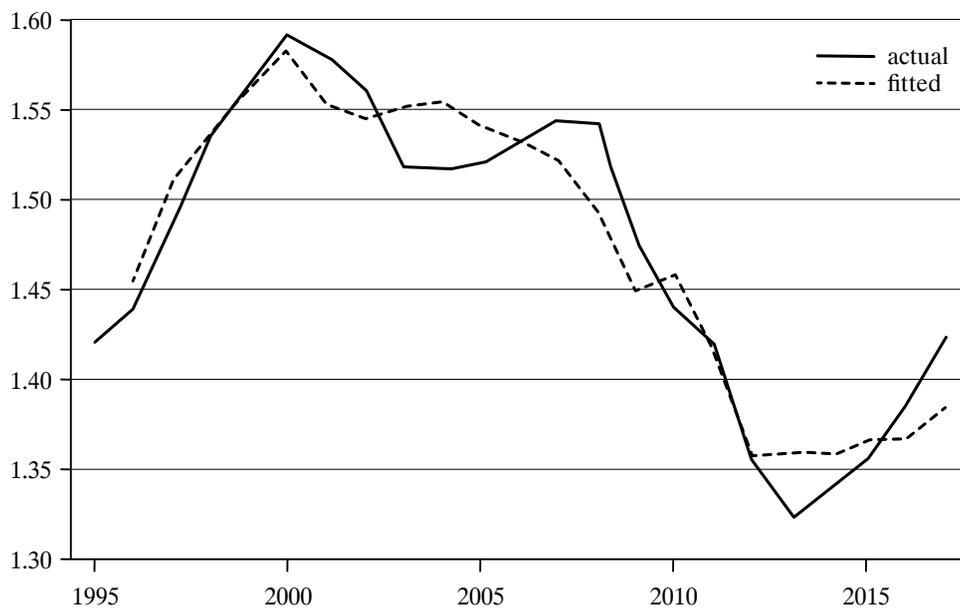
Source: own calculations.

Table 5

Real exchange rate estimation: Portugal

Specification	Coefficient	Std. Error	t-ratio	p-value
const	0.3552	0.2524	1.407	0.1828
ipPort_1	0.1221	0.0630	1.937	0.0748
igPort_1	–0.0296	0.0257	–1.151	0.2703
etjPort	–0.0012	0.0024	–0.512	0.6169
tcrPort_1	0.7248	0.2704	2.680	0.0189
tcrPort_2	0.1601	0.3439	0.465	0.6493
tcrPort_3	–0.1409	0.2580	–0.546	0.5943

Model diagnostics

Mean dependent var.	1.9873	S.D. dependent var.	0.0205
Sum squared resid.	0.0013	S.E. of regression	0.0099
R-squared	0.8415	Adj. *R*-squared	0.7684
$F(6, 13)$	11.5052	P-value (F)	0.0001
Log-likelihood	68.2579	Akaike criterion	–122.5158
Schwarz criterion	–115.5457	Hannan-Quinn	–121.1552
Rho	–0.2184	Durbin-Watson	2.4102

Notes: Model 5Port: OLS, using observations 1996–2017 ($T = 22$); dependent variable: *tcrPort*.

Source: own calculations.

Figure 5

Real exchange rate (actual & estimated): Portugal (*tcrPort*)

Source: own calculations.

Table 6

Impacts on public investments: Poland

Specification	Coefficient	Std. Error	t-ratio	p-value
const	0.0459	0.6218	0.074	0.9420
ipPol_1	0.0673	0.4338	0.155	0.8785
igPol_1	0.8084	0.2555	3.164	0.0057
igPol_2	0.0553	0.2474	0.224	0.8256

Model diagnostics

Mean dependent var.	1.0646	S.D. dependent var.	0.2008
Sum squared resid.	0.1692	S.E. of regression	0.0997
R-squared	0.7902	Adj. R-squared	0.7532
F (3, 17)	21.3548	P-value (F)	5.30e-06
Log-likelihood	20.8249	Akaike criterion	–33.6499
Schwarz criterion	–29.4718	Hannan-Quinn	–32.7432
Rho	–0.0075	Durbin-Watson	1.9848

Notes: Model 1Pol: OLS, using observations 1996–2017 ($T = 22$); dependent variable: *igPol*.

Source: own calculations.

Figure 6

Public investment (actual & estimated): Poland (*igPol*)
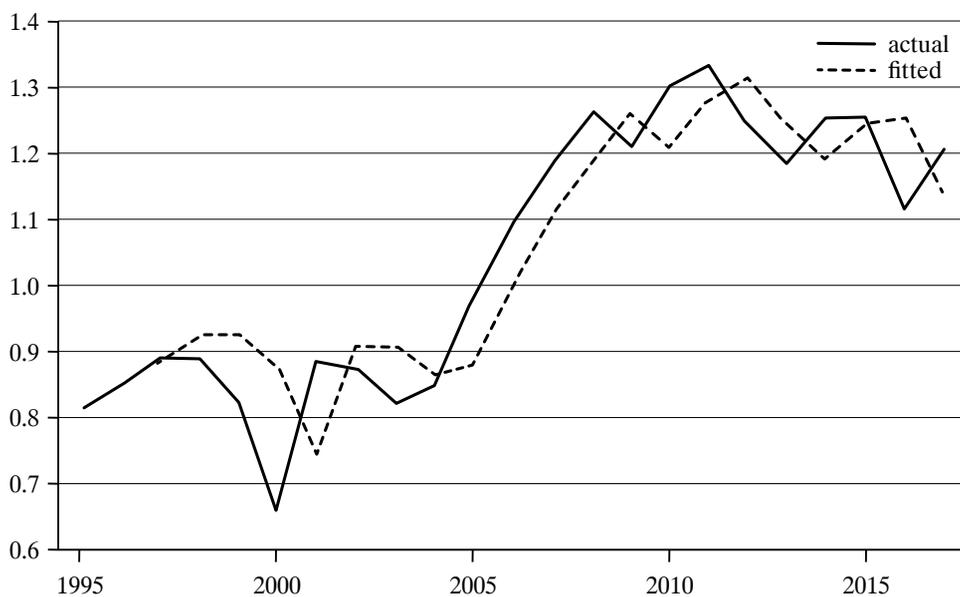
Source: own calculations.

Table 7

Impacts on private investments (crowding-in vs crowding-out effects): Poland

Specification	Coefficient	Std. Error	t-ratio	p-value
const	0.6596	0.2578	2.558	0.0192
igPol_1	0.1051	0.0725	1.450	0.1634
ipPol_1	0.5524	0.1819	3.037	0.0068

Model diagnostics

Mean dependent var.	1.7047	S.D. dependent var.	0.0762
Sum squared resid.	0.0397	S.E. of regression	0.0457
R-squared	0.6748	Adj. *R*-squared	0.6406
F (2, 19)	19.7120	*P*-value (*F*)	0.0001
Log-likelihood	38.2818	Akaike criterion	−70.5636
Schwarz criterion	−67.2905	Hannan-Quinn	−69.7926
Rho	0.2635	Durbin's *h*	2.3703

Notes: Model2Pol: OLS, using observations 1996–2017 (*T* = 22); dependent variable: *ipPol*.

Source: own calculations.

Figure 7

Private investment (actual & estimated): Poland (*ipPol*)
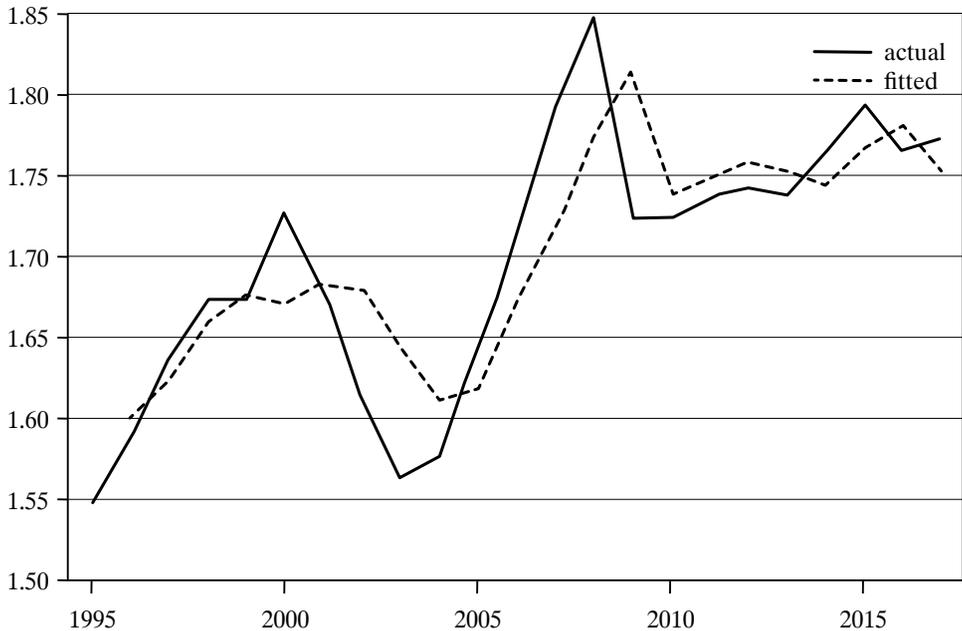
Source: own calculations.

T a b l e 8

Output estimation: Poland

Specification	Coefficient	Std. Error	*t*-ratio	*p*-value
const	–0.3433	0.3894	–0.882	0.3929
ippon	0.4950	0.1125	4.401	0.0006
ipPol_1	–0.4125	0.1497	–2.756	0.0155
igPol	0.0859	0.0547	1.569	0.1390
igPol_1	–0.1134	0.0633	–1.792	0.0948
tcrPol	0.1520	0.2019	0.753	0.4639
etjPol_1	0.0002	0.0015	0.141	0.8899
yPol_1	0.9765	0.1446	6.753	<0.0001

Model diagnostics

Mean dependent var.	2.4593	S.D. dependent var.	0.1322
Sum squared resid.	0.0041	S.E. of regression	0.0172
R-squared	0.9888	Adj. *R*-squared	0.9831
F (2, 19)	176.0434	*P*-value (*F*)	1.49e-12
Log-likelihood	63.1822	Akaike criterion	–110.3644
Schwarz criterion	–101.6361	Hannan-Quinn	–108.3083
Rho	0.0022	Durbin's *h*	0.0138

Notes: Model 3Pol : Estimation OLS, using observations 1996–2017 ($T = 22$); dependent variable: *yPol*.

Source: own calculations.

F i g u r e 8

Output (actual & estimated): Poland (*yPol*)
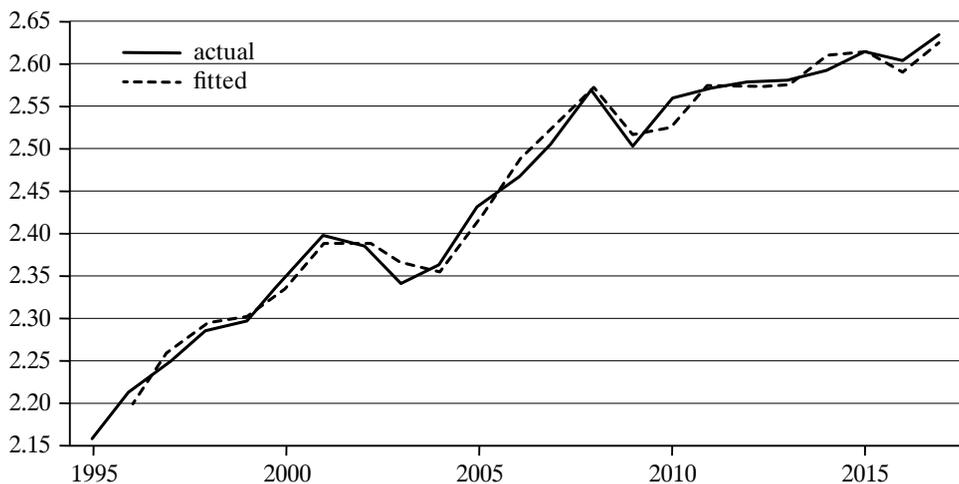
Source: own calculations.

T a b l e 9

Private investment estimation: Poland

Specification	Coefficient	Std. Error	t-ratio	p-value
Const	0.8558	0.2864	2.989	0.0079
etjPol_1	−0.0044	0.0021	−2.070	0.0531
Dpol	−0.4005	0.2530	−1.583	0.1309
ipPol_1	0.6383	0.1425	4.481	0.0003

Model diagnostics

Mean dependent var.	1.7047	S.D. dependent var.	0.0762
Sum squared resid.	0.0356	S.E. of regression	0.0445
R-squared	0.7084	Adj. *R*-squared	0.6598
F (3, 18)	14.5733	P-value (F)	0.0001
Log-likelihood	39.4802	Akaike criterion	−70.9605
Schwarz criterion	−66.5963	Hannan-Quinn	−69.9324
Rho	0.5002	Durbin's h	3.1536

Notes: Model 4Pol: OLS, using observations 1996–2017 ($T = 22$); dependent variable: *ipPol*.
Source: own calculations.

F i g u r e 9

Private investment (actual & estimated): Poland (*ipPol*)
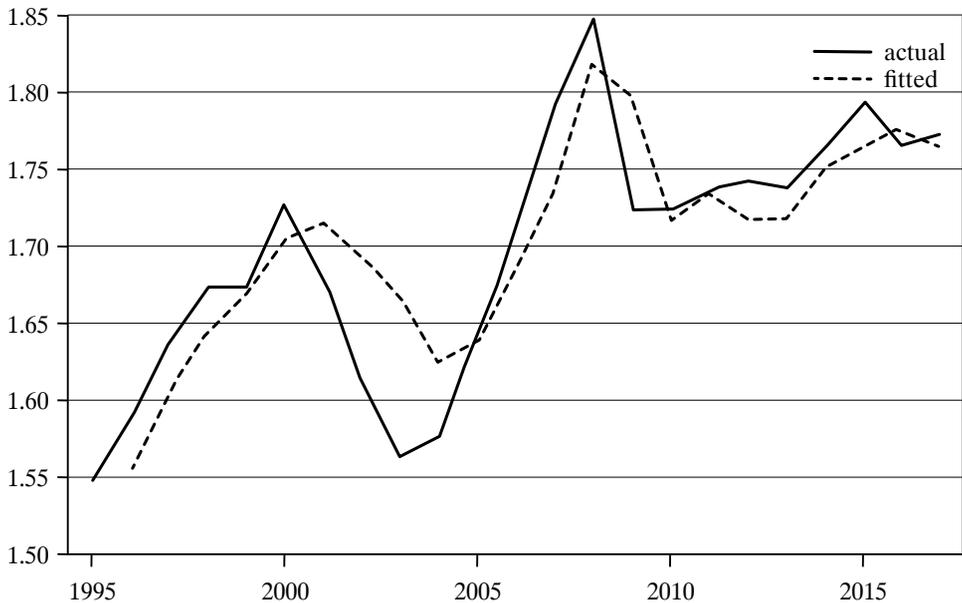
Source: own calculations.

Table 10

Real exchange rate estimation: Poland

Specification	Coefficient	Std. Error	t-ratio	p-value
const	1.8192	0.6935	2.623	0.0211
ipPol_1	0.2212	0.1557	1.421	0.1790
igPol_1	−0.0679	0.0679	−1.000	0.3354
etjPol	0.0021	0.0019	1.132	0.2781
tcrPol_1	0.1008	0.2555	0.395	0.6995
tcrPol_2	−0.1646	0.2442	−0.674	0.5120
tcrPol_3	−0.0129	0.2318	−0.055	0.9566

Model diagnostics

Mean dependent var.	1.9893	S.D. dependent var.	0.0335
Sum squared resid.	0.0124	S.E. of regression	0.0309
R-squared	0.4180	Adj. R-squared	0.1493
F (6, 13)	1.5558	P-value (F)	0.2366
Log-likelihood	45.4914	Akaike criterion	−76.9829
Schwarz criterion	−70.0127	Hannan-Quinn	−75.6222
Rho	−0.0443	Durbin-Watson	2.0618

Note: Model 5Pol: OLS, using observations 1996–2017 ($T = 22$); dependent variable: *tcrPol*.

Source: own calculations.

Figure 10

Real exchange rate (actual & estimated): Poland (*tcrPol*)
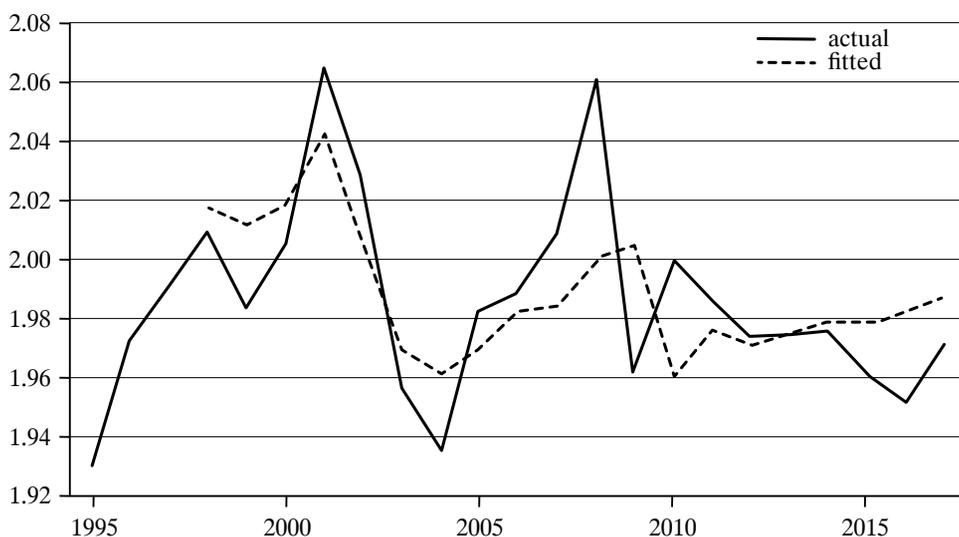
Source: own calculations.

CROWDING-IN AND CROWDING-OUT EFFECTS OF PUBLIC INVESTMENTS IN POLAND AND PORTUGAL: A COMPARATIVE STUDY

Summary

The article aims to analyse on a comparative basis the effects of public investment spending on the economies of Poland and Portugal in the period 1996–2017. In the economic theory, there are divergent opinions as to the impact of expansionary fiscal policy on economic growth. The direct and indirect impact of the increasing government spending on the economy is one of the key questions in assessing the effectiveness of government spending policy. In the empirical analysis several regression models were used to examine major relationships that are essential in the assessment of the macroeconomic effects of public spending in both countries. The estimation results for Poland point at the presence of a positive effect of public investments on the volume of private sector's investment outlays and gross domestic product. Another finding is the absence of negative effects of public investments on economic competitiveness measured by the real exchange rate. This confirms the existence of complementarity between private and public investment and excludes their substitutability. On the other hand, in case of Portugal, there is no evidence of the positive macroeconomic influence of public investment spending throughout the analysed period. This may indicate that the initial stimulating effect of the inflow of EU funds combined with domestic public investment outlays, which was observed in earlier years, tended to disappear and transformed into crowding-out of private investmens by public investments. However, this result can also be connected with the economic stagnation resulting from the 2008+ crisis and the later recession when public outlays were not able to activate the private companies enough. Financial costs represented by nominal interest rate played also an important role in shaping private investment in both Poland and Portugal and in the output evolution.

EFEKTY POBUDZANIA I WYPIERANIA INWESTYCJI PUBLICZNYCH W POLSCE I PORTUGALII: STUDIUM PORÓWNAWCZE

Streszczenie

Celem artykułu jest przeprowadzenie analizy porównawczej wpływu wydatków publicznych o charakterze inwestycyjnym gospodarkę Polski i Portugalii w latach 1997–2017. W teorii ekonomii istnieją rozbieżne opinie co do wpływu ekspansywnej polityki fiskalnej na wzrost gospodarczy. Bezpośredni i pośredni wpływ rosnących wydatków rządowych na gospodarkę jest jednym z węzłowych pytań w ocenie efektywności polityki wydatków państwowych. W analizie empirycznej wykorzystano kilka modeli regresji do zbadania kluczowych relacji związanych z oceną makroekonomicznych efektów wydatków publicznych w obydwu badanych krajach. Wyniki estymacji wskazują na istnienie w Polsce efektów pozytywnych, jeśli chodzi o wpływ publicznych wydatków inwestycyjnych na wielkość inwestycji sektora prywatnego oraz na produkt krajowy brutto. Innym spostrzeżeniem jest brak negatywnego wpływu inwestycji sektora publicznego na konkurencyjność gospodarki mierzoną zmianami realnego kursu walutowego. Potwierdza to obecność efektu komplementarności pomiędzy inwestycjami prywatnymi i publicznymi i wyklucza relację substytucyjną. Natomiast w odniesieniu do Portugalii nie stwierdzono w skali całego

badanego okresu pozytywnego wpływu inwestycji publicznych na gospodarkę. Może to wskazywać, że początkowy stymulujący efekt dopływu funduszy unijnych oraz krajowych publicznych nakładów inwestycyjnych, obserwowany w poprzednich okresach, stopniowo zanikał i przekształcał się w tendencję do wypierania inwestycji prywatnych przez inwestycje publiczne. Jednak ten rezultat można również przypisać późniejszej stagnacji gospodarki związanej z konsekwencjami kryzysu 2008+ i późniejszej recesji, w których to warunkach publiczne nakłady nie są zdolne do z aktywizowania w istotnym stopniu prywatnych przedsiębiorstw. Koszt finansowy reprezentowany przez nominalną stopę procentową również odgrywa istotną rolę w kształtowaniu prywatnych inwestycji zarówno w Polsce, jak i w Portugalii, a w konsekwencji w kształtowaniu dynamiki produkcji.

Słowa kluczowe: inwestycje publiczne i prywatne, polityka fiskalna, zmienne makroekonomiczne, efekty pobudzania i wypierania

JEL: H50, H54, E62

ЭФФЕКТЫ СТИМУЛИРОВАНИЯ И ВЫДАВЛИВАНИЯ ПУБЛИЧНЫХ ИНВЕСТИЦИЙ В ПОЛЬШЕ И В ПОРТУГАЛИИ – СРАВНИТЕЛЬНЫЙ АНАЛИЗ

Резюме

Целью статьи является сравнительный анализ влияния публичных расходов инвестиционного характера на экономику Польши и Португалии в 1997–2017 гг. В экономической науке существуют противоположные мнения относительно влияния экспансивной фискальной политики на экономический рост. Прямое и косвенное влияние растущих правительственных расходов на экономику является одним из ключевых вопросов в оценке эффективности политики государственных расходов. В эмпирическом анализе было использовано несколько моделей регрессии для изучения ключевых соотношений, связанных с оценкой макроэкономических эффектов публичных расходов в обеих исследуемых странах. Результаты эстимации указывают на существование в Польше положительных эффектов, если речь идет о влияние публичных инвестиционных расходов на объемы инвестиций частного сектора, а также на ВВП.

Другим замечанием является отсутствие отрицательного влияния инвестиций публичного сектора на конкурентоспособность экономики, измеряемую изменениями валютного курса. Это подтверждает наличие эффекта комплементарности между частными и публичными инвестициями и исключает субстиционную зависимость. Относительно Португалии в масштабе всего изучаемого периода не было отмечено положительного влияния публичных инвестиций на экономику.

Это может указывать на то, что первоначальный стимулирующий эффект притока фондов ЕС, а также отечественных публичных инвестиционных затрат, наблюдаемый в предыдущие периоды, постепенно исчезал и превратился в тенденцию выдавливания частных инвестиций публичными инвестициями. Однако этот результат можно также связывать с позднейшей стагнацией экономики, связанной с последствиями кризиса 2008+ и последующей рецессии, когда публичные вложения были не в состоянии существенно активизировать частные предприятия. В формировании частных инвестиций, как в Польше, так и в Португалии, существенную роль играют финансовые затраты (номинальные процентные ставки).

Ключевые слова: публичные и частные инвестиции, фискальная политика, макроэкономические переменные, эффекты стимулирования и выдавливания

JEL: H50, H54, E62