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New evidence on the effects of public investment in the European Union

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New evidence on the effects of public investment in the European Union

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Abstract

Public investment can support geoeconomic policy goals by strengthening economic resilience through the creation of public assets and by fostering domestic sources of economic growth. This paper presents new evidence on how public investment affects output, unemployment, private investment and public debt in the 27 EU member countries. Using forecast errors based on archival data to identify public investment shocks, we find that expansionary shocks (a) have favourable effects on output and unemployment in the short to medium run; (b) do not crowd out private investment; and (c) do not jeopardise public debt sustainability. Even though fiscal consolidation pressures linked to EU fiscal rules are high, promoting public investment may be critical – not only for economic development, but also to advance geostrategic goals in energy, infrastructure and resilience.

Keywords: Public investment, growth, unemployment, public debt

JEL classification: E32, D84, F02, Q41, Q43, Q48

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1. INTRODUCTION

The Draghi Report on EU competitiveness highlights the fact that public investment is essential to achievement of the EU's geostrategic objectives. Increased public investment may help fill the total EUR 750-800bn annual investment gap (around 4.5% of EU GDP), including in energy security, digital infrastructure and decarbonisation. Private-sector actors may avoid providing the required investment because relevant investment projects often involve large upfront costs, long time horizons and uncertain returns. Public investment may help crowd in private investment and support the EU's open strategic autonomy, i.e. its ability to act independently and to protect its interest in such key areas as energy, security and technology, while remaining open to trade and international cooperation (Draghi, 2024a).

Furthermore, Draghi (2024b) argues that Europe has relied excessively on foreign demand to fuel growth, while keeping domestic demand subdued by tolerating low wage growth and tight fiscal policy over much of the 2010s. With the US now seemingly unwilling to buy European export goods as it did in the past, and with China's import growth slowing (Tordoir et al., 2025), Europe must refocus on domestic growth drivers, including public investment.

While the Draghi Report and various other studies (e.g. European Commission, 2020; Heimberger and Lichtenberger, 2023; Pisani-Ferry and Tagliapietra, 2024) highlight the need for substantial additional public investment to meet geostrategic goals, European fiscal policy makers are facing constraints. EU national governments are under substantial fiscal consolidation pressure to reduce fiscal deficits and public debt ratios over the coming years to meet the EU's new fiscal rules (e.g. Darvas et al., 2024; Heimberger, 2025). As public investment can be reduced or postponed more easily than other government spending components (Jacques, 2021), EU governments may find it challenging to expand public investment – or at least to defend existing investment levels. National EU governments' multi-year fiscal plans to meet the EU's fiscal rules show that the nationally financed public investment rate is projected to be cut in more than a third of EU countries over the next few years. Harsher fiscal consolidation measures correlate with deeper public investment cuts (Boivin and Darvas, 2025).

Against the background of the geostrategic importance of public investment and present fiscal consolidation pressure, this paper focuses on the empirical evidence regarding how public investment affects macroeconomic outcomes and the public debt ratio. If the empirical evidence suggests that public investment contributes to economic growth more than it raises public debt, that may strengthen the case for financing it – even through borrowing – without undermining fiscal stability (e.g. IMF, 2014;

Abiad et al., 2016). We provide fresh empirical evidence for 27 European Union (EU) countries over the time period 2000-2023 and discuss our findings in the context of existing studies.

The rest of the paper is structured as follows. Section 2 discusses the related literature. Section 3 introduces our empirical strategy, including explanations of public investment shock identification, econometric estimation and data sources. Section 4 presents our econometric findings. And Section 5 offers a conclusion.

2. RELATED LITERATURE

Recent estimates converge on a sizeable and persistent EU investment gap, although the figures do vary to some extent, according to scope and assumptions. The Draghi Report puts total additional annual investment needs across the green, digital, security and competitiveness agenda at EUR 750-800bn, or around 4-5% of EU GDP (Draghi, 2024a). Focusing on the climate and energy transition, Pisani-Ferry and Tagliapietra (2024) estimate that meeting the EU's 2030 climate target will require about 2% of GDP in additional investment each year over the period 2025-2030. Complementing this, Heimberger and Lichtenberger (2023) argue that at least 1% of EU GDP in additional public investment per year will be needed to meet the climate goals.

In the aftermath of costly economic crises related to the COVID-19 pandemic and the energy price shock due to the war in Ukraine, many EU countries are grappling with sluggish economic growth and elevated public debt levels (e.g. European Commission, 2025). This has prompted renewed interest in the macroeconomic effects of changes to fiscal policy (e.g. Heimberger, 2025).

Fiscal multipliers measure the output response to an exogenous change in fiscal policy. A multiplier of 0.5 would imply that a EUR 1 expansionary shock to government spending raises output by EUR 0.50. Current research underscores the fact that government spending may contribute to boosting the economy. Recent empirical studies and quantitative literature surveys report average spending multipliers close to 1 – or even considerably higher – in many settings (Zubairy, 2014; Gechert, 2015; Angelini et al., 2023; Clemens et al., 2025). Public investment multipliers are even regularly reported in a range of 1.5 to 4 (e.g. Gechert, 2015; Deleidi et al., 2020; Saccone et al., 2022; Ciaffi et al., 2024b; Angelini et al., 2023). Public investment has attracted attention as a policy tool to stimulate growth, while potentially improving medium-term public debt dynamics by raising output and crowding in private-sector activity (Abiad et al., 2016; Auerbach and Gorodnichenko, 2017; Ciaffi et al., 2024a).

To estimate the effects of fiscal policy credibly, researchers identify exogenous policy changes – e.g. through narrative approaches, using information from budget documents (e.g. Romer and Romer, 2010), forecast error methods (e.g. Abiad et al., 2016) or institutional timing assumptions that exploit implementation lags in fiscal policy (e.g. Blanchard and Perotti, 2002) – thereby isolating fiscal policy shifts unrelated to economic conditions. The identification of exogenous fiscal policy shocks helps reduce endogeneity concerns and yields more reliable estimates for the macroeconomic effects of fiscal policy.

Direct government spending typically has a larger impact on output than do taxes (e.g. Gechert, 2015; Gechert and Heimberger, 2022). When fiscal multipliers exceed unity, expansionary fiscal policy may improve debt sustainability, as the boost to GDP outweighs the increase in public debt (e.g. Auerbach

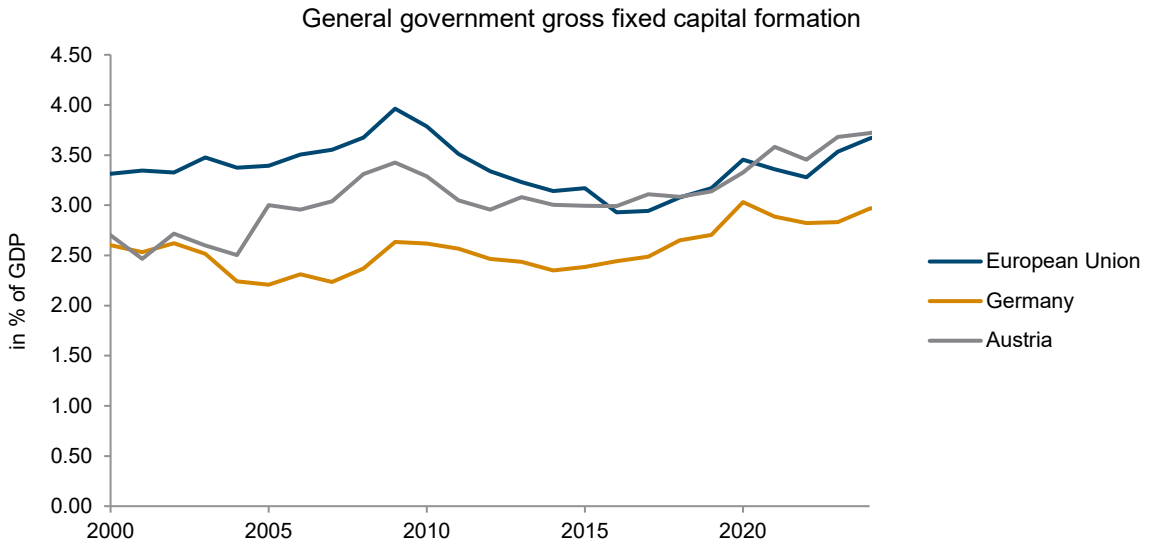
and Gorodnichenko, 2017; Ciaffi et al., 2024a). Existing evidence also suggests that public investment may affect the public-debt-to-GDP ratio more favourably than public consumption (Petrović et al., 2021). While total public investment tends to have a persistent and robust effect on GDP, multipliers have been shown to be particularly large for investments related to research and development (R&D), institutional capacity and education (IMF, 2014; Saccone et al., 2022; Ciaffi et al., 2024b). Targeted 'mission-oriented' investments – directed toward strategic innovation or societal challenges – may yield especially high returns by catalysing complementary private-sector activity (Deleidi and Mazzucato, 2021).

In periods of economic slack, the macroeconomic effects of public investment can be particularly strong, reflecting the greater responsiveness of output to additional public demand when idle resources are available (Auerbach and Gorodnichenko, 2012; Deleidi et al., 2020; Petrović et al., 2021). Public investment can be particularly effective in such contexts, both in the short term (by stimulating aggregate demand) and in the longer term (by raising potential output) (Abiad et al., 2016). Conversely, reducing public investment – in particular during an economic downturn – can have pronounced adverse effects on the economy (Ardanaz et al., 2024; Ciaffi et al., 2024a), thereby harming long-run debt sustainability through scarring effects on productive capacity and long-term unemployment (e.g. DeLong and Summers, 2012). Fiscal consolidation accompanied by cuts in public investment may have long-term negative effects on potential output, i.e. what an economy is able to produce without risking an upsurge in inflation (Fatas and Summers, 2018; Gechert et al., 2019).

Investment reports highlight broad patterns of how public investment has evolved in EU countries (e.g. European Commission, 2022; Cerniglia and Saraceno, 2024; European Investment Bank, 2024). To gain a general overview of public investment dynamics, we examine government gross and net fixed capital formation as a share of GDP for Austria, Germany and the EU 27. Gross public investment represents total government spending on fixed assets before accounting for depreciation. While the EU's average gross public investment ratio appears relatively stable over the period 2000-2024, this masks some pronounced shifts: a marked decline in the years after the global financial crisis and the euro area crisis, an incomplete recovery in the years running up to the Covid-19 crisis, and a further rise linked to COVID-19 fiscal support and the launch of the EU Recovery and Resilience Facility (e.g. Heimberger and Lichtenberger, 2023). Compared to Austria, Germany maintained a noticeably lower gross public investment ratio throughout the period. Austria, by contrast, overtook the EU average in 2021.

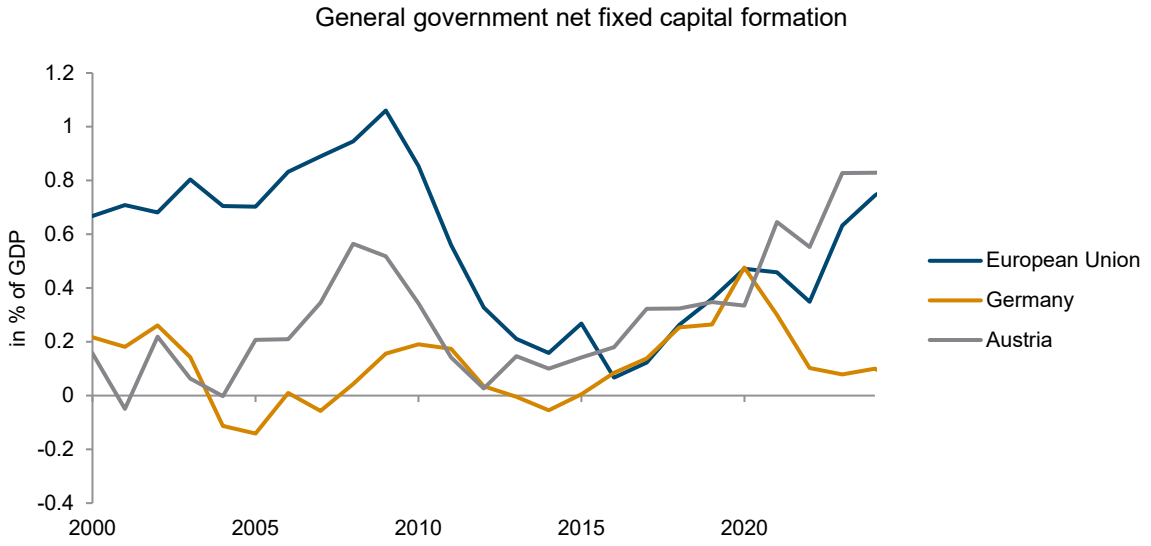
Net public investment – gross investment minus depreciation – provides a clearer picture of whether the public capital stock is expanding. For the European Union as a whole, net investment was positive until 2010 but then fell sharply and remained low for much of the 2010s, when a decline in the public capital stock was most prevalent in the crisis-ridden periphery economies of the euro area (e.g. Mody, 2018). In Germany, net investment hovered at close to or below zero between 2003 and the mid-2010s, suggesting that spending largely covered asset replacement, rather than new capacity – consistent with long-standing public underinvestment concerns (e.g. Bardt et al., 2020). Austria's net public investment ratio was generally positive over the whole period, though it dipped after 2008 and increased markedly only after the COVID-19 pandemic hit – with net public investment peaking at 0.8% of GDP in 2024. The EU average also saw a post-pandemic rise, while Germany's net investment rate fell back to around zero after peaking in 2020.

Figure 1 / Gross public investment as % of GDP



Source: AMECO (autumn 2024); own calculations.

Figure 2 / Net public investment as % of GDP



Source: AMECO (autumn 2024).

3. EMPIRICAL STRATEGY

We estimate the effects of public investment shocks on real GDP, the unemployment rate, the private investment ratio and the public debt ratio in a sample of euro area countries, using panel data covering two decades. In what follows, we explain shock identification (Section 3.1), econometric estimation (Section 3.2) and the data set (Section 3.3).

3.1. Identifying public investment shocks

We identify public investment shocks as the forecast error of public investment. In particular, we define a public investment shock as the difference between the actual value of the public investment ratio (i.e. general government gross fixed capital formation as a percentage of GDP) and the forecast of the public investment ratio provided by the European Commission in its autumn forecast of the same year (published in October or November).

By using public investment forecast errors, we follow IMF (2014) and Abiad et al. (2016), who calculate public investment forecast errors for a set of advanced economies inside and outside Europe. Our contribution is to apply their approach to a sample of euro area countries and to use more recent data.

Use of this approach to identify public investment shocks addresses the two main problems discussed prominently in the empirical literature: fiscal foresight and endogeneity. The fiscal foresight problem arises as households and firms receive information about changes to public investment in advance, which may lead them to adapt their spending behaviour before the policy switch actually occurs. This could result in inconsistent econometric estimates (e.g. Leeper et al., 2013; Ramey, 2011). By using forecast errors, we align the information known to firms and households with our econometric information set. Furthermore, the use of forecast errors tackles the endogeneity problem, as changes to fiscal policy may be endogenous to cyclical conditions in the economy. Since fiscal policy typically only responds to the business cycle with a substantial lag (e.g. Blanchard and Perotti, 2002; Romer and Romer, 2010) and we use information about public investment and the economy as captured in forecasts up until October or November of the same year, endogeneity is highly unlikely to be of major concern.

3.2. Econometric estimation

We estimate the effects of public investment over the short to medium term by estimating impulse-response functions from local projections (Jorda, 2005), which is more flexible than standard VAR approaches and less sensitive to lag choices (e.g. Jorda and Taylor, 2025).

Our econometric approach is based on baseline regression equation (1), which we estimate separately for each response horizon k (with $k = 1, \dots 4$):[1]

$$y_{i,t+k} - y_{i,t} = \beta_k F_{i,t} + \sum_{l=1}^{2} \gamma_{k,l} Z_{i,t-l} + \delta_i^k + \theta_t^k + \varepsilon_{i,t}^k \qquad (1)$$

[1] We use Adämmer (2019) for the estimates. Econometrically, β_1 at horizon k=1 is the coefficient corresponding to the impact horizon, which will be labelled as 0 years after the shock in Figure 3 and Table 1 to match the impulse response convention.

In this equation, $y_{i,t+k}$ represents the response variable of interest (log of real GDP, the unemployment ratio, the private investment ratio or the public-debt-to-GDP ratio) k periods after the public investment shock, and $y_{i,t+k} - y_{i,t}$ gives the cumulative response of y at horizon k to the investment shock. $F_{i,t}$ is the public investment forecast error as a percentage of GDP in country i and year t. $Z_{i,t-l}$ is a vector of controls, which includes real GDP growth, the long-term nominal interest rate, the public debt ratio, the real effective exchange rate and the respective endogenous variable. We include lags of the controls to capture their dynamics and help avoid omitted variable bias. δ_i^k are country-fixed effects, θ_t^k are time-fixed effects and $\varepsilon_{i,t}^k$ is the stochastic residual. To avoid biased standard errors, we use the Driscoll and Kraay (1998) standard error estimator robust to serial correlation and cross-sectional correlation.

3.3. Data

Our sample covers the 27 EU member countries over the time period 2000-2023.[2] To calculate the public investment forecast errors, we use archive data of the European Commission from the AMECO database on public investment forecasts.[3] We extract actual (ex-post) public-investment-to-GDP values. The definition of the public investment shock is the difference between the actual (ex-post) value in public investment as a percentage of GDP and the forecast for the public investment ratio provided by the European Commission in its autumn forecast of the same year (published in October or November).[4] We also obtained data for the other variables used in the econometric analysis from the AMECO database version published in autumn 2024.

4. ECONOMETRIC RESULTS

Figure 3 shows our econometric findings regarding how real GDP (panel A), the unemployment rate (panel B), the private investment ratio (panel C) and the public debt ratio (panel D) respond to a public investment shock amounting to 1 percentage point of GDP.

In terms of the output effect, we find an impact multiplier of 0.6: a one percentage point of GDP increase in public investment raises real GDP by 0.6% on impact (period 0). The cumulative multiplier increases over the response horizon and, three years after the shock, peaks at 1.3.

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2 We will conduct a robustness check to assess whether excluding the Covid-19 crisis years from 2020 onwards influences our panel estimation results.

3 Archive data for the relevant forecasts over 2010-2019 are publicly available. We received forecast values for the period 2000-2009 from the AMECO database's statistical support via e-mail.

4 A statistical break in the European System of Accounts (ESA 95 to ESA 2010) introduced several reclassifications of private and public investment. To account for this, we compute forecast errors in two statistical regimes: (i) for 2000–2012, we compare the Autumn-of-year forecast with ESA 95 ex-post values from the AMECO Autumn 2013 vintage; (ii) for 2014–2023, we compare the Autumn-of-year forecast with ESA 2010 ex-post values from the AMECO Autumn 2024 vintage. For 2013, to avoid a mechanical zero while remaining consistent with ESA 95, we compare the Autumn 2013 forecast with the Spring 2014 ex-post values. ESA 2010 officially replaced ESA 95 in September 2014.

Figure 3 / The cumulative effects of a public investment shock of 1 percentage point of GDP on real output, the unemployment rate, the private investment ratio and the public debt ratio

Source: AMECO (autumn 2024), AMECO archive; own calculations based on equation (1). Shaded areas show the 68% confidence interval. The red dashes represent the horizontal zero effect line. Sample: 27 EU member countries over the time period 2000-2023.

Our estimated cumulative public investment multipliers fall within the range reported in the literature. The impact multiplier of 0.6 and the one-year multiplier of 1.2 are consistent with the meta-analysis by Gechert (2015), who reports an average public investment multiplier of 1.4 (with a standard deviation of 0.9), though without distinguishing short- and medium-run effects. After three years, our estimated cumulative multiplier of 1.3 is lower than the 2.5 reported by Clemens et al. (2025) for Germany using a narrative instrument for government investment, and the 2.4 documented by Auerbach and Gorodnichenko (2012) for the United States. While our identification strategy differs from these studies, it is directly comparable to Abiad et al. (2016), who also use forecast errors to identify public investment shocks; their peak multiplier of 1.4 for 17 OECD countries over 1985–2013 is closely aligned with our results for 27 EU countries over 2000-2023.

The persistent output effects of public investment may partly be rationalised with the literature on the hysteresis effects of fiscal policy, which suggests that temporary fiscal policy shocks can lead to multi-year persistent output effects. One mechanism may involve higher public investment raising productive capacity via infrastructure and capital deepening (e.g. Lavoie, 2018). Output gains may further operate through direct aggregate demand effects and, potentially, through supply-side improvements linked to public capital (e.g. Gechert et al., 2019).

The unemployment rate falls by 0.2 percentage points on impact and by 0.6 percentage points two years later, before returning to zero in the third year. The point estimates for the private investment ratio response are positive throughout the response horizon, but the uncertainty band mostly includes 0. Our

results are not consistent with crowding-out effects and are instead weakly suggestive of the crowding-in of private investment.

The public debt ratio tends to decline in response to the public investment shock, driven by the favourable macroeconomic effects. Although the point estimates are negative right across the horizon, the uncertainty bands widen over time, so that we cannot rule out the absence of an effect after three years. Our finding that public investment shocks do not jeopardise debt sustainability is consistent with Abiad et al. (2016). While the debt numerator rises when investment is debt-financed, public investment raises output, thereby increasing the denominator.

We conducted several robustness checks to assess the sensitivity of our results. First, we replaced real GDP growth in the controls with the output gap as a cyclical indicator. Second, we added an additional lag of the control variables to test dependence on lag structure. Third, we included the primary fiscal balance to account for the overall fiscal stance. Fourth, we excluded Ireland, since its GDP data are distorted by multinational corporate activity and may be unreliable (e.g. Economides and Nikolaishvili 2023). Fifth, we excluded the years 2020-2023 from the sample to check for the role of outliers related to the Covid-19 crisis. Table 1 shows that the cumulative multiplier estimates are robust. They decline slightly when controlling for the output gap, the primary balance, or when excluding the COVID-19 crisis years; they increase modestly with an additional lag or when excluding Ireland. In all cases, however, the peak estimates remain close to the baseline value of 1.3.

Table 1 / Robustness checks for public investment multiplier

Response horizon	Cumulative multiplier – lower bound	Cumulative multiplier – point estimate	Cumulative multiplier – upper bound
Baseline findings: see Figure 3 A)			
0	0.18	0.57	0.96
1	0.58	1.20	1.83
2	0.49	1.29	2.09
3	0.28	1.29	2.29
Cyclical conditions: output gap instead of GDP growth			
0	0.18	0.57	0.96
1	0.54	1.13	1.73
2	0.40	1.16	1.93
3	0.15	1.14	2.13
Lag structure: additional lag			
0	-0.02	0.23	0.48
1	0.41	0.89	1.36
2	0.40	1.15	1.89
3	0.34	1.35	2.37
Fiscal stance: primary balance			
0	0.17	0.55	0.93
1	0.54	1.18	1.82
2	0.43	1.24	2.05
3	0.22	1.24	2.26
Country group: exclude Ireland			
0	0.38	0.78	1.18
1	0.69	1.36	2.04
2	0.63	1.46	2.30
3	0.42	1.42	2.42
Time period: Exclude years 2020-2023 (Covid-19)			
0	0.22	0.66	1.09
1	0.45	1.19	1.93
2	0.26	1.16	2.06
3	0.04	1.13	2.22

Source: own estimations based on local projections (see equation 1). The lower and upper bound estimates show the 68% confidence interval. The response horizon is 0 on impact, 1 for one year after the *public investment* shock, etc.

5. CONCLUSIONS

We present new evidence that, on average, expansionary public investment shocks in EU member countries have a favourable macroeconomic effect: public investment boosts output and reduces unemployment in the short to medium run, and it neither crowds out private investment nor compromises public debt sustainability.

For policymakers, the scope and necessity of public investment are shaped by political objectives. As highlighted in the Draghi Report on competitiveness and in other recent studies, EU fiscal policy makers will need to scale up public investment to meet key geostrategic objectives in areas such as energy, transport and digital infrastructure. While the required investment is substantial – Heimberger and Lichtenberger (2023) estimate that general government gross fixed capital formation will have to rise by 1% of EU GDP annually to meet the climate and energy targets – it remains well within reach. Our

findings suggest that past public investment shocks in EU member countries generated favourable macroeconomic effects without undermining debt sustainability. While this evidence primarily contributes to the academic debate, it may also offer valuable insights for policymakers weighing the potential impact of further investment.

A key challenge for policymakers is the pressure to pursue fiscal consolidation under the EU's revised fiscal rules (Darvas et al., 2024). High public debt and government financing costs constrain fiscal space. The interest rate environment is important: while most EU member states benefited from falling interest rates and lower debt-servicing costs during the 2010s, the recent rise in government bond yields must be carefully considered in any assessment. However, less favourable financing conditions need not undermine the case for public investment, given its long-term strategic and economic payoffs.

Given the national fiscal adjustment requirements to meet the EU's fiscal rules, a new EU investment fund financed through joint borrowing, as a successor to NextGenerationEU, may contribute to addressing the significant investment gaps facing the EU. Such an EU investment fund could substantially relieve national budgets of EU member states, thereby allowing governments to make important steps in expanding infrastructure investments while making it more realistic to comply with EU fiscal rules (e.g. Heimberger and Lichtenberger, 2023; Boivin and Darvas, 2025; Draghi, 2025).

In light of current fiscal consolidation efforts, ensuring adequate public investment has become a key challenge. To maximise the macroeconomic benefits, it is essential to focus on the efficiency of public investment – particularly in the selection, implementation and monitoring of projects – as inefficiencies may significantly reduce potential gains (e.g. Pritchett, 2000; Abiad et al., 2016; Jalles et al., 2025). Multipliers can be expected to be particularly large when investment spending addresses clear infrastructure needs (e.g. IMF, 2014), supports education and institutional capacity (e.g. Saccone et al., 2022) and promotes R&D (e.g. Ciaffi et al., 2024b), as well as structural transformations (Deleidi and Mazzucato, 2021). The empirical evidence suggests that well-designed and well-timed public investment supports economic development, especially during periods of economic slack (e.g. Gechert and Rannenberg, 2018; Petrović et al., 2021). From a policy perspective, it is critical for achieving geostrategic policy objectives (e.g. Pisani-Ferry and Tagliapietra, 2024).

Moreover, the geoeconomic fabric of the world is changing rapidly. As Draghi (2024b) notes, the current US administration appears unwilling to act as the EU's buyer of last resort. Europe will thus have to contend with a deliberate US strategy to rebalance global demand and suppress trade surpluses in its major trading partners; and that will require a rethinking of macroeconomic policy in several areas (Tordoir et al., 2025). Draghi concludes that the EU's fiscal policy was unduly restrictive, suppressed domestic demand and cut public investment in the 2010s, which contributed to the build-up of a major productivity gap compared to the US. More instead of less public investment may help tackle not only Europe's ailing economic growth, but also its geoeconomic overdependence on foreign demand.

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Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein "Wiener Institut für Internationale Wirtschaftsvergleiche", A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

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