In sickness and in health: protecting and supporting public investment in Europe

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Highlights:

- The long-term decline in gross public investment in EU Member States mirrors the trend in other advanced economies, but recent developments have been different: Public investment has increased elsewhere, but in the EU it has declined and even collapsed in the most vulnerable countries, exaggerating the output fall.
- The provisions in the EU fiscal framework to support public investment are very weak. The recently inserted "investment clause" is almost no help. In the short term, exclusion of national co-funding of EU-supported investments from the fiscal indicators considered in the Stability and Growth Pact would be sensible.
- In the medium-term, the EU fiscal framework should be extended with an asymmetric "golden rule" to further protect public investment in bad times, while limiting adverse incentives in good times. During a downturn, a European investment programme is needed and the European Semester should encourage greater investment by Member States with healthy public finances and low public investment rates. Reform and harmonisation of budgeting, accounting, transparency and project assessment is also needed to improve the quality of public investment.

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1 The purpose of public investment

Public investment should help societies achieve their goals, and should ultimately contribute to social welfare. High quality capital stocks in the areas of communication, education or transport are typically thought to entail considerable spillover effects that might stimulate investment by the private sector. Public order and safety are necessary for a stable institutional environment. Investments in social protection, healthcare and recreation support the labour force and social development. Housing and community amenities, such as water supply and street lightening, are preconditions of normal life. Environmental protection can support sustainable development. However, public investment might not always be free from the influence of interest groups. Even if the intent is to increase social welfare, public investment might not go to the right place, or might not be deployed in the most efficient way.

When assessing the impact of public investment on the economy, two issues have to be differentiated[2]:

(a) the impact of public investment on medium/long-term growth and output,
(b) the impact of cuts in public investment during the crisis.

On the first issue, the academic literature finds mixed results, for good reasons: accurate data is not available, it is difficult to isolate the influence of other factors and methodologies are different (see Appendix 2 for a survey)[3]. Nevertheless, a number of studies have found that certain types of public investment, such as infrastructure, are particularly beneficial.

On the second issue, there seems to be a consensus that cuts in public investment during a recession have greater negative impacts on the economy than cuts in other expenditure categories, or tax increases. During the recent global and euro-area financial and economic crises Europe saw drastic cuts in public investment in vulnerable member states and there was also a relative decline in most of the other member states: the share of public investment in primary public expenditure declined. Thus, fiscal consolidation strategies did not have growth-friendly compositions and likely exaggerated the output contractions. These developments are in stark contrast to developments in other advanced economies, in which public investment was used as a counter-cyclical fiscal-stabilisation tool.

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[2] A related issue is the complementarity of public and private investments. As Zachmann (2012) argues, long-term growth prospects are fundamentally determined by structural factors that are often complementary and inter-related, such as infrastructure, human capital, financial sector development and the quality of regulation. When addressing structural weaknesses, targeting individual shortcomings might not be beneficial if other barriers persist and therefore public investment might be best employed when it is targeted at individual shortcomings that are holding back an entire sector.

[3] By focusing on EU cohesion policy, the literature survey of Marzinotto (2012) found similar results.

Recognising the benefits of public investment and its particular exposure to fiscal consolidation in Europe, in summer 2013 the European Commission proposed a so-called "investment clause", which allows member states that are in deep recession, but that have budget deficits below the 3% of GDP threshold and that respect the public debt reduction rule, to temporarily deviate from the fiscal targets of the Stability and Growth Pact (SGP), to the extent of the national co-funding of EU-funded investments. Four countries have applied to use this investment clause, with requests from Italy and Slovakia being rejected by the European Commission. The European Parliament did not find the investment clause sufficient and in October 2013 passed a resolution in which it proposed permanently and unconditionally excluding national co-funding of EU-funded investments from the indicators used in the structural deficit procedure. This proposal has been neglected so far.

What is the correct way to treat public investment in the EU fiscal framework? This paper addresses this question, after assessing developments in public investment in Europe and in other advanced economies.

2 Developments in public investment

Unfortunately, comprehensive data on public investment is not available. The most widely used indicator, gross fixed capital formation, is a very imprecise measure of public investment, because it is largely a gross measure (i.e. it includes capital depreciation) and does not include investment by state-owned enterprise (SOEs) (see Appendix 1 for details). However, we must use this indicator because no other indicator is available for assessing long-term trends.

Long-term trends

Panel A of chart 1 indicates that public investment in the main advanced countries has been characterised by a long-term downward trend since the early 1970s, while in the four cohesion countries of the EU-15 (Greece, Ireland, Spain and Portugal) and in the 12 Member States that joined the EU between 2004 and 2007 there was a gradual increase from 1995 up to 2008/2009. Since then, most countries have moved from expansive fiscal policies to very tight policies, with fiscal programmes heavily focusing on public investment.

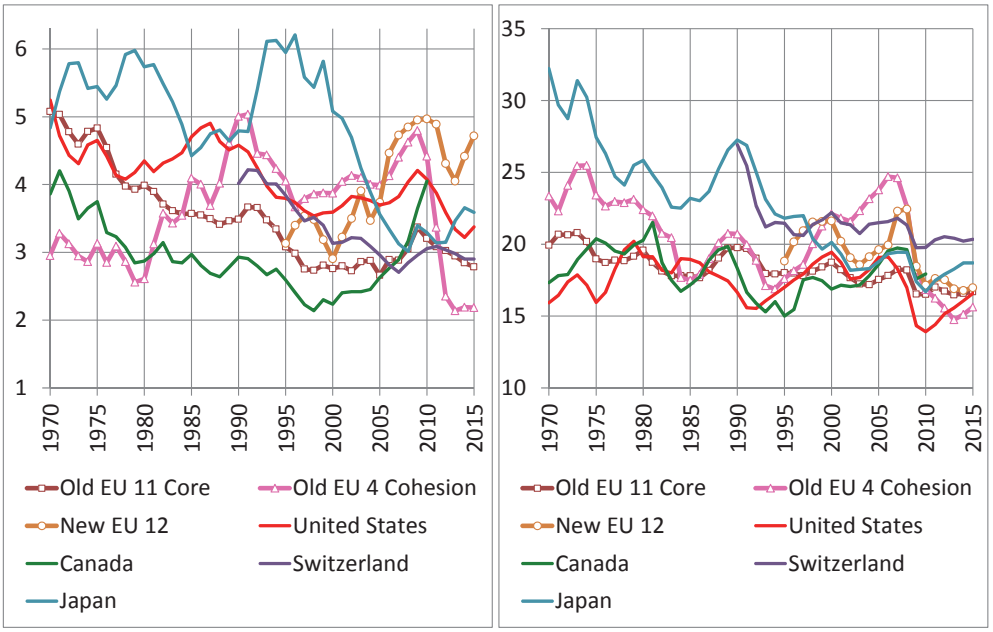
As for the non-cohesion EU-15 countries (a group we call EU-core), general government gross fixed capital formation has dropped from about 5% of GDP in 1970 to less than 3%. Some decline is also evident for the United States, for which gross fixed capital formation has outperformed that of the EU-core since 1978. Switzerland used to have somewhat higher public investment ratios than the EU-core countries, while Japan used to have much higher investment rates, despite the major decline since 1995.

This long-term decline has not been offset by private gross fixed capital formation. In Panel B of chart 1 it is evident that private-sector investment also declined between 1970 to 2015 in EU-core countries, and also in Japan and Switzerland. In the United States, the level of private investment was lower in 1970 than in core EU Member States, while the private investment rate fluctuated along the business cycles since then. In the four EU-15 cohesion countries, there was also a gradual decline from 1970, but this lasted only until the mid-1990s, when a major investment boom started, which lasted until the global financial and economic crisis.

Chart 1: Gross fixed capital formation from 1970 to 2015

A: General government **B: Private sector**

% of GDP



Source: Authors' calculations using the AMECO database.

Note: Old EU-core-9: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands and the United Kingdom. Old EU-cohesion-4: Greece, Ireland, Portugal and Spain. New EU-12: Bulgaria, Czech Republic, Cyprus, Estonia, Hungary, Malta, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

A number of hypotheses on the determinants of the slowdown in public investment have been proposed. One seminal contribution is Mehrotra and Välilä (2006), who present a critical discussion of the determinants of the slowdown and provide evidence with a panel co-integration model for 1970–2003 for EU Member States. One of their main findings is a negative effect on public investment of discretionary fiscal consolidation and of high public debt. The cost of debt financing and the effort required to join EU economic and monetary union do not seem to be significant, in contrast to many arguments on the negative effect of the introduction of Maastricht requirements on public investment. Yet, gross fixed capital formation also declined in Switzerland and Canada until the mid-2000s, despite their healthy public sectors, which might bring into question the importance of fiscal consolidation episodes. Mehrotra and Välilä (2006) also argue that it is unlikely that any political drive toward a smaller economic role for the state can account for the decline in public investment, because the share tax of revenues to GDP has not become less significant in recent decades.

Straub and Tchakarov (2007) add that in parallel with the decline in public investment, public consumption in the EU-15 has increased. They also note that public-private partnerships are a relatively recent phenomenon that have become significant only in a few EU Member States, and cannot therefore explain the long-term decline in public investment.

Overall, we conclude that the long-term decline in EU government gross fixed capital formation is broadly in line with developments in other advanced economies. However, the developments during the global and euro area financial and economic crises were strikingly different.

Recent developments

Government investment was a primary target for fiscal consolidation. Panel A of chart 1 indicates that the share of public gross fixed capital formation in GDP declined from 4% in 2009 to 1.5% in 2013, on average, in Greece, Ireland, Spain and Portugal. At the same time, private gross fixed capital formation also collapsed in these countries, from more than 25% of GDP in 2007 to less than 15% in 2013. There was also a sizeable fall in public gross fixed capital formation in the 12 EU Member States that joined the bloc between 2004 and 2007 (the group we call New EU-12), and a minor decline in EU-core countries. These developments are in contrast to Canada, Japan and the United States, where public gross fixed capital formation has increased in recent years.

Table 1 looks at the composition of the change in public expenditure from 2009 to 2013, net of bank recapitalisation by the public sector. For all EU country groups, capital expenditure (defined here as gross fixed capital formation and capital transfers excluding bank recapitalisation) fell more than other primary expenditure cate-

gories between 2009 and 2013 in nominal terms[4]. There was a particular collapse in the four EU-15 cohesion countries (51%) and in Italy (24%). In the other EU-core countries, capital expenditure slightly declined (by 1%) between 2009 and 2013 in nominal terms, while all primary expenditures increased by 9%. These developments in the EU were in contrast to developments in the United States and Switzerland, where capital expenditure increased more rapidly than other primary expenditure (such detailed data is not available in our data source for other advanced countries). Table 1 shows the developments in the nominal value of public expenditure: taking into account inflation from 2009 to 2013, in real terms there were even more significant falls in capital expenditure in the EU.

What kinds of public investment were cut? Unfortunately, data is available only for gross fixed capital formation (not available for capital transfers, nor for measures of net investment) and only up to 2011, and therefore we can show only a partial picture for the first years of fiscal consolidation. As table 2 shows, in the four EU-15 cohesion countries, total gross fixed capital formation fell by 36% during this period and every main category suffered major cuts. The three largest categories of public investment are economic affairs[5] (almost one-half of public gross fixed capital formation), housing and community amenities[6] (12% share) and education[7] (10% share), which were cut by 28%, 61% and 37%, respectively. In Italy, where public gross fixed capital formation was cut by 16% from 2009 to 2011, most major categories suffered from cuts of similar magnitude, including economic affairs and education[8]. These changes refer to the period up to 2011, but in 2012 and 2013 additional major

[4] See Appendix 1 for definitions. Among the 28 EU Member States, there were six smaller countries in which capital expenditures increased faster than other primary expenditures both from 2008 and 2009 to 2013: Austria, Bulgaria, Denmark, Hungary, Malta, Romania and Sweden. Looking at the 2009–2013 period only, capital expenditures also increased faster than other primary expenditures in Estonia, Latvia, Lithuania and Romania, but in these four countries fiscal consolidation started earlier and there were already major cuts in public investment in 2009: compared to 2008, capital expenditures increased less than other primary expenditures in these four countries, too.

[5] Economic affairs have nine sub-components: 1 General economic, commercial and labour affairs; 2 Agriculture, forestry, fishing and hunting; 3 Fuel and energy; 4 Mining, manufacturing and construction; 5 Transport; 6 Communication; 7 Other industries; 8 R&D Economic affairs; 9 Economic affairs n.e.c.

[6] Housing and community amenities has six sub-components: 1 Housing development; 2 Community development; 3 Water supply; 4 Street lighting; 5 R&D Housing and community amenities; 6 Housing and community amenities n.e.c..

[7] Education has eight sub-components: 1 Pre-primary and primary education; 2 Secondary education; 3 Post-secondary non-tertiary education; 4 Tertiary education; 5 Education not definable by level; 6 Subsidiary services to education; 7 R&D Education; 8 Education n.e.c..

[8] In Italy, there were two small categories (defence and social protection) which recorded increase from 2009 to 2011.

cuts were implemented in public investment and the November 2013 European Commission forecast notes further expected cuts in 2014: by an additional 15% in the four EU-15 cohesion countries and by 7% in Italy.

Table 1: Fiscal adjustment strategies by main expenditure categories from 2009 to 2013

	Greece, Ireland, Portugal and Spain	Italy	10 other EU-15 countries	New EU-12	United States	Switzerland
	% change in current prices					
Total expenditure	–9	1	9	9	9	11
Interest expenditure	48	15	15	27	89	–6
Primary expenditure	–12	–1	9	8	4	11
Compensation of employees	–13	–4	7	3	3	10
Current transfers	1	7	12	11	12	11
Other current primary expenditure	–19	–6	8	15	–13	13
Capital expenditure	–51	–24	–1	–7	20	14

Source: Authors' calculations using the November 2013 AMECO.

Note: New EU-12 refers to the Member States that joined the EU between 2004–2007. EU-15 refers to Member States before 2004. The aggregates involving countries with different currencies were calculated using constant exchange rates and therefore exchange rate fluctuations do not affect the values shown. Capital expenditure is the sum of gross fixed capital formation and capital transfers (see Appendix 1 for the definitions). Capital transfers also include public sector support to bank recapitalisation. Since we do not have detailed data on bank support, for countries in which the 2009 value of capital transfers was more than 10% larger than in 2006 and 2007, we used the average of 2006–2007 capital transfers for 2009, instead of the 2009 actual capital transfers. We made such a correction for: Belgium, Cyprus, Finland, Greece, Ireland, Latvia, Malta, Netherlands, Poland, Portugal, Slovakia, United Kingdom and United States. We also corrected the 2013 capital transfers data for Slovenia (unusually high transfer), Slovakia (negative transfer), Netherlands (unusually low transfer) and Greece (unusually high transfer): for Slovenia, Slovakia and the Netherlands we used 2012 data, while for Greece we used 2014 forecast (because 2012 data was also unusually high due to recapitalisation).

Table 2: Cuts in government gross fixed capital formation by function during the first years of fiscal adjustment from 2008/09 to 2011

	Greece, Ireland, Spain, Portugal		Italy	
	Share in %	% change in current prices	Share in %	% change in current prices
Total	**100**	**–36**	**100**	**–16**
General public services	6	–44	16	–16
Defence	2	–65	3	42
Public order and safety	3	–28	4	–26
Economic affairs	46	–28	32	–15
Environment protection	6	–40	9	–14
Housing and community amenities	12	–61	11	–33
Health	7	–44	9	–13
Recreation, culture and religion	7	–30	7	–33
Education	10	–37	7	–14
Social protection	2	–27	2	11

Source: Authors' calculations using Eurostat's general government expenditure by function (COFOG) database.

Note: Share in 2008 and the change from 2008 to 2011 in the aggregate of Greece, Ireland, Spain and Portugal, and share in 2009 and the change from 2009 to 2011 in Italy.

3 Public investment in the EU fiscal framework

The previous section has shown that government gross fixed capital formation has been a major victim of fiscal consolidation in the EU. Therefore, it is clear that the EU fiscal framework was unable to foster public investment as a counter-cyclical fiscal stabilisation tool during the deepest crisis since World War II in EU countries with fiscal space, in contrast to other advanced economies. Furthermore, the EU fiscal framework could not even prevent major collapses of public investment in countries with vulnerable fiscal positions, despite the supporting role of the EU budget.

This dismal record is in spite of the claim by European Commission (2012b, p. 23) that *"The EU fiscal framework offers scope to balance the acknowledgment of productive public investment needs with fiscal discipline objectives,"* and several communications that growth-friendly expenditure categories should be preserved during fiscal consolidation. For example, a decade ago, the European Commission (2004, p. 30) noted that *"For the countries with high deficits, the budgetary consolidation strategy, based on expenditure restraint, should not be achieved at the expenses of the most "productive""components of public spending (such as public investment, education and research expenditures)."* The same suggestion was made more recently in the Annual Growth Surveys (AGS), which set growth-friendly fiscal consolidation as a key objective. For example, the 2013 AGS issued the following recommendation: *"The Member States should strive in*

particular to maintain an adequate fiscal consolidation pace while preserving investments aimed at achieving the Europe 2020 goals for growth and jobs. The 2013 AGS underlines that Investments in education, research, innovation and energy should be prioritised and strengthened where possible, while ensuring the efficiency of such expenditure."

But what are the provisions in the EU's fiscal framework that should shield productive investment when Member States implement their budgetary policies? We list three aspects plus the supporting role of the EU budget.

First, the Stability and Growth Pact (SGP) was strengthened by the recent reforms, making the EU fiscal rules more stringent. In particular, the so-called Six Pack[9] operationalised the public debt rule: Countries with a public debt in excess of 60% of GDP should reduce their public debt ratio at an average yearly rate of one-twentieth of the difference between their public debt ratio and the 60% of GDP threshold. Meanwhile, the Fiscal Compact (the inter-governmental Treaty on Stability, Coordination and Governance (TSCG), which entered into force on 1 January 2013 and is binding for all euro area Member States that have ratified it), requires a balanced budget with a lower limit of a structural deficit of 0.5% GDP (1.0% of GDP for Member States with a debt ratio significantly below 60% of GDP). These more stringent fiscal rules will limit even more the fiscal room for manoeuvre, which is likely to hinder public investment because it is the easiest target of fiscal consolidation.

Second, there are a few specific provisions for public investment, as summarised by European Commission (2012b). Public investment is a relevant factor when considering the launch of an excessive deficit procedure (EDP) against a country. In the preventive arm of the SGP, government gross fixed capital formation is averaged over a number of years in order to avoid annual peaks in investment, when defining the expenditure benchmarks and structural balance objectives. Supported by the request of the European Council (2013) to explore *"the possibilities offered by the EU's existing fiscal framework to balance the productive public investment needs with fiscal discipline objectives ... in the preventive arm of the SGP",* Rehn (2013a) clarified the intention already mentioned in European Commission (2012b) to consider allowing temporary deviations from the structural deficit path towards the MTO set in the country-specific recommendations, or the MTO for member states that have reached it, provided that (1) economic growth is negative or well below its potential, (2) the deviation does not lead to a breach of the 3% of GDP deficit ceiling and the public debt rule is respected, and (3) the deviation is linked to national expenditure on projects co-funded by the EU under its Structural and Cohesion policy, Trans-European Networks (TEN) and Connecting Europe Facility

[9] The Six Pack consists of 5 regulations and 1 directive, which entered into force in December 2011 for all EU Member States. See at http://ec.europa.eu/economy_finance/articles/governance/2012-03-14_six_pack_en.htm.

(CEF). Once weak economic conditions are no longer a factor, any deviation must be compensated for so that the time path towards the MTO is not affected. This set of criteria is called the "investment clause" and will be first implemented when assessing the national budgets for 2014 and the budgetary outcomes for 2013.

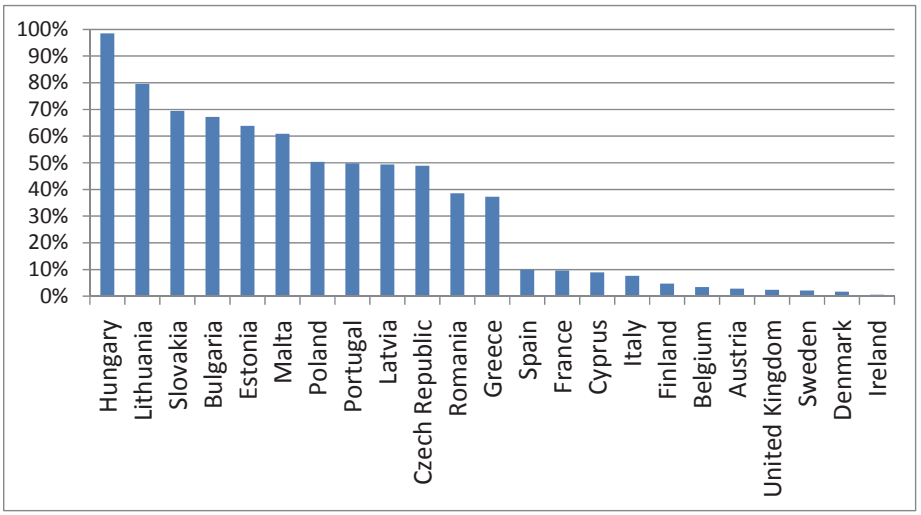
The European Parliament did not consider these provisions sufficient and passed a resolution on 8 October 2013 (European Parliament, 2013), in which it requested the European Commission and Member States to exploit the options for *"public expenditure related to the implementation of programmes co-financed by the European Structural and Investment Funds to be completely excluded from the definition of SGP structural deficits"*. As Prota and Viesti (2013) noted in their summary of the debate on the investment clause, this resolution was adopted by the European Parliament by 433 votes to 131, a very large majority. But this call was not heeded by the European Commission and a few days later, on 15 October 2013, Mr. Rehn reiterated in his speech at the ECOFIN that the European Commission will consider the three criteria listed in his letter of 3 July 2013 (Rehn, 2013a and 2013b).[10]

Third, in the corrective arm of the SGP, the Council, based on the recommendation of the European Commission, granted extra time to end the excessive deficit of a number of countries, which may help to safeguard public investment.

While not directly related to the EU fiscal framework, we also note that the substantial fall in public investment happened despite the supporting role of the EU budget, which aims to facilitate better use of EU funds by: (i) reprogramming funds towards the end of the end of the programme period, and (ii) the reduction of national co-financing through a temporary increase of co-financing rates up to 95% for assistance for Member States with the greatest difficulties (Greece, Hungary, Ireland, Latvia and Portugal). Chart 2 shows that EU-supported investment (including the national co-financing) was a very high share of public investment in most member states that joined the EU in 2004–2007, while the share is about one-half in Portugal and one-third in Greece. In other EU-15 Member States, including Spain and especially Ireland, the share is small.

[10] In November 2013 the European Commission (2013) reported that four countries have applied for the investment clause, namely Bulgaria, Italy, Slovakia and Romania, of which Italy (due to breaching the debt reduction rule) and Slovakia (due to not correcting the excessive deficit in a lasting way) do not qualify for it, while the assessment for Bulgaria and Romania will be communicated later.

Chart 2: Structural funds and national co-financing 2009–2011 average
% of the sum of total public gross fixed capital formation and investment grants



Source: European Commission (2012a) using data from Eurostat.

How significant can these provisions be in preserving public investment? Not very, in our view. Most EU Member States were under the excessive deficit procedure during the fiscal adjustments of recent years and therefore would have not been able to benefit even from the modest investment clause had that been introduced earlier. In the preventive arm, the treatment of public investment can have only limited effect. One reason for this is that the 3% budget deficit threshold and the debt reduction rule have to be respected for getting a temporary deviation from the MTO, but as Darvas (2013a) argued, it will be a major challenge for Italy and Spain to meet the debt reduction rule. Moreover, another condition for getting temporary deviation from the MTO is that the investment should be co-funded by the EU, but for Spain, Italy and Ireland, the share of EU-funded projects in total public investment was rather small during 2009–11 (chart 2) and this is unlikely to change in the future.

Therefore, we conclude that the EU's fiscal framework is not really conducive to preserving public investment during economic slumps.

4 An asymmetric "golden rule" for Europe?

The dismal record with public investment during the crisis and the inability of the EU's fiscal framework to preserve such investment should raise once again the issue of the incorporation of an appropriate "golden rule" in the EU fiscal framework. A golden rule would mean a fiscal rule that excludes capital expenditure from the

computation of budget deficit requirements. The European Parliament (2013) proposal, which was not acted on by the Commission, would be a light form of the golden rule, which would exclude investments co-funded by the EU from the Stability and Growth Pact (SGP) deficit requirement (see the previous section). Beyond this proposal, the question of a more comprehensive golden rule exempting "all" or "most" public investment should also be considered. Consideration of it should include whether such a rule should be symmetric over the business cycle or if it should be asymmetric in the sense of having different provisions for economic expansions and recessions.

A golden rule would have a strong rationale; see for example Blanchard and Giavazzi (2004), who advocated the exclusion of net public investment from the deficit considered in the SGP and the establishment of an investment agency in each country to deal with the investment budget, which should be separate from the current budget of the government. Even European Commission (2004) acknowledged that such a rule would have merits, but its involvement in the SGP during its first reform was rejected for the following reasons (Box II. 6. in European Commission, 2004):

- It could entail maintaining high deficit for long periods;
- It might create distortions, with physical infrastructure preferred to other forms of capital or current spending that might also be beneficial over the long run;
- The difficulties in deciding which expenditure categories should be granted special budgetary treatment;
- Net public investment is the relevant variable for intergenerational equity, but it is just a small fraction of gross investment;
- There would be significant incentives to record current expenditure as capital spending.

There are arguments both for and against these points[11], but to inform the debate we can try to assess what would have happened if a golden rule was in place during the crisis in such a form that would have made cuts in net public investment irrelevant for meeting the fiscal targets. Table 3 shows that in the four EU-15 cohesion countries, government net fixed capital formation was sizeable before the crisis and there were major declines of about 3% of GDP by 2013, even turning to negative in three of the four countries and almost zero in Ireland. However, recent research suggests that the fiscal multiplier is higher during a recession than during expansions and is particularly high for cutting public investment, see for example, the estimates of Auerbach and Gorodnichenko (2012) which are reported in table 4. Baum, Marcos Poplawski-Ribeiro and Weber (2012) reached similar conclusions. Therefore, preserving government investment during the recent crisis may have led to smaller output and the consequent employment falls and would have in fact lowered the

[11] Blanchard and Giavazzi (2004) challenge some of these arguments.

overall budget deficit if the multiplier is indeed greater than about two[12]. There is of course uncertainty about econometric estimates of the multiplier and different countries may be characterised by different multipliers. Yet even if the multiplier is less than two, but sizeable, preserving public investment would have reduced output and employment contraction at the expense of a not-so-large increase in the overall budget deficit.

If net public investment was irrelevant for the fiscal adjustment requirements under the SGP, then governments would have been forced to cut current spending, but they would have had the option to keep public investment. Certainly, since at the height of the crisis governments decided to cut investment more deeply and not current spending, governments may not have been happy with a fiscal rule that forces them to cut current spending instead of investments. In fact, the United Kingdom, where a golden rule was introduced in 1997, suspended it in 2008 (box 1), and Germany, where a golden rule was also in place earlier, replaced it with the so called "debt-brake" in 2011.

Table 3: Net fixed capital formation of the general government
% of GDP

	2000–2009 average	2008/09	2013
Greece	1.5	1.7	–1.6
Ireland	2.5	3.7	0.2
Spain	2.1	2.7	–0.7
Portugal	1.5	0.9	–0.3
EU-11 core	0.5	0.6	0.3
EU-12 NMS	1.2	2.2	1.2

Source: Authors' calculations based on AMECO.

Note: The column 2008/09 indicates the pre-crisis peak in net public investment: 2008 for Ireland, Greece, Portugal and EU-12 NMS, and 2009 for Spain and EU-11 core. EU-11 core denotes 11 of the first 15 members of the EU, except Greece, Ireland, Spain and Portugal. EU-12 NMS denotes the 12 Member States that joined the EU between 2004 and 2007.

[12] When the multiplier is larger than two and public revenues amount to 50% of GDP, a cut in expenditure is in fact increases the budget deficit even in nominal terms: a EUR 1 cut in public expenditures reduces output by more than EUR 2 and therefore the revenues by more than EUR 1.

Table 4: Fiscal multiplier estimates of Auerbach and Gorodnichenko (2012)

	Total spending		Consumption spending		Investment spending	
	Measure 1	Measure 2	Measure 1	Measure 2	Measure 1	Measure 2
Linear	0.87	0.58	0.82	0.89	2.07	2.75
Expansion	0.49	–0.80	0.12	–0.16	2.82	1.94
Recession	2.12	2.17	2.28	1.37	2.79	4.26

Source: Auerbach and Gorodnichenko (2012).

Note: Measure 1 is the maximum impact on output during 20 quarters. Measure 2 is the ratio of the sum of the output response (to a shock in government spending) to the sum of government spending response (to a shock in government spending) during 20 quarters, which has the rationale since the size of the multiplier depends on the persistence of fiscal shocks. The estimates are statistically different from zero expect the multipliers of consumption spending during an expansion.

Box 1: The UK's golden rule and its suspension

Creel, Monperrus-Veroni and Saraceno (2009) summarise the two key features of the UK Code for fiscal stability, which was in place before 2008: (1) the "golden rule", according to which government borrowing should not exceed net capital formation over the cycle, allowing to *"spread the cost of durables over the financial years during which they will be used and to spread the burden of capital formation over the generation of taxpayers that will be benefiting from it"* and (2) the "sustainable investment rule" to prevent overinvestment and to limit net public debt. Creel, Monperrus-Veroni and Saraceno (2009) found, using a structural vector autoregressions (SVARs) that the introduction of the UK's golden rule in 1997 strengthened the positive effect of public investment on output.

Dupont and Kwarteng (2012) assess the reasons behind the failure of the UK's golden rule. They conclude that a main reason is that the rule failed to bring the budget back into surplus, as the rule required a balanced current budget over the economic cycle and therefore the government could always motivate a deficit as long as it could project surpluses in the near future. In this regard, Dupont and Kwarteng (2012) also conclude that the fiscal rules gave politicians too much flexibility, left no room for error and spending plans were based on over-optimistic forecasts.

Yet during the current crisis, a fiscal rule giving specials status to net public investment would have improved outcomes: more growth-friendly composition of fiscal consolidation (as governments would have been forced to cut current expenditures, but not investments), lower output and employment falls in the short term (as the fiscal multiplier is smaller for current spending than for investments), and better

growth prospects in the medium- and long-term (because of the higher stock of public capital and reduced destruction of human capital resulting from longer-term unemployment). Even Turrini (2004), who on balance concluded that a golden rule is not desirable for the EU fiscal framework, noted that a golden rule *"may help to avoid an excessive compression of desirable investment projects especially during periods in which fiscal consolidations are needed to respect the requirement of fiscal discipline of the EU fiscal framework"*. So a golden rule can be particularly helpful during a crisis.

Beyond these crisis-related fiscal consolidation issues, the standard arguments in favour of a golden rule are also appealing:

- Intra-generational equity requires that the cost of public investment should be borne by future generations who will benefit from it and therefore capital expenditure should be financed through debt and not by taxes paid by the current generation (Blanchard and Giavazzi, 2004).
- In the presence of deficit limits, socially desirable public investment projects may not be undertaken (Turrini, 2004), and a golden rule could help to avoid strategic underinvestment (Peletier, Dur and Swank, 1999).
- In corporate accounting, the cost of investment is not charged to a single year when the investment is implemented, but distributed across the years of its use: this principle has merits and should be adopted in public sector fiscal rules by an appropriate golden rule.

Certainly, there are major conceptual and technical difficulties in selecting which expenditure categories should be granted special budgetary treatment, as also emphasised by Turrini (2004). But these difficulties should not prevent the consideration of a rule that would be effective in crisis times. Instead, proper provisions should be made to prevent the emergence of adverse incentives during good times, methodologies for calculating net investment and accounting practices should be harmonised across the EU, and the current and capital budgets should be separated, along with greatly increased transparency of the capital budget. We note that the EU fiscal framework builds strongly on the notions of potential output and structural budget balance: two unobservable variables, whose theoretical definitions are ambiguous. Yet an agreement was found on how to define and how to estimate these concepts. These estimates play major roles in the fiscal framework, despite well-known deficiencies, such as major revisions for the past (Darvas, 2013b). Analogously, the difficulties in defining the net investment measure to be excluded from the deficit considered in the SGP as least during bad times, should not prohibit the revision of the EU fiscal framework if that would improve economic outcomes.

A straightforward way to add an asymmetric golden rule to the current fiscal framework of the EU would be the following. Whenever the negative output gap exceeds a threshold, say actual output falls by more than 1% below potential output, the allowed structural deficit is increased by the amount of net public investment

compared to the benchmark of the current EU framework. A cut in net public investment would then by definition reduce the extra room for deficit. When the negative output gap is eliminated and actual output reaches potential output, a transition period lasting for e. g. three years would start during which the extra room for the deficit is gradually eliminated. Therefore, such a system would encourage governments to keep investment and cut instead current expenditures during an economic downturn, while allowing them to have a larger overall budget deficit than in the current EU fiscal framework. But the elimination of this extra room for the deficit in good times would address the concern of unduly favouring investments over other types of government expenditures at a time when governments have more fiscal space. The public debt rule could also be amended to make it consistent with the deficit rule. Such a system would not be prone to the drawbacks ofthe UK's golden rule as highlighted by Dupont and Kwarteng (2012).

5 Perspectives on public investment in the EU

The two main developments in public investment in EU Member States are oppositely related with those in other advanced economies. While the long-term decline in public investment since the 1970s in EU-core countries is broadly in line with other advanced economies, developments during the global and euro area financial and economic crises have been different: Public investment increased in Canada, Japan and the United States, but there was a modest fall in EU-core countries, and a dramatic collapse in vulnerable EU Member States, despite support from EU funds. Since the fiscal multiplier during a deep recession is likely to be higher than normal times, and the multiplier for productive government investment is especially high, preserving public investment could have made a sizeable difference in terms of output, employment and medium-term growth potential, while not having a major negative impact on budget deficits and debt ratios.

The EU fiscal framework has very modest provisions on preserving public investment, which is typically the first target of fiscal consolidation. The recently-inserted investment clause, which might allow a temporary deviation from fiscal targets for EU funding-related investments if the economy is in a deep recession and the 3% of GDP deficit rule and the debt reduction rule are respected, is of almost no help. Therefore, something more decisive has to be done.

Unfortunately, the European Parliament's October 2013 call to exclude, permanently and unconditionally, all national co-funding of EU-supported investments from the fiscal indicators considered in the Stability and Growth Pact, has not been respected. In the short term, given the difficulties in making a more significant modification to the EU fiscal framework, this proposal would be a sensible way to support investment, even though it would have rather limited impact: in Spain, Cyprus, Italy and Ireland (four older EU Member States with high public debt ratios)

the share of EU-supported investment is rather low, while in Greece, Portugal and the newer Member States national co-financing is typically small. Yet even some help is better than none.

But in the medium term, more ambitious support for public investment should also be considered. A kind of asymmetric golden rule, which would exclude a measure of net public investment from the fiscal indicators of the SGP at least during recessions, would be a sensible option. Such a rule would have strong rationale, because it would lead to a more growth-friendly composition of fiscal consolation, thereby limiting the fall in output and employment in the short term, and offering better growth prospects for the medium/long-term. The rule may also be asymmetric during the business cycle and work differently in good and bad times. In good times, it should be formulated in a way to prevent perverse incentives, such as an excessive preference of physical infrastructure over other growth-related expenditure. In bad times, the major goal should be the preservation of net public investment. The difficulties in defining, measuring and monitoring the net investment items to be excluded should not prevent a proper incorporation of the rule. As a comparison, indicators of potential output and structural budget balance are also included in the EU fiscal framework, even though they are very difficult to define conceptually and to estimate empirically, and earlier estimates were revised significantly. The incorporation of a golden rule should of course be accompanied by the harmonisation of EU accounting and reporting practices, the investment budget of the government should be separated from the current budget and the transparency of public investments should be increased.

Beyond an appropriate golden rule, which may help to prevent a collapse in public investment in vulnerable countries, the EU fiscal framework should use more actively public investment as a cyclical stabilisation tool during a recession, similar to what happened in a number of non-EU advanced and emerging countries recently. The first best option would be an EU, or at least a euro area, fiscal stabilisation instrument[13]. But if the development of such a common instrument is not feasible, two more realistic measures have to be implemented. First, a much more significant European investment programme is needed. The European Investment Bank seems to be the best institution to carry out such an investment programme (Darvas, 2012). Therefore, much more capital should be provided to the EIB beyond the EUR 10 billion agreed at the 29 June 2012 European Council and the internal procedures of the EIB should be revived to allow faster investments. Second, fiscal coordination through the European Semester should encourage Member States with healthy public finances to increase their investments when the euro area economy is weak. For example, Germany and Austria are among the countries in which there was public disinvestment, i. e. net public investment was negative recent years at a time

[13] See Darvas (2012) and Wolff (2012).

when the stock of public capital relative to GDP is among the lowest in advanced countries (table 5). Yet despite the fact the Germany has out-performed both European and national fiscal targets, in the country-specific recommendations delivered by the European Semester, it did not receive a recommendation to increase public investment[14].

Certainly, the quality of public investment is of utmost importance, as rightly emphasised by the European Commission (2012c), and smart and strategic choices have to be made for public investment to have forceful effects (Zachmann, 2012). Therefore, the fiscal reforms we have outlined should be accompanied by major budgeting, accounting, transparency and assessment reforms to ensure that public investment is effectively deployed to the right places.

[14] See Darvas and Vihriälä (2013). Moreover, Zeuner (2013) concluded that there is major public investment backlog in Germany, yet public investment is even inadequate to maintain infrastructure.

Table 5: Government net fixed capital formation and the stock of public capital

	Government NFCF, 2013	Government capital stock, 2010
	% of GDP	
Estonia	2.6	N/A
Romania	2.5	N/A
Bulgaria	2.4	N/A
Poland	1.9	N/A
Latvia	1.7	N/A
Luxembourg	1.6	N/A
Sweden	1.2	49
Lithuania	1.2	N/A
Cyprus	1.1	N/A
United Kingdom	1.0	36
Malta	1.0	N/A
Slovenia	0.8	N/A
Hungary	0.8	N/A
United States	0.7	52
France	0.5	54
Croatia	0.4	N/A
Finland	0.4	43
Denmark	0.3	44
Netherlands	0.3	58
Ireland	0.2	51
Italy	–0.1	57
Belgium	–0.1	35
Germany	–0.2	42
Austria	–0.2	40
Portugal	–0.3	50
Spain	–0.7	52
Czech Republic	–1.0	N/A
Slovakia	–1.0	N/A
Greece	–1.6	49

Source: Authors' calculations using data from AMECO November 2013 vintage (NFCF) and Checherita-Westphal, Hughes-Hallett and Rother, 2012 (public capital stock).

Note: NFCF data of the United States is from 2011. The capital stock estimation is based on a number of assumptions and uses GFCF data, which does not include all public investment, nor privatisation (see Appendix 1), and therefore the results should be treated with caution. The countries are ordered according the NFCF.

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Appendix 1: What is public investment? Some definitions and clarifications

Conceptually, investment directly financed with the budget of public sector entities should be considered as public investment, but it is extremely difficult to measure it and all available indicators are imprecise. Here we consider the following indicators:

- Gross fixed capital formation of the general government;
- General government gross capital expenditure;
- Net fixed capital formation of the general government;
- Public-private partnerships (PPPs);
- Investment by state-owned enterprises (SOEs) and privatisation of SOEs.

The most widely used indicator of public investment is gross fixed capital formation (GFCF) of the general government[15]. The concept deals with produced tangible and intangible non-financial assets (e.g. dwellings, machinery, cultivated assets, software, major improvements to existing assets, reclamation of land from sea etc.). Financial assets, such as the ownership of companies, are excluded. It is important to notice that state-owned enterprises (SOEs) that are treated as "market operators", such as railway companies or power-grid companies, are classified in the corporate sector and not as part of the general government and therefore government GFCF potentially misses a large part of infrastructure investment.

An alternative measure of gross public investment is the sum of gross fixed capital formation and government capital transfers[16,17]. But a drawback of this measure is that capital transfers also include government subsidies to private investments that are not a component of public investments. In chart 3 we compare gross fixed capital formation plus capital transfers (i.e. capital expenditure), and distinguish within the capital transfers the share of "investment grants" that in principle should net out the effect of other capital transfers that do not entail creation of fixed capital.

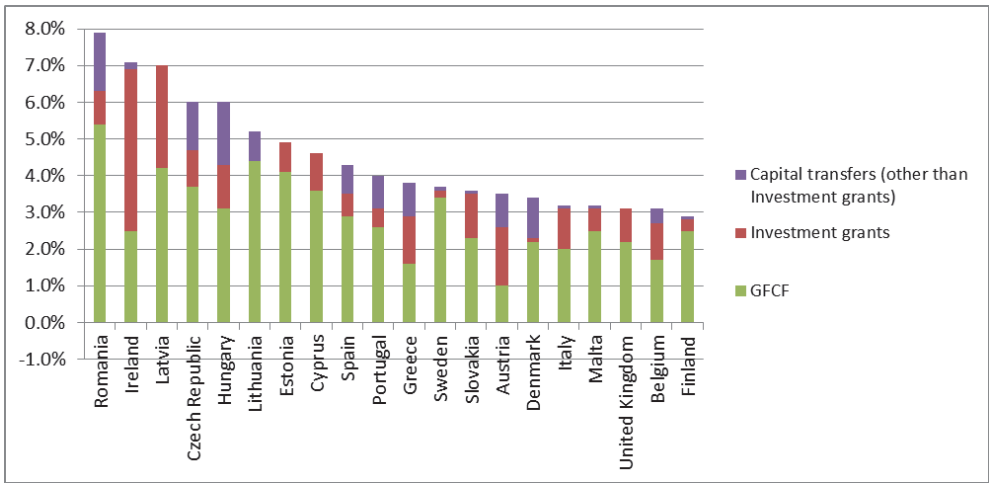
[15] A related concept is "Gross Capital Formation" (code P5 in the nomenclature used by the European System of Accounts – ESA-95), which is the sum of three components: Gross fixed capital formation (P51), Changes in inventories (P52), Acquisitions less disposals of valuables (P53).

[16] Capital transfers (D9) cover: i) Capital taxes (D91) – taxes on capital transfers: inheritance taxes, death duties and taxes on gifts. Ii) Investment grants (D92) – consist of capital transfers in cash or in kind made by government or by the rest of the world to other resident or non-resident institutional units to finance all or part of the costs of their acquiring fixed assets, iii) Other capital transfers (D99).

[17] Capital expenditure is defined as P51 (Gross Fixed Capital Formation) and D9 (Capital Transfers Consolidated) in ESA-95.

Chart 3: Gross fixed capital formation, investment grants and other elements of capital transfers in 2011

% of GDP



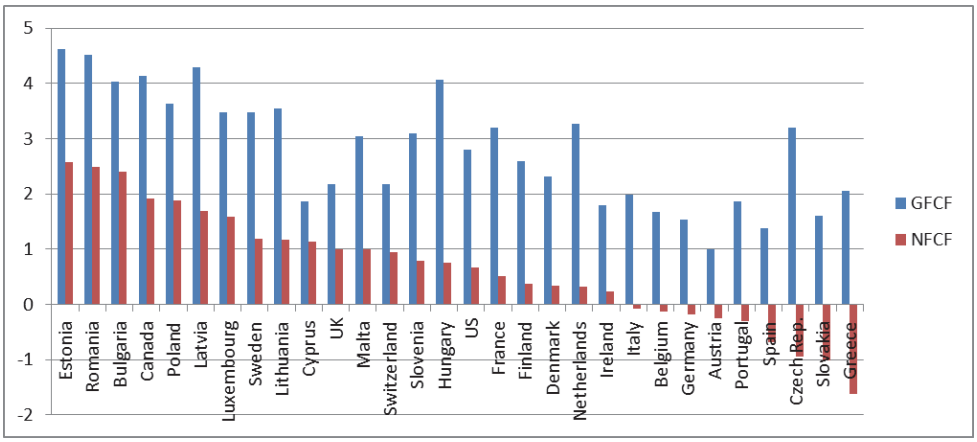
Source: Eurostat database, Government national accounts.

Note: Data on capital transfers and investment grants is not available for the EU Member States not included in the chart.

Certainly, net capital formation would be a better indicator of investment than gross capital formation, since usage and time depreciates the capital stock. A positive gross investment may actually imply disinvestment (i.e. decline of the capital stock), if gross investment does not reach the value of depreciation. GFCF of the general government is a gross measure in the sense that it does not consider depreciation, yet it also has a net component in the sense that the value of the acquisition of new investments is netted against sales or other disposals of existing capital goods[18]. When deducting capital depreciation, the differences between gross and net investment can be quite significant, as it is shown in chart 4. In a number of countries (Italy, Belgium, Germany, Austria, Portugal, Spain, Czech Republic, Slovakia and Greece) gross investment in 2012 was below capital depreciation and therefore the net public capital stock has declined. Unfortunately, it is even more difficult to measure capital depreciation than gross investment and therefore net capital formation is a less reliable indicator.

[18] These sales and disposals of non-financial assets include privatizations of government-owned non-financial properties, such as e.g. the sale of an office building: these are deducted from the value of new acquisitions of non-financial assets and are therefore accounted in a negative way in gross fixed capital formation. Privatizations of SOEs are not included in the concept and therefore do not affect gross fixed capital formation of the general government.

Chart 4: Gross and net public investment (capital formation) in 2013
% of GDP



Source: AMECO database.
Note: 2012 data for the USA, 2010 data for Canada. Net fixed capital formation is available at current prices and then expressed as a share of GDP.

Public private partnerships (PPPs) further complicate the measurement of public investment. PPPs are an innovative financing mechanism of infrastructure investments. Until 2004, the treatment of PPPs in national accounts was not uniform across Europe, in the absence of EU-wide guidelines. The novelty of the instrument and the different treatment by EU Member States is also reflected in the absence of systematic data on PPPs. The European PPP Expertise Centre (EPEC)[19] regularly monitors European PPPs; according to recent analysis by the Centre, the aggregate value of PPP transactions that reached financial close on the European market in the first half of 2013 amounted to EUR 9 billion, which is a rather small amount compared to government GFCF in the EU. Unfortunately, the actual contribution of government into project financed through PPPs is rather difficult to estimate. Despite the lack of comparable data, we know that the share of PPPs is relatively small compared to government investment (Peree and Valila, 2007). In their study, Peree and Valila (2007) combine different sources on micro-level data on projects structured as PPPs to obtain estimates on PPPs at the aggregate level. According to the authors, until 2006 the only countries where PPPs seemed to have a systemic importance were the UK and Portugal, in which the average total project amount of PPPs (i.e. stocks) was around 20–33% of average public investment flow, while in all other countries even the stock value of signed public-private partnership contracts is small compared to annual public investment flows.

[19] www.eib.org/epec/.

Finally, we highlight that the treatment of state-owned enterprises (SOEs) further distorts the picture on public investment. While first principles suggests that SOEs are part of the public sector, investment by SOEs are not included in government GFCF (as we noted earlier), which is one reason why GFCF is a distorted measure of gross investment. When the public capital stock is calculated from government time series of GFCF, which is typically the case, then it misses the capital stock of SOEs which is therefore one more reason why the estimated public capital stock is also a distorted measure. Also, privatisation of SOEs should, by definition, reduce the public capital stock, but this effect cannot be incorporated by estimates for the capital stock for two reasons: the capital stock of SOEs is not incorporated in public capital stock estimates and there is no comprehensive data on privatisation either.

The unmistakable conclusion is that all available indicators on public investment and public capital are imprecise and major improvements would be needed in statistical services to be able to offer a correct and comprehensive picture on gross and net public investment and capital.

Appendix 2: Public investment and economic growth

The empirical literature on the effects of public investment and capital on economic growth is somewhat inconclusive, though the majority of studies find positive effects. This might be due to several factors.

One reason for this inconclusiveness is the difficulties related to the definition and measurement of public investment, as we discussed in the previous section. This makes any selection of the variable to be used in the empirical analysis imperfect.

- Coverage: as we noted in Appendix 1, public GFCF, the indicator most widely used, does not include investment of SOEs and therefore this indicator potentially misses an important share of public investment.
- Gross vs net: net public investment is the proper indicator of additions to the public capital stock, but data on net investment are even less reliable.
- Composition of public investment/capital: A considerable portion of public investment is functional to the supporting of broad functions of government, such as the provision of public services, maintaining law and order, community amenities and administration, which can improve the business climate and the quality of public services, but they may have different impacts on economic performance than, for example, highways and schools. Lucas (1998) argued that public investment in education increases the level of human capital and this can be seen as a main source of long-run economic growth. However, not just investment, but current spending on education and health is also growth enhancing and therefore the most widely used indicator of public investment (GFCF) is narrow in the sense

that it does not cover all public spending that adds to a country's productive potential.

- Flow vs stock: the data on public capital stock would be better for analytical purposes than investments, but it is even more problematic to measure than public investment. Only a few studies attempted to estimate the stock of public capital, but these estimates rely on a number of assumptions which introduce major uncertainties. Furthermore, the capital stock estimates are based on historical GFCF, which, as we argued above, does not include all public investment, including the investment of SOEs. Also, capital stock estimates do not used to consider privatisation, which was a significant factor in reducing the public capital stock in a number of countries.

A second reason for the inconclusiveness of the empirical literature is the difficulty to isolate the effect of public investment on long term growth, because there are several other influencing variables. Moreover, the nature of infrastructure investment implies that the full impact of investment in roads, telecommunications, and other infrastructure on growth can only be realized with considerable lags, once effective networks have been established (Straub and Tchakarov, 2007). It is difficult to formulate a model that approximates well the delayed impacts.

Thirdly, the results might also depend on the type of methodology used. Traditionally, the effect of public investment on growth has been analysed with four major types of methods (Straub and Tchakarov, 2007; Turrini, 2004).

1. The first one entails the estimation of aggregate production functions that relate output to public capital stocks. A seminal article with this approach was Aschauer (1989), who found that, for the United States, public investment would exert a strong positive impact on production. This article has triggered a debate among academics, with subsequent analyses testing different levels of aggregations, but mostly leading to weak results. In a recent paper applying panel econometric methods, Calderón, Moral-Benito and Servén (2014) both statistically and economically highly significant impact of infrastructure on output, which is robust to alternative dynamic specifications and infrastructure measures.
2. The second strand of methodologies focuses on cost or profit functions of private sector firms, to assess whether public capital lowers business costs. The results arising from these analyses are quite ambiguous, though in most of the cases public capital is found to reduce the costs of private sector firms (Turrini, 2004).
3. A third strand of studies analyses, using mostly cross-section regressions, aims to study the impact of public capital on the growth potential of countries or regions rather than the level of output[20]. These papers assess whether public investment helps explain differences in cross-country or cross-regional growth, with the underlying concept that that public capital has an impact on the accumu-

[20] Barro (1991), Easterly and Rebelo (1993), Holtz-Eakin and Schwartz (1995).

lation possibilities of the economy, rather than on the level of output. Positive results are obtained when using a subcomponent of public capital, namely infrastructure in transport and telecommunications.[21]

4. A fourth strand of literature uses vector autoregressions (VAR) to analyse the direction of causation. Yet even within this group of studies results are rather inconclusive, as for instance the evidence does not support the claim that public investment rather than consumption boosts growth[22] or that public investment pays by itself in the long run. Most of these studies focus on public investment rather than on public capital, as it was the case for aggregate production function studies. Pereira (2000, 2001) and Pereira and Andraz (2005) found that all types of public investment affect positively private output, yet core infrastructure investments display the highest rate of return, and that this positive effect is mainly due to a crowding-in effect on private investment. Voss (2002), in contrast with Pereira, showed that public investment tends to crowd out private investments. Sturm et al. (1999) found a positive and significant short-run effect of public investment, but no long-run effects, while Creel, Monperrus-Veroni and Saraceno (2009) and Tenhofen, Wolff and Heppke-Falk (2010) found long-term effects.[23]

Let us also highlight that Aschauer (1998) and Barro (1990) argued that the relationship between public investment and growth could even turn negative once public capital is above certain threshold. In fact maintaining or expanding the existing capital stock may require high tax rates, which would reduce growth, all else being equal.

Therefore, there are good reasons for mixed results in the academic literature, though a number of studies found the certain types of public investment/capital, like infrastructure, is conducive to economic growth.

[21] Calderon and Serven (2003), Easterly and Rebelo (1993) for instance. Note that these works refer to Latin America.

[22] See, among the others, Perotti (2004).

[23] For a comprehensive literature survey, see Arslanalp et al. (2010).