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Highlights in this issue:

- Improvements in public infrastructure raise potential growth
- In Poland, increasing public investment in infrastructure, reduced the impact of the global crisis
- Significant investment is still needed in view of deficient infrastructure

Public investment, transport infrastructure and growth in Poland

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Summary

This Country Focus discusses the relation between public investment and economic growth in Poland. Theoretical and empirical work has shown that improvements in the quantity and quality of public infrastructure have a positive impact on growth in the medium and, possibly, in the long run. The effect is even more important for economies in transition engaged in a catching up process. The analysis presented supports these conclusions and provides statistical evidence suggesting that higher public investment stimulates growth in Poland. In recent years, a significant effort has already been made to increase public spending in infrastructure, which has contributed to smooth the economic downturn in Poland during the crisis. However, significant infrastructure investments are still needed, notably in the area of transport. In the current post-crisis environment, the envisaged efforts to further improve public infrastructure seem to be an appropriate way to support the recovery. Spending reallocation within the budget and a more extensive use of EU funds would allow financing these new investments, without increasing the budget deficit or introducing distortionary taxes, which would partly or fully offset the positive impact of the additional investments.

Public investment and growth in the literature

Theoretical literature on infrastructure and growth has been substantially influenced by the work of Barro (1990). According to endogenous growth models, the size and structure of taxation and public expenditure affect the potential growth of an economy. Productive government spending enhances growth (Kneller et al., 1999), especially in developing countries with relatively poorer infrastructures (Gupta et al., 2005), while non-productive spending does not. Within different public expenditure categories, capital spending stands out as one of the least equivocally favourable to growth.

In the standard production function¹ in which output is a function of (private and public) capital (K), labour (L), and technology, higher public investment increases the amount of public capital in the economy, thus directly increasing output (Y). Moreover, public investment in infrastructure also increases private returns, stimulating total factor productivity (TFP), and private investment (Aschauer, 1989a). One caveat is that public investment may not always be complementary to private capital in the aggregate production function, and that higher public capital, if not well targeted to the needs of the economy, may also crowd out private investment. This

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risk seems to be more prevalent in countries with weak institutions or that lack trade and financial openness (Cavallo and Daude, 2008).

There is a positive link between public investment and growth, especially in catching-up economies

Empirical work by Aschauer (1989b) on the United States has provided evidence of such a positive relationship between public investment and growth. This relation has been confirmed by Munnell (1992), based on different modelling techniques applied to different countries, and is also supported by more recent studies (Table 1). However, many authors underline that the benefits of infrastructure investments may be offset by the negative impact of additional distortionary taxes to finance them. This finding, referred to as the “Barro Curve” in economic literature, underlines the importance of financing additional public capital by reallocations within the budget.

In less wealthy countries, with still relatively small stocks of both private and public capital, investment has higher rates of return than in more developed economies. However, little empirical work has been done for the countries which entered the EU in the mid-2000s. The final multiplicative and dynamic effect of infrastructure investment is likely to be positive and long-term welfare rises even if the increased comes at the expense of a reduction in the provision of other welfare-augmenting public goods and services (Baier and Glomm, 2001). Similarly, higher public investment is believed to have higher returns if it also helps mitigating differences in regional incomes.

Table 1. Recent empirical research on the impact of public investment on real GDP

Author(s)	Country	Period	Technique	Long-run effect (in %) of a 1% shock to public investment
Pereira and Roca-Sagales (2001)	ES	1970-1993	VAR	0.52
Everaert (2003)	BE	1953-1996	VECM	0.14
Pereira and Andraz (2003)	US	1956-1997	VECM	0.05
Ramirez (2004)	Mexico	1955-1999	VECM	0.37
Pereira and Andraz (2005)	PT	1976-1998	VAR	0.18
Pina and Aubyn (2005)	PT	1960-2001	VECM	0.29
Cadot et al. (2006)	FR	1985-1992	Regional simult.-equation panel	0.08
Annala et al. (2008)	Japan	1970-1998	VECM	0.10
Creel and Pilon (2008)	DE, FR, IT, UK, US	1960 (1963 for FR) -2004	VAR	Mixed results
	AT, BE, DE, FR, IT, NL	1969-2002	Panel (fixed and random effects)	0.10-0.14

Note: VAR: Vector autoregression; VECM: Vector error correction model

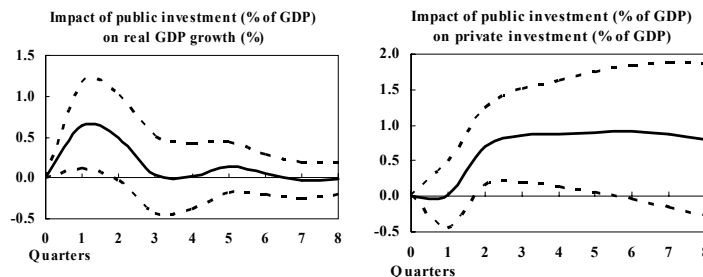


Public investment and growth in Poland

To assess the relation between public investment and growth in Poland, we estimate a simple vector autoregression model on quarterly variables over the period 1999-2007. Impulse response functions point to a positive relationship between public investment, private investment and GDP growth in Poland (Figure 1). In line with other papers, a demand stimulus can already be noticed after 1-2 quarters, with 1 percentage point of GDP higher public investment increasing GDP growth by more than ½ percentage point (quarter on quarter). The supply-side effect, i.e. an upsurge in private investment encouraged by the expected productivity gain (thanks to a faster improvement in the business environment, as shaped by the quality or quantity public capital), materialises after 2-3 quarters and reaches a

There appears to be a positive relationship between public investment, private investment and GDP growth in Poland.

Figure 1. Orthogonalised impulse-response functions based on vector autoregression for Poland



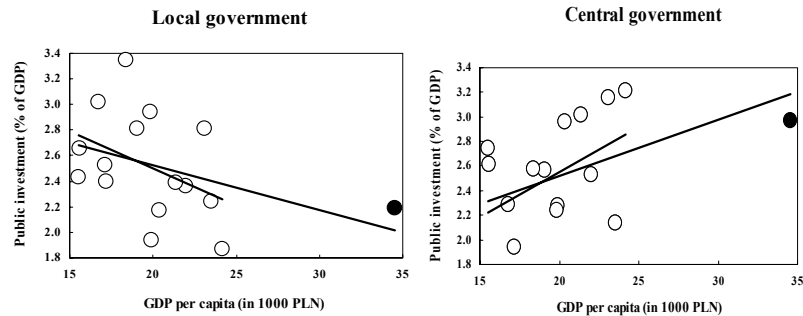
Orthogonalised impulse-response. Sample period: 1999Q3-2007Q4. Dashed lines indicate 90% confidence band. VAR includes two lags of GDP growth, private investment and public investment (in the order of endogeneity) and quarterly dummies. Source: Commission services.

maximum after 6 quarters, with 1 percentage point of GDP more public investment increasing private investment by more than $\frac{3}{4}$ percentage point of GDP. The effect is not only large but also materialises relatively quickly, consistent with theoretical expectations and findings for other catching-up economies. Overall, this analysis points to a positive impact of public investment on growth in Poland and does not show apparent crowding-out effects.

As pointed out, the impact of public investment on growth is also related to the quality of institutions and other variables. In particular, sustainable growth is not possible in an environment characterised by too high inequalities and regional disparities. The standard argument is that inequalities entail either considerable social instability or high redistribution, both of which are harmful for investment and growth (Kaldor, 1956; Persson and Tabellini, 1994). Therefore, growth-supporting government policies should attempt reducing large regional disparities. Local government investment in Poland seems to satisfy this condition, since poorer regions invested more (relative to their GDP) than richer regions in 1999-2006. In contrast, central government investment was larger in higher-income regions (Figure 2).

In Poland, local government investment helps avoiding too high inequalities which can be harmful for growth.

Figure 2. Regional GDP per capita and public investment (non ESA95) in different government subsectors, long-term averages for 1999-2006



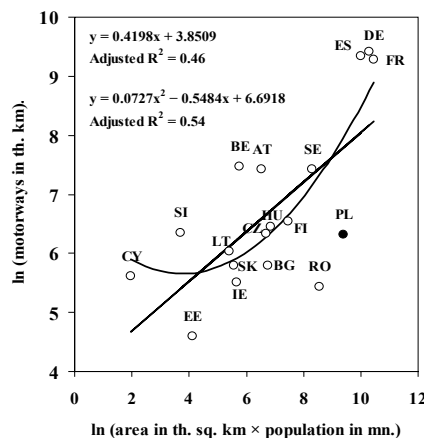
Note: Regions correspond to the NUTS-2 level. The outlier (black dot) is the capital region. Source: Polish central statistical office (GUS).

Investment needs: underdevelopment of transport infrastructure

When assessing the impact of public investment on growth and, in particular, potential crowding-out of private capital spending, an important element to take into consideration is the current shortage of public infrastructure in the country. This paper focuses on transport infrastructure, where additional public investments seem to be particularly important. There are two main arguments which can be used to justify these additional public investments needs in infrastructure.

Firstly, there seems to be a large gap between the existing and desirable length of motorways in Poland. Figure 3 shows the country size (as measured by area multiplied by population) and the length of motorways for a sample of EU Member States. Based on deviations from the fitted line or curve presented in Figure 3 and ignoring landscape or the possibility of substituting road haulage with other modes of transport, such as rail, the absolute gap is the largest in Poland and amounts to about 1800-2200 km (depending on the type of estimated function). These estimates are based on 2005 data from Eurostat, but the situation improved only marginally in Poland since then: the length of motorways increased by about 100 km in 2006 and was little changed in 2007 and in 2008. Assuming the current estimations of average motorway constructions costs in Poland and currency exchange rates (both of which have been fluctuating significantly in the recent period) and keeping them constant, the elimination of such a gap would imply investment in the range of 7½-9½% of GDP, i.e. about twice the size of total annual public investment in 2008.

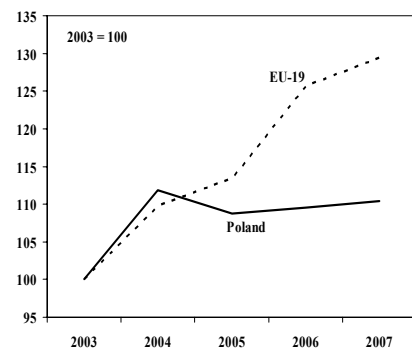
Figure 3. Length of motorways in 2005 and country sizes



Underdeveloped and badly maintained road and railway infrastructure implies considerable investment needs in Poland.

Note: Regions correspond to the NUTS-2 level. The outlier (black dot) is the capital region.
Source: Polish central statistical office (GUS).

Figure 4. National railway transport of goods in Poland and in other EU Member States



Note: Indexes based on the evolution of transport volumes in tonnes x kilometres. Data available for 19 EU Member States other than Poland: AT, CZ, DE, DK, EE, ES, FI, GR, HU, IT, LT, LU, LV, NL, PT, SE, SI, SK, UK.
Source: Commission services.

Secondly, Poland is the only country among the six largest EU Member States (in terms of population) which does not have any high-speed railways (lines on which trains can go faster than 250 km/h at some point during the journey). Only about 5% of lines can be exploited with speeds above 160 km/h and about 15% with speeds of 120-160 km/h. Average transport speeds are low, especially for goods transport (about 20-25 km/h, twice as low as in Germany), making the railway freight uncompetitive as regards many goods and contributing to congestion on roads. The speed limits result from both a lack of modern lines as well as a deteriorating quality of existing ones, since the outlays on maintenance have not been sufficient. Consequently, after a strong rise in trade volumes in 2004 following the EU accession, railway transport of goods stagnated, compared to a steep increase in other Member States and despite a faster real GDP growth in Poland than in these Member States (Figure 4).

Recent developments in public investment, plans and outcomes

Poland has made a very significant effort in terms of public investment in the recent years reflecting, inter alia, a larger absorption of EU funds. However, the starting point was a very low level of capital expenditure, focused on maintenance spending in general and no new investment for many years; even that was insufficient to avoid degradation of the existing infrastructure. Therefore, the gap between the needs and the reality persists. The share of absorbed EU funds² accounts for about 1/5 of total public investment in 2007-2009 and is expected to rise in the future. Shifting more domestic resources from government current expenditure to capital expenditure will have a leverage effect for total investment: it will increase domestic co-financing of EU projects and thus also the absorption of EU funds. Since 2005, public investment as a share of GDP has increased from below 3½% of GDP to over 4½% of GDP in 2008. According to our estimates, this share has increased in 2009, though less than initially planned. These developments have contributed to the good economic performance of Poland during the crisis – in 2009, Poland will be the only country to exhibit positive real GDP growth. In particular, our estimates indicate that without the increase in public investment, GDP growth would have been lower by about ¼ percentage point.

Public investment looks pro-cyclical in Poland as it is legally and politically the easiest way to reduce fiscal deficits.

However, investment being the main component of “non-mandatory” expenditure in Poland (¼ of the budget), cuts in public investment have typically been the first type of adjustment measures in case of revenue shortfalls, explaining the strongly procyclical pattern of public capital expenditure over the last two decades (Figure 5). With EU countries gradually shifting from expansionary fiscal policies to consolidation, the risk exists that public capital spending will be significantly curtailed in 2010-2011. There is a very strong case for resisting this temptation, as a reallocation of public spending toward capital spending would further support the recovery. For example, the large-scale plans to build motorways ahead of the

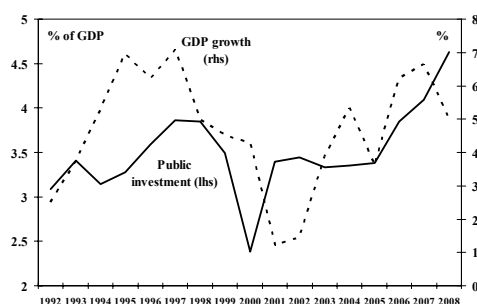
The recent EDP recommendations imply that investment increases are compensated with lower current expenditure and higher absorption of EU funds.

European football championship in 2012 should be continued and should not be subject to similar revisions as the 2007 road construction strategy.³ While the experience with previous consolidation attempts in Poland proved that investment cuts are politically easiest, fiscal consolidation should cover current rather than capital expenditure, as it was recommended to the Polish authorities by the EU Council in July 2009 in the framework of the excessive deficit procedure (EDP).

Beyond these short-term considerations, there seems to be some scope to improve implementation of infrastructure projects. The execution of public investment has always been below plans in the recent years (Figure 6). The underperformance appears to be particularly pronounced at central government level. This seems to reflect a number of factors: many concurrent plans which are not well integrated into an overarching strategy, slow compulsory land purchase procedures, insufficient use of external audit (Laursen and Myers, 2009), complicated tendering procedures, lack of local spatial planning maps, biased motivation schemes (few “carrots” and many “sticks”), too frequent changes both in top management and line administration (lack of civil service system), etc. All these obstacles seem equally significant; so solving just one is not sufficient to considerably speed up public investment. The administrative problems appear not only in the greenfield projects but also in a large share of maintenance and repair works in existing infrastructure (SCC, 2009).

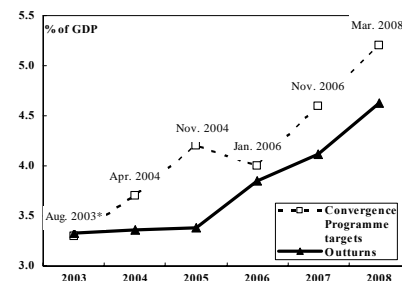
Administrative efficiency should be improved to avoid the execution of investment below plans.

Figure 5. Public investment and growth cycles



Source: Commission services.

Figure 6. Short-term plans and outturns



Note: * Pre-Accession Economic Programme 2003

Source: Commission services.

Conclusion

The empirical analysis presented in this paper suggests that improvements in the quantity and quality of public infrastructure can have a positive impact on growth in Poland, in line with the theory and empirical literature on the subject. A significant effort has been made in recent years to increase public capital spending and this has contributed to smooth the economic downturn during the crisis. However, Poland still has important infrastructure needs, notably in the area of transports. The envisaged efforts to further improve public infrastructure are particularly welcome and seem to an appropriate way to support the recovery. Additional public investment at the local level would also help moderate the regional income disparities accumulated in the course of the economic transition and which have been exacerbated by the crisis. These investments should be financed through spending reallocation within the budget or a more extensive use of EU funds, to avoid higher deficits and distortionary taxes that would partly or fully offset their positive impact. Last but not least, the utilisation of reallocated resources i.e. the implementation of investment plans should be reinforced through removing administrative deficiencies.

References

- Annala, C. N., R. G. Batina, and J. P. Feehan (2008), "Empirical impact of public infrastructure on the Japanese economy", *Japanese Economic Review*, Vol. 59, Iss. 4, pp. 419-437.
- Aschauer, D. A. (1989a), "Does public capital crowd out private capital?", *Journal of Monetary Economics*, Vol. 24, Iss. 2, pp. 171-188
- Aschauer, D. A. (1989b), "Is public expenditure productive?," *Journal of Monetary Economics*, Vol. 23, Iss. 2, pp. 177-200.
- Baier, S. L. and G. Glomm (2001), "Long-run growth and welfare effects of public policies with distortionary taxation", *Journal of Economic Dynamics and Control*, Vol. 25, Iss. 12, pp. 2007-2042.
- Barro, R. J. (1990), "Government Spending in a Simple Model of Endogenous Growth", *Journal of Political Economy*, Vol. 98, Iss. 5, pp. S103-S126.
- Cadot, O., L.-H. Röller, and A. Stephan (2006), "Contribution to productivity or pork barrel? The two faces of infrastructure investment", *Journal of Public Economics*, Vol. 90, Iss. 6-7, pp. 1133-1153.
- Cavallo, E. A. and C. Daude (2008), "Public Investment in Developing Countries: A Blessing or a Curse?", Inter-American Development Bank, RES Working Papers No. 4597.
- Creel, J. and G. Pilon (2008), "Is public capital productive in Europe?", *International Review of Applied Economics*, Vol. 22, Iss. 6, pp. 673-691.
- CSO, Central Statistical Office (2008), *Transport – Activity Results in 2007*, in Polish, http://www.stat.gov.pl/cps/rde/xbcr/gus/PUBL_transport_wyniki_dzialalnosci_2007.pdf
- Everaert, G. (2003), "Balanced growth and public capital: an empirical analysis with I(2) trends in capital stock data", *Economic Modelling*, Vol. 20, Iss. 4, pp. 741-763.
- GDNRM, General Directorate for National Roads and Motorways (2009), "The report on the technical state of asphalt and concrete surfaces of the state road network at the end of 2008", March, in Polish, <http://www.gddkia.gov.pl/viewattach.php/id/65b220427b992c8d0252cd9ec80704b7>
- Gupta, S., B. Clements, E. Baldacci, and C. Mulas-Granados (2005), "Fiscal policy, expenditure composition, and growth in low-income countries", *Journal of International Money and Finance*, Vol. 24, Iss. 3, pp. 441-463.
- Kaldor, N. (1956), "Alternative Theories of Distribution", *Review of Economic Studies*, Vol. 23, pp. 94-100.
- Kneller, R., M. F. Bleaney, and N. Gemmell (1999), "Fiscal policy and growth: evidence from OECD countries", *Journal of Public Economics*, Vol. 74, Iss. 2, pp. 171-190.
- Laursen, T. and B. Myers, (2009), "Public Investment Management in the New EU Member States", World Bank, Working Paper No. 161.
- Ministry of Infrastructure (2007), "The road construction programme for 2008-2012", Attachment to government resolution No. 163/2007 of 25.9.2007, October, in Polish, http://www.mi.gov.pl/files/0/3961/PROGRAM_Budowy_Drog_Krajowych.pdf
- Munnell, A. H. (1992), "Infrastructure Investment and Economic Growth", *Journal of Economic Perspectives*, Vol. 6, Iss. 4, pp. 189-198.
- Pereira, A. M. and J. M. Andraz (2003), "On the Impact of Public Investment on the Performance of US Industries", *Public Finance Review*, Vol. 31, Iss. 1, pp. 66-90.
- Pereira, A. M. and O. Roca-Sagales (2001), "Infrastructures and private sector performance in Spain", *Journal of Policy Modeling*, Vol. 23, Iss. 4, pp. 371-384.
- Persson, T. and G. Tabellini (1994), "Is Inequality Harmful for Growth?", *American Economic Review*, Vol. 84, pp. 600-621.
- Pina, A. M. and M. S. Aubyn (2005), "Comparing macroeconomic returns on human and public capital: An empirical analysis of the Portuguese case (1960-2001)", *Journal of Policy Modeling*, Vol. 27, Iss. 5, pp. 585-598.
- Ramirez, M. D. (2004), "Is public infrastructure spending productive in the Mexican case? A vector error correction analysis", *Journal of International Trade & Economic Development*, Vol. 13, Iss. 2, pp. 159-178.
- SCC (2009), Supreme Chamber of Control, "Report on the audit of public administration in the area of the quality of public road works", in Polish, 2/2009/P/08/064/KKT, http://bip.nik.gov.pl/pl/bip/wyniki_kontroli_wstep/inform2008/p_08_064_200902271600031235746803/px_remote_kkt_p_08_064_200902271600031235746803_01

¹ $Y = TFP \cdot L^\alpha \cdot K_{priv}^\beta \cdot K_{publ}^\gamma$ where Y denotes output, K capital, L labour and α , β , and γ are determined by technology.

² The 2007-2013 financial perspective.

³ According to the October 2007 road construction strategy, the previous Polish government planned that almost 1100 km of motorways would be built by 2012 (Ministry of Infrastructure, 2007), not least due to the European football championship scheduled for that year. However, this optimistic plan prepared during an electoral campaign was later revised down by the current government in view of quickly rising construction prices in 2008. The largest reduction of construction plans (by about 40%) concerned one- and two-lane non-motorway express roads although their total length is shorter than motorways.

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