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Article

Roads on a downhill? Trends in EU infrastructure investment

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ABSTRACT

This paper describes long-term trends in public investment and analyses their causes and consequences. This has been undertaken separately for the EU-15 and the new member countries in Central and Eastern Europe. In addition, it assesses the significance of infrastructure finance through public-private partnerships, which are often portrayed as a substitute for traditional public procurement of infrastructure. The conclusion that emerges is that while public investment has been trending down in non-cohesion countries and while public-private partnerships are gaining popularity, the quantitative significance of these developments should not be exaggerated.

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Roads on a downhill? Trends in EU infrastructure investment

"I see gr-eat changes takin' place ivry day, but no change at all ivry fifty years."

Finley Peter Dunne

1. Introduction

Public investment in most old member countries of the EU has been on a trend decline for the past three decades, at least if measured in relation to GDP. In the new member states, the transition-induced need for additional infrastructure spending has coincided with a protracted need for fiscal consolidation, leaving its mark on infrastructure investment. Are European roads on a downhill, figuratively speaking? To what extent is that downhill being flattened by new, innovative ways to finance infrastructure, such as public-private partnerships?

The aim of this paper is to assess the evolution and determinants of public infrastructure investment in EU countries. In particular, we wish to go beyond the accepted wisdom that public investment in the old member countries has been on a downtrend by studying country-by-country the exact extent of the slide; its implications for public capital stocks; and the factors that have been responsible for the slide. Furthermore, we examine the evolution of infrastructure investment in general and public investment in particular in the new member countries so as to precisely verify what impact fiscal consolidation has had. Finally, we assess the quantitative significance of public-private partnerships, thereby evaluating whether or not there has been a major structural shift in the infrastructure sectors away from public and toward private financing and provision.

By addressing this array of issues, this paper sets the stage for the other contributions to this volume. To put the analysis of public-private partnerships in a proper perspective, it seems opportune to set the facts and figures straight and to analyse what has been driving their trends and bumps. In other words, this paper wishes to assess the quantitative evidence underlying the qualitative observation that the financing of infrastructure is undergoing structural changes.

Before entering the analysis, a note on terminology is warranted. There is often confusion about the terms 'infrastructure investment' and 'public investment'. While it is true that the bulk of public investment is infrastructure investment—such as the construction, operation, and maintenance of roads, bridges, tunnels, schools, hospitals, prisons and the like—the reverse does not hold. That is, a whole lot of infrastructure investment is undertaken by commercial entities (public sector corporations or private sector ones) and often mistakenly taken for public investment. Examples include investment by energy companies in generation capacity; telecoms companies in networks; or rail companies in rolling stock or rail infrastructure. In all these cases the investment is financed and undertaken by commercially run enterprises and therefore recorded as private investment in national accounts statistics—regardless of the ownership structure of that enterprise. Only investment directly financed from the budget of the government—be it at the central or subnational level—qualifies as public investment.

2. Public investment and capital stocks in old member states

It is accepted wisdom by now that public investment has been on a trend decline in most industrial countries since the 1970s. Indeed, gross fixed capital formation by the general



Timo Välijä



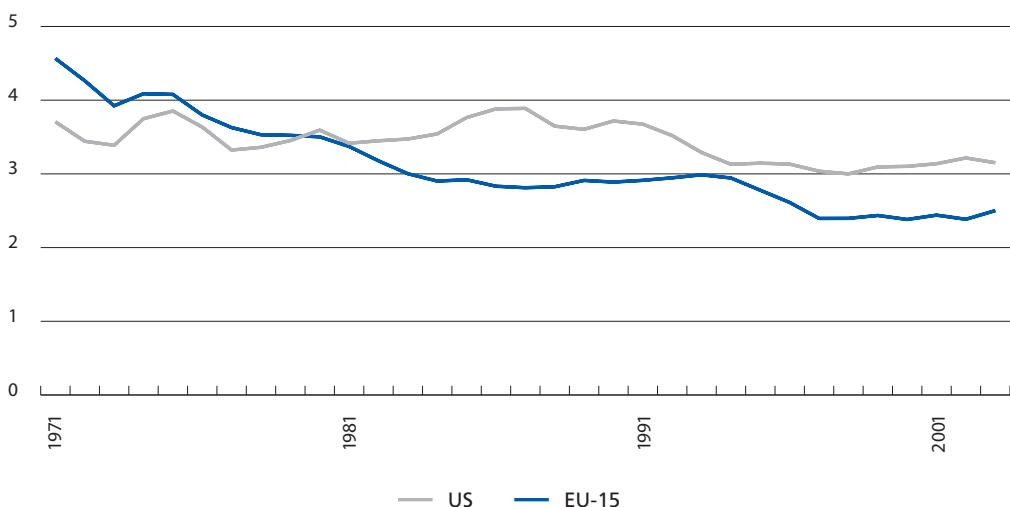
Tomasz Kozluk



Aaron Mehrotra

government in the 15 countries constituting the pre-enlargement EU has halved from well over 4 percent of GDP in the early years of the 1970s to just over 2 percent of GDP in recent years.¹ In the United States (US) the decline has been less pronounced from 3.5 percent of GDP in the early 1970s to 3 percent of GDP now.

Figure 1. Gross fixed capital formation by the general government in the EU-15 and the US (in % of GDP), 1971-2003.



Source: OECD.

This section aims to examine the evolution of public investment in the pre-enlargement EU, with a special focus on the causes and consequences of the downtrend in public investment flows. The observation that public investment, as a share of GDP, has been declining is not very informative *per se* and therefore requires further investigation in several respects. First, has the downtrend been a common phenomenon in more or less all old EU member countries, or does the aggregate figure hide significant differences across countries? Second, has the downtrend in public investment been so steep as to ignite an erosion of public capital stocks, or are the current levels of investment still sufficient to cover at least the depreciation of public capital assets? Third, what are the factors explaining the downtrend? These questions are addressed in turn below.

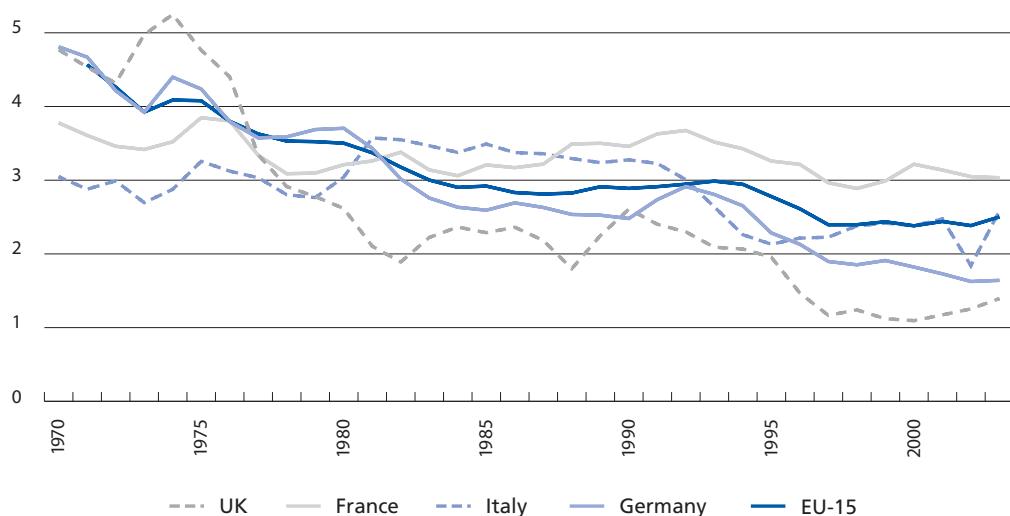
2.1 Evolution of public investment flows

While the general trend in public investment, as a share of GDP, has indeed pointed down in the pre-enlargement EU, there has been considerable variation across individual countries, as illustrated by the figures below. In the group of large countries (France, Germany, Italy, and the United Kingdom (UK)) public investment fell from an average of 4 percent of GDP in the early 1970s to 2.2 percent of GDP in recent years. The fall has been particularly pronounced in the UK, where public investment peaked at 5 percent of GDP in the early 1970s; fell to some 2 percent of GDP by the early 1980s where it hovered for a decade, only to continue sliding thereafter toward 1 percent of GDP.

Among the large EU countries, public investment has declined most in the UK.

1 Luxembourg is only included starting 1990.

Figure 2. Gross fixed capital formation by the general government in large EU countries (in % of GDP), 1970—2003.

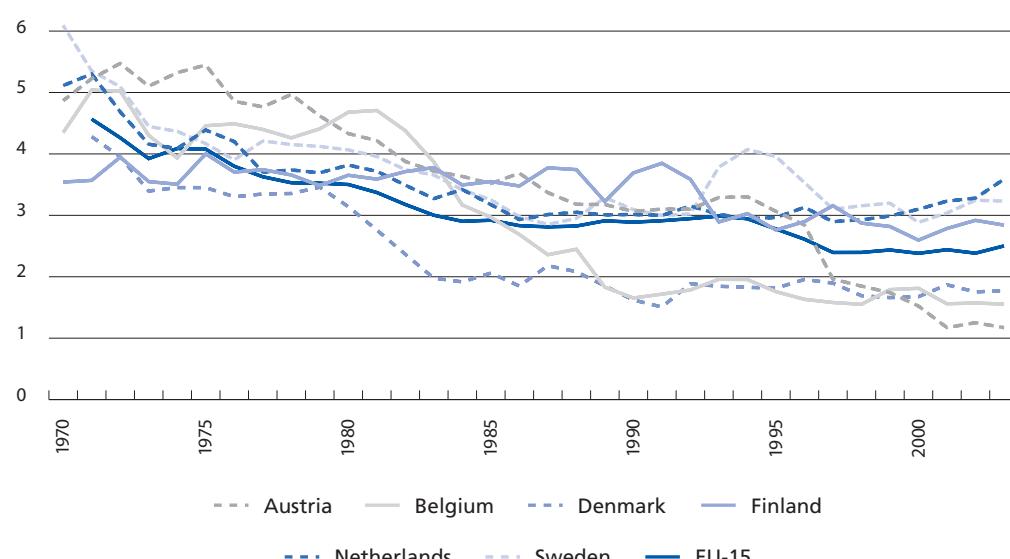


Source: OECD.

The fall in public investment was also quite pronounced in the group of smaller non-cohesion countries (Austria, Belgium, Denmark, Finland, the Netherlands, and Sweden), where average public investment more than halved from almost 5 to 2.4 percent of GDP. Austria, Belgium, and Denmark experienced the biggest declines, from 4-5 percent of GDP in early 1970s to just over 1 percent of GDP in recent years. In contrast, Finland's public investment has declined by less than one percentage point of GDP during the past three decades.

Austria, Belgium, and Denmark have had the steepest declines among smaller non-cohesion countries.

Figure 3. Gross fixed capital formation by the general government in smaller non-cohesion countries (in % of GDP), 1970—2003.

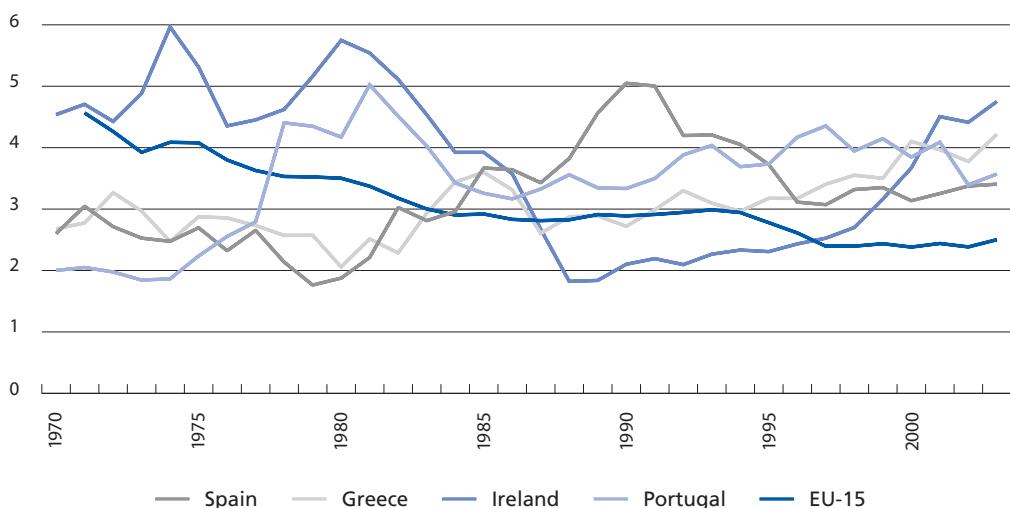


Source: OECD.

In cohesion countries, public investment has trended up rather than down.

The cohesion countries (Greece, Ireland, Portugal, and Spain) have been less homogenous as a group; nevertheless, there has been a tendency for public investment to trend up rather than down within that group, the average increasing from 3 to 4 percent of GDP. Ireland, as an extreme, has seen public investment drop from the peak of 6 percent of GDP in the 1970s to below 2 percent of GDP in the late 1980s, with a subsequent increase to nearly 5 percent of GDP more recently.

Figure 4. Gross fixed capital formation by the general government in cohesion countries (in % of GDP), 1970—2003.



Source: OECD.

2.2 Evolution of public capital stocks

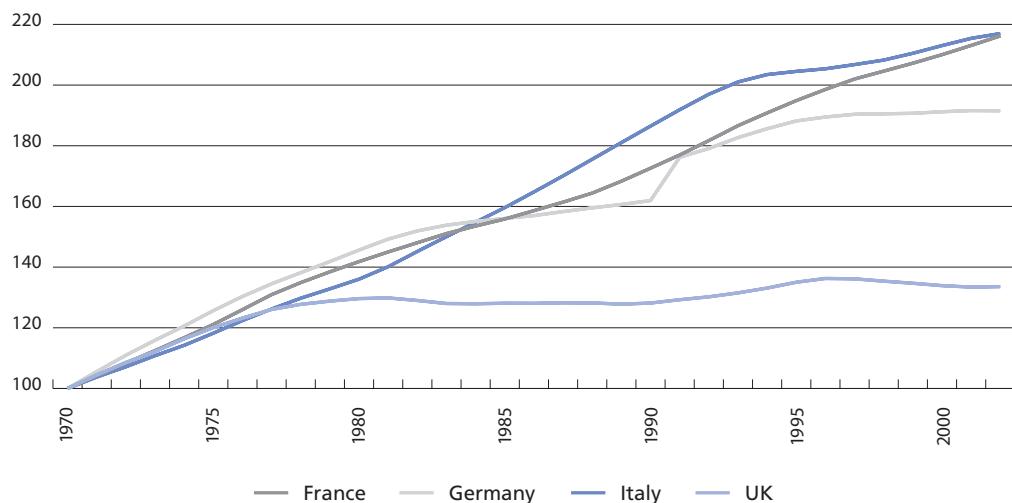
Having depicted the evolution of public investment flows above, it is of interest to examine how public capital stocks have evolved as a result of a general drop in flows—at least if measured in relation to GDP. Notably, the aim here is only to describe the evolution of public capital stocks, without any analysis or *a priori* view about their optimal size and evolution over time.

A new set of estimates on public capital stocks in 22 OECD countries has been prepared by Kamps (2004). The estimates for the pre-enlargement EU member states are presented below in relation to the size of the public capital stock in 1970 in each country and also in a cross-country comparison.²

Figure 5 below suggests that public capital stocks have roughly doubled since 1970 in all large EU countries except in the UK, where the cumulative growth has been below 40 percent. Moreover, the public capital stock in the UK has remained rather flat since the late 1970s.

2 The estimates for the public capital stocks depicted below are calculated using the so-called perpetual inventory method. The capital stock in any given period is calculated as the sum of the stock in the previous period plus gross investment flow in the current period less depreciation. The initial capital stock is estimated assuming that the capital stock in year 1860 equalled zero, and that gross investment grew during 1860-1960 at a constant rate of 4 percent, to reach the actually observed level in 1960. The rate of depreciation is assumed constant for any given year but variable across years during 1960-2001. It is assumed to have been constant at 2.5 percent during 1860-1960, while increasing gradually from 2.5 percent in 1960 to 4 percent in 2001. The constant depreciation rate implies that capital put in place in any given year will never be fully depreciated, it just converges towards zero over a very long time.

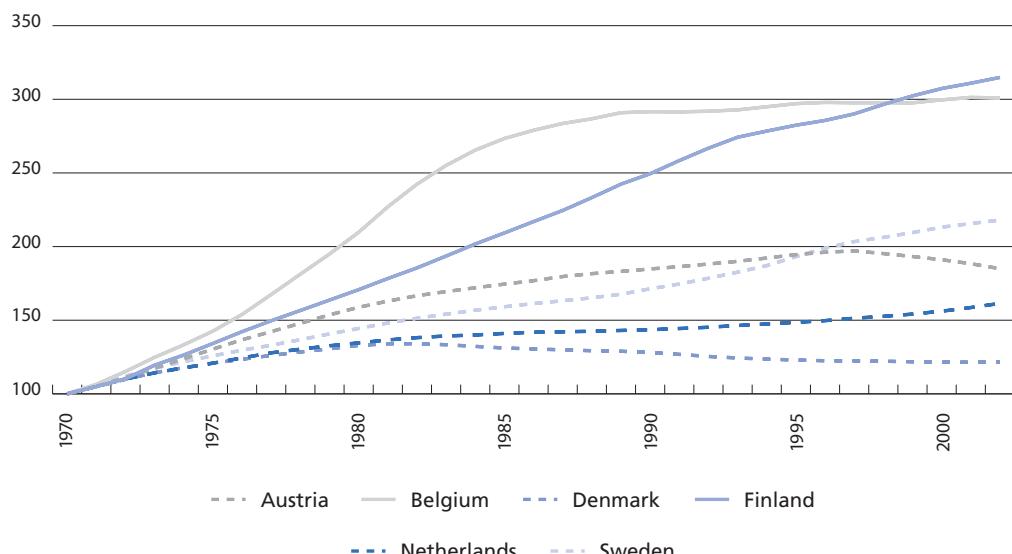
Figure 5. Public capital stock in large EU countries (1970 = 100), 1970—2003.



Source: Kamps (2004).

Among smaller non-cohesion countries public capital stocks have trebled in Belgium and Finland, doubled in Austria and Sweden, while growing more modestly in the Netherlands and Denmark. The growth took place as early as the 1970s in Austria, Belgium, and Denmark; since the 1980s, these countries' public capital stocks have been almost unchanged.

Figure 6. Public capital stock in smaller non-cohesion countries (1970 = 100), 1970—2003.

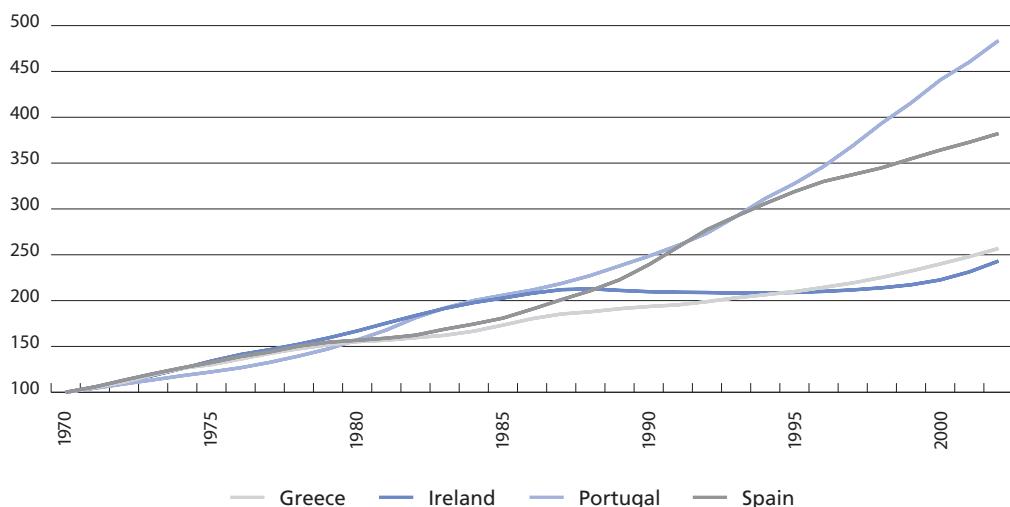


Source: Kamps (2004).

As regards the cohesion countries, the public capital stock has grown almost fivefold in Portugal, fourfold in Spain, and more than doubled in Greece and Ireland.

Public capital stocks have grown fastest in the cohesion countries.

Figure 7. Public capital stock in cohesion countries (1970 = 100), 1970—2003.



Source: Kamps (2004).

While the increases in public capital stocks reported above seem large at the outset, one needs to recognise that they have occurred over more than three decades. Over such a long period of time average annual growth rate of no more than 2.3 percent is sufficient to double the initial stock.

Nevertheless, the important observation above is that public capital stocks have been growing considerably in real terms since the beginning of the 1980s in all but three sample countries (Denmark, the Netherlands, and the UK). This implies that the downturn in the ratio of public investment to GDP has not been so steep as to cause public investment to fall below the level of depreciation; on the contrary, in most old EU member countries public investment continues to cover depreciation and allow for a further expansion of public capital stocks. The downturn in investment flows has, however, led to a slowdown in the rate of growth of public capital stocks, but it has not reversed that growth.

Let us then compare the size of public capital stocks across countries. This is shown in Figure 8, converting the estimates in national currency units for the year 2000 into US dollars at purchasing power parity. Moreover, the stocks are expressed in per capita terms to abstract from the differences in country sizes.

Among the old EU member states, Austria has the largest public capital stock (USD 15,000 per capita). This is less than half of Japan and some 10 percent less than the US. At USD 6,600 per capita, Portugal's public capital stock is the smallest in the sample.

The size of public capital stocks varies strikingly between non-cohesion countries. Consider Austria, Belgium, Denmark, and the UK, all of which have had virtually flat public capital stocks since the mid-1980s. The Austrian public capital stock per capita is more than 50 percent larger than that in Belgium and the UK, with Denmark in the middle.

Some of the dispersion is likely to reflect statistical differences related to the institutional set-up for providing infrastructure and public services.³ Furthermore, geography and demography can explain

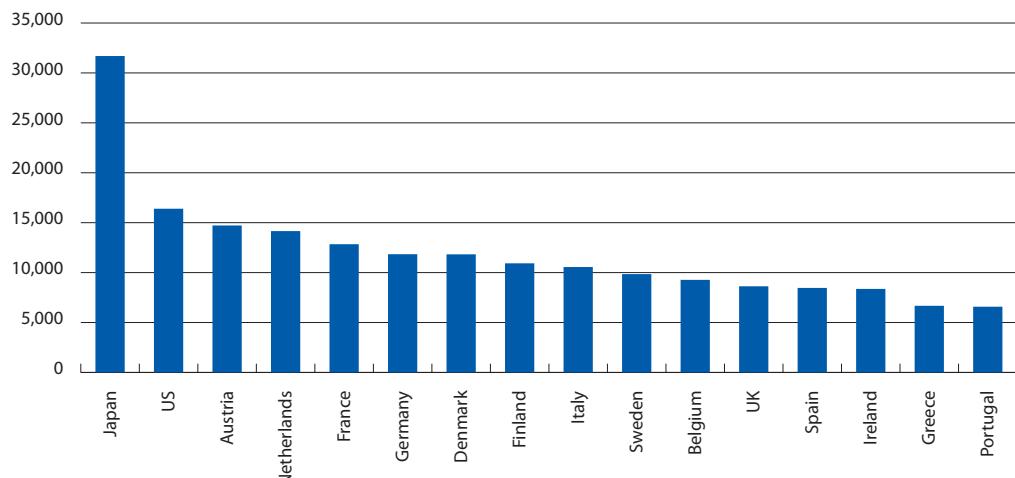
3 An infrastructure or public service may be financed and provided by a public corporation in one country (thus showing up as private investment in national accounts statistics), while in another country it is financed directly from local budgets, for instance (thus showing up as public investment).

The downturn in public investment has not eroded public capital stocks.

away some of the differences: it is more expensive to construct roads in mountains than in lowlands, and it is more expensive to provide public services in countries with relatively old populations.

The size of public capital stock varies a lot across countries.

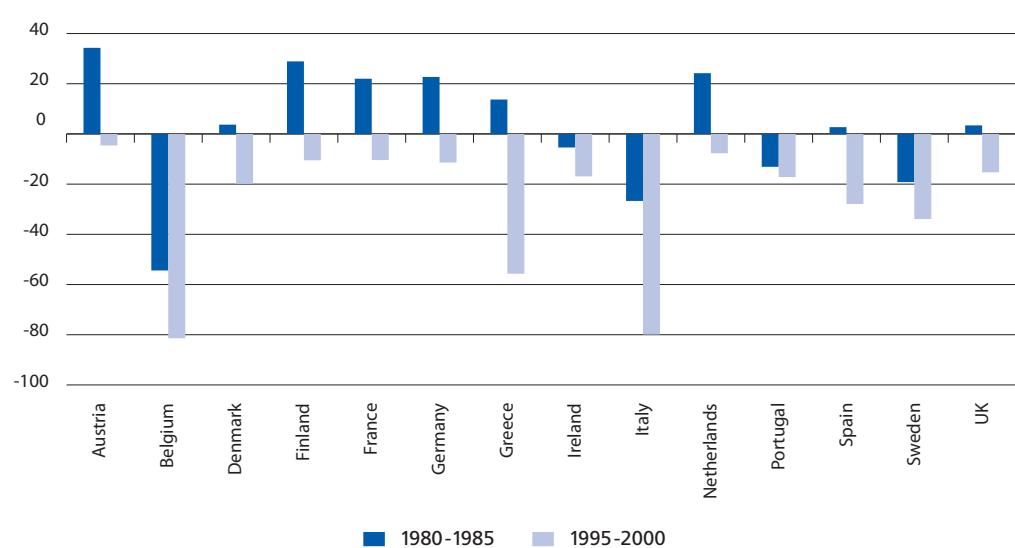
Figure 8. Public capital stock per capita at purchasing power parity in 2000 USD



Source: Kamps (2004).

Finally, the estimates for public capital stocks can be compared with the amount of public debt, thus providing a very rough measure of governments' net worth. This is done in Figure 9 below, with the following caveats. First, the ratio of public capital to GDP is expressed in real terms, so it is fully comparable with the debt-to-GDP ratio only under the assumption that the GDP deflator can also be used to deflate public investment. Second, public debt is measured in terms of gross outstanding debt, thus excluding any contingent liabilities.

Figure 9. Public capital less public debt (in % of GDP)



Sources: Kamps (2004), OECD.

With the caveats in mind, our narrow measure of net worth would seem to have deteriorated significantly in all pre-enlargement EU countries by the mid-1990s. Two decades ago, public debt was more than fully backed by public capital in the majority of countries. However, in the second half of the 1990s it was no longer the case in any single country, and the gap reached over 15 percentage points of GDP in 9 out of the 14 countries.

2.3 Determinants of public investment

The above description of the evolution of public investment flows and capital stocks raises three kinds of analytical questions. First, what created the patterns observed above, especially the dominant long-term downtrend in public investment? Second, what are the consequences of the observed public investment behaviour, especially in terms of economic growth? Third, in view of the significant cross-country differences in the size of public capital stocks, what is the economically optimal amount of public capital in a country and, similarly, do EU countries have too much or too little public capital? The second and third questions will be addressed in detail in Romp and de Haan as well as Kamps, respectively (this volume), so let us focus here on the underlying factors of the observed developments in public investment and capital stocks.

Several hypotheses have been put forward to explain the downtrend in public investment. They include, most notably, extensive privatisation and the drive toward a smaller economic role for the state in the past two to three decades; the emergence of alternative ways to finance infrastructure investment, such as public-private partnerships; the impact of EMU's fiscal rules; and a decreasing need for additional infrastructure.

Some of these hypotheses can be refuted up-front. Privatisation, for one, has not affected public investment—let alone accounted for its long-term downtrend—as any investment undertaken and financed by public enterprises is recorded in national accounts statistics as private investment. Only investment directly financed from the budget of the national or a subnational government qualifies as public. Consequently, privatisation *per se* would not affect public investment at all.⁴ Furthermore, it is unlikely that any political drive toward a smaller economic role for the state has been very important; after all, if measured in terms of tax revenue to GDP ratios, it would seem that governments have not become smaller in recent decades. Finally, public-private partnerships remain a recent phenomenon and account for a visible share of infrastructure investment in only a few countries, as discussed in detail in Section 4.

Little rigorous analysis has been devoted to the testing of other hypotheses. De Haan *et al.* (1996) and Sturm (1998) focus on politico-economic factors affecting public investment, and they conclude that episodes of 'fiscal stringency' and frequent changes of government tend to be associated with lower public investment. In a more recent study Galí and Perotti (2003) focus on whether or not EMU has changed the cyclical behaviour of public investment, finding that the 'mildly procyclical' behaviour of public investment has not been significantly altered by EMU. Finally, European Commission (2003) and Turrini (2004) assess the role of a range of general economic and fiscal variables in determining public investment, finding among other things that EMU has had a positive direct impact on the level of public investment, but a negative indirect impact through a reduction in fiscal deficits and public debt.

While these studies cast some light on the determinants of public investment in Europe, they do not offer comprehensive and conclusive evidence of why public investment has trended down for so

⁴ However, privatisation may well affect other items in the budget, such as capital transfers.

long. Also, none of them addresses the hypothesis that public investment has been falling because of the decreasing need for additional public capital. While this hypothesis is intimately related to the question of optimal size of public capital stocks, it can be assessed alongside the other hypotheses even without first estimating the optimal size of public capital stocks.

Our analyses⁵ (see Box 1 for details) aim to establish the macroeconomic determinants of public investment, with a special focus on its long-term trend, and to assess whether the level of public investment is influenced by the size of public capital stock. The statistically significant determinants of public investment include the level of national income, the budgetary situation, and fiscal sustainability considerations. Higher levels of GDP tend to be associated with higher public investment; episodes of discretionary fiscal consolidation depress public investment, as do high levels of public debt. Neither financing costs nor EMU have played a statistically significant role. As regards EMU, we cannot find any statistically significant impact on public investment either directly or indirectly through its fiscal rules on fiscal deficits and public debt. The only exception is possibly Finland, where there is some evidence that EMU may have had a negative impact on the level of public investment, albeit of minuscule magnitude. These findings appear consistent with the fact that fiscal consolidation efforts were initiated in many countries long before the Maastricht Treaty entered into force.

As regards the long-term downtrend in public investment, we find that drawn-out episodes of fiscal consolidation, ultimately aimed at addressing fiscal sustainability concerns, are the key factor in most sample countries. In other words, public investment is one of many fiscal policy tools used to curtail budgetary deficits and the accumulation of public debt. Notably, the use of public investment for such purposes appears unrelated to the fiscal rules embodied in EMU.

Finally, we find no evidence in support of the hypothesis that the level of public investment would depend on the size of the public capital stock. That is, we reject the view that public investment has slowed down due to a saturation of the demand for public capital (infrastructure). This result, in turn, appears consistent with the earlier observation that there is no relationship between the evolution of the public capital stock (i.e., the steepness of the downtrend in public investment) and its size.

In sum, our analyses suggest that none of the reviewed hypotheses about the decline in public investment, measured in relation to GDP, seems valid. Specifically, we find no evidence that the fiscal rules embodied in EMU would have accounted for the downtrend, nor do we find evidence that the demand for public capital would be saturated. Instead, drawn-out periods of fiscal consolidation, undertaken independently of the EMU fiscal rules, are the main reason why public investment has declined in non-cohesion countries. Whether this decline has had a detrimental impact on economic growth at the aggregate level will be examined in Romp and de Haan (this volume).

***The long-term
downtrend in public
investment is related
to drawn-out episodes
of fiscal consolidation,
unrelated to EMU.***

⁵ The detailed results are reported in Välijä and Mehrotra (2005).

Box 1. Econometric analyses of the determinants of public investment

To test the hypotheses according to which EMU or the saturation of infrastructure demand has accounted for the long-term behaviour of public investment and, more broadly, to establish the macroeconomic determinants of public investment, the following econometric analyses were conducted.

Determinants: panel data analysis

To establish the macroeconomic determinants of public investment without distinguishing their short-term (cyclical) and long-term (trend) components, a panel data analysis was conducted estimating a model with real GDP; real long-term interest rates; public debt (in relation to trend GDP); net lending (or surplus) of the general government (in relation to trend GDP); and an EMU dummy as explanatory variables for public investment (in relation to trend GDP). The estimation was conducted separately for non-cohesion countries and cohesion countries. Also, single-equation estimation was performed for each non-cohesion country individually. The results of the panel data analysis suggest that GDP, public debt, and the fiscal position are significant determinants of public investment, with neither financing costs nor EMU playing a significant role. In addition to the EMU dummy, its interaction terms with the public debt and net lending variables were both statistically insignificant. The results do not differ significantly between cohesion and non-cohesion countries.

Long-term trend: cointegration analysis

To account for the long-term trend behaviour of public investment, a cointegration analysis was conducted for public investment, public debt, and net lending (all variables in real terms). GDP could not be included due to trend-stationarity. The cointegration analysis was conducted for eight non-cohesion countries with sufficient data (Austria, Finland, France, Germany, Italy, the Netherlands, Sweden, and the UK). No cointegrating relationship was found for Sweden. The results for the other countries suggest that drawn-out episodes of fiscal consolidation are the main factor associated with long-term trends in public investment. While the ultimate purpose of long-term fiscal consolidation is obviously to address debt sustainability concerns, a direct link between public debt and public investment was present only in Germany and the Netherlands.

Testing the saturation hypothesis: cross-section analysis

Cross-section analyses were conducted to test whether cross-country differences in the level of public investment are explained by cross-country differences in the level of GDP per capita; public debt, and the size of public capital stock. The analysis comprised all non-cohesion countries, and the years studied included 1980, 1990, and 2000. The results of this cross-section analysis reject the saturation hypothesis. In none of the years analysed was the level of public investment determined by the size of the public capital stock, regardless how the latter was measured (in relation to GDP or per capita). In 1980 and 1990, cross-country differences in both GDP and public debt were significant factors in explaining cross-country differences in the level of public investment; however, in 2000, such links could no longer be established.

3. Infrastructure in new member states

Turning to the new EU member states—notably the eight countries in Central and Eastern Europe (CEE)⁶—it is of interest to examine the implications of their economic transition and the associated fiscal consolidation on investment in infrastructure and public services. This is addressed in two steps below. First, we examine the evolution of public investment, especially with a view to the conflicting needs for additional infrastructure spending and fiscal consolidation to support macroeconomic stabilisation efforts. Second, we describe how total investment (public and private) in the transportation (including communication), health, and education sectors has evolved in the CEE countries during the past decade or so, and we contrast the findings to developments in the old member states (EU-15).

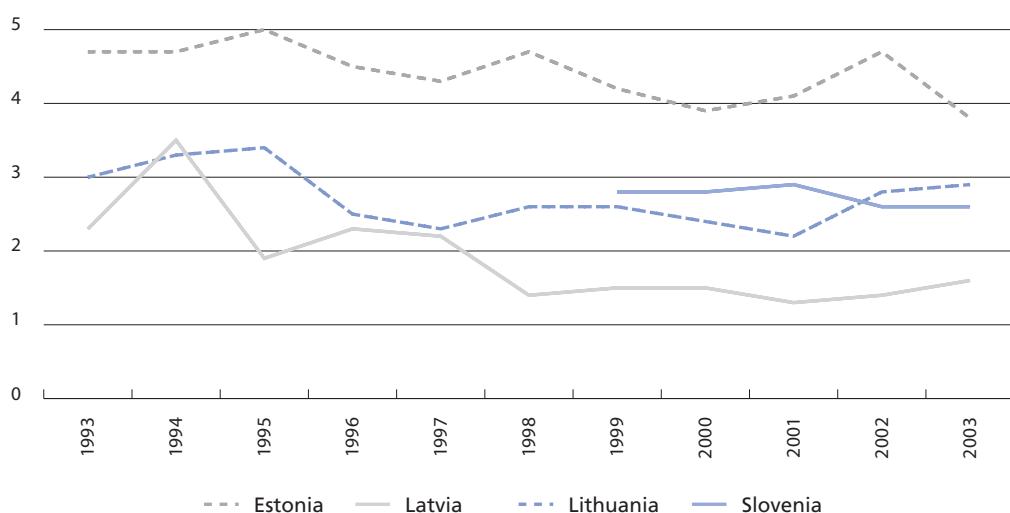
3.1 Public investment

Alongside other transition economies, the eight new EU member states were characterised by significant macroeconomic imbalances at the outset of their transition. Subsequent macroeconomic stabilisation efforts required prolonged periods of fiscal consolidation in many cases. How did the fiscal consolidation affect public investment in these countries?

Measured in relation to their GDP, few CEE countries have experienced a steep decline in public investment, as shown in Figures 10 and 11. Only Latvia and perhaps the Slovak Republic have had a clear downtrend, while all other countries' public investment lacks an unambiguous trend one way or the other. However, there is a clear difference in terms of the volatility of the public investment-to-GDP ratio between the Czech Republic, Hungary and the Slovak Republic on the one hand, and the other five countries on the other hand, with the former group of three countries displaying significantly more ups and downs.

Public investment in new member countries has remained stable in relation to GDP.

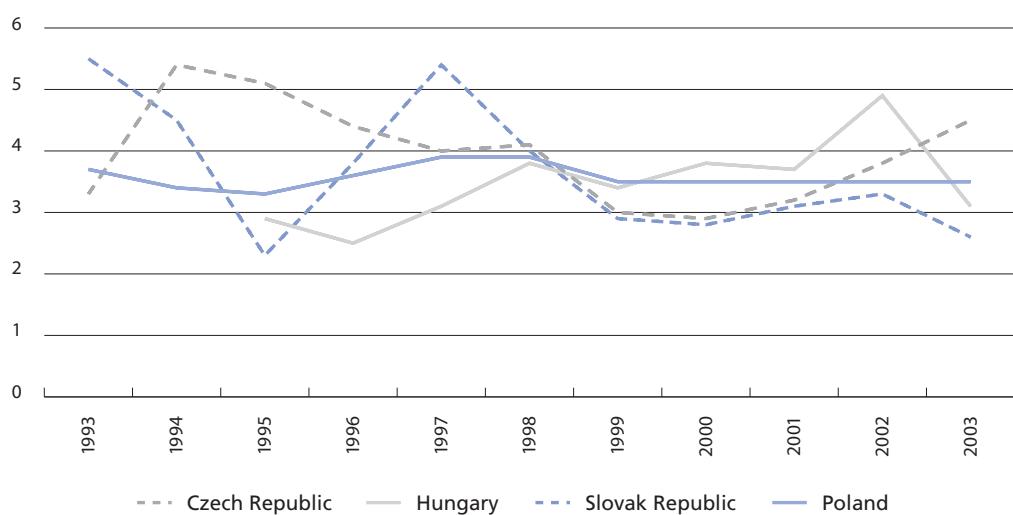
Figure 10. Gross fixed capital formation of the general government (in % of GDP).



Source: New Cronos.

6 These countries include the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak republic, and Slovenia. The other two new member countries, Cyprus and Malta, are left outside this analysis both because their economies are structurally different from the eight listed above and also because data availability is inadequate for them.

Figure 11. Gross fixed capital formation of the general government (in % of GDP).

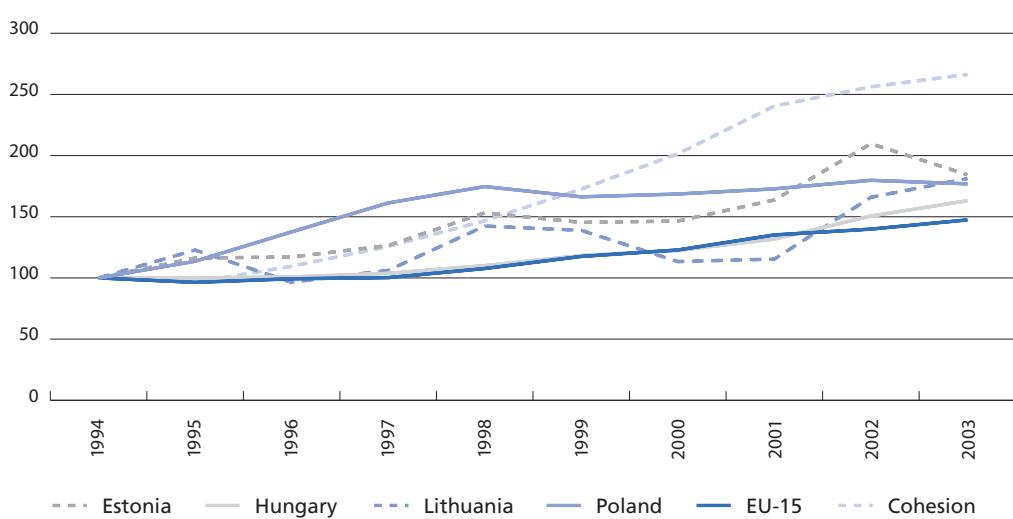


Source: New Cronos.

Deflated by PPI, public investment has grown in most CEE countries.

The figures depicted above also reflect volatility in GDP—which in the case of the CEE countries has been significant—so let us also consider the evolution of public investment using the index of producer prices as a deflator and, moreover, using 1994 as the base year. The results are shown in figures 12 and 13 below, and are also contrasted with the EU-15 and the cohesion countries. Taking the EU-15 average (unweighted) as a benchmark, real growth in public investment exceeded this benchmark in the cohesion countries as well as in Estonia, Lithuania, Poland, and Hungary. Public investment growth has been slower than the EU-15 average in Latvia, the Czech Republic and the Slovak Republic. In 2003, Latvia's public investment was at the same level as in 1994 in real terms; in the Czech Republic, it was 30 percent higher, and in the Slovak Republic some 20 percent lower.

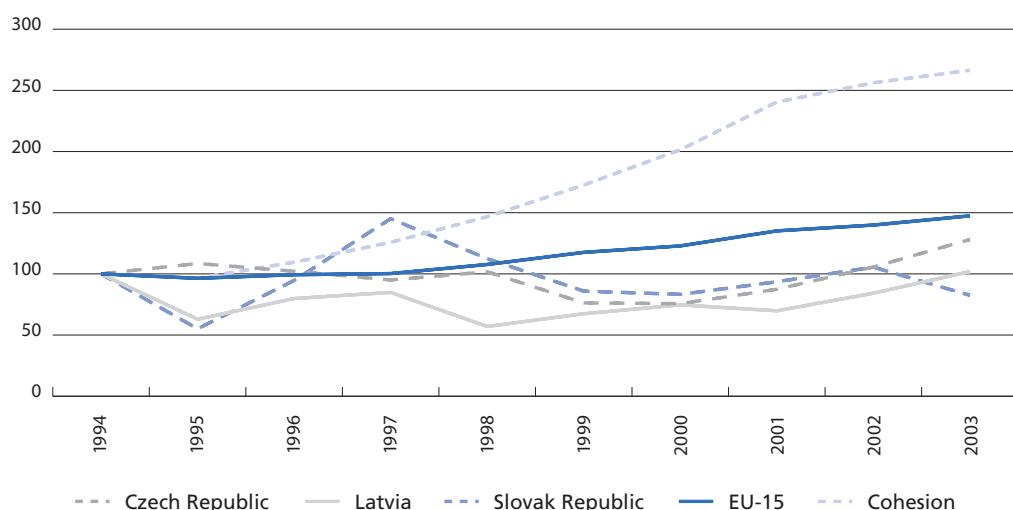
Figure 12. Real gross fixed capital formation of the general government (1994 = 100).



Source: New Cronos.

Note: Gross fixed capital formation of the general government deflated by the Producer Price Index.

Figure 13. Real gross fixed capital formation of the general government (1994 = 100).



Source: New Cronos.

Note: Gross fixed capital formation of the general government deflated by the Producer Price Index.

All in all, there has been no clear across-the-board decline in public investment in the new member countries. Measured in relation to GDP, public investment has not displayed any significant trends. In real terms, it has been growing in most new member countries at rates close to or above the EU-15. Exceptions include especially Latvia and the Slovak Republic, where public investment remains at or below its 1994 level.

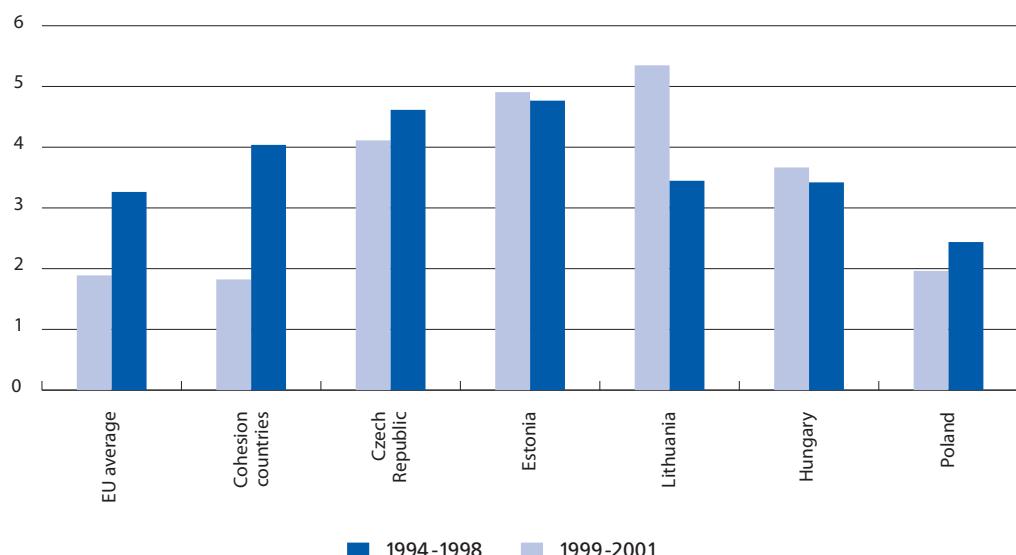
3.2 Sectoral investment

Figures 14-16 below depict total economy investment (public and private) in the transportation, health, and education sectors, respectively, for those CEE countries for which such data are available and also for the EU-15 (unweighted average) and the cohesion countries (unweighted average). The figures compare the time periods before and after 1999 in order to gauge differences, if any, between 'initial' and 'subsequent' transition—both concepts and time periods being naturally *ad hoc* in character. The time periods covered are short, so one should obviously avoid too far-reaching conclusions. Furthermore, it is important to recognise that the discussion concerns investment flows, telling us nothing about the size of capital stocks, as estimates for capital stocks are not available for the CEE countries.

As regards investment in the transportation sector (also including storage and communication in the absence of a further breakdown), Figure 14 suggests there has been some convergence between the five CEE countries and the EU-15. Apart from Poland, the sampled CEE countries had transportation investment levels around the mid-1990s twice as high as those in the EU-15 and cohesion countries. The significant increase in transportation investment in the EU-15—especially in the cohesion countries—combined with small increases or drops in the CEE countries, bridged the gap between investment levels; with the EU-15 average reaching 3.3 percent of GDP and the CEE sample average falling to 3.7 percent of GDP.

Transportation sector investment has converged between old and new member countries.

Figure 14. Gross fixed capital formation in transportation, storage, and communication (total economy), in % of GDP.

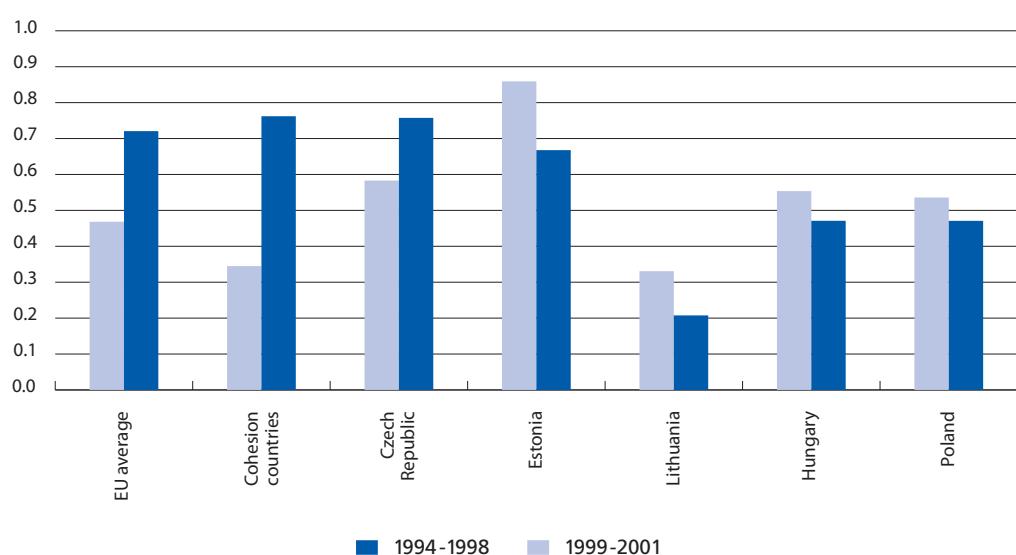


Source: New Cronos.

Health and education investment, too, has converged between old and new member countries.

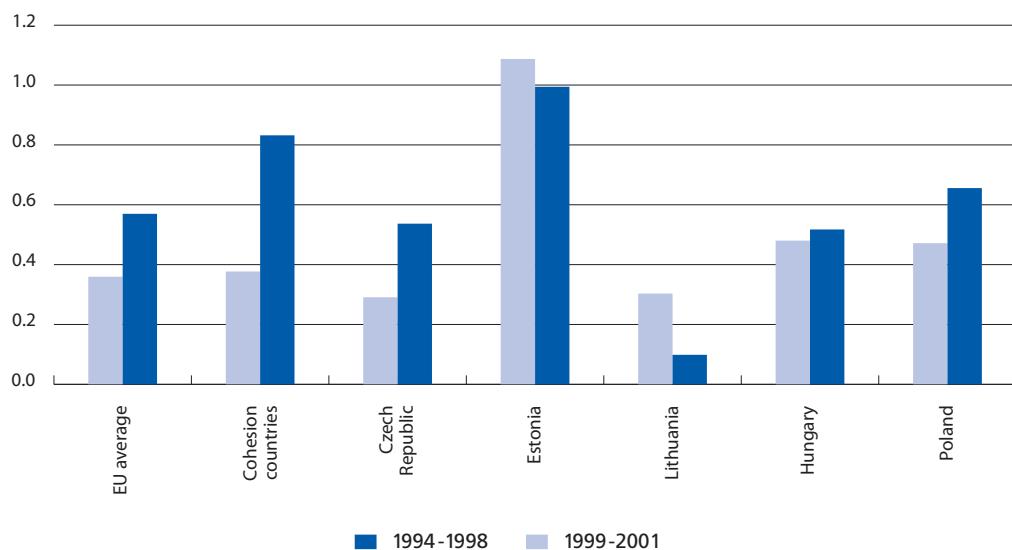
There has been convergence between the EU-15 and CEE countries also in the health (and social services) as well as education sectors, as shown in Figures 15 and 16. Total economy health sector investment in the CEE sample has fallen from 0.6 to 0.5 percent of GDP on average, while the EU-15 average has increased from 0.5 to 0.7 percent of GDP. Education sector investment, in turn, has increased in both groups, reaching 0.6 percent of GDP in the later sample period.

Figure 15. Gross fixed capital formation in health and social services (total economy), in % of GDP.



Source: New Cronos.

Figure 16. Gross fixed capital formation in education (total economy), in % of GDP.



Source: New Cronos.

Consequently, total economy investment in the sectors considered has converged between the CEE sample and the EU-15. Investment in all these sectors was significantly higher in the CEE countries around mid-1990s than in the EU-15 and cohesion countries. However, investment in these sectors increased significantly in the EU-15 in general and in the cohesion countries in particular, which – combined with a drop or only modest increase in the CEE countries – resulted in the convergence of investment levels in the two groups of countries.

The convergence of investment levels, however, tells us nothing about the relative sizes of infrastructure assets. In the absence of estimates for capital stocks, one can only observe that if differences in terms of assets' age and quality exist between the old and new EU member countries—as is commonly perceived to be the case—the new member countries would need higher flow investment than the EU-15 to close those gaps. Converging investment flows would only serve to sustain the gaps at their current levels.

The convergence of sectoral investment serves to sustain gaps in stocks of infrastructure assets between old and new member countries.

4. Significance of public-private partnerships

Section 2 above suggested that public investment has undergone a structural change in the old member states, where the downturn in the ratio of public investment to GDP has slowed down or even brought the growth of public capital stocks to a halt. Another structural change—at least qualitatively speaking—in the financing of infrastructure and public services is the emergence of private finance through public-private partnerships (PPPs). The aim of this section is to examine their quantitative significance across countries, and to thereby assess to what extent they may or may not have offset the decline in public infrastructure finance.

Before embarking on the analysis, a caveat concerning data is required. PPPs are a relatively recent phenomenon, and only in the UK have they existed for more than a decade. This relative novelty is reflected in the data available on PPPs. Until early 2004, there were no European-wide guidelines regarding the treatment of PPPs in national accounts statistics (see Box 2). Consequently, countries have treated them in various ways, and apart from the UK where data on flow investment through PPPs are available, it has been difficult to assess their macroeconomic impact.

Box 2. Statistical treatment of public-private partnerships

National accounts statistics are based on the principle that any economic unit, including a PPP, can only be recorded in national accounts statistics in one institutional sector. That is, a PPP can only be a public sector entity or a private sector entity. Even when a PPP is a joint venture with shared equity participation by the public and private sector partners, it cannot be split between the institutional sectors.

Whether a PPP is included in the public or private sector affects the measured fiscal position. If the partnership is part of the public sector (general government), the financing and acquisition of the underlying assets appear on the public sector's balance sheet, directly affecting the measured fiscal deficit and public debt. If, on the other hand, the partnership is recorded as a private sector entity, it has only a limited short-term impact on the fiscal accounts. The financing and acquisition of the underlying assets appears on the private sector's balance sheet, with the public sector only incurring current expenditure for paying for the service itself once its supply starts.

To harmonise the varying recording practices across countries, Eurostat (2004) issued a decision on the treatment of public-private partnerships in the national accounts. It is based on an assessment of the distribution of risks between the partners, and it stipulates that a partnership should be recorded off the public sector's balance sheet if the private partner carries the construction risk and either the availability or the demand risk for the project in question. In other words, the private partner is to carry at least one of the major long-term risks, in addition to the shorter-term construction risk, for the partnership to be recorded as a private entity and thereby outside the public sector's deficit and debt calculation. Otherwise, the partnership is recorded on the public sector's balance sheet.

To get around this problem, the analysis below is based on micro-level data on individual projects structured as PPPs. The data come from the ProjectWare database (for non-UK countries) and other additional sources. This approach allows us to get an aggregate picture of the extent of PPPs, even in the absence of macro-level data. However, the project-level data generally only indicate the total value of each project (a stock variable), but gives no indication of the annual investment flows envisaged during the lifespan of the project.⁷ This makes it difficult to assess exactly how much a particular project has contributed to aggregate investment, demand, and growth each year.

A comparison of PPPs and public investment ...

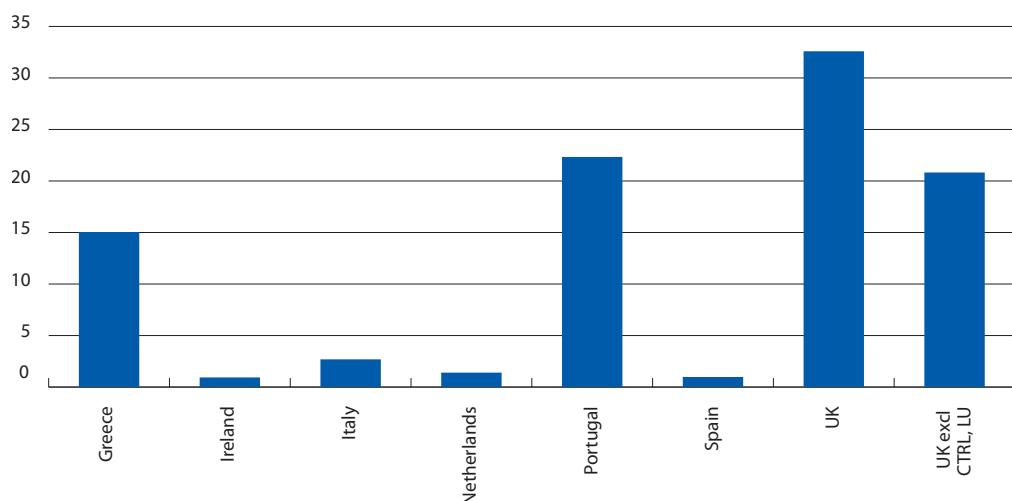
With these caveats in mind, let us turn to the assessment of the quantitative significance of PPPs. Figure 17 shows the value of signed PPP contracts (a stock variable) in relation to public investment (a flow variable) in those EU member countries where the ratio has been significant. PPPs are compared to public investment, rather than to another macroeconomic aggregate such as GDP, in order to highlight the role of PPPs as an alternative to public investment.

The only countries where PPPs appear to have some persistent systemic importance are Portugal and the UK.⁸ In all other countries even the stock value of signed public-private partnership contracts is small compared to annual public investment flows, or they represent a small number of projects. The latter is notably the case in Greece (three projects).

⁷ In other words, the data only reports the financial commitment at project signature, which may differ significantly from actual investment flows that materialise over the life cycle of the project. This being the case, the analysis should be interpreted as telling us something about the upper bound of the size of PPPs.

⁸ The UK figures for 2002-03 include the London Underground project, which alone accounts for more than 70 percent of the total signed value of PPP projects in those years.

Figure 17. Signed value of PPP contracts, in % of public investment (average 1995-2003).

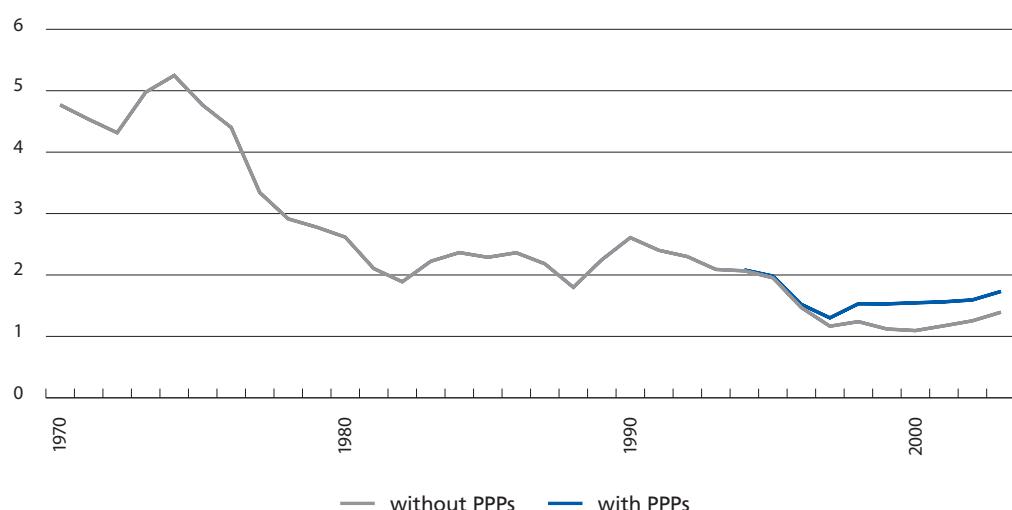


Sources: ProjectWare; HM Treasury; New Cronos; European PPP Report 2004; European Investment Fund.

In the UK, investment through PPPs has equalled 15—25 percent of total public investment in the past five years (including the London Underground and Channel Tunnel Rail Link projects), as shown in Figure 18. While corresponding flow-to-flow comparison is not available for Portugal, one can use the stock figures depicted above to estimate their investment flow implications. Assuming that investment related to a project starts the year it is signed, and assuming that investment flows are equally distributed over four years, one can estimate that investment through PPPs in Portugal equalled 15—35 percent of total public investment during 1999-2003.⁹

*... suggests that
PPPs have systemic
importance only in
Portugal and the UK.*

Figure 18. Public investment with and without PPPs in the UK, in % of GDP



Sources: OECD, HM Treasury.

⁹ To the extent that PPP projects are recorded on the public sector's balance sheet in Portugal, the public investment figures already include investment through such PPPs. This being the case, the estimated ratios of investment through PPPs to public investment would belittle the relative importance of PPPs.

PPPs are, indeed, geographically concentrated in the UK and Portugal, even if measured in pure value terms. The UK alone accounts for almost 70 percent of the signed value of all PPP contracts within the EU. Of those 70 percent, 25 percentage points are accounted for by the London Underground project alone. Portugal, in turn, accounts for almost 10 percent of the signed value of all PPP contracts, leaving only 20 percent for the other countries.

The difference in sectoral distribution of PPPs in the UK and other countries (see the contribution by Riess for details) has led to a difference in the distribution of contract size between the UK and other countries. In the UK, the median contract is small, in the range of £10—50 million. Outside the UK, the median contract ranges within €100—500 million, as transportation sector projects in general and road projects in particular tend to be large in value. Put differently, in the UK as many as 80 percent of all PPP contracts are worth less than £50 million, while outside the UK, 70 percent are worth more than €100 million.

To sum up the findings about PPPs in financing infrastructure and public services, we have seen above that they have systemic significance from a quantitative perspective in the UK and Portugal, where annual investment through them corresponds to some 15—30 percent of public investment. In all other EU countries PPPs are few in number and relatively small in value.

5. Summary and conclusions

European infrastructure finance would seem to have changed fundamentally.

Taken at face value, it would seem that major structural changes have taken place in the financing and provision of infrastructure services in Europe. In most old EU member countries, public investment, measured in relation to GDP, has been on a trend decline since the 1970s. At the same time, the last 10 to 15 years have seen the emergence of privately financed and produced infrastructure services, starting in the UK in the early 1990s and spreading subsequently to continental Europe. In the new EU member countries in Central and Eastern Europe, the need for upgrading infrastructure assets in the context of their economic transition has coincided with the need for fiscal stringency, which could in principle have caused a detrimental squeeze on infrastructure investment.

While all of these developments are undoubtedly important qualitatively speaking, this paper has focussed on assessing their quantitative significance. In particular, we have studied the implications of falling public investment flows on the size of public capital stocks in the old EU member countries; the reasons behind the downtrend in public investment; the evolution of public and private infrastructure investment in the new member countries; and the extent to which public-private partnerships have replaced public investment in old and new EU member countries alike.

As regards public investment in the old member states of the EU, the stock of public capital has continued to grow in all but a few non-cohesion countries, despite the downtrend in public investment. In other words, the downtrend simply reflects the fact that public investment has been growing more slowly than GDP, but it has still grown. In most countries, this growth has been sufficiently high to cover depreciation and a further build-up of public capital stocks, albeit at a rate that has been slowing down.

While the downtrend in the public investment-to-GDP ratio should therefore not give rise to overblown concerns about the erosion of infrastructure, it is nevertheless important to know what caused that downtrend so as to grasp its economic consequences. Some of the most commonly expressed hypotheses in this regard have included privatisation and the drive toward a smaller economic role for the state; the emergence of alternative ways to finance infrastructure investment, such as PPPs; the impact of EMU's fiscal rules; and a decreasing need for additional infrastructure.

We refuted all of these hypotheses. A series of empirical analyses of the determinants of public investment in the pre-enlargement EU countries during 1970—2003 suggested that the level of national income and fiscal considerations, including budget deficits and public debt, are the key macroeconomic determinants of public investment. Neither the fiscal rules of EMU nor financing costs, nor the size of the public capital stock are significant factors explaining the behaviour of public investment. In explaining the long-term trend behaviour of public investment, drawn-out episodes of fiscal consolidation play the dominant role.

Turning to the new member countries of the EU, notably the eight CEE countries, the conclusion is that there has been no wholesale squeeze of infrastructure investment either economy-wide, or by the public sector. While total economy (public plus private) investment in the transportation, storage, and communication sectors has fallen somewhat in the five sampled CEE countries (in relation to GDP), it still remains above the average for the EU-15. Total economy investment in health and education has hardly changed, staying at approximately the same level as in EU-15. However, the stability of investment flows is rather uninformative *per se*, and in the absence of hard data on capital stocks it is hazardous to draw too far-reaching conclusions about their size and evolution.

Despite the protracted need for fiscal stringency in the course of transition, public investment, too, has escaped a downtrend. It has been volatile in a few CEE countries and has known episodes of fiscal contraction that have relied on cuts in public investment spending, but apart from Latvia and the Slovak Republic there has been no clear downtrend in public investment. This, in combination with the developments in selected infrastructure and public service sectors reported above, suggests that fiscal consolidation in the CEE countries has not led to any disproportionate squeeze on infrastructure investment. To accelerate their economic transition, it might have been desirable for infrastructure investment to grow faster in these countries, but at least it has not collapsed.

Against the background of the slowdown in public capital accumulation in the old EU member countries and the stable though not necessarily optimal level of public investment in the new member countries, how much difference has private financing and provision of infrastructure services made? While the emergence of PPPs has undoubtedly brought about an important structural change qualitatively speaking, their quantitative importance remains modest. Only in the UK have PPPs sufficient depth and breadth to make a systemic difference. Portugal is the other country where PPPs are significant for the macroeconomy, but even there their application has been limited almost exclusively to the road sector. In all other EU countries, both old and new, private financing and provision of infrastructure remains limited in terms of value, number of projects, and sectoral distribution.

In conclusion, European roads are not on a steep downhill. While public investment, as a share of GDP, has been on a downtrend in the old EU member countries, and while PPPs have not become a significant source of infrastructure provision outside the UK and Portugal, infrastructure assets are nevertheless not being eroded, as evidenced by the continued growth of public capital stocks in most countries. Similarly in the new member countries: even though infrastructure investment could have grown faster, it has at least not collapsed.

The change in the European infrastructure finance has been qualitatively more important than quantitatively.

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