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Article

Composition of government investment in Europe: Some forensic evidence

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ABSTRACT

We set out to decompose government investment, seeking especially to estimate how much governments in Europe invest in infrastructure in general and transport infrastructure in particular. It is concluded that infrastructure accounts for about one-third of overall government investment in the EU on average, with the share of transport investment as high as 80 percent in government infrastructure investment. These shares have remained quite stable in the past decades, so government transport investment has not suffered from excessive swings, slides or sudden stops – at least relative to other types of government investment. Whether that has been economically optimal is an altogether different issue, to be addressed elsewhere.

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Composition of government investment in Europe: Some forensic evidence

1. Introduction

Investment activity by governments is a surprisingly tough nut to crack in terms of both concepts and data. To keep things simple, economists habitually use the concepts “public investment”, “government investment”, “infrastructure investment” and even “transport infrastructure investment” as synonyms. All of them are, presumably, considered as government contributions to the economy’s productive capital stock. In empirical work all those concepts are often measured as gross fixed capital formation of the general government.

This paper is all about showing that the cost of such simplicity is significant inaccuracy, both in theory and in practice. There is a world of difference between public investment and transport infrastructure investment, both conceptually and quantitatively. This being the case, an excessively casual attitude to concepts will result in significant measurement errors.

The empirical and policy implications of such measurement errors are obvious. If one wants to guide public policy about the desirability of additional transport investment, one should assess the productivity of investment in roads and the like. Measuring the productivity of transport investment jointly with schools, public running tracks in municipal woods or other government investment would not be very helpful for a policy maker looking for guidance on transport investment only.

Sorting out the concepts is reasonably easy, so we will not devote more than the latter part of this introduction to that task. Having defined the concepts we can set out to measure them in the remainder of the paper. The focus will be on decomposing government investment so that we can isolate the share of infrastructure in general and transport infrastructure in particular. That will allow us to document how big exactly the gaps between those concepts are.

But let us start by getting the terminology straight.

The first task is to get the concept “public investment” out of the way; after all, it is frequently and erroneously used to denote government investment. The public sector comprises the general government and entities in the corporate sector that are owned by the government, such as railway companies or power grid companies. Thus, public investment includes investment by the general government (*i.e.*, government investment) plus investment by government-owned corporations.

Against a commonly held belief, government ownership of an economic unit does not automatically imply that investment undertaken by that unit is government investment. Take publicly owned infrastructure companies, such as many utilities. Is investment by a publicly-owned utility recorded as investment by the government or corporate sector in national accounts statistics? Box 1 addresses this question. In brief, its conclusion is that the principal source of revenues, not ownership structure, dictates the recording. Investment by firms whose revenues from market sales cover more than half of their production costs is recorded as investment by the corporate sector, and all other investment is recorded as investment by the government sector.



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**Box 1. Government versus corporate infrastructure investment:
Example of an electricity grid company**

Consider investment in additional transmission capacity by a hypothetical electricity grid company. It is often thought that the recording of such investment depends on the ownership structure of the company. In other words, it is postulated that the investment should be classified as investment by the corporate sector if the grid company is (majority) owned by the private sector and as investment by the government sector if the grid company is (majority) owned by the government sector.

As specified in the 1995 version of the European Systems of Accounts (ESA 95), the criterion for classifying the investment relates to the sectoral classification of the grid company, which can be different from its ownership structure. Section 2 of ESA 95 defines as general government:

"... all institutional units which are other non-market producers whose output is intended for individual and collective consumption, and mainly financed by compulsory payments made by units belonging to other sectors, and/or all institutional units principally engaged in the redistribution of national income and wealth."

Key here is the distinction between market and non-market producers and production. Chapter 3 of ESA 95 defines non-market output as "output provided for free or at prices that are not economically significant". Economically significant prices, in turn, are by convention defined as prices that allow more than 50 percent of production costs to be covered by sales revenues.

In sum, our grid company is classified as a general government sector unit if and only if most of its production is non-market, with sales revenues accounting for less than one-half of production costs. Specifically, if the transmission fees the grid company collects cover less than half of the costs of producing the transmission service, the company belongs to the government sector in national accounts statistics, and any investment by it is classified as government investment.

Conversely, if the transmission fees cover more than half the costs, the grid company is classified as a corporate sector unit. Note that this is the case even if the grid company is fully owned by the government.

This principle illustrated by the grid company extends to investment undertaken by enterprises in other infrastructure sectors. Thus, the classification of investment by a railway company in rolling stock depends on its main source of revenues, not on its ownership structure.

**Government investment
is not the same
as infrastructure
investment.**

Second, consider the difference between government investment and infrastructure investment – a key distinction in what is to come. There is a fair amount of infrastructure investment that is not undertaken by the government, such as investment by commercially-run private and government-owned utilities mentioned above. Conversely, governments undertake many different types of investment, some of which can reasonably be called "infrastructure investment" (roads, say) but others not (public running tracks in the woods, already mentioned in passing above).

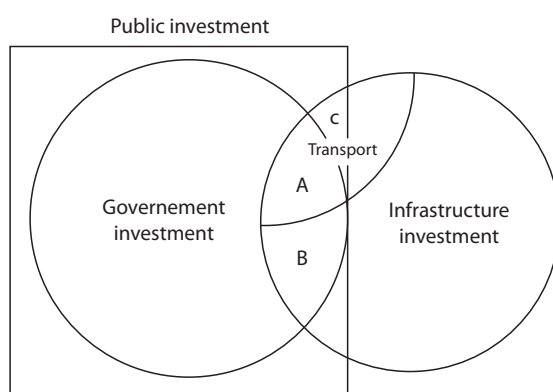
To illustrate, consider the Venn diagram in Figure 1. It shows two sets, government investment and infrastructure investment. (The relative sizes of the sets and sub-sets are not intended to reflect reality.) The rectangular universal set surrounding government investment is public investment, including also investment by government-owned corporations. One part of infrastructure investment is investment in the transport sector. The two sets overlap to some extent, but by no means fully.

In this paper we are especially interested in the intersection of the two sets. The first task, undertaken in Section 2 below, is indeed to quantify the intersection (A plus B), denoting infrastructure investment by the government. Having started to decompose government investment, one may as well go all the way and figure out what the remainder of it comprises (*i.e.*, government investment not included in A or B).

The aim is to decompose government investment.

Next, we seek to split the intersection A + B into A and B; that is, we seek to quantify the share of transport in government infrastructure investment. That is the topic of Section 3. To conclude Section 3, we also give a try at estimating A in relation to overall transport infrastructure investment.

Figure 1. Composition of government and infrastructure investment in a Venn diagram



Sections 2 and 3 both rely on data from the past decade and a half, so Section 4 extends the time perspective backwards and asks how the Venn diagram in Figure 1 has evolved over time. Or to put it more simply, Section 4 considers how the composition of government investment has changed over time.

It will turn out that it is no straightforward task to measure A or A plus B. (If it were, someone else would probably have written this paper a long time ago.)¹ That is why some novel forensic investigation – promised in the title – is necessary. That is also why we stop there and do not proceed to consider intersections such as C, denoting transport infrastructure investment by government owned corporations or, for that matter, to any normative analysis about the optimality of the observed investment levels. We will leave those issues to another Sherlock Holmes to tackle.

¹ However, there is improvement in sight as regards the data on especially government transport investment: A current task force organised by Eurostat has as its goal to produce data on government transport investment in the member states of the European Union that are comparable across countries. The publication of such data is some time away in the future, and until then the estimates offered below are among the very few in existence.

2. Composition of government investment²

This section presents the key stylised facts about the composition of government investment in the European Union. The underlying data are based on the functional classification of government expenditure in the 1993 UN System of National Accounts and in the 1995 European System of Accounts (ESA 95).³ The focus is therefore on the past decade or so; longer-term developments are discussed in Section 4. The section starts with a presentation of the functional classification, followed by a description of the stylised facts in EU-15 (old member states of the European Union) and subsequently in the new member states.

To be precise, “government investment” is shorthand for gross capital formation of the general government, which comprises the central and sub-national (regional, local) governments as well as social security funds. It includes changes in inventories, which may create some undesired noise for our analysis; however, the breakdown between gross fixed capital formation and changes in inventories is not available. Also, our variable is measured gross of consumption of fixed capital, but net of sales of fixed assets. The latter implies that government investment below does not exactly measure new investment alone.⁴

The functional breakdown of government investment thus defined is presented in Table 1. The right-hand side column shows the functional classification (Classification of Functions of Government, COFOG for short) in ESA 95 (Eurostat 2007). The left-hand side shows our own aggregation of the ten available “functions” into four types of government investment with economically distinct roles.

Table 1. Functional breakdown of government investment

<i>Aggregation</i>	<i>ESA 95 COFOG</i>
1. Infrastructure (INF)	Economic Affairs
2. Hospitals and schools (HS)	Health Education
3. Public Goods (PG)	Defence General Public Services Environment Order and Safety
4. Redistribution (RED)	Housing Recreation Social Protection

Source: Eurostat, own aggregation

Different types of government investment have different economic roles.

The four different types of government investment affect the economy through different channels, with varying degrees of directness, and over different time horizons. Government investment in infrastructure, consisting of just Economic Affairs in the ESA 95 COFOG, seeks to measure government investment in traditional infrastructure, mainly transport. This type of government investment has the most direct economic impact by reducing firms’ production and transaction

² This section draws on Kappeler and Väilä (2007), and Perée and Väilä (2008).

³ The data are available through Eurostat’s website at http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1090,30070682,1090_33076576&_dad=portal&_schema=PORTAL.

⁴ Gross (fixed) capital formation does not include ordinary maintenance of fixed assets, but it includes major improvements of fixed assets, such as rehabilitation of a road.

costs. The economic impact of government investment in health and education sectors is more long-term and less direct in character, as it facilitates the building up and maintenance of the economy's stock of human capital. Investment in public goods affects the economy's allocative efficiency indirectly through framework conditions for productive activity. Finally, redistribution affects the economy's income distribution rather than allocative or productive efficiency *per se*.

Government investment in infrastructure ("Economic Affairs", illustrated by the intersection A plus B in Figure 1) will be the focus of Sections 3 and 4. It comprises a number of different sectors, including Agriculture; Fuel and energy; Mining, Manufacturing and construction; Transport; Communication; R&D; and others. Among these sectors, Transport is likely to be by far the dominant recipient of government investment; exactly how dominant it is will be the topic of Section 3.

In addition to infrastructure investment, some other aggregates shown in Table 1 contain undesirable "noise" as no further breakdowns of the right-hand side "functions" are available. For example, government investment in water supply and wastewater management are not part of infrastructure as one would wish; instead, they are part of redistribution (Housing) and public goods (Environment), respectively. Similarly, one would wish to include street lighting in public goods; now it is included in Housing, and thereby redistribution.

It is important to acknowledge that investment by companies owned by the government sector but run on a commercial basis is not included in our data, as explained in Box 1. For example, investment by energy companies owned by the government sector is not included in government investment in infrastructure; rather, it is classified as corporate investment in national accounts statistics as long as such companies are commercially run. Note that government transfers to such companies to finance their infrastructure investment are also not included.

Investment by commercially-run companies, even when state owned, is classified as corporate-sector investment.

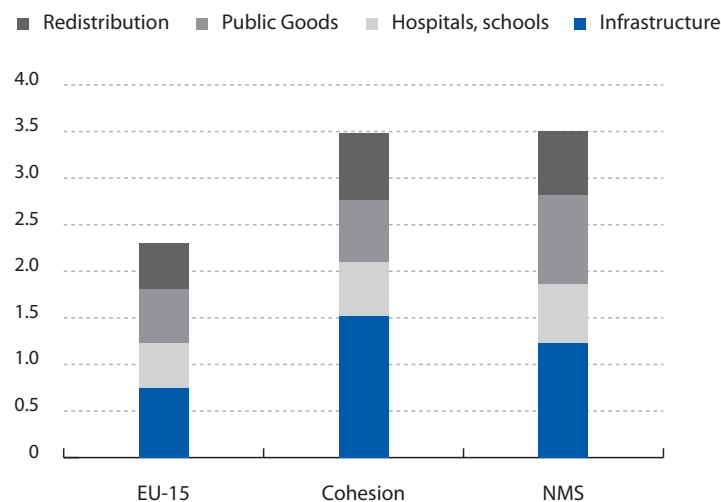
Similarly, when comparing the data across countries, it is important to bear in mind that the institutional framework for providing public services differs between countries. Thus, water or sewage networks may belong to municipalities in one country and to commercially run companies in another country. In the former case they would be included in our data, in the latter case they would be excluded from them.

With these caveats in mind, and following the classification presented in Table 1, Figure 2 shows the breakdown of government investment in EU-15 as a group; separately in the cohesion countries (Greece, Ireland, Portugal and Spain); and also in the new member states (NMS).

Two observations stand out from Figure 2. First, the share of government investment in infrastructure is on average about one-third of aggregate government investment in EU-15 and in NMS, but higher (40 percent) in the cohesion countries. This is striking, especially considering that "government investment" and "infrastructure investment" are often used synonymously in both theoretical and empirical literature. If we include investment in hospitals and schools, which is sometimes considered part of an economy's infrastructure broadly defined, we still only get to one-half of total government investment.

The second, and related, observation from Figure 2 is that infrastructure investment in NMS is somewhat higher than in old EU member states, but below the level in the cohesion countries. While it would be hazardous to draw far-reaching conclusions based on the composition of recent investment flows alone, one can nevertheless take Figure 2 to imply that there has not been any obvious convergence of economically productive government capital stocks between the new member states and especially the cohesion countries.

Figure 2. Composition of government investment in groups of EU countries (in percent of GDP, GDP-weighted average 2000-05)



Source: Eurostat, own classification

Considering the individual countries of EU-15, Figure 3 depicts the composition of government investment as per the aggregation presented above. There are some striking differences between countries; for example, the level of investment in infrastructure in Ireland, Luxembourg and the Netherlands is as much as four times that in Austria, Denmark, France or the United Kingdom (top panel). Government investment in hospitals and schools in Greece is some four times the level in Austria and Belgium. Luxembourg has four times the level of government investment in public goods compared to Austria, Denmark and Germany. Finally, government investment in redistribution in France and Luxembourg is six times that in Austria and the United Kingdom.

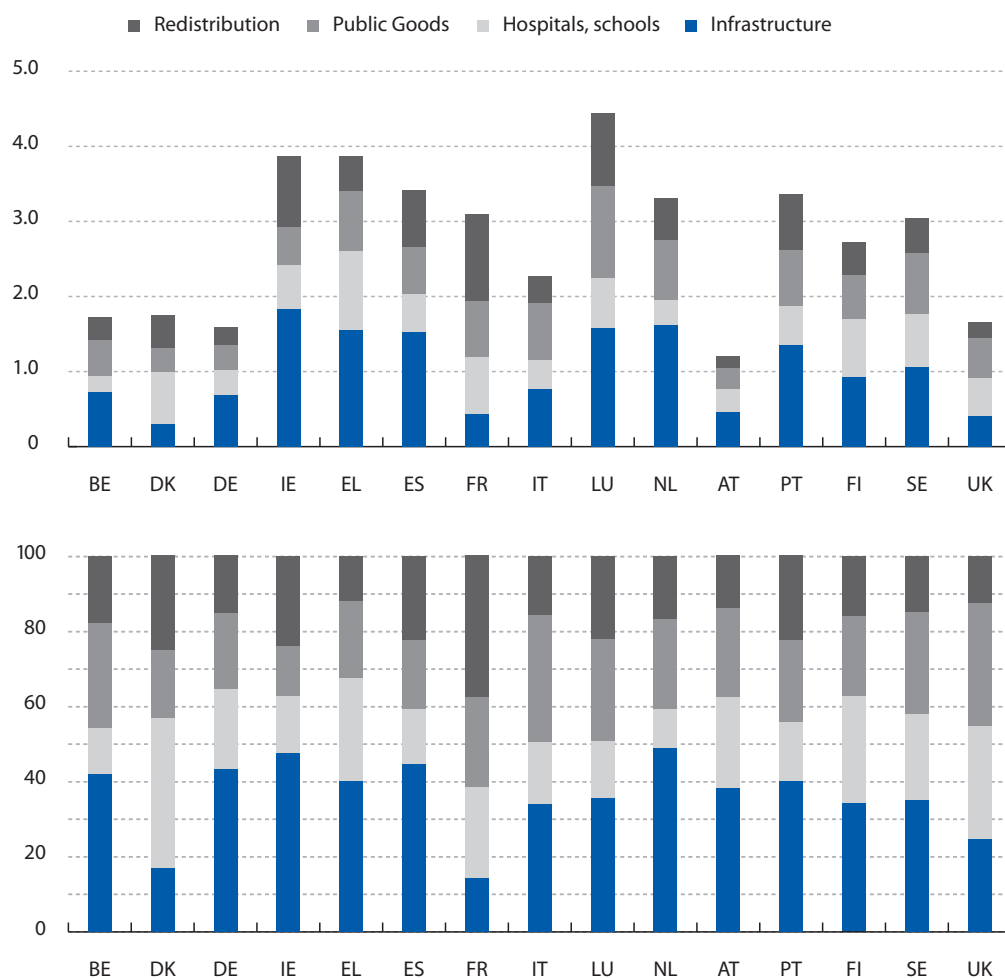
Again, it should be emphasised that some of these cross-country differences reflect differences in the institutional set-ups for providing public services, with similar investment classified in one country as government and in another one as corporate sector investment. Therefore, the cross-country differences should not be interpreted as differences in the level of total investment in the various services; rather, they should be interpreted as differences in the government component of such investment only.

Infrastructure accounts for one-third of government investment in Europe.

In terms of shares of total government investment (bottom panel in Figure 3), we note that infrastructure accounts on average for about one-third, and hospitals and schools account for another 20 percent. Public goods and redistribution account for about one-quarter each.

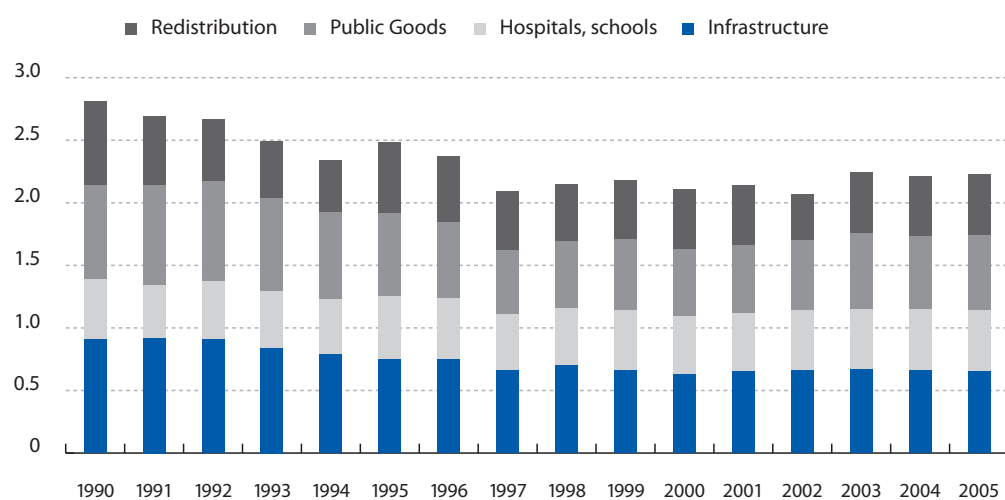
Figure 4 shows the evolution over time of the level and share of the different types of government investment. Overall, government investment in EU-15 has declined from 2.7 percent of GDP to just over 2 percent of GDP since 1990. The shares of the different types of government investment in overall government investment have remained reasonably stable over time. This suggests that both the trend decline in government investment and the cyclical ups and downs have hit the various types of government investment relatively evenly in the past decade and a half.

Figure 3. Composition of government investment in EU-15, average 2000-05
(Top panel: In percent of GDP. Bottom panel: As share of total)



Source: Eurostat, own classification

Figure 4. Evolution of government investment by type, EU-15



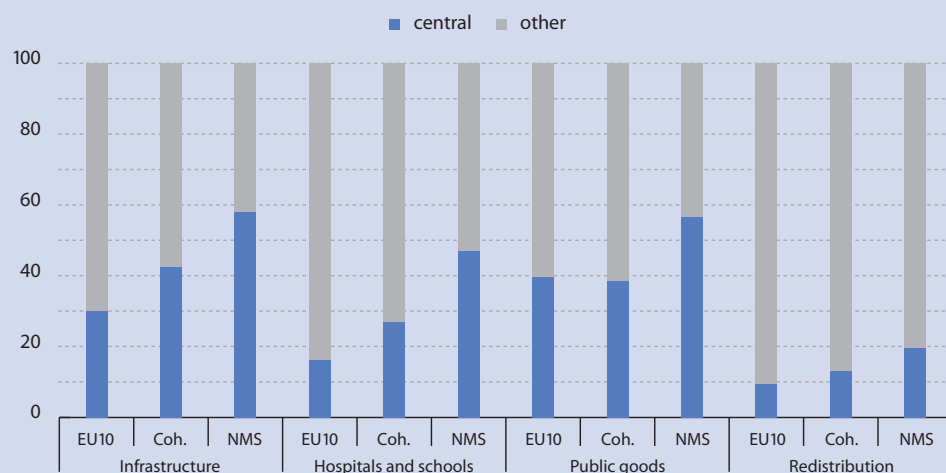
Source: Eurostat, own classification

Having described how the composition of government investment has varied between EU-15 countries and over time in the recent past, it is natural to ask what can explain such differences. Box 2 reports the results of a study into how the composition of government investment depends on the system of fiscal federalism, concluding that fiscal decentralisation tends to boost economically productive government investment, such as infrastructure.

Box 2. Composition of government investment and fiscal federalism

There are significant differences across European countries with regard to the level of government that provides a certain public service. Figure B1 shows the shares of the central and sub-national (regional, municipal) governments in the components of government investment identified in the main text. The figure suggests that the share of the central government is greater in all types of government investment in the new member states than in the old ones. In all three country groups the share of the central government is greatest in government investment in infrastructure and public goods, while it is smallest in redistributive government investment.

Figure B1. Government investment by type and level of government
(in percent of total; average 2000-05)



Source: Eurostat, own calculations

A study by Kappeler and Väilä (2007) seeks to disentangle the role of fiscal federalism in explaining the composition of government investment in EU-10 (EU-15 less the cohesion countries and Luxembourg). This box summarises the conceptual underpinnings and the empirical results of that paper.

Starting with the conceptual underpinnings, the traditional economic literature on fiscal relationships between different levels of government emphasised the distinction between local and global benefits from government spending. The benefits of, say, investment in a municipal sports facility accrue chiefly to the local population. In contrast, the benefits of national defence accrue to the population at large. There are also intermediate cases, like motorways, whose benefits can accrue locally, regionally, and also nationally.

If the system of fiscal federalism changes – if for example spending power is decentralised from the central government to lower levels of government – one can easily see how the composition of government investment would change in this framework. Decentralisation would lead to more investment yielding local benefits, possibly at the cost of investment yielding country-wide benefits. Decentralisation would thus lead to more sports facilities and fewer military installations.

More recent literature on fiscal federalism has focussed on the interdependencies in public policy decisions between sub-national units (regions for short, but the analysis applies equally well at municipal level). Consider regional tax competition. Regions compete against one another in order to attract firms and productive capital. If the competition concerns tax rates, such regional tax competition can result in a “race to the bottom”. With low tax rates and low tax revenues, regions’ ability to provide public services and to undertake investment projects is limited. Thus, in competing for the location of firms, regions may reduce their tax rates to such an extent as to unduly suppress government investment.

But regional competition can also be about government spending. Good regional infrastructure (a “public input”) reduces production costs for private firms and may be more important for their location decisions than rock-bottom tax rates. In the extreme, this type of regional competition may induce regions to over-invest in infrastructure serving firms, at the cost of more consumption-oriented government spending such as sports facilities. This can also generate distortions in the composition of government expenditure, with decentralisation leading to an over-supply of government infrastructure and an under-supply of local public goods.

To see how fiscal decentralisation actually affects the composition of government investment in the European context, the study by Kappeler and Vällilä conducts two empirical analyses. First, the impact of decentralisation on the level of each type of government investment is estimated. Second, the impact of fiscal decentralisation on the share of each type of government investment in total government investment is estimated.

Decentralisation in these analyses is measured as the share of taxes accruing to sub-national governments in relation to the overall tax intake of the general government. The country sample used in the analysis is EU-10, and the sample period is 1990-2005.

The key results of these analyses are summarised in the table below. It shows the signs of the estimated coefficients for the decentralisation variable (sub-national tax share) in both levels and share analyses. A plus indicates that more decentralisation is associated with higher overall government investment of the type in question. A zero indicates a statistically insignificant relationship between decentralisation and government investment, while a minus indicates that more decentralisation is associated with less government investment.

	INF	HS	PG	RED	TOTAL
Level	+	+	+	0	+
Share	0	+	0	-	

Decentralisation thus increases the level of government investment in total, and of the components it increases investment in infrastructure (INF); hospitals and schools (HS); and public goods (PG). Decentralisation does not affect the level of redistribution investment. In terms of shares in total government investment, decentralisation increases the relative share of investment in hospitals and schools, at the cost of investment in redistribution. Note, however, that although the relative share of redistribution investment declines with decentralisation, its absolute level does not.

The result that decentralisation reduces the share of redistribution investment is difficult to reconcile with the traditional theory of fiscal federalism reviewed earlier. The redistribution variable is meant to capture consumption-oriented local public goods, such as recreational facilities, and the traditional view predicted that decentralisation should lead to an increase, not relative decline, in their provision.

In contrast, the results can be more readily interpreted in view of the newer thinking emphasising broader fiscal competition among sub-national units. Decentralisation increases the level of investment in especially infrastructure as well as hospitals and schools, all providing “public inputs” for private firms. What is more, the increase in investment in hospitals and schools suppresses the share of investment in redistribution, suggesting that decentralisation leads to a relative decline in consumption-oriented government investment.

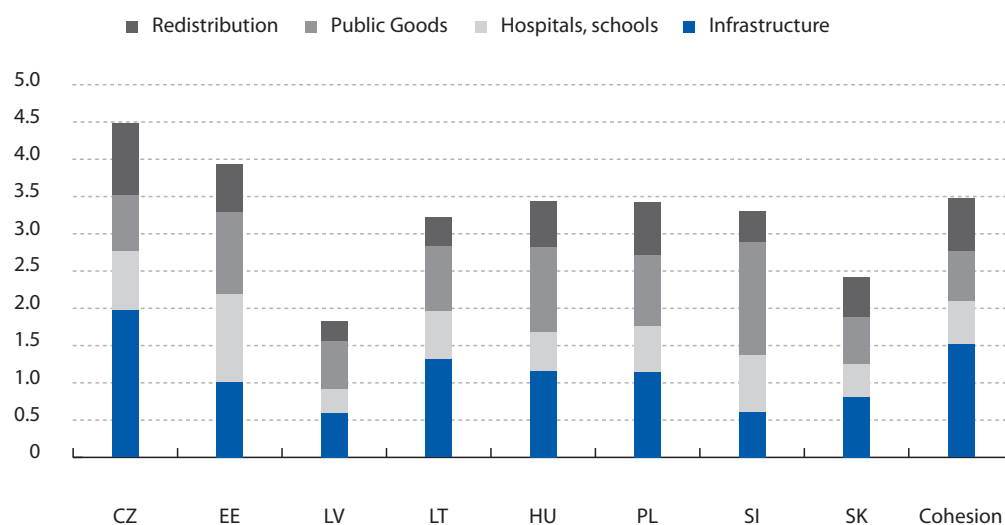
It is noteworthy that decentralisation does not lower the level of any type of government investment. This being the case, there is no evidence of decentralisation being associated with tax competition that would have a detrimental impact on the overall level of government investment.

A common feature for the new member states is the significance of investment in public goods.

We now turn to a description of the composition of government investment in the new member states for which data are available. There are, again, big differences in the composition of government investment between individual NMS, as shown in Figure 5, which also contrasts the composition of government investment in NMS to the cohesion countries. At one end of the spectrum, the Czech Republic invests in government infrastructure even more than the cohesion countries. At the other end of the spectrum, Latvia and the Slovak Republic invest in government infrastructure no more or even less than old EU member states. On the other hand, a common feature for almost all NMS is the significance of investment in public goods, including defence, order and safety, public administration and the environment. Bar in the Czech Republic, the share of public goods is well in excess of one-quarter of aggregate government investment in NMS,⁵ compared to one-fifth in the cohesion countries and about one-quarter in other EU-15 countries.

5 In a more detailed breakdown, the shares of defence, order and safety, public administration, and the environment in investment in public goods are, on average, roughly speaking equal in the eight new member states shown in Figure 5. 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 5. Composition of government investment in new member states (in percent of GDP, average 2000-05)



Source: Eurostat, own classification

To conclude this section, let us summarise some key stylised facts of the composition of government investment in Europe. On average, a third is infrastructure investment and another 20 percent investment in hospitals and schools. These two types of government investment, accounting for half the total, are productive from an economic perspective, reducing firms’ costs and boosting human capital. The other half of government investment is roughly evenly split between public goods and redistribution, as defined in this section.

Half of government investment is directly economically productive.

As regards differences across country groups, the share of government investment in hospitals and schools as well as redistribution is higher in the old member states (EU-15) than in the new ones. NMS have the biggest share of investment in public goods. In turn, the cohesion countries have – at 40 percent – by far the highest share of infrastructure investment.

3. Government infrastructure investment

Having broken down government investment into four economically different categories above, this section zooms in on one of them – government infrastructure investment (“Economic Affairs”, or the intersection A plus B in Figure 1) – seeking to decompose it further. We saw that infrastructure is the single biggest component of government investment in Europe; however, we also saw that it comprises a bewildering array of investment, ranging from roads to government agricultural investment. Our prior was that transportation investment dominates government infrastructure investment; in this section we set to test that prior.

Before assessing the share of transport in government infrastructure investment (that is, to figure out the share of A), Box 3 takes a detour around the globe and compares government infrastructure investment in Europe to that in Japan and the United States. In sum, government infrastructure investment remains relatively much more dominant in Japan than in Europe or the United States.

Box 3. Government investment in “Economic Affairs” in the EU, Japan and the United States

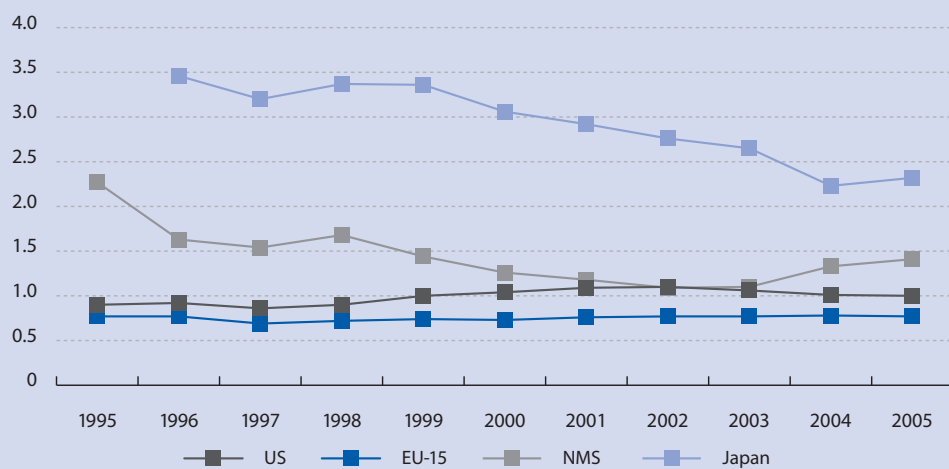
The classification of government expenditure by functions (COFOG) in the European System of Accounts (1995) discussed in Section 2 is based on the United Nations’ System of National Accounts (1993); consequently, a similar breakdown as presented for European countries is also used in countries outside Europe. That allows us to compare the level and evolution of government investment in “Economic Affairs” (infrastructure for short) in Europe with Japan and the United States.

The Figure B2 shows that the current level of government infrastructure investment is lowest in EU-15 at about 0.8 percent of GDP, a third of the level in Japan. In the United States the government sector invests some 1 percent of GDP in infrastructure, while in the new member states of the EU the figure is 1.5 percent of GDP.

As mentioned in the main text, some of the cross-country differences reflect simply different institutional set-ups for providing infrastructure services. In addition, it is important not to confuse quantity with quality: These figures tell us something about the relative size of annual investment flows from public sources, but how productive that investment is is an altogether different matter.

Further on Figure B2, we see that government infrastructure investment has remained remarkably stable over the past decade or so in EU-15 and the United States, while there has been a marked downtrend in Japan, related to the winding down of the drawn-out fiscal stimulus of the 1990s. In the NMS, government infrastructure investment was on a downtrend until a few years ago, halving in magnitude relative to GDP. However, the past few years have seen a reversal of that downtrend.

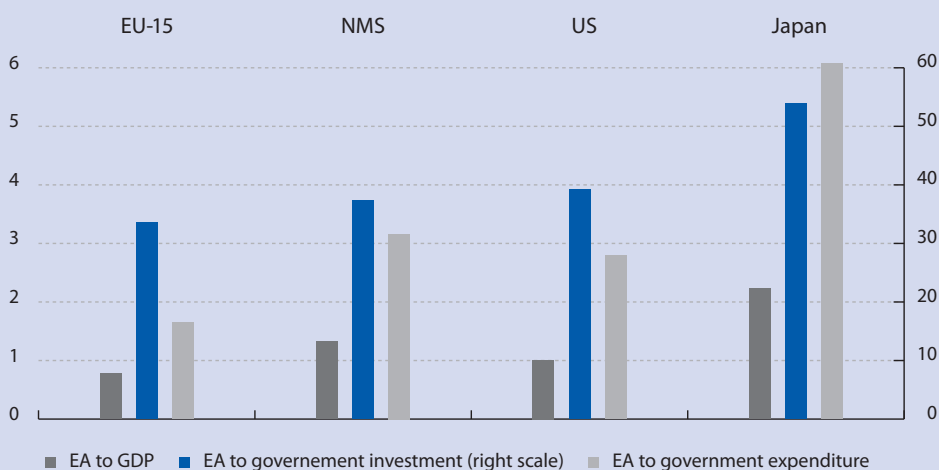
Figure B2. Government investment in “Economic Affairs” (in percent of GDP; GDP-weighted average for EU-15 and NMS)



Source: Eurostat, OECD, own calculations

To broaden the perspective, Figure B3 compares government infrastructure investment not only to GDP but also to total government investment and total government expenditure. Infrastructure investment is the dominant component of overall government investment in Japan, with a share of some 55 percent. In Europe and in the United States that share is lower at between 30 and 40 percent. In relation to total government spending infrastructure investment accounts for 6 percent in Japan, roughly half of that ratio in NMS and the United States, and one-quarter in EU-15.

Figure B3. Government investment in “Economic Affairs” (2004, in percent)



Source: Eurostat, OECD, own calculations

In sum, while on a downtrend, government infrastructure investment remains relatively much more dominant in Japan than in Europe or the United States. Especially in the old member states of the EU infrastructure investment is at a relatively modest level. That is, however, not necessarily bad; to assess the economic (sub-) optimality of the current levels of government infrastructure investment one would need to know how productive such investment is.

The decomposition of government investment in “Economic Affairs” is no straightforward matter. In principle, there exists a further breakdown of aggregate government investment by function of government. The first-level breakdown presented in Section 2 is supplemented by a second-level breakdown, comprising more narrowly defined “functions” such as transport. However, submission of data according to the second-level breakdown by national statistical agencies to Eurostat is voluntary, and only a few countries have so far provided such data.⁶

It is not straightforward to decompose government infrastructure investment.

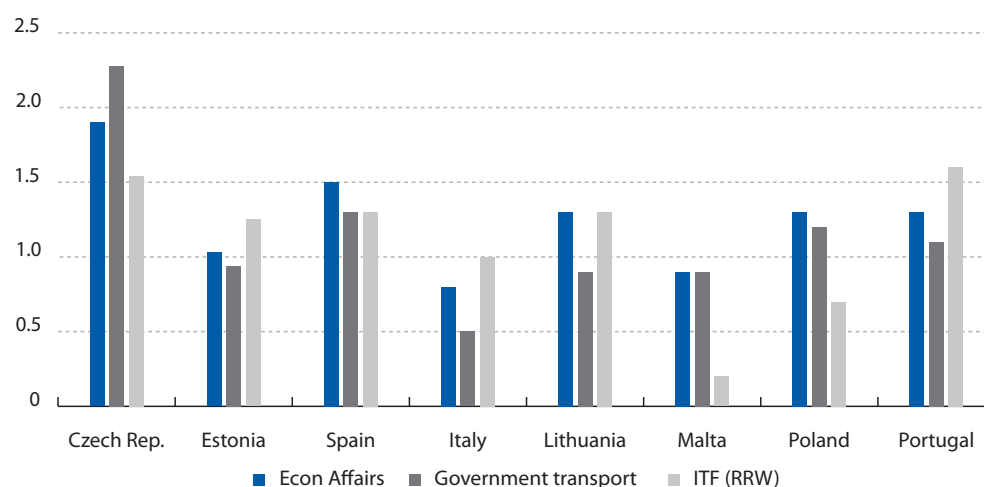
To decompose government investment in “Economic Affairs” we therefore have to rely on proxies. This will obviously limit the comparability of data across countries and over time which, in turn, means that the results below should be interpreted with some caution. Details about the data sources for constructing proxies and the caveats involved in that exercise are given in the Annex.

⁶ In addition, some transport-related public investment may not be reported under Transport in Economic Affairs but, instead, under individual government ministries unrelated to transport activities, such as ministries for a certain geographical area. Such investment is excluded from our data.

The share of transport in government infrastructure investment has to be estimated using proxies.

Alongside government investment in “Economic Affairs” as a benchmark, Figure 6 shows the existing “hard data” on government transport investment (level-two breakdown of government investment by function) for the few countries where such data are directly available.⁷ Figure 6 also presents our first proxy for government transport investment, based on data from the International Transport Forum (ITF). Those data cover transport investment in road, rail and inland waterways (RRW). A comparison of the ITF data on these three sub-sectors with the “hard data” gives an indication of how good a proxy it is. In principle, we would expect government investment in “Economic Affairs” to be higher than both the ITF-based proxy and the hard data on government transport investment.

Figure 6. Government investment in Economic Affairs; of which transport; and comparison with International Transport Forum data (in percent of GDP, average 2000-05)



Sources: Eurostat, International Transport Forum (ITF)

Two conclusions can be drawn from Figure 6. First, transport accounts for well over 80 percent of government investment in “Economic Affairs” on average. Second, the ITF data on investment in road, rail and inland waterway infrastructure is close to government transport investment on average, with some exceptions. In the case of Portugal the ITF data appear to include a great deal of corporate transport investment (presumably PPP roads) as well, while in Poland and, especially, Malta the ITF data only capture part of government transport investment.

A possibly important discrepancy between the government transport investment and ITF data concerns the railway sector. In many countries railway companies cover the bulk of their operating costs from market sales (passenger and cargo charges), so they are considered corporations and not government-sector units. However, governments frequently extend transfers to railway companies to finance their infrastructure investment. In such cases the ITF data would capture railway infrastructure investment, while our data on government transport investment – which excludes transfers – would not. As a result, the ITF figures would be higher, *ceteris paribus*. We cannot, however, quantify the importance of this source of discrepancy using aggregate data sources.

The second comparison, shown in Figure 7, involves mixing data from two different classifications of functions of government. Government investment in “Economic Affairs” (ESA 95) is compared with a proxy for government transport investment obtained from the classification used in ESA 79,

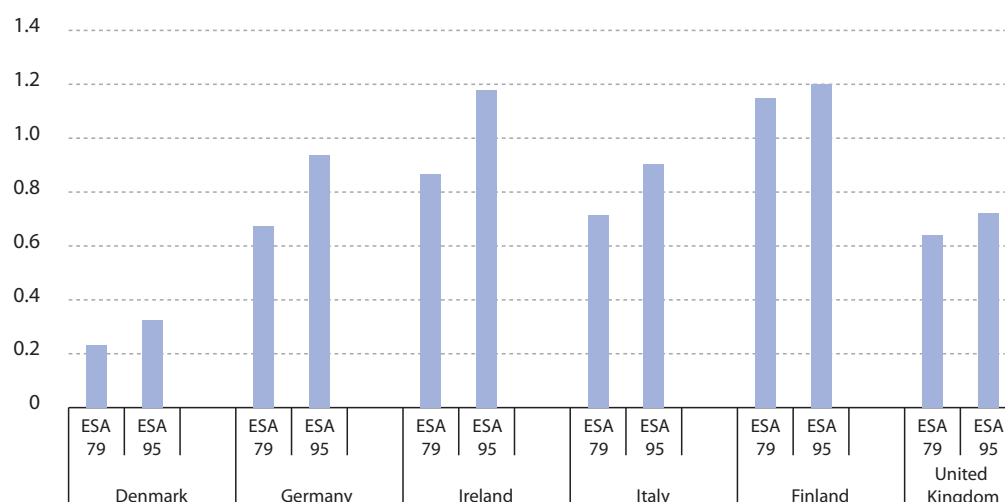
⁷ As noted earlier, these data exclude infrastructure investment by government-owned corporations financed through government transfers. This is especially relevant in the railway sector.

the predecessor of ESA 95. The functional classification in ESA 79 is described in detail in Section 4; suffice it to say here that it included Transportation and communication as a function in its own right. Given that most investment in communication has even historically been undertaken by the corporate sector, we consider government investment in Transportation and communication from the ESA 79 as a reasonable proxy for government transport investment.

Figure 7 shows a comparison of government investment in Economic Affairs (ESA 95) and government investment in Transportation and communication (ESA 79) for those countries and time periods where both are available for at least three overlapping years. It is, in general, not advisable to mix data based on different accounting standards. Rather than drawing any far-reaching conclusions, we therefore just note, based on Figure 7, that government investment in Transportation and communication in ESA 79 has been for the sampled countries some 70 to 90 percent of government investment in “Economic Affairs” in ESA 95.

Transport accounts for some 80 percent of government infrastructure investment.

Figure 7. Government investment in Transportation and communication (ESA 79) versus government investment in Economic Affairs (ESA 95) (in percent of GDP, average 1990-95)



Source: Eurostat, own calculations

Note: Only countries with at least three overlapping observations are included. The observation period is 1991-95 for Germany and 1993-95 for Finland.

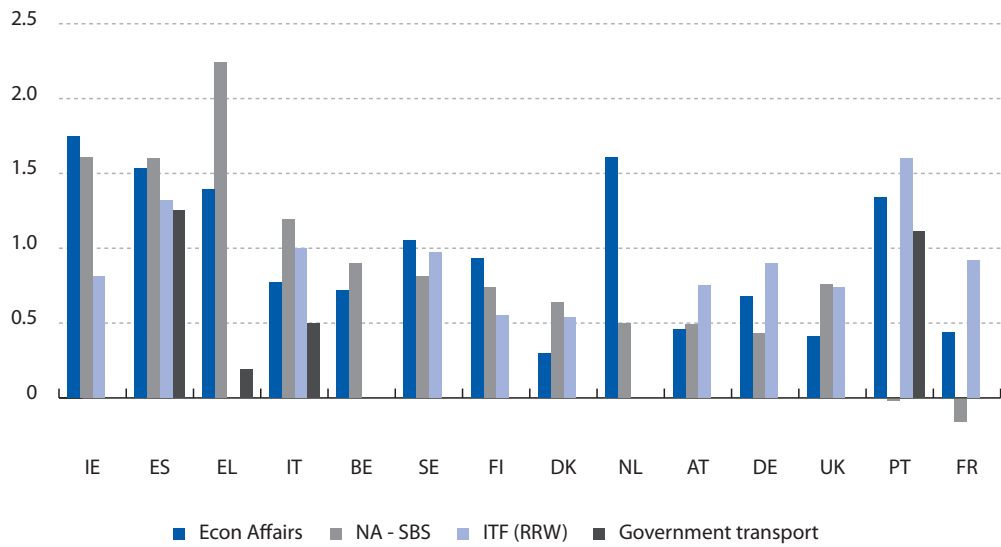
Figures 8 and 9 present a third proxy for government transport investment, as well as a summary comparison of all variables based on ESA 95. Again, government investment in “Economic Affairs” is shown as a benchmark for these proxies. The new proxy – which is available for most EU countries – is obtained by subtracting Transport, storage and communication investment as recorded in the Structural Business Statistics from total economy investment in Transport, storage and communication, as recorded in the national accounts. The former proxies corporate investment in Transport, storage and communication, and if we subtract it from total economy investment, we obtain a proxy for government investment in Transport, storage and communication. Given that most of storage and communication investment is undertaken by the corporate sector, the subtraction described above leaves us with a proxy of government transport investment.

In principle, we would expect that this proxy for government transport investment should be close to the ITF-based proxy as well as hard data on government transport investment for those countries where they are available. All these figures should be smaller than government investment in “Economic Affairs”.

The proxies are subject to caveats.

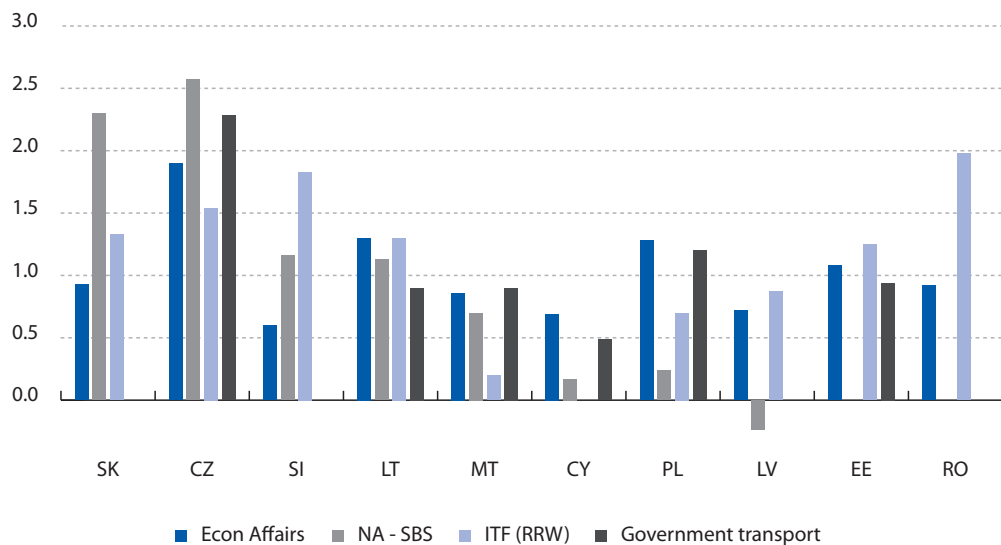
In practice, there are only a few countries where these relationships hold exactly. Lithuania comes closest, and there is a reasonable match in Sweden and Finland. There are some striking mismatches for a number of countries – e.g., government investment in “Economic Affairs” falling well short of our proxies for government transport investment in some cases. In addition, the last proxy derived by subtracting Structural Business Statistics data from national accounts data varies much more between countries than any of the other indicators considered, sometimes even turning negative, suggesting that the caveats listed in the Annex about the coverage and comparability of these datasets need to be taken seriously.

Figure 8. Proxies for government transport investment, old member states (in percent of GDP, average 2000-05)



Source: Eurostat, ITF, own calculations

Figure 9. Proxies for government transport investment, new member states (in percent of GDP, average 2000-05)



Source: Eurostat, ITF, own calculations

Nevertheless, Figures 8 and 9 suggest some reasonably uncontroversial conclusions. First, transport accounts for roughly 80 percent of government investment in “Economic Affairs”. In the countries with hard data on government transport investment, that share is 88 percent. In both old and new member states, the ITF-based proxy is on average higher than government investment in “Economic Affairs” – suggesting the presence of corporate sector transport investment in the ITF data (notably in the railway sector). In countries where the ITF-based proxy is below government investment in “Economic Affairs”, it amounts to good 70 percent of the latter. The proxy derived by subtracting Structural Business Statistics data from national accounts data is on average quite close to government investment in “Economic Affairs” in both old and new member states. Considering only countries with this proxy below government investment in “Economic Affairs”, their average share is about 60 percent.

Second, the level of government transport investment varies by country groups, with individual cohesion countries in the range 1 – 1.5 percent of GDP; other old member states at 0.5 – 1 percent of GDP, and new member states at 0.5 – 2 percent of GDP.

In other words, the share of transport in overall government investment is on average and roughly speaking one-quarter in the old member states of the EU; one-third in the cohesion countries; and between one-quarter and one-third in the new member states.

Transport accounts for one-quarter to one-third of overall government investment.

In a way to conclude this section, Box 4 seeks to put the estimated government transport investment into perspective and relate it to overall transport infrastructure investment in Europe. Linking back to the Venn diagram in Figure 1, Box 4 seeks to relate the intersection A to overall transport infrastructure investment.

Box 4. Government investment in overall transport infrastructure investment

A key conclusion of Section 3 is that transport accounts on average for some 80 percent of government investment in “Economic Affairs”. The aim of this box is to put that finding in a broader perspective by relating government transport investment to overall transport investment in EU member states.

The task is obviously not straightforward and involves a few courageous assumptions and cutting some corners. The first assumption is that transport does indeed account for 80 percent of government investment in “Economic Affairs” in all EU countries. This assumption allows us to calculate country-specific estimates for government transport investment.

Estimating overall transport investment in each country is more complicated. As mentioned in the main text, the national accounts statistics lump investment by the transport sector together with storage and communication investment. While the ITF data are well-focused on transport investment, they are for many countries a better proxy for government than overall transport investment. And the investment data in the Structural Business Statistics has the same drawback as all data that are based on a sectoral classification: They measure all investment, not just investment in transport infrastructure assets, by all companies who report transport sector as their main activity.

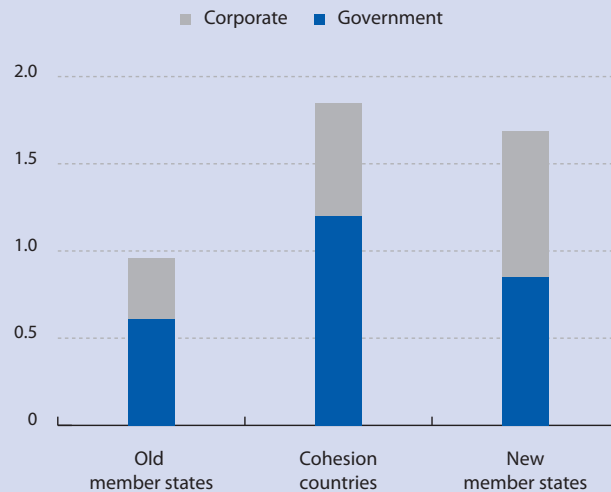
To get an estimate of total economy investment in transport infrastructure, we adopt a different perspective and consider the production of, rather than investment in, transport infrastructure. The Structural Business Statistics report for each country the annual “production value” of a sample of companies whose main activity is in the construction of transport

infrastructure. This production value serves as a proxy for gross capital formation in transport infrastructure assets.

This estimate is, of course, subject to major *caveats*. First, we cannot know how well the reported production value of, *e.g.*, road construction companies, proxies the formation of road assets. Second, the data cover the construction and, to some extent, maintenance of highways, roads, railways, airfields, waterways, ports as well as sports facilities but not, *e.g.*, bridges and tunnels. So the difference between sports facilities (which we would wish to exclude) and bridges and tunnels (which we would wish to include) introduces an error to the estimate.

Bearing these caveats in mind, Figure B4 shows our best estimate of government transport investment in relation to the construction value of transport infrastructure.

Figure B4. Construction value of transport infrastructure assets and estimated government sector share therein (GDP-weighted averages 2000-05, in percent of GDP)



Source: Eurostat, own calculations

Note: Old member states include Austria, Belgium, Finland, France, Italy, Luxembourg, the Netherlands, Portugal, Spain and the United Kingdom. Cohesion countries include Portugal and Spain. New member states include Cyprus, Estonia, Latvia, Lithuania, Malta, Poland, Romania, the Slovak Republic and Slovenia.

As regards the construction value of transport infrastructure, we see that at some 1 percent of GDP on average, the old member states are well below the cohesion countries (1.8 percent of GDP) and the new member states (1.7 percent of GDP).

The share of the government sector is above 60 percent in the old member states and cohesion countries, while it is at 50 percent in the new member states. These differences reflect differences in assets built (railways tend to be government while airports or ports are more often private), and also differences in the institutional set-up for providing infrastructure assets. Take Austria, where the government share is lowest among the old member states (30 percent). The Austrian network of motor- and expressways is controlled by ASFINAG, which is state owned but classified outside the government sector. Investment by ASFINAG would therefore be recorded as corporate sector investment and not part of government transport investment, explaining the seemingly low share of government in overall transport infrastructure investment.

4. Composition of government investment and government infrastructure investment pre-1990s

This section presents developments in the composition of government investment in a longer time perspective, again with a special focus on transport. As explained in Section 2, the system of national accounting changed in 1995, so we need to resort to the previous version of the European System of Accounts, ESA 79, to discuss pre-1995 developments. To maximise the comparability of the discussion in this section with Sections 2 and 3, we start by replicating our aggregation in Section 2 using ESA 79 data. The functional breakdown in ESA 79 includes a separate category labelled Transportation and communication, which facilitates our analysis of government transport investment. In describing the evolution of the composition of government investment and the share of transport in it, we focus on the four biggest EU member states (France, Germany, Italy and the United Kingdom) and the period 1977-1993. To conclude this section, we consider observed changes in government (transport) investment in view of broader fiscal policy developments.

Comparisons over time are complicated by changes in national accounting standards.

4.1 Composition of government investment

The functional classification of government expenditure in ESA 79 was slightly different from that presented in Section 2. Table 2 below augments Table 1 by adding the classification of functions of government in ESA 79.

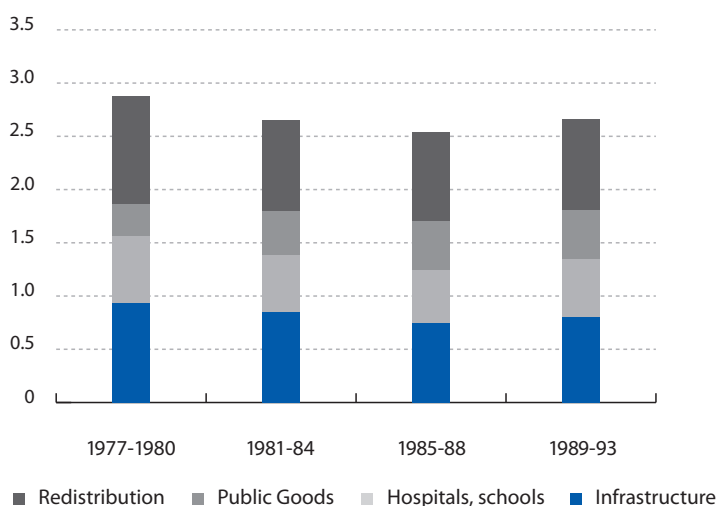
Table 2. Functional breakdown of government investment, ESA 95 and ESA 79

Aggregation	ESA 95 COFOG	ESA 79 COFOG
1. Infrastructure	Economic Affairs	Agriculture, forestry, hunting and fishing Fuel and energy affairs and services Mining and mineral resource Transportation and communication Other economic affairs and services
2. Hospitals and schools	Health Education	Health affairs and services Education affairs and services
3. Public Goods	Defence General Public Services Environment Order and Safety	General public services Public order and safety affairs Defence affairs and services Expenditures not classified by major group
4. Redistribution	Housing Recreation Social Protection	Housing and community amenity services Recreational Social security and welfare services

Source: Eurostat, own aggregation

Following this classification, Figure 10 depicts the level and composition of government investment in the four biggest EU member states for the period 1977-1993. The bars represent four-year averages of the components of government investment, expressed as percentage shares of GDP.

Figure 10. Composition of government investment in France, Germany, Italy and the United Kingdom (in percent of GDP)



Source: Eurostat, own calculations

The level of government investment, measured relative to GDP, was consistently above 2.5 percent during this sample period. It decreased slightly over the twelve years till 1988 from 2.9 percent to 2.5 percent, but nearly half of this decrease was recovered later on. At a first glance, what declined most was government investment in infrastructure and hospitals and schools. Their combined share first declined from 1.56 to 1.24 percent, only to increase to 1.35 percent by 1993.

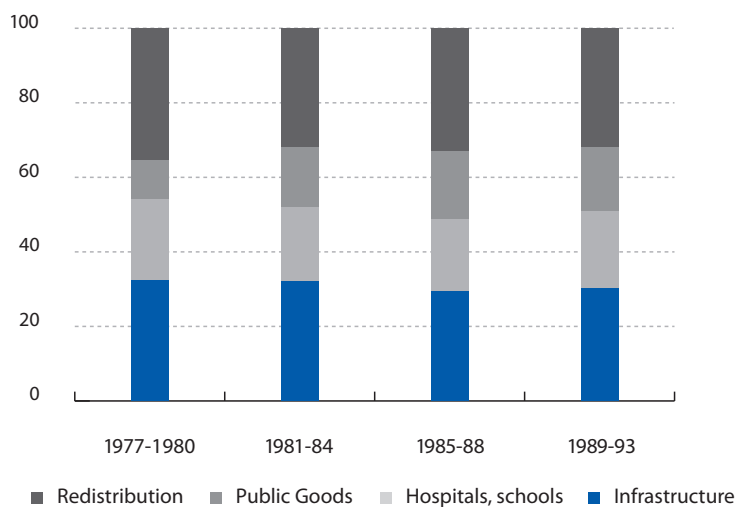
The other two categories of government investment moved consistently in one direction over the sample period. Government investment in redistribution declined from 1 percent of GDP in the first four years to 0.8 percent thereafter, while investment in public goods expanded throughout the sample period from 0.3 to 0.45 percent of GDP.

The shares of infrastructure and hospitals and schools have remained stable.

Figure 11 shows the shares of the four types of government investment in total government investment. The shares of infrastructure and hospitals and schools have remained stable at about 30 and 20 percent, respectively, ever since the late 1970s. This implies that changes in both these components have followed those in overall government investment. The shares of the other two types of government investment, however, have undergone larger changes. While the share of investment in public goods rose steadily from 10 to 17 percent between the late 1970s and early 1990s, the share of government investment in redistribution registered a decrease of 4 percentage points – the largest among the four categories.

Government investment in redistribution decreased largely due to developments in the United Kingdom, while investment in public goods rose mainly in France and Italy. Box 5 provides further details on the contributions of each of the four countries to the aggregate developments shown in Figures 10 and 11.

Figure 11. Composition of government investment in France, Germany, Italy, and the United Kingdom (in percent of total government investment)

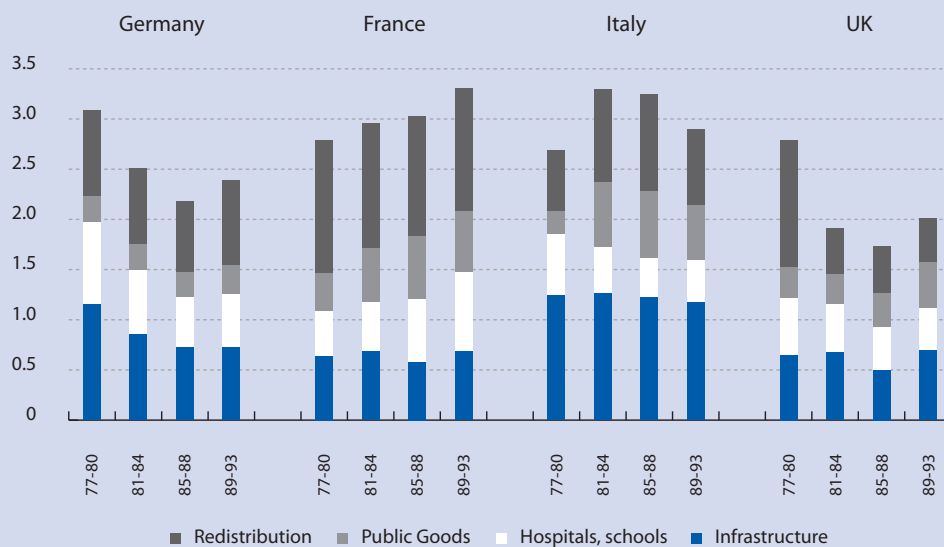


Source: Eurostat, own calculations

Box 5. Country-by-country developments in the composition of government investment

This Box considers differences between the four countries in terms of the composition of government investment. Figure B5 replicates Figure 10 but disaggregated by country.

Figure B5. Composition of government investment (in percent of GDP)



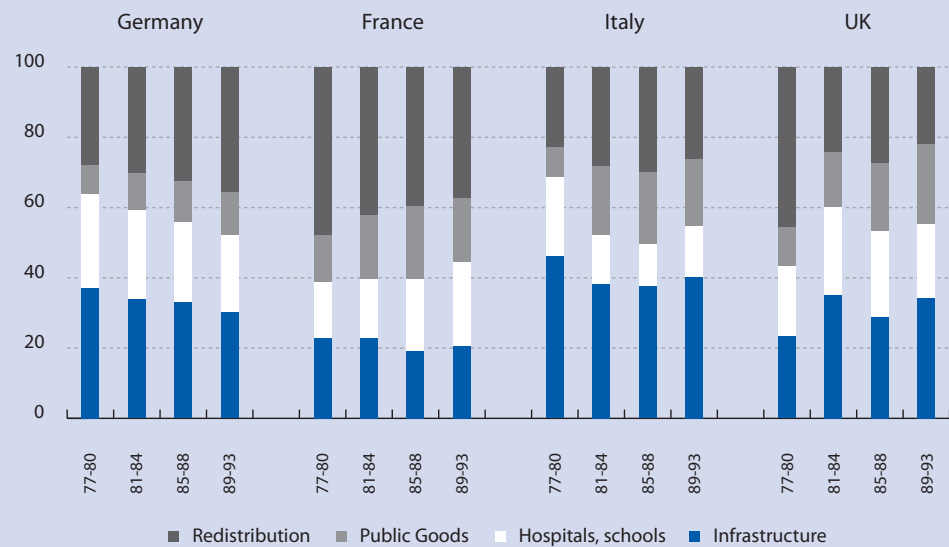
Source: Eurostat, own calculations

Overall government investment declined in Germany and the United Kingdom but increased in France and Italy. Government investment in infrastructure and hospitals and schools combined declined markedly in Germany and slightly in the United Kingdom, thanks to a rebound in the early 1990s. In France and Italy infrastructure investment stayed stable, while investment in hospitals and schools boomed in France but shrank in Italy.

The share of public goods investment in GDP was stable in Germany, while it increased especially in France and Italy. Government investment in redistribution came down dramatically in the United Kingdom during the early 1980s. In the other three countries developments were more mixed.

Figure B6 below replicates Figure 11, showing the shares of the components of government investment in overall government investment.

Figure B6. Composition of government investment (in percent of total government investment)



Source: Eurostat, own calculations

Notably, the share of infrastructure investment dropped from almost 40 to 30 percent in Germany, while increasing from 25 to 35 percent in the United Kingdom, thanks to the rebound in the early 1990s. There were significant changes in the share of hospitals and schools in France (up) and Italy (down). The share of investment in public goods increased in all countries apart from Germany. In France and the United Kingdom, this happened at the expense of government investment in redistribution, while in Italy the share of investment in hospitals and schools bore the adjustment.

4.2 Government investment in transportation and communication

This subsection zooms in on government transportation investment, seeking to provide a longer time perspective to the discussion in Section 3. As noted earlier, the ESA 79 accounts documented government investment in Transportation and communication as a separate item. As the bulk of communication investment (especially telecommunications) is recorded as corporate sector

investment in national accounts and not as government-sector investment, we regard government investment in Transportation and communication as a good proxy for government transport investment.

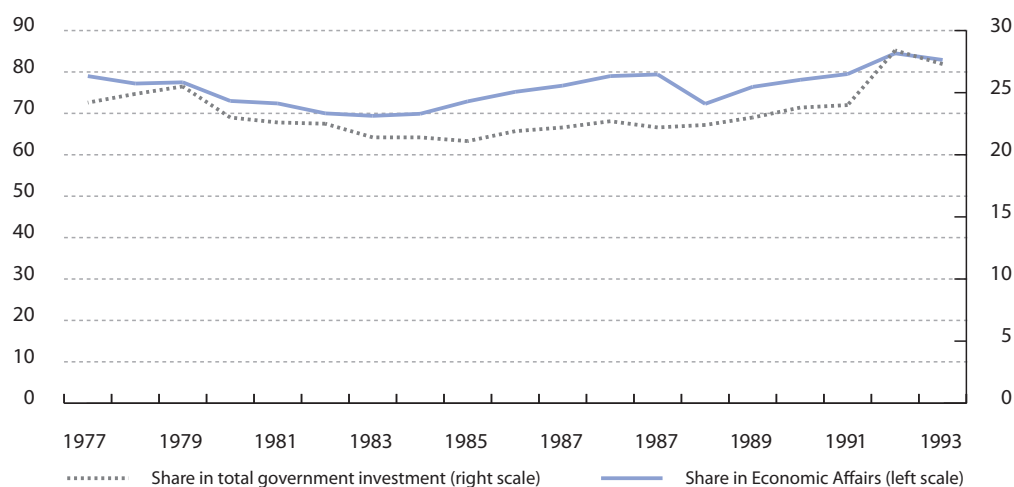
Recall that Section 3 found, based on proxy variables, that government transport investment accounted for some 80 percent of government investment in “Economic Affairs” (infrastructure). We now wish to ascertain whether that share has been stable over a longer time horizon or whether there have been some longer term trends or structural breaks.

Figure 12 depicts the percentage share of government investment in Transportation and communication in government infrastructure investment for the four biggest European economies (solid line). During the whole period this share fluctuated between 70 and 80 percent. There are no obvious long term trends or structural breaks.

Transport has maintained its relative share in government investment.

The aggregate share shown in Figure 12 hides some differences between the individual countries (not illustrated). The share of Transportation and communication in government infrastructure investment trended down in Italy and up in the United Kingdom. In Germany the share was flat with little volatility, while in France there was considerable volatility without a discernable trend.

Figure 12. Government investment in Transportation and communication in France, Germany, Italy and the United Kingdom (shares in percent)



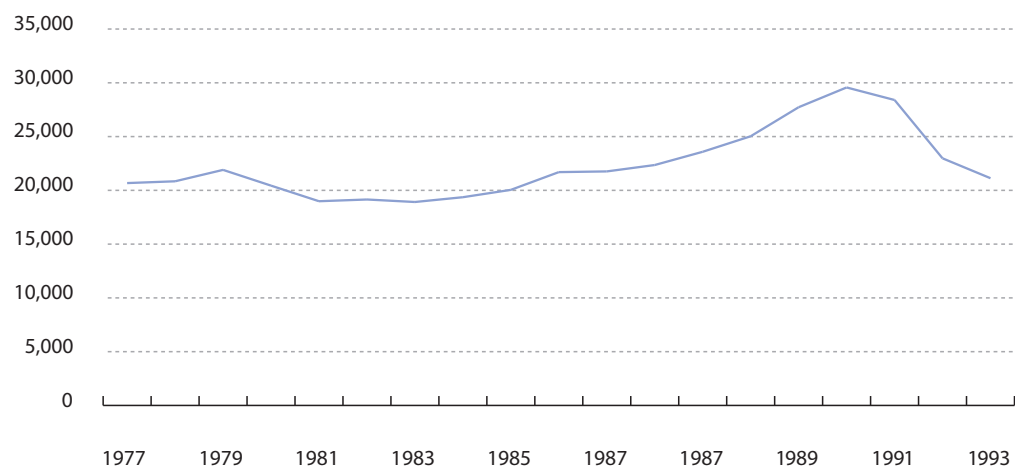
Source: Eurostat, own calculations

Figure 12 also depicts the percentage share of government investment in transportation and communication in total government investment (dotted line). It has moved in the band of 21-26 percent, again with no obvious long term trend or structural break.

Again, developments differ across individual countries. Consistent with Box 5 (showing the share of infrastructure in overall government investment) and the description of the share of Transportation and communication in government infrastructure investment, the following can be concluded about the share of Transportation and communication in overall government investment. In Germany, Transportation and communication steadily lost ground in overall investment. There was a downtrend in Italy, too, albeit shallower. In France the share of Transportation and communication in overall government investment was stable, while it was on an uptrend in the United Kingdom.

Finally, let us consider the evolution of government investment in Transportation and communication in real terms, abstracting from fluctuations in other comparator variables. Figure 13 plots aggregate government investment in transportation and communication in the four countries in constant 1995 prices. The figure shows that real government transportation investment remained reasonably stable throughout most of the 1980s. In the late 1980s, it started to grow strongly, increasing by 40-50 percent in real terms in just a few years. The main reason for this increase was German reunification, which both caused a level shift in the series (by adding government investment in the former GDR) and contributed to the uptrend (by inducing growth in government investment). Note, however, that this structural break does not show up in the ratios discussed earlier, which implies that the level shift and uptrend were of at least similar relative magnitudes in infrastructure and overall government investment.

Figure 13. Government investment in Transportation and communication in France, Germany, Italy, and the United Kingdom (millions of 1995 euros)



Source: Eurostat, own calculations

Note: Deflator for aggregate gross fixed capital formation has been used.

To sum up, the key findings concerning the relative shares of government infrastructure and transport investment in a longer time perspective are as follows:

At the aggregate level both infrastructure in general and transport in particular have retained their shares in the past decades, moving alongside overall government investment without any clear time trends or structural breaks. To put it differently, transport and infrastructure investment have not grown much faster or more slowly than other types of government investment taken together.

There have been marked differences between individual countries.

Developments in individual countries have, however, differed. Most importantly, transport investment and infrastructure investment have both lost ground in Italy. In contrast, both have been on an uptrend in the United Kingdom. In Germany, transport has retained a stable share in infrastructure investment; however, the share of infrastructure in overall government investment has declined. In France, there have been no clear trends.

4.3 Changes in fiscal position and government transport investment

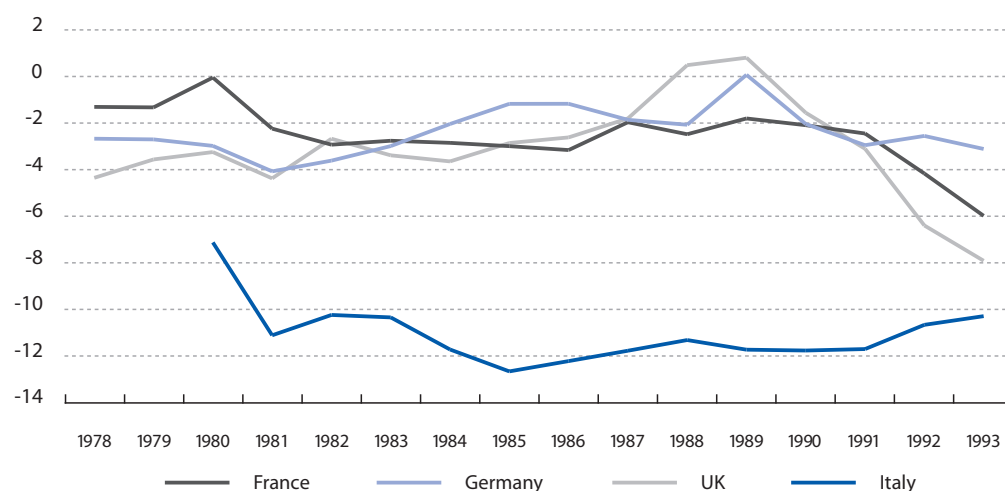
To conclude this section, we broaden the perspective and link the movements in government investment in general and transport in particular to changes in overall fiscal positions. This serves to assess whether government transport investment played a role in fiscal policy swings that is somehow different from the rest of government investment.

Has transport investment reacted to fiscal-policy swings differently from other government investment?

The scope of this analysis is quite modest. We do not attempt to decompose changes in overall fiscal positions into their discretionary or cyclical components, so we cannot draw any conclusions about the contributions of government (transport) investment to different types of fiscal swings.⁸ In other words, we cannot say, based on what is to come, whether government (transport) investment swung more during episodes of discretionary consolidation or in cyclical fluctuations. Rather, we simply consider ups and downs in the overall fiscal position and compare the magnitude of such changes to the magnitude of simultaneous changes in government investment. We zoom in on government transport investment in order to see whether it has behaved somehow differently from overall government investment.

To start with, let us depict the evolution of overall fiscal positions in the four biggest EU member states during 1978-93 (Figure 14). The fiscal position improved in Germany and the United Kingdom throughout the 1980s, while worsening in France and Italy.

Figure 14. Net borrowing (-)/ Net lending (+) (in percent of GDP)



Source: Eurostat, own calculations

Based on the data underlying Figure 14, we can calculate annual changes in the overall fiscal position in each of the four countries. We then calculate the annual changes in government (transport) investment and relate them to the changes in the overall fiscal position. This gives us a measure of the contribution of government (transport) investment to changes in the overall fiscal position.

⁸ There have been attempts to consider the link between fiscal consolidations and public investment; as surveyed by Serven (2007), it is something like conventional wisdom to consider that fiscal consolidations affect public investment disproportionately.

Table 3 shows such contributions of both government transport investment and of overall government investment. The signs in the table show whether a change in government (transport) investment supported or counteracted the change in the fiscal balance. A positive sign signals support, that is, a decrease in investment when the fiscal balance improves or an increase in investment when the fiscal balance deteriorates. A negative sign denotes the opposite: Investment increases (decreases) while the fiscal balance improves (worsens).

Take Germany as an example. Government transport investment contributed on average 5 percent to a change in fiscal balance (column 2), with transport investment increasing at times of fiscal improvement and contributing -9 percent to the improvement (column 3). During episodes of fiscal worsening, government transport investment grew as well, contributing on average 17 percent to the worsening (column 4). As regards total government investment, its contributions were -27 percent to fiscal improvements (that is, government investment increased) and 64 percent to worsening (again, government investment increased).

Table 3. Contribution of government (transport) investment to changes in fiscal balance (in percent of the change in fiscal balance, 1973-95)

	Government investment in Transportation and communication			Total government investment		
	Average	Fiscal improvement	Fiscal worsening	Average	Fiscal improvement	Fiscal worsening
Germany	5	-9	17	23	-27	64
<i>Observations</i>	23	11	12	23	11	12
France	6	10	4	-41	-221	32
<i>Observations</i>	16	5	11	16	5	11
Italy	9	9	9	30	28	31
<i>Observations</i>	16	4	12	16	4	12
United Kingdom	-14	-31	3	-38	-96	17
<i>Observations</i>	18	9	9	18	9	9

Source: Eurostat

Note: Contributions are expressed in percent of change in the overall fiscal position. Data for Germany include ex-GDR from 1991.

Government transport investment has not consistently followed the ups and downs of fiscal balances.

With this interpretation of Table 3 in mind, we conclude that government transport investment followed the ups and downs of the fiscal balances only in France and Italy. It increased in Germany and the United Kingdom regardless of the direction of change in the fiscal balance. However, the magnitude of increase (relative to the change in the fiscal position) in Germany was greater whenever the fiscal position worsened, while in the United Kingdom, government transport investment increased much more strongly whenever the fiscal balance improved.

We must be careful in not interpreting these co-movements as pro- /counter-cyclical or as supporting/counteracting fiscal consolidation or relaxation efforts. In the absence of any knowledge about the source of changes in the fiscal balance (structural, cyclical, one-off, random) we cannot assess the specific role of government (transport) investment.

The magnitudes of the contributions, mostly around 10 percent, seem small at the outset – but are they really? To make a judgement we consider the contributions of transport in relation to the contributions of total government investment, also shown in Table 3.

In considering the relative contributions of transport and total government investment to changes in the fiscal balance, we focus on episodes where the fiscal balance has improved. We know from Figure 12 that transport accounted, on average, for about one-quarter of total government investment. That share varied a little from country to country, with France at 15 percent and the other three countries at or above 25 percent.

Take first Germany and the United Kingdom, where government transport investment increased even at times of fiscal improvement. In both countries also overall government investment increased when their fiscal positions improved. The increase in transport, relative to the improvement in the fiscal position, was in both cases exactly one-third of the increase in overall government investment. As the share of transport in overall government investment was smaller (around one-quarter), we can conclude that transport was not disadvantaged relative to other government investment at times of fiscal improvement.

Then consider France and Italy, where transport declined when the overall fiscal position improved. In France, government transport investment contributed some 10 percent to the fiscal improvement, while other government investment actually increased. In Italy, both transport and other government investment contributed to the improvement, with transport accounting for one-third of the contribution of total government investment.

To sum up, we can consider the behaviour of government transport investment in a broader fiscal perspective by two measures: First, did it move up and down with the fiscal balance and, second, were its movements “small” or “large” compared to other government investment at times of improving fiscal positions. In Germany and the United Kingdom, transport kept growing throughout, keeping pace with other government investment even at times of fiscal improvement. In France and Italy transport investment followed the ups and downs of the fiscal balance; however, in France transport contributed to fiscal improvements more than other government investment, while in Italy the contribution of transport investment was broadly in line with its weight in total government investment.

All in all, government transport investment has not consistently followed the ups and downs of fiscal balances. Also, it has not been the case that government transport investment has consistently carried a disproportionate burden at times of improving fiscal balances. Whether the reaction of government transport investment in times of especially structural improvement in fiscal balances (discretionary fiscal tightening) is somehow different from other types of public investment cannot be assessed based on the analysis above; that we leave to future research to tackle.

Government transport investment has not carried a disproportionate burden at times of fiscal improvement.

5. Conclusions

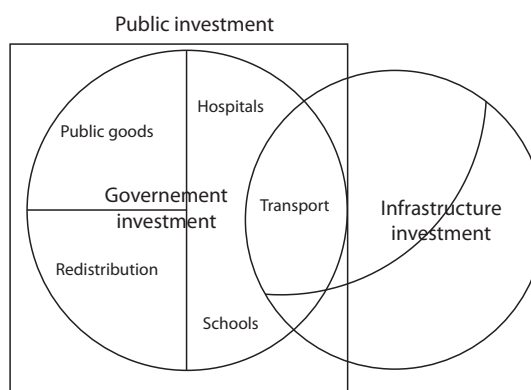
To clarify misconceptions about what government investment is and what it is not, this paper has sought to decompose it by economic function; specifically, it has sought to depict the share of infrastructure in general and transport infrastructure in particular in overall government investment and to describe changes over time in those shares.

The key findings of our forensic investigation are as follows. In rough terms infrastructure accounts for one-third of government investment in the EU; in the cohesion countries that share is higher at 40 percent. Add to that government investment in hospitals and schools and half of overall government investment is accounted for. The other half comprises investment in public goods (such as military installations) and redistribution (social housing, municipal swimming pools and the like).

Within government infrastructure investment, as much as 80 percent represents transport, chiefly road. In other words, the share of transport in overall government investment is on average and roughly speaking about one-quarter in the old member states of the EU; one-third in the cohesion countries; and between one-quarter and one-third in the new member states.

Based on these results, we can reproduce the Venn diagram in Figure 1 with additional detail and more precision. The relative sizes of the subsets of government investment in Figure 15 are indicative of EU average.

Figure 15. Composition of government and infrastructure investment in a Venn diagram



Transport and other infrastructure investment did not grow much faster or more slowly than other types of government investment.

Considering government transport investment in a longer time perspective, there have not been any major trends or structural breaks, at least at the aggregate level. Both infrastructure in general and transport in particular retained their shares throughout the 1980s, moving alongside overall government investment without any clear time trends or structural breaks. To put it differently, transport and infrastructure investment did not grow much faster or more slowly than other types of government investment taken together.

In a broader fiscal perspective, government transport investment has not consistently followed the ups and downs of fiscal balances, nor has it consistently carried a disproportionate burden at times of generally improving fiscal balances. Whether especially discretionary fiscal tightening has affected government transport investment differently from other government investment remains to be examined in future research.

In conclusion, government transport investment has not, over the past decades, suffered from excessive swings, slides or sudden stops – at least relative to other types of government investment. Whether that has been economically optimal or not is an altogether different issue, to be addressed elsewhere.

Government transport investment has remained stable – which may or may not have been optimal.

Annex: Data sources and caveats

To construct proxies for government transport investment in Section 3, we use the following sets of data:

Data on transport infrastructure investment from the International Transport Forum (ITF).⁹ ITF compiles and publishes data broken down by transport mode (road, rail, inland waterways, ports, airports). The data originate from relevant government ministries and vary from country to country in terms of coverage (*e.g.*, to what extent corporate investment or local government investment is included).

Historical data on government investment through 1995, based on the European System of Accounts, version 1979 (ESA 79). In ESA 79 the breakdown of government investment included Transportation and communication as a separate category.

National accounts data (as reported by Eurostat in its New Cronos database¹⁰) broken down by NACE sector of economic activity. These data provide us with total economy investment, without making a distinction between the government and corporate sectors. Moreover, the lowest level of aggregation lumps together the transportation sector with communication and storage, with no further breakdown available. Also, the data cover all investment by the sector, not only investment in infrastructure assets and their maintenance.

Structural Business Statistics, also available through New Cronos, reporting investment¹¹ by a sample of surveyed enterprises whose main sector of activity is Transport, storage or communication – including infrastructure. In other words, the sectoral breakdown of Structural Business Statistics follows the same NACE classification as national accounts statistics, and the same *caveats* apply to both sets of data.

There are different sources of *caveats* involved in constructing proxies based on these data sets. There are issues related to changes in accounting standards over time (ESA 79 *versus* ESA 95); breakdowns by institutional sector (government *versus* corporate); and breakdowns by sector of economic activity (transport alone *versus* an aggregate of transport, storage and communication). In addition, some of the datasets report investment by economic sector (*e.g.*, all investment by enterprises in the transport sector), while others, notably ITF report investment in infrastructure assets and their maintenance in the transport sector (roads, rail tracks, inland waterways, seaports, airports).

What is the significance of these *caveats* for estimating the share of transport in government investment in “Economic Affairs” in Section 3? First, although the change in accounting standards from ESA 79 to ESA 95 created the aggregate “Economic Affairs” that we try to disentangle, the fact that a few countries reported a breakdown of their government investment according to both standards for a number of years in the early 1990s is actually helpful for us. Second, the lack of a breakdown by institutional sector can be circumvented by assuming that the Structural Business Statistics represent investment that in the national accounts would be classified as investment by the corporate sector. This assumption seems justified, as the Structural Business Statistics are based on enterprise surveys, and as the bulk of state-owned enterprises in the transport sector, such as

9 The ITF data are available through: <http://www.internationaltransportforum.org/>.

10 Available through: http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1090,30070682,1090_33076576&_dad=portal&_schema=PORTAL.

11 The reported variable is “investment in tangible goods”, as opposed to gross (fixed) capital formation in the national accounts statistics.

railway companies, cover most of their costs through market sales and are therefore considered corporations, not government sector entities.

Furthermore, it is plausible to assume that most investment in storage and communication is corporate rather than government; hence, the lumping together of transport, storage and communication in the NACE sectoral breakdown need not introduce an insurmountable obstacle. Under this assumption, most economy-wide investment in storage and communication would be captured by the Structural Business Statistics, so simply subtracting the Transport, storage and communication investment in Structural Business Statistics from that in the national accounts should in principle give us a reasonable approximation of government transport investment.

Finally, consider the *caveat* concerning the mixing of investment by sector and by asset type. Take road: The government sector is dominant in investing in road infrastructure, while most other investment (transport equipment) would be recorded in the corporate sector. In other words, the bulk of government transport investment comprises infrastructure assets, while corporate transport investment is much more a mixture of equipment and, for some modes of transport, also infrastructure assets (seaports, airports). This means that data focussing on infrastructure assets (such as the ITF data) should be a reasonable match for government investment data, while the mixture of infrastructure and other assets in the national accounts and Structural Business Statistics should not pose a major problem, as most of such mixture would be netted out when subtracting the latter from the former.

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