

Perée, Eric; Vällilä, Timo

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European Investment Bank

## Economic and Financial Report 2007/01

# A Primer on Public Investment in Europe, Old and New<sup>†</sup>

Eric Perée and Timo Välilä\*

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### Notes

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\* The authors are, respectively, Head and Senior Economist, Economic and Financial Studies Division of the European Investment Bank

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# **A Primer on Public Investment in Europe, Old and New**

## **Abstract**

We take stock of what is known about public investment in the member states of the European Union, old and new alike. The interesting features about the long-term evolution of public investment have been its downtrend in old EU member states, bar the cohesion countries, and its volatility in new member states. The downtrend in the old member states cannot be traced back to EMU's fiscal rules *per se*, nor can it be explained by the emergence of innovative financing mechanisms for infrastructure, such as public-private partnerships. Rather, it is the result of drawn-out episodes of fiscal adjustment and consolidation, necessitated by long periods of unsustainable fiscal policies and deterioration of governments' net worth. We also examine the composition of public investment and conclude that only half of it comprises infrastructure investment in EU-15 and in EU-8, with a slightly higher share in the cohesion countries. The share of infrastructure investment, especially in traditional transport and other communications infrastructure, is in EU-8 somewhat higher than in old EU member states, but below the level in the cohesion countries. All this suggests for the new member states that the on-going build-up of their public capital stocks, especially infrastructure capital, requires the safeguarding of sufficient fiscal space to accommodate adequate public investment.

## **1. Introduction**

Many aspects of public investment are surprisingly poorly understood, at least in the European context. To start with, there is often confusion about what public investment means in the first place, as much of economic literature employs the terms 'public investment' and 'infrastructure investment' interchangeably. A great deal of public investment is not infrastructure investment, and a great deal of infrastructure investment is not public. As we will dwell on the composition of public investment in what is to come, some examples of non-public infrastructure investment should suffice here. They include investment by energy companies in generation capacity; telecoms companies in networks; or rail companies in rolling stock or rail track. In all these cases commercial enterprises finance these investments which are recorded as investment of the enterprise sector in national accounts statistics—regardless of the ownership structure of the enterprises. Only investment directly financed from the budget of the government—at the central or subnational level—qualifies as public investment.

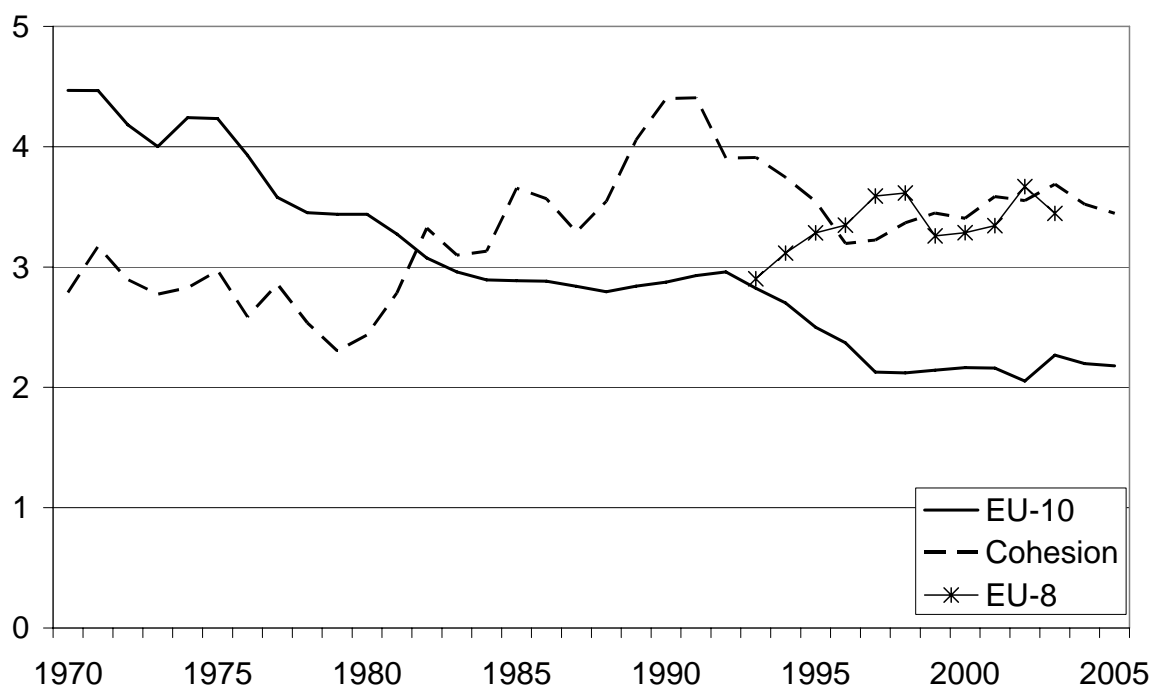
Furthermore, public investment has attracted only limited academic interest as a research topic. While some empirical studies have sought to assess the productivity of public investment, issues such as the determinants or the composition of public investment have received much less attention. This omission is somewhat surprising, given that sufficient data exist to address these issues empirically and given that the issues are of obvious policy relevance.

The aim of this paper is take stock of what we know about public investment in the member states of the European Union, old and new alike. We will start by depicting the long-term evolution of public investment in section 2. Section 3 will examine its determinants, with a special focus on EMU's fiscal rules and innovative financing mechanisms for infrastructure, where the experience of old EU member states can be especially instructive for the new member states. The composition of public investment is discussed in section 4, and section 5 draws some conclusions, specifically for the new member states.

## 2. Long-term trends in public investment

Public investment has experienced a general downward trend—at least if measured in relation to GDP—in old EU member countries (EU-10 in Figure 1) during the past three decades. However, as explained below, that general downtrend hides significant differences between individual countries. Most notably, public investment has actually increased, again in relation to GDP, in the cohesion countries (Greece, Ireland, Portugal, and Spain). There was also a slight increase in the new Eastern European member states (EU-8) at the outset of their transition in the early 1990s, with a subsequent levelling out. These broad trends are depicted in Figure 1.

**Figure 1. Gross fixed capital formation by the general government in EU countries (in percent of GDP, GDP-weighted averages), 1970—2005.**



Source: Eurostat, OECD.

The evolution of public investment in the individual countries is examined in detail in Mehrotra and Vålilä (2006), who show that in the group of large countries (France, Germany, Italy, and the UK) public investment halved from 4 percent of GDP in the early 1970s to some 2 percent of GDP in recent years. The fall has been particularly pronounced in Germany and in the UK, where public investment has fallen from a peak of about 5 percent

of GDP in the early 1970s to an average of 1.5 percent since the turn of the millennium. In contrast, the decline has been only about 0.5 percentage points of GDP in France.

The fall in public investment has been pronounced also in the group of smaller non-cohesion countries (Austria, Belgium, Denmark, Finland, the Netherlands, and Sweden), where public investment has halved on average from about 5 to 2.5 percent of GDP. Austria and Belgium have experienced the biggest declines, from 5 percent of GDP in early 1970s to 1-2 percent of GDP in recent years. In contrast, Finland's public investment has declined by only one percentage point of GDP during the past three decades.

The cohesion countries (Greece, Ireland, Portugal, and Spain) have been even less homogenous as a group; nevertheless, public investment has tended to trend up rather than down within that group. Ireland, representing 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 bounce back to 4 percent of GDP more recently.

Before turning to new EU member states, let us pause for a moment to consider how the evolution of public investment flows in old EU member states described above have affected their public capital stocks—arguably the more important variable in the long term.

Estimates by Kamps (2006), Mehrotra and Vålilä (2006) show 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 and where the public capital stock has remained rather flat since the late 1970s. 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 remained almost unchanged. 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.

The important observation with respect to public capital stocks in old EU member countries is that they have grown steadily in real terms in all but a few countries. This implies that the downtrend 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;<sup>1</sup> 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. Granted, the downtrend in investment flows has led to a slowdown in the rate of growth of public capital stocks, but it has not reversed that growth.

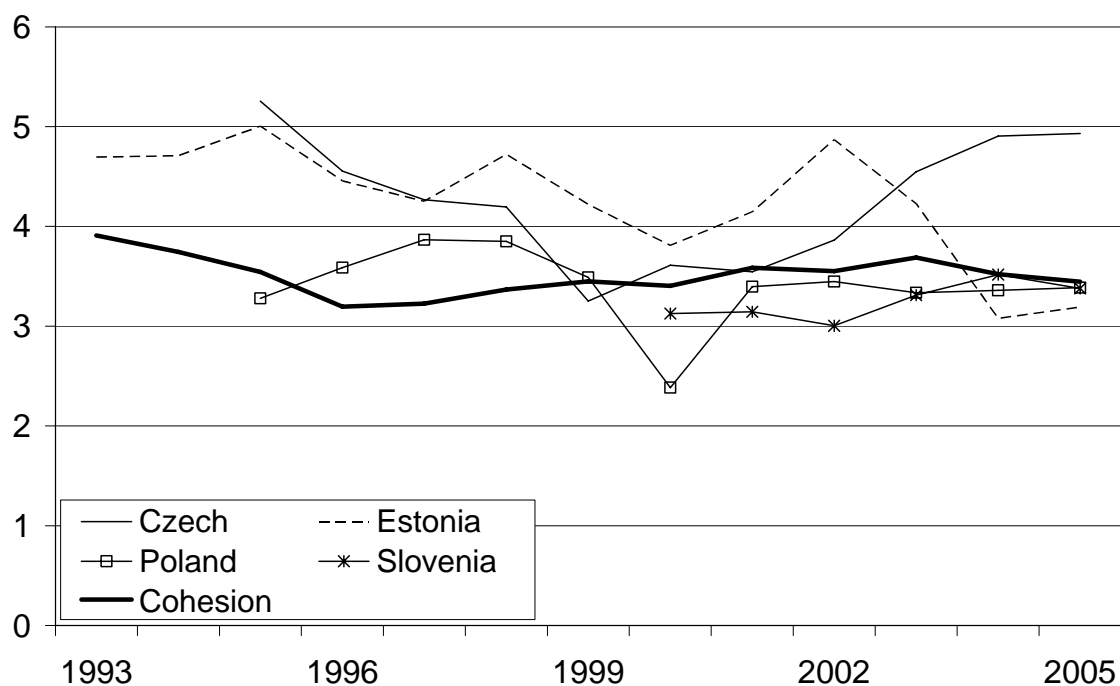
Turning then to the new EU member states in Eastern Europe, the interesting feature of their public investment in the past decade and a half is volatility, rather than trend behaviour. Few EU-8 countries have experienced steep up- or downtrends in their public investment relative to GDP, as shown in Figures 2 and 3. However, the volatility of their public investment-to-GDP ratios varies. Figure 2 depicts the four EU-8 countries with the flattest ratios, while Figure 3 shows the four most volatile ones.<sup>2</sup> The countries with lower volatility have tended to have higher levels of public investment relative to GDP, often at or above the cohesion countries, and the countries with more volatility have had lower average levels of public investment relative to GDP, often well below the cohesion countries.<sup>3</sup>

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<sup>1</sup> Given the high degree of inertia of the capital stock, lower investment rates affect the evolution of the stock very slowly. Hence, we should not conclude that the low level of investment in some countries would be sufficient to maintain the level of capital stocks in the long run.

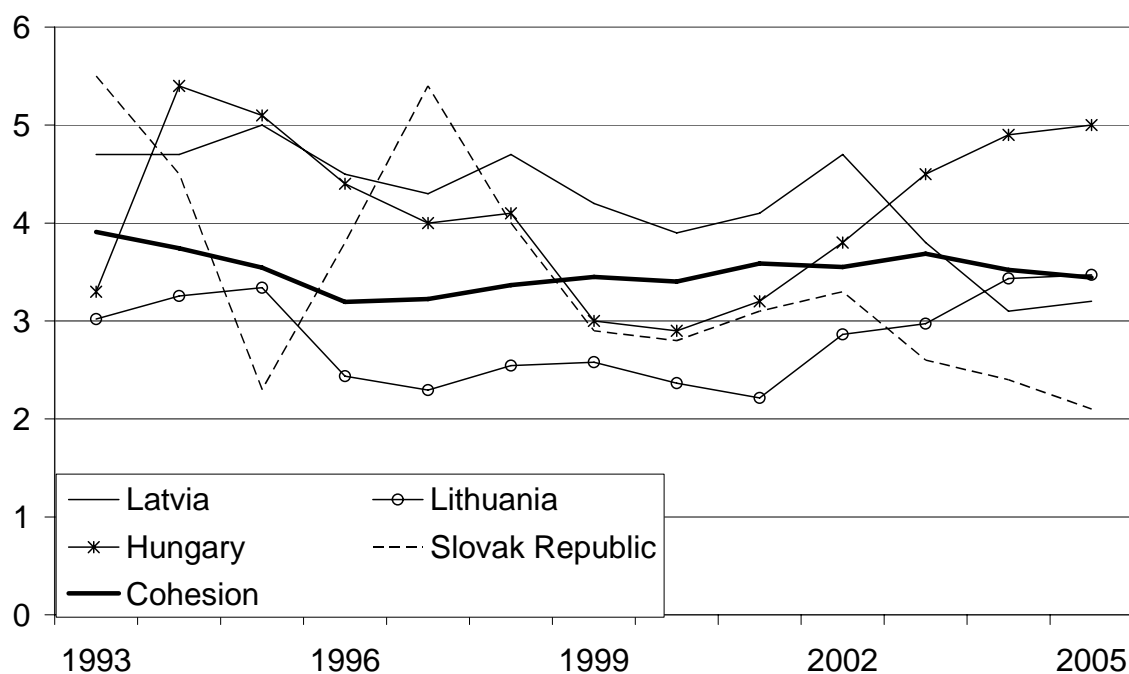
<sup>2</sup> Volatility is here measured by the coefficient of variation, which relates the standard deviation of variable to its mean value.

**Figure 2. Gross fixed capital formation of the general government (in percent of GDP).**



Source: Eurostat.

**Figure 3. Gross fixed capital formation of the general government (in percent of GDP).**



Source: Eurostat.

<sup>3</sup> A word a caution: data on public investment in EU-8 vary between different sources, in some cases significantly. While some of the details presented here may be specific to the data source used, the broader conclusions should be robust across data sources.



Of course, volatility in public investment-to-GDP ratios depends on the ups and downs of both public investment and GDP. While public investment and GDP tend to move in tandem,<sup>4</sup> public investment in EU-8 has by some measure been somewhat more volatile than GDP.<sup>5</sup> Moreover, a low level of public investment relative to GDP is more strongly associated with high volatility in public investment itself, rather in GDP.<sup>6</sup> In other words, higher volatility and lower level of public investment go hand in hand, so the pattern of volatility and level shown in Figures 2 and 3 can indeed be traced back to the behaviour of public investment itself, with GDP movements playing a relatively smaller role.

How these public investment flows have affected the size of public capital stocks in EU-8 is difficult to say in the absence of data on public capital stocks for these countries. Measured by various physical quantity indicators, such as the density of road and rail networks, EU-8 countries do not seem to be far behind old EU member states, if at all. However, such physical quantity indicators ignore the quality of infrastructure assets, which is in some cases poor or even substandard in EU-8. Therefore, to make the value of their public capital stocks converge to the levels observed in old EU member states, EU-8 countries would need to invest considerably more in flow terms. While it is, of course, difficult to say how significant the gap between EU-10 and EU-8 shown in Figure 1 is in this respect, we will return to this issue in Section 4 when examining the composition of public investment.

### **3. Determinants of public investment**

Having examined the evolution of public investment, it is opportune to ask what has accounted for it. The primary aim of this section is to identify long-term structural determinants of public investment, with factors behind cyclical swings of lesser interest. For that reason the focus is on old EU member states, including the cohesion countries. However, the analysis revolves around two issues with direct relevance for the new member states as well, namely the impact of EMU's fiscal rules on public investment and the significance of

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<sup>4</sup> In the sample shown in Figures 2 and 3, the simple correlation coefficient between public investment and GDP is, on average, 0.85.

<sup>5</sup> The coefficient of variation in the sample of Figures 2 and 3 is on average 42 percent for public investment and 38 percent for GDP.

<sup>6</sup> The correlation between public investment relative to GDP and the coefficient of variation for public investment is -0.57, while the correlation between public investment relative to GDP and the coefficient of variation for GDP is -0.27.

innovative financing mechanisms for infrastructure, such as public-private partnerships (PPPs). Consequently, the experience of old EU member states, as detailed below, can offer useful lessons for EU-8.

### **3.1 Have EMU's fiscal rules suppressed public investment? <sup>7</sup>**

The trend decline in public investment in old EU member states has on occasions been linked to EMU's fiscal rules, including the Maastricht convergence criteria pertaining to fiscal deficits and public debt as well as the deficit rule embodied in the Stability and Growth Pact (SGP). Blanchard and Giavazzi (2004)—concerned that public investment has already fallen to sub-optimally low levels in many EU countries—suggest that the SGP be rewritten so as to exclude public investment spending altogether from the measure of fiscal deficit that is subject to the rule. Underlying this suggestion is the argument that the SGP or any similar deficit rule is, by construction, bound to discriminate against public investment, and that only by excluding it from the fiscal deficit rule could public investment be safeguarded.

Little rigorous empirical analysis has, however, sought to test the link between EMU's fiscal rules and public investment. Galí and Perotti (2003) focus on whether or not EMU has changed the cyclical behavior of public investment, finding that the 'mildly pro-cyclical' behaviour of public investment has not been significantly altered by EMU. 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.

To assess the impact of EMU's fiscal rules on public investment head on, Mehrotra and Vålilä (2006) estimate panel data and cointegration models for old EU member states for the period 1970-2003. In the panel data analyses the gross fixed capital formation of the general government is regressed on various measures of real output; real long-term interest rates; public debt; net lending (overall surplus) of the general government; and on a dummy variable to account for the participation of the respective economy in EMU. The

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<sup>7</sup> This section draws on Perée and Vålilä (2005) and Mehrotra and Vålilä (2006).

cointegration analysis, in turn, seeks to disentangle common stochastic trends among public investment, budgetary position, and public debt.

In the panel data analyses Mehrotra and Vålilä (2006) find that output is a statistically significant explanatory variable, obtaining a positive coefficient. The estimated coefficients for the aggregated fiscal variables suggest that public investment tends to move in tandem with discretionary changes in fiscal policy, but to smooth out movements in public debt. The coefficient for the (cyclically adjusted) net lending variable is significant and negative, so active fiscal consolidation efforts appear to have hit public investment, while public investment has increased during episodes of discretionary fiscal expansion. The debt variable is always significant and negative, implying that public investment acts so as to smooth out movements in public debt. The real long-term interest rate obtains a positive but only weakly significant coefficient, suggesting that financing cost considerations have not played an economically sensible role in determining public investment decisions.

Notably, the EMU dummy (defined as a post-Maastricht dummy variable) is never individually significant. The same is true for the interaction terms between the EMU dummy and the net lending variable, and the dummy and the public debt variable. These results suggest that EMU, *per se*, has had no statistically significant impact on public investment either directly or indirectly through its fiscal rules.

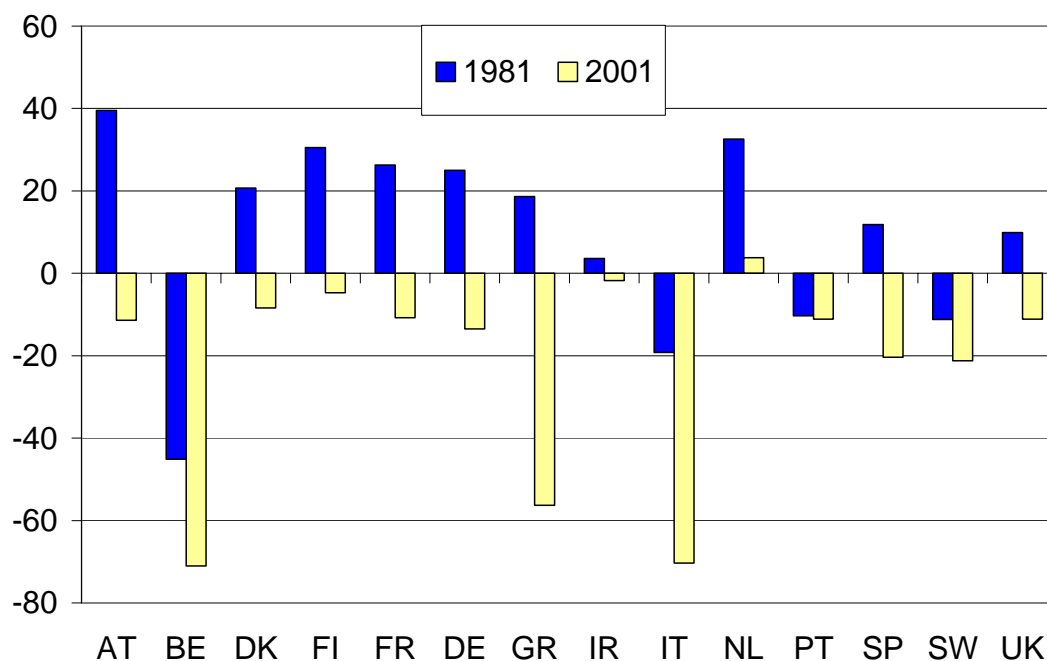
In sum, the statistically significant determinants of public investment include the level of national income, the budgetary situation, and fiscal sustainability considerations. Neither financing costs nor EMU have played a statistically significant role. As confirmed by the cointegration analysis, the significant downtrend that characterizes the evolution of public investment in non-cohesion countries is chiefly determined by drawn-out episodes of fiscal consolidation, unrelated to EMU.

These findings appear consistent with the fact that fiscal consolidation efforts were initiated in many countries long before the Maastricht Treaty entered into force, in response to structural fiscal problems long in the making. This point is illustrated in Figure 4 that depicts the evolution of 'government net worth' between 1981 and 2001, where net worth is measured by the difference between the size of public capital stocks and the amount of public

debt in old EU member states.<sup>8</sup> <sup>9</sup>A quarter century ago public debt was still more than fully backed by public capital in most of the countries. However, at the outset of the new millennium, that was no longer the case. Government net worth has contracted in all countries between 1981 and 2001 (on average by 30 percent of GDP). In nearly all countries net worth had turned negative by 2001.

In other words, most old EU member states have experienced deterioration in their net worth that has been both dramatic and taken place over a long time. The fiscal consolidation efforts that have sought to address that deterioration have been equally protracted. The long-term trend decline in public investment, which started already in the 1970s in many countries, has been one element in such consolidation efforts. EMU's fiscal rules, while also aimed to safeguard fiscal stability and sustainability, have not changed the consolidation and adjustment paths significantly one way or the other.

**Figure 4. Public capital less public debt (in percent of GDP).**



Sources: Kamps (2006), OECD.

<sup>8</sup> Figure 4 is subject to three 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, etc. Finally, the comparison above is purely mechanical and does not take into account how productive public capital is, i.e., what the true value is of governments' fixed assets.

<sup>9</sup> Although Figure 4 only shows observations from two years, they are representative of longer-term patterns. See Mehrotra and Vålilä (2006.).

### **3.2 Have innovative financing mechanisms for infrastructure rendered public investment less important?**

Section 2 above suggested that public investment has undergone a structural change in the old member states, where the downtrend in the ratio of public investment to GDP has either slowed or 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 and to thereby assess to what extent they may or may not have offset the decline in public investment.

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 and a half. 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. 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.

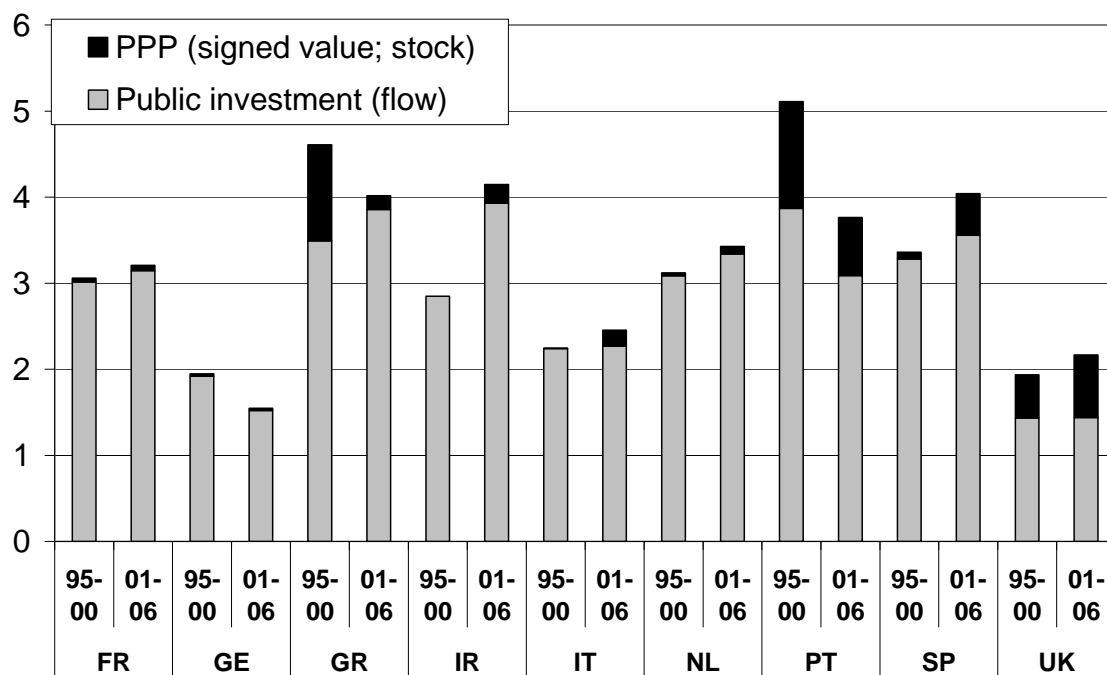
To get around this problem, the analysis below is based on micro-level data on individual projects structured as PPPs.<sup>10</sup> This approach allows us to get an aggregate picture of the extent of PPPs, even in the absence of macro-level data. However, the project-level data generally indicate only the total value of each project (a stock variable), but give no indication of the annual investment flows envisaged during the construction phase of the project.<sup>11</sup> This makes it difficult to assess exactly how much a particular project has contributed to aggregate investment, demand, and growth each year. One way to alleviate this problem is to compare average PPP transaction values to public investment flows during multi-year periods, as is done in Figure 5.

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<sup>10</sup> Further details pertaining to the database used can be found in a forthcoming Economic and Financial Report of the Economic and Financial Studies Division, European Investment Bank, EFR/2007-02, available at [www.eib.org/efs](http://www.eib.org/efs).

With these caveats in mind, let us turn to the assessment of the quantitative significance of PPPs. Figure 5 shows the average annual value of signed PPP contracts (a stock variable) and public investment (a flow variable), both relative to GDP, in those old EU member countries that have made most use of PPP procurement. The sample period is split into two, covering 1995-2000 and 2001-06 respectively, so as to help detect changes over time.

**Figure 5. Signed value of PPP contracts (stock) and public investment (flow), (in percent of GDP, period averages)**



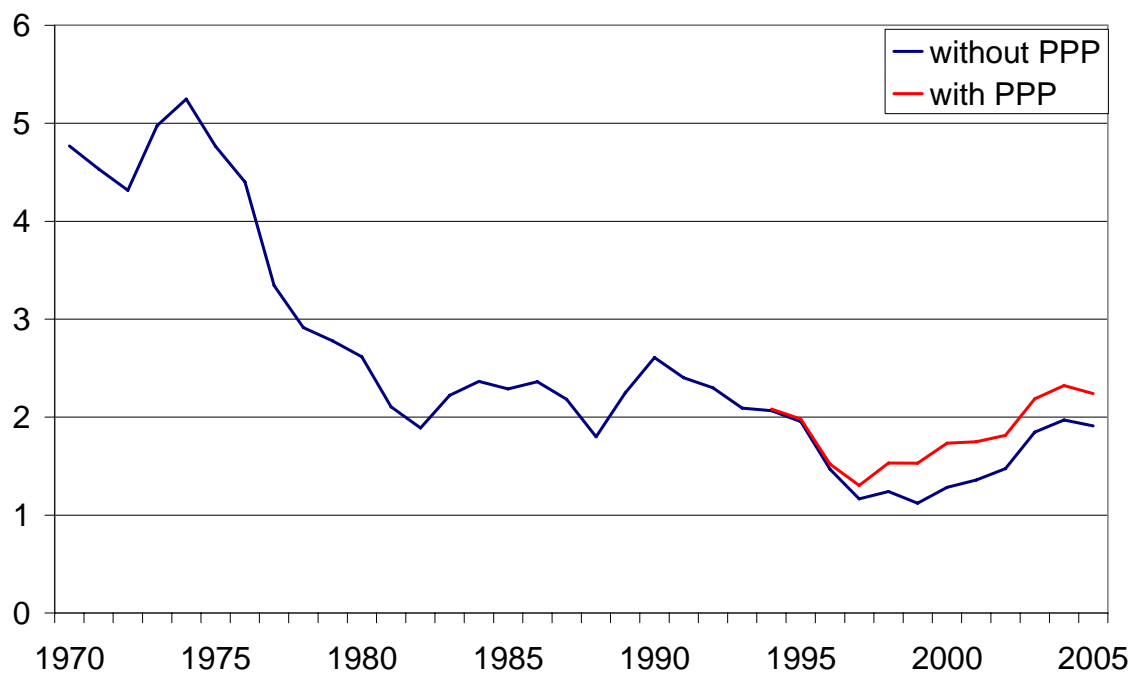
Sources: Eurostat; ProjectWare; HM Treasury; EirePPP; Infrastructure Journal; PriceWaterhouseCoopers.

The only countries where PPPs appear to have some persistent systemic importance are Portugal and the UK. In both countries the average signed value of PPP projects (total project value) amounts to 20-33 percent of average annual public investment flow. The UK alone accounts for more than half of the signed value of all PPP contracts within the EU. In the UK, where data on actual investment flows through PPP projects are available through HM Treasury, investment through PPPs has equalled 15—25 percent of total public investment in

<sup>11</sup> In other words, the data report only the financial commitment at project signature, which may differ significantly from actual investment flows that materialize 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.

the past years.<sup>12</sup> While investment through PPPs is thus of macroeconomic significance in the UK, such investment has not been so significant as to reverse the long-term downtrend in public investment, as illustrated in Figure 6.<sup>13</sup>

**Figure 6. Public investment with and without PPPs in the UK (in percent of GDP)**



Sources: OECD, HM Treasury.

In all other countries even the stock value of signed public-private partnership contracts is small compared to annual public investment flows. While PPPs seem significant in Greece, especially before the change of millennium, their macroeconomic and systemic significance has been limited by the small number of large-size individual projects. In contrast, countries such as Italy and Spain have had a relatively large number of PPP projects, but these have tended to be of small size, thus remaining of limited macroeconomic significance. Obviously, as a PPP framework has been developed only in recent years in several countries, the share of PPPs relative to public investment, as depicted in Figure 5, could well underestimate the long-run share of PPPs moving forward.

<sup>12</sup> The difference between the actual investment flow figure of 15-25 percent and the relationship between signed PPP values and public investment flows of 25-33 percent shown in Figure 5 can be taken as a measure of how much upward bias is left in the stock-flow comparison even after considering 5-year averages.

<sup>13</sup> In fact, Figure 6 exaggerates the impact of PPPs, as it double-counts capital expenditure through those PPPs that are booked on the public sector's balance sheet.

To sum up the findings about PPPs in financing infrastructure and public services, we have seen above that they have had persistent systemic significance from a quantitative perspective in just a few countries, notably Portugal and the UK. While qualitatively important innovations, PPPs have nevertheless not been significant enough to offset long-term trends in public investment.

#### **4. Composition of public investment**

The discussion has thus far focussed on aggregate public investment, as has virtually all public investment–related research in the European context. We know, however, that public sector investment projects cover a wide variety of undertakings, ranging from national highway networks to municipal recreation facilities. The economic role and impact of transportation networks is very different from swimming pools, to take but one example, so it would seem important to dig deeper and consider what aggregate public investment actually comprises.

To that end, Eurostat’s New Cronos database reports a breakdown of public investment (gross capital formation, including inventories) according to the functional classification of the United Nations’ System of National Accounts, also used in the 1995 version of European System of Accounts. That breakdown contains ten different classes of public investment, which we have re-grouped into four classes on the basis of their different economic characteristics. The four classes include:

- ‘Traditional infrastructure,’ most notably communications networks in both transportation and telecommunications;<sup>14</sup>
- ‘Human capital infrastructure,’ including investment in schools (education) and hospitals (health);
- ‘Public goods,’ including functions like defence, order and safety, public administration, and environment;

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<sup>14</sup> ‘Traditional infrastructure’ consists of ‘economic affairs’ in the more detailed breakdown which, in turn, includes functions like agriculture, mining, R&D, and others, alongside communications infrastructure. Those additional functions add undesirable ‘noise’ to what we label traditional infrastructure. While we cannot do better in the absence of a further breakdown, there are good reasons to believe that the size of public investment in transportation infrastructure dominates the other types of investment.



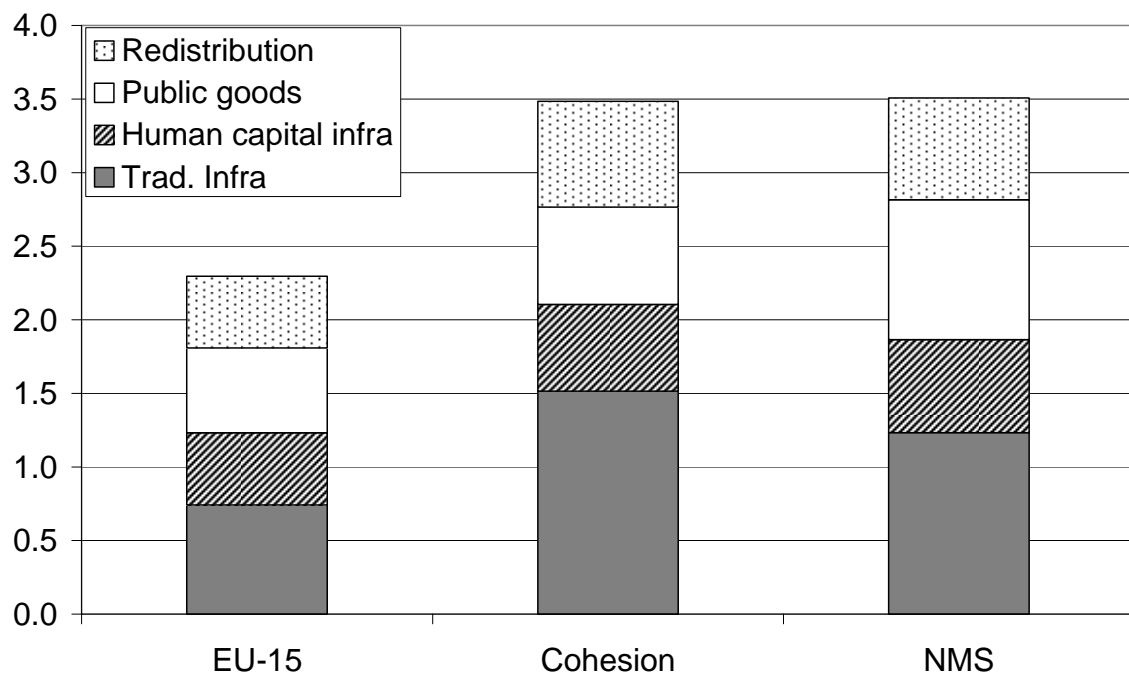
- 'Redistribution,' including social housing and protection, as well as recreational facilities.

Using this classification, Figure 7 shows the composition of public investment in the old EU member states (EU-15) as a group and separately for the cohesion countries, as well as for EU-8 (labelled NMS in the figure).

Two observations stand out from Figure 7. First, the share of infrastructure investment, including both traditional and human capital infrastructure investment, is on average about one-half of aggregate public investment in EU-15 and in EU-8, with a slightly higher share in the cohesion countries. This is striking, especially considering that 'public investment' and 'infrastructure investment' are often used synonymously in both theoretical and empirical literature. However, only half of public investment is directly economically productive in the sense implied by the literature, which has obvious implications for, e.g., empirical assessments of the direct growth impact of public investment and public capital.

The second, and related, observation from Figure 7 is that infrastructure investment, especially in traditional transport and other communications infrastructure, is in EU-8 somewhat higher than in old EU member states, but below the level in the cohesion countries. This links to the discussion at the end of Section 2, where it was pointed out that for the value of public capital stocks to converge between the new and old EU member states, the former would need significantly higher investment in flow terms than the latter. While it would be hazardous to draw far-reaching conclusions based on the composition of recent investment flows alone, one can nevertheless take Figure 7 to imply that the speed of convergence of economically productive public capital stocks between old and new member states has not been distinctly fast.

**Figure 7. Composition of public investment in groups of EU countries (in percent of GDP, GDP-weighted average 2000-05).**

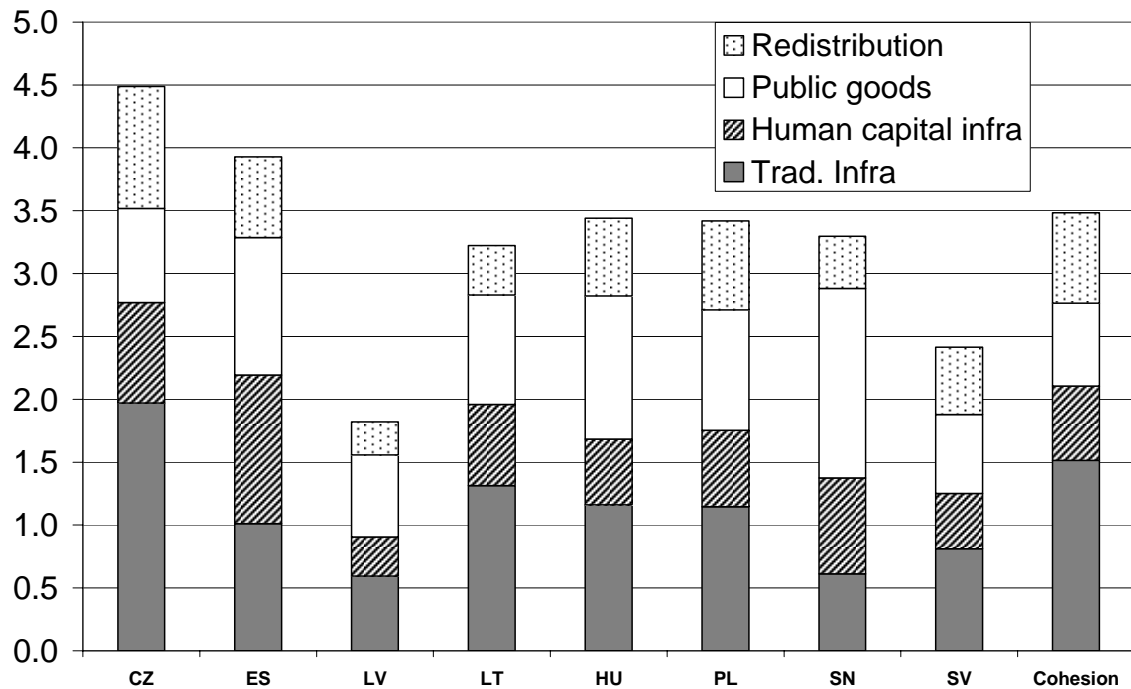


Source: Eurostat, own classification.

There are, again, big differences in the composition of public investment between individual EU-8 countries, as shown in Figure 8. At one end of the spectrum, the Czech Republic invests in public infrastructure even more than the cohesion countries. At the other end of the spectrum, Latvia and the Slovak Republic invest in public infrastructure no more or even less than old EU member states. On the other hand, a common feature for almost all EU-8 countries is the significance of investment in public goods, including defence, order and safety, public administration, and the environment. Barring the case of the Czech Republic, the share of public goods is more than one-quarter of aggregate public investment in EU-8 countries.<sup>15</sup>

<sup>15</sup> In a more detailed breakdown, the shares of defence, order and safety, public administration, and the environment in investment in public goods are roughly speaking equal in EU-8 on average. The share of public administration is slightly higher than the others, and to the extent that such investment is linked to the development of institutions necessary for a well-functioning market economy, such investment enhances long-term growth potential.

**Figure 8. Composition of public investment in EU-8 (in percent of GDP, average 2000-05).**



Source: Eurostat, own classification.

As is obvious from the brief discussion above, the study of the composition of public investment is only in its infancy. A better and more nuanced understanding of the role and economic impact of different types of public investment is of special policy interest for countries that face the oftentimes difficult balancing act between short-term fiscal prudence and calls for public investment to enhance their long-term growth potential. And that group of countries would seem to include all EU member countries, both old and new alike.

## 5. Conclusions

The interesting features about the long-term evolution of public investment have been its downtrend in old EU member states, bar the cohesion countries, and its volatility in new member states. The downtrend in the old member states cannot be traced back to EMU's fiscal rules *per se*, nor can it be explained by the emergence of innovative financing mechanisms for infrastructure, such as public-private partnerships. Rather, it is the result of drawn-out episodes of fiscal adjustment and consolidation, necessitated by long periods of unsustainable fiscal policies and deterioration of governments' net worth.

All this suggests for the new member states that the on-going build-up of their public capital stocks, especially infrastructure capital, requires the safeguarding of sufficient fiscal space to accommodate adequate public investment. As public-private partnerships can only offer limited support quantitatively speaking, public budgets remain the most important source of infrastructure finance. At the same time, the experience of old member states suggests that EMU's fiscal rules need not come with any automatic or inevitable suppression of public investment. Thus, the key challenge remains how to safeguard the productivity of public investment and public expenditure more broadly.

Put differently, safeguarding a sufficient level of public investment in general and infrastructure investment in particular is important, but safeguarding the quality of such investment is arguably even more important. This involves the complexities of project appraisal, selection, and management within the public sector. But that is another subject matter.

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