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More for less or less for more? Government spending efficiency in CESEE

Central, Eastern and Southeastern European (CESEE) governments have remained relatively lean by EU standards, but progress in government effectiveness has been uneven across CESEE countries. Our efficiency analysis suggests that the key challenge is not primarily how much governments are spending, but rather how effectively government spending is translated into governance outcomes. Strengthening administrative capacity and the quality of government spending therefore appears to be particularly important.

Authors

Markus Eller
Oesterreichische Nationalbank
Central, Eastern and Southeastern Europe
markus.eller@oenb.at

Tomáš Slačík
Oesterreichische Nationalbank
Central, Eastern and Southeastern Europe
tomas.slacik@oenb.at

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CESEE governments: lean but unevenly effective

Public spending in CESEE has risen only moderately as a share of GDP since the 1990s, while governments have remained relatively lean by EU standards. Gains in effectiveness have been uneven, however, often curbed by weaknesses in infrastructure, competitiveness and human capital performance.

Spending efficiency gaps persist

CESEE's input-based efficiency is now broadly in line with the rest of the EU, after having outperformed the latter in earlier periods. However, output-based efficiency still lags behind: Some progress was made; yet, not enough to close the sizeable gap. Relative convergence has largely stalled since 2012.

It is about spending better, not necessarily spending more

Many CESEE governments appear to operate below their optimal input scale, but extra spending alone would usually yield only limited gains in outcomes. The priority is to improve how spending is allocated, managed and implemented.

Abstract[1]

This paper examines the evolution of government size, effectiveness and spending efficiency in eleven Central, Eastern and Southeastern European (CESEE) EU member states over the period from 1996 to 2024. While public spending in CESEE has risen moderately, CESEE governments have remained relatively lean compared with the rest of the EU. Government effectiveness has improved overall but unevenly across CESEE countries. Using a Data Envelopment Analysis framework, we find a pronounced asymmetry between input- and output-based efficiency. CESEE countries perform broadly in line with the rest of the EU in terms of input efficiency – after having outperformed the EU in earlier periods. However, they exhibit a persistent gap in output efficiency. While this gap has narrowed somewhat, output-based efficiency has largely stagnated since around 2012 at levels well below the EU benchmark. Returns-to-scale patterns indicate that CESEE governments tend to operate at "too small" input scales; yet, in most cases they still generate sub-proportional output gains, pointing to structural weaknesses in the spending-performance nexus. Overall, improving administrative capacity and the quality of public spending appears, from an efficiency perspective, more promising for enhancing government performance than further fiscal restraint.

1 Introduction, motivation and literature context

Recently, especially in light of tightening fiscal positions of many governments in advanced and emerging countries, the paradox of expanded government size coupled with declining effectiveness, efficiency and public satisfaction has gained increased attention (see, e.g., IMF, 2025). A thought-provoking article published by *The Economist*[2] in September 2024 argues that governments in advanced economies are "bigger than ever" yet "more useless," pointing to a troubling disconnect between the scale of public institutions and their perceived effectiveness. This paper seeks to empirically investigate to what extent this paradox resonates also in the context of Central, Eastern and Southeastern Europe (CESEE), where post-socialist transitions, EU integration and a relentless series of global and/or local crises have shaped the evolution of public sectors over the past three decades. We examine the trajectory of government size, effectiveness and efficiency in the eleven CESEE EU member states – Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia, Estonia, Latvia and Lithuania – over the period from 1996 to 2024. More specifically, drawing on a combination of descriptive statistics, institutional indicators and non-parametric efficiency analysis, the present study aims to answer three interrelated questions:

1. **How has government size changed in CESEE over the past 30 years?** To address this question, we analyse government expenditure and revenue as a share of GDP. We trace their evolution over time, examining both aggregate trends and changes in composition across individual CESEE countries. These developments are then compared with patterns observed in the EU as a whole.

2. **How has government effectiveness evolved in CESEE during the same period?** Government effectiveness is defined as the quality of public service delivery, policy formulation and bureaucratic capacity. Our analysis relies on the Government Effectiveness indicator from the World Bank's

[1] The authors would like to thank Boris Cournede, Mikulas Luptacik, Marta Rodríguez-Vives, Fabio Rumler, Julia Wörz, an anonymous referee as well as participants of the National Bank of Slovakia Research Seminar and of an ECB workshop on current challenges in Central and Eastern Europe for helpful comments and valuable suggestions. We further thank Zoltan Walko for data support and Barbara Meinx for language editing.

[2] Governments are bigger than ever. They are also more useless.

Worldwide Governance Indicators (WGI), which combines multiple survey-based and expert-assessed metrics.

3. **To what extent have CESEE governments been efficient in converting spending into effectiveness?** Recognising that effectiveness and efficiency are distinct concepts, we estimate public sector efficiency using Data Envelopment Analysis (DEA), a non-parametric frontier method widely applied in public finance research (e.g., Charnes et al., 1978; Afonso et al., 2005, 2024). In our empirical specification, the DEA model uses total government expenditure (% of GDP) as the input and the Government Effectiveness score as the output. Beyond calculating efficiency scores, the applied methodology also allows us to identify whether countries operate under increasing, constant, or decreasing returns to scale. This provides insight into whether additional public spending would yield (over-)proportionate gains in effectiveness or whether diminishing returns would emerge.

This study contributes to a growing body of literature on public sector performance in transition and post-transition economies. Earlier work by Tanzi and Schuknecht (2000) emphasised the trade-offs between government size and economic outcomes, concluding that once a government reaches a certain size (roughly 30–40% of GDP in advanced economies), the marginal productivity of public spending diminishes, as it is financed by high and increasingly distortionary taxes. Afonso et al. (2005, 2022, 2024) apply DEA methodologies to assess public spending efficiency and show, for OECD countries, that higher efficiency is associated with greater trust in the government and stronger market confidence. Chrysanthakopoulos et al. (2025) extended this analysis to macroeconomic outcomes, showing that public sector efficiency gains can reduce government debt and boost labour market productivity and private investment. In the CESEE context, studies by Hauner and Kyobe (2008), Giordano and Tommasino (2013) and Herrera and Ouedraogo (2018) have highlighted the role of institutional quality and political engagement in shaping public sector performance. Complementing these perspectives, Eller and Scheiber (2020) demonstrate that citizens' trust in CESEE governments is strongly affected by past economic hardship. They stress the importance of building fiscal buffers to protect poor households during crises and of investing adequately in human capital and social inclusion. By integrating these strands of research and applying them to a focused regional sample over a long-time horizon, this paper aims to shed light on the evolving role of governments in CESEE and offer policy-relevant insights into how public sectors can be made more efficient.

Our findings highlight three key patterns. First, although government spending relative to GDP in CESEE has increased moderately since the mid-1990s, its composition has shifted towards higher public sector wages and investment and lower intermediate consumption. Meanwhile, governments overall have remained relatively lean compared with the rest of the EU. Second, improvements in government effectiveness have been uneven across the region, with progress in some cases and stagnation in others, reflecting persistent weaknesses in structural dimensions such as infrastructure quality, competitiveness and human capital performance. Third, the efficiency analysis points to a clear divergence between inputs and outcomes. On the input side, CESEE countries have historically performed strongly – often exceeding the efficiency levels observed in the rest of the EU – but have gradually converged towards the EU average in recent years. By contrast, this relative strength has not translated into comparable gains in governance outcomes. Although the gap in output efficiency has narrowed somewhat over time, progress has stalled since around 2012, leaving CESEE countries persistently below the EU benchmark. Evidence from returns-to-scale patterns suggests that in most cases this reflects not only differences in scale, but also how effectively resources are used: Despite operating below optimal input levels, additional spending tends to yield only limited improvements in performance. This, in turn, points to underlying weaknesses in the mechanisms through which public spending is translated into outcomes.

These results also have implications for price and financial market stability and are therefore relevant from a central bank perspective. More efficient public spending can strengthen fiscal space and enhance trust in public institutions, thereby increasing the effectiveness and credibility of fiscal policy. In turn, this can support both price stability (by facilitating counter-cyclical policy responses) and financial stability (e.g., by reducing sovereign risk and, in turn, vulnerabilities in the financial system stemming from banks' exposures to the sovereign). This is particularly important in the current environment of fiscal consolidation pressure, necessitated by elevated public debt ratios following successive crises, alongside renewed demands to expand or redirect government spending amid ongoing geopolitical tensions (as discussed in Haroutunian et al., 2026).

Following these introductory remarks, the remainder of the paper is structured as follows. Section 2 provides an overview of how the size and composition of government spending in CESEE have evolved. Section 3 examines the evolution of government effectiveness as a key performance indicator. Section 4 brings together both the input and output dimensions and presents our estimates of government spending efficiency. Finally, section 5 concludes and discusses policy implications as well as potential avenues for future research.

2 The input dimension: evolution of size and structure of government spending in CESEE

2.1 CESEE governments: lean, but only in relative terms

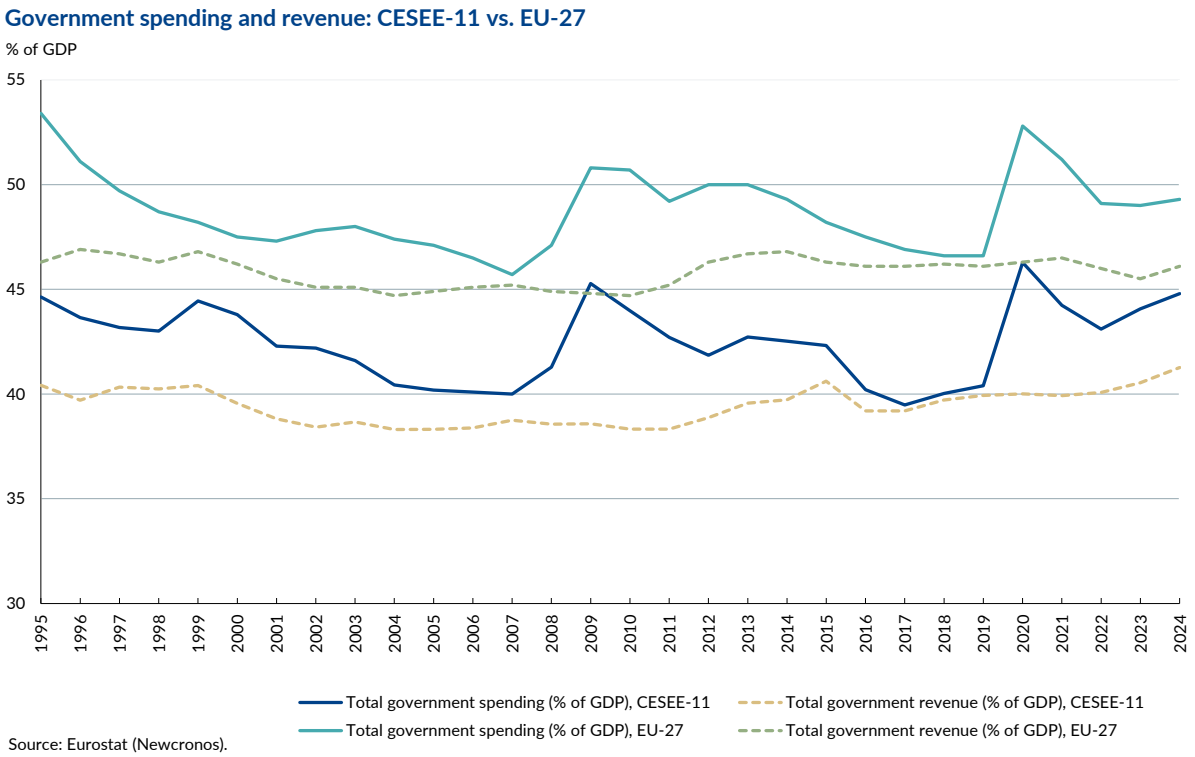
To analyse how government size and expenditure structure in CESEE have evolved over the last three decades, we rely on Eurostat's New Cronos database, which organises fiscal data *by economic type*. On the expenditure side, the dataset allows us to decompose government spending into capital and current expenditure. Capital expenditure includes gross fixed capital formation, while current expenditure comprises compensation of employees, intermediate consumption, social transfers, subsidies and interest payments.

Governments in the CESEE-11 have generally been comparatively lean, at least when benchmarked against the EU-27 aggregate. Government size – measured as total general government expenditure as a share of GDP – is, on average, lower in the CESEE-11, amounting to nearly 45% of GDP in 2024, compared with 49% in the EU as a whole (see chart 1). During the past three decades, government size increased noticeably in the aftermath of major economic shocks (the global financial crisis, the COVID-19 pandemic and the war in Ukraine). While it typically declined again to roughly pre-crisis levels after a few years, government expenditure relative to GDP has remained elevated – particularly in CESEE – in the wake of the pandemic and war in Ukraine. Comparing the most recent level (2024) with the earliest available levels in the second half of the 1990s[3] reveals that government size has slightly increased in the CESEE-11, by 1 percentage point of GDP, while it decreased by about the same amount in the EU as a whole. As a result, the difference in spending ratios between the EU-27 and the CESEE-11 has narrowed somewhat, from about 6.5 percentage points in the late 1990s to about 4.5 percentage points most recently. Nevertheless, CESEE countries have maintained a relatively frugal government profile, despite

[3] Because total government spending figures, or some of their subcomponents, exhibit significant jumps at the start of the available time series in a few countries, we chose to compute a simple average for 1995–1999 and treat this as the benchmark for comparison with the most recent data.

becoming significantly wealthier over this period – contrary to what might be expected under Wagner's law[4].

Chart 1



Source: Eurostat (Newcronos).

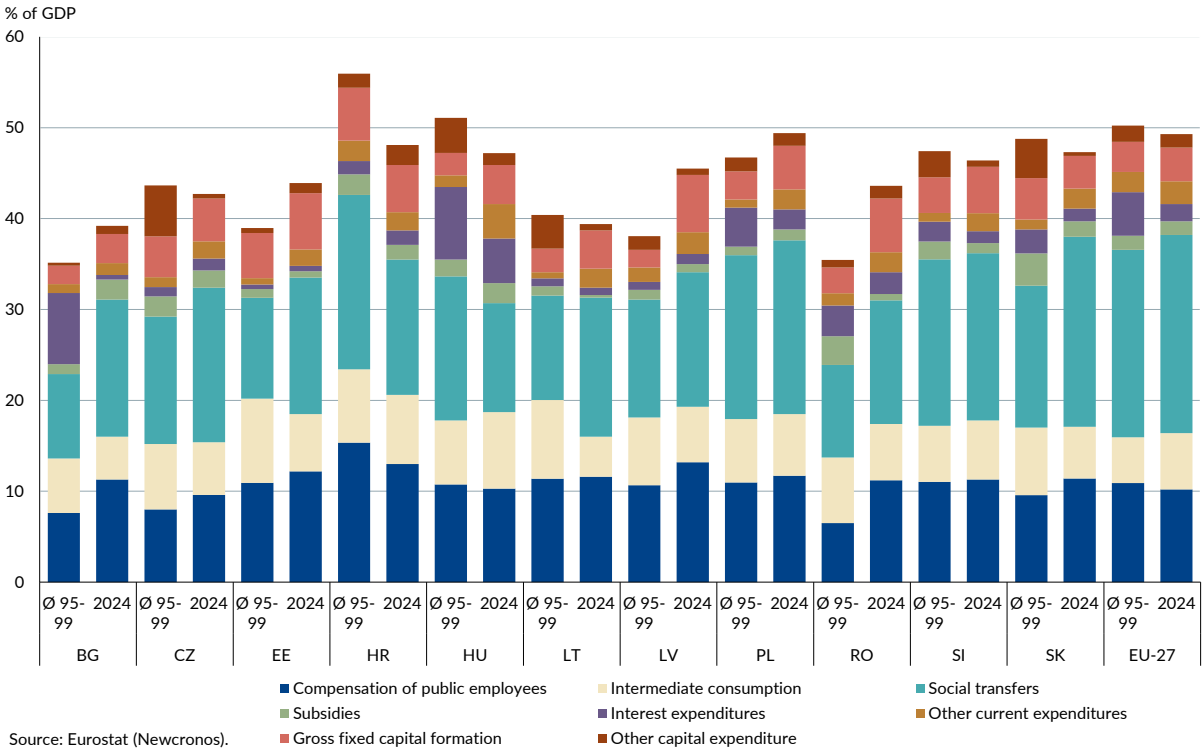
Among the CESEE-11, the highest government spending ratio in 2024 was observed in Poland, where expenditures amounted to 49% of GDP – already at the EU-27 level. It is followed by Slovakia, Croatia, Hungary, Slovenia and Latvia, all with spending ratios in the range of 45–48% (see chart 2). By contrast, the leanest governments in the region are currently found in Bulgaria and Lithuania, with spending ratios of 39%, and in Czechia, Estonia and Romania, where expenditures amounted to around 42–43% of GDP in 2024. However, it should be borne in mind that this notion of "leanness" is relative: CESEE governments appear modest primarily in comparison with the EU aggregate, while even within the EU – and more so in a global context – government size varies considerably. Turning to dynamics, compared with the late 1990s, Latvia and Romania recorded the strongest increases in government size, at around 8 percentage points, largely reflecting higher spending on public investment and public wages. Most other countries experienced a more moderate expansion over the three decades. By contrast, two countries stand out for having considerably reduced their spending ratios during this period: Hungary, by about 4 percentage points, and Croatia, by about 8 percentage points, indicating a notable divergence in government spending trajectories within the region.[5]

[4] Wagner's Law posits that public expenditure rises faster than national income as an economy develops, suggesting that rising demand for state services (social, protective, administrative) leads to a larger public sector relative to the economy as countries grow wealthier.

[5] Unlike that of its regional peers, Croatia's spending ratio exceeded 55% of GDP in the late 1990s, reflecting post-war reconstruction needs and elevated military and social expenditures. It declined gradually in the early 2000s as fiscal consolidation measures and structural reforms took hold.

Chart 2

General government expenditures by economic type in the CESEE-11 and the EU-27: 1995–1999 average vs. 2024

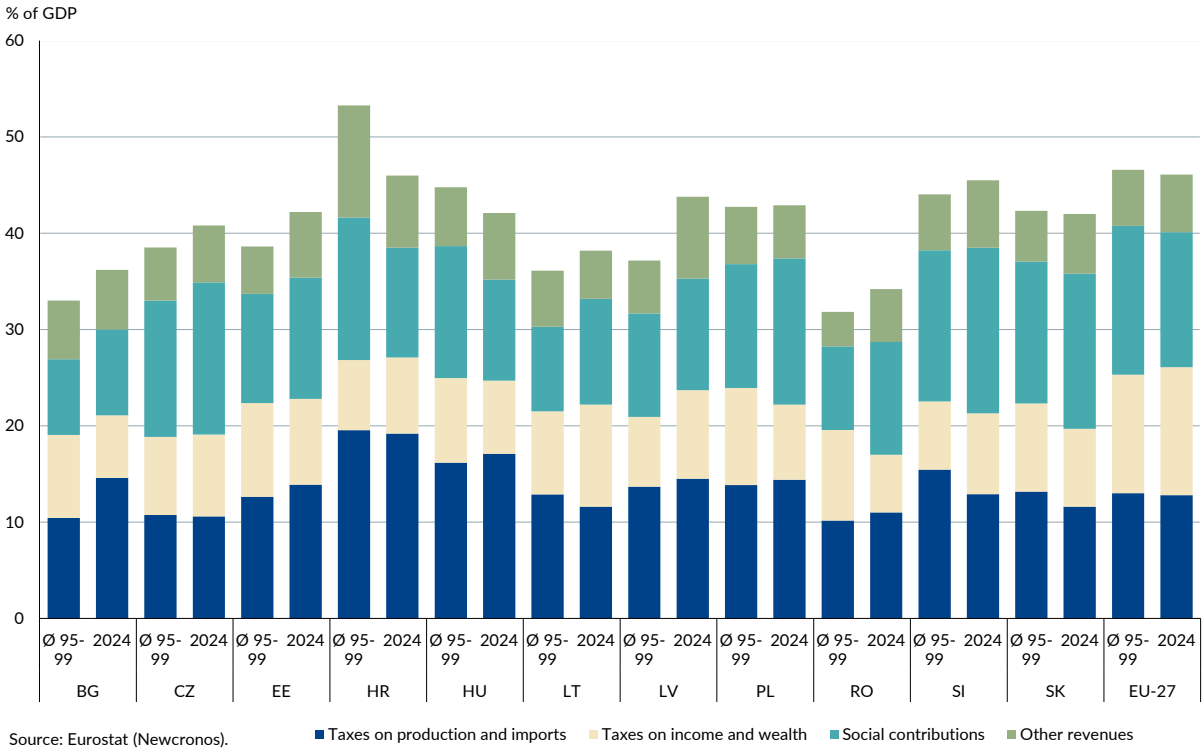


Source: Eurostat (Newcronos).

Finally, examining government revenues is essential to obtain a complete picture of government size and the financing of government expenditure. Overall, lower expenditure ratios in CESEE are mirrored by lower revenue ratios (41% of GDP on average in 2024) compared with the EU as a whole (46%, see chart 1). This difference reflects both policy choices and structural factors, often including a larger informal labour market, more volatile tax bases, the use of revenue windfalls, and weaker tax administration capacity. The composition of revenues also differs markedly (see chart 3). Direct taxes on income and property generate comparatively less revenue in CESEE, averaging about 8% of GDP in 2024 compared with around 13% of GDP in the EU. By contrast, CESEE countries rely more heavily on indirect taxes on production and imports, which generated revenues of about 14% of GDP in 2024, slightly exceeding the EU average of 13%. Consistent with the more limited role of direct taxation and lower social transfer spending (see next subsection), social security contributions are also somewhat lower in CESEE than in the EU overall (13% versus 14% of GDP in 2024). However, their relative importance has increased considerably since the late 1990s in countries like Romania, Poland and Lithuania.

Chart 3

General government revenues by economic type in the CESEE-11 and the EU-27: 1995–1999 average vs. 2024



Source: Eurostat (Newcronos).

2.2 Relative importance of different expenditure categories

In this subsection, we dig deeper into the relative importance of different expenditure categories and important changes since the second half of the 1990s, relying on the classification of government expenditure *by economic type* as shown in chart 2.[6]

Social transfers constitute the largest expenditure category in the countries under review. In the EU as a whole, spending on social transfers already exceeded 20% of GDP in the late 1990s and increased only modestly thereafter, reaching almost 22% in 2024. By contrast, the CESEE-11 countries started from a much lower average level – from around 14% of GDP in the second half of the 1990s. By 2024, they had increased social transfer spending to 16% (ranging from 12% of GDP in Hungary to close to 21% in Slovakia), thus still remaining well below the EU average. This comparatively lower level of social transfer spending in CESEE reflects, in part, less developed welfare systems at the outset of the transition period and, subsequently, a relatively restrained expansion. Nevertheless, a few CESEE countries stand out for having expanded social transfers more substantially over the past three decades, with increases of 6 percentage points of GDP in Bulgaria, 5 percentage points in Slovakia, and 3–4 percentage points in Czechia, Estonia, Lithuania and Romania.

[6] To offer an alternative perspective on the role of different expenditure categories in driving changes in government size, one could also rely on the Classification of the Functions of Government (COFOG). This classification groups public expenditure by function and thus reflects the purpose of spending (e.g., health, education, or defence). While the classification by economic type is generally better suited for analysing fiscal stance, tax structures and macroeconomic implications, the classification by function facilitates cross-country comparisons of spending priorities and the evaluation of public service provision (see Eller, 2011). Due to space constraints and the fact that COFOG data are currently available only up to 2023, we refrain from presenting a COFOG-based decomposition in this paper. The corresponding results are, however, available from the authors upon request.

As regards the second-largest expenditure category, the countries under review spend on average around one-tenth of their GDP on compensation of public sector employees. At 11.5% of GDP in 2024, this share was somewhat higher in CESEE compared with the EU aggregate of 10%. Among the CESEE countries, Estonia, Croatia and Latvia stand out with shares of 12–13% in 2024, while Czechia is the only CESEE country spending less than 10% of GDP on public employee compensation. The cross-regional average has remained broadly stable over the past three decades, fluctuating around 10–11% of GDP. However, a few countries recorded comparatively strong increases, notably Bulgaria and Romania (about 4–5 percentage points of GDP since the late 1990s) and Latvia (around 2.5 percentage points), reflecting an expansion of administrative structures and public employment, but also relatively strong public wage growth. By contrast, only two CESEE countries, Croatia and Hungary, experienced a decline in their public sector compensation shares.

As the third-largest expenditure category, intermediate consumption accounted for around 6% of GDP in both the EU and the CESEE-11 in 2024. While recent levels have thus been similar, the trajectories have differed markedly. In the late 1990s, CESEE countries devoted substantially higher shares to intermediate inputs (7.4% of GDP on average) than the EU (5%). Since then, the CESEE-11 have recorded a pronounced decline to 6.2% of GDP in 2024, with the EU aggregate meanwhile increasing to the same level. The downward adjustment in CESEE was particularly visible in Lithuania and Estonia, while Hungary is the only country with a notable increase. Taken together, the rise in public sector compensation shares alongside the decline in intermediate consumption points to a gradual shift in the input mix of public service provision, with personnel costs gaining weight relative to non-labour operating inputs. This likely reflects both expenditure rationalisation in material inputs and, in several cases, a strengthening of the wage component in public spending.

Government investment (gross fixed capital formation) constitutes a comparatively small but economically important expenditure category. In the late 1990s, both the EU and the CESEE-11 devoted about 3.5% of GDP to public investment. Since then, however, trajectories have diverged. While the EU as a whole increased government investment only slightly – to 3.7% of GDP in 2024 – the CESEE countries raised it markedly to nearly 5% of GDP on average. This upward shift reflects sustained infrastructure modernisation and capital deepening during the transition process, supported by EU funds. Cross-country differences remain pronounced, however: Governments in Estonia, Latvia and Romania invest about 6% of GDP, whereas Bulgaria and Slovakia, at around 3.5% of GDP, lie at the lower end of the spectrum and below the EU average.[7]

Interest expenditure has declined markedly over the past three decades. In the late 1990s, CESEE countries spent on average 3% of GDP on interest payments, compared with nearly 5% in the EU; by 2024, these shares had fallen to 1.6% and 1.9% of GDP, respectively. The decline was particularly pronounced in countries with initially high debt servicing burdens, most notably Bulgaria and Hungary. Even countries that significantly increased their debt ratios, such as Czechia and Lithuania, managed to contain interest expenditure relative to GDP. This broad-based adjustment across the region reflects improved debt management as well as the prolonged low interest rate environment prior to the recent tightening cycle. Hungary now stands out as the only CESEE country still devoting a comparatively large

[7] In addition to gross fixed capital formation, chart 2 shows a separate category for *other capital expenditure*, which includes changes in inventories, net acquisition of non-financial non-produced assets and capital transfers. Based on the data, this category is typically dominated by capital transfers, which are often volatile and one-off in nature. Under European System of Accounts (ESA) rules, capital transfers do not represent government investment in its own fixed assets, but rather support the acquisition, replacement, or financing of assets by other sectors. Examples include investment grants to manufacturing firms to build new production plants, or government support to households for rebuilding homes damaged by natural disasters.

share of GDP – nearly 5% in 2024 – to debt servicing, whereas in most other CESEE countries interest expenditure remains below or broadly in line with the EU average.

Finally, subsidies account for a relatively small share of total expenditure. In the late 1990s, they averaged 1.8% of GDP in the CESEE-11 and 1.6% in the EU; by 2024, the CESEE average had declined slightly to 1.3%, while the EU aggregate remained broadly stable at 1.5%. Developments have been heterogeneous: Romania and Slovakia recorded notable declines (around 2–2.5 percentage points), whereas Bulgaria, Hungary and Poland now exhibit somewhat higher ratios than in the late 1990s. Overall, subsidies have not been a major driver of long-term expenditure growth in CESEE and in several cases reflect adjustment away from transition-era support schemes. Nevertheless, recurring policy debates highlight concerns about distorted incentives, governance weaknesses and fiscal risks associated with large or poorly targeted schemes – particularly where reliance on EU funds[8] or broad-based energy and sectoral support may delay structural adjustment and reduce allocative efficiency.

3 The output dimension: evolution of government effectiveness in CESEE

As a key output indicator, we focus on the Government Effectiveness indicator from the World Bank's Worldwide Governance Indicators (WGI). Government effectiveness captures the effective delivery and quality of government services, as perceived by users and stakeholders, rather than their sheer volume. More specifically, it incorporates perceptions of the quality of public services and the civil service, the extent to which civil servants are protected from political interference, the quality of policy formulation and implementation, and the credibility of government commitments. It is a composite index that aggregates information from multiple sources, including citizens' perceptions, expert assessments, business surveys and evaluations by think tanks, NGOs and multilateral organisations. The indicator is constructed by statistically aggregating these sources, assigning greater weight to those that provide more informative and reliable signals of governance.[9] As such, government effectiveness constitutes a continuous, cardinal indicator of government performance, allowing meaningful quantitative comparisons.

This indicator is particularly well suited for our purpose. First, it combines conceptual breadth with a clear focus on state capacity, measuring bureaucratic quality, policy capability and service delivery without conflating governance with regime type or democratic institutions. Second, it offers strong cross-country comparability and extensive temporal coverage, including CESEE countries for the period from 1996 to 2024 (as available at the time of writing). Third, it rests on a transparent and methodologically rigorous framework: the Unobserved Components Model used explicitly addresses measurement error, systematically aggregates heterogeneous sources and provides confidence intervals, thereby enhancing reliability and interpretability. Fourth, it is widely used in both academic and policy-oriented applications, facilitating comparability across studies and reducing concerns about indicator selection bias. Finally, by drawing on perceptions from multiple stakeholder groups, it mitigates single-source bias and

[8] In the government finance statistics underlying the analysis, public spending is recorded according to the economic transactions carried out by the general government sector, independent of the specific financing source. As a result, EU-financed projects that are implemented via the general government sector are reflected in government expenditure figures in the same way as nationally financed spending. That said, it should be noted that harmonised fiscal data allowing EU-financed spending to be separately identified within general government expenditure on a cross-country and time-consistent basis are – to the best of our knowledge – not available.

[9] See Kaufmann and Kraay (2024) for methodological details and World Bank (2025) for latest methodological revisions.

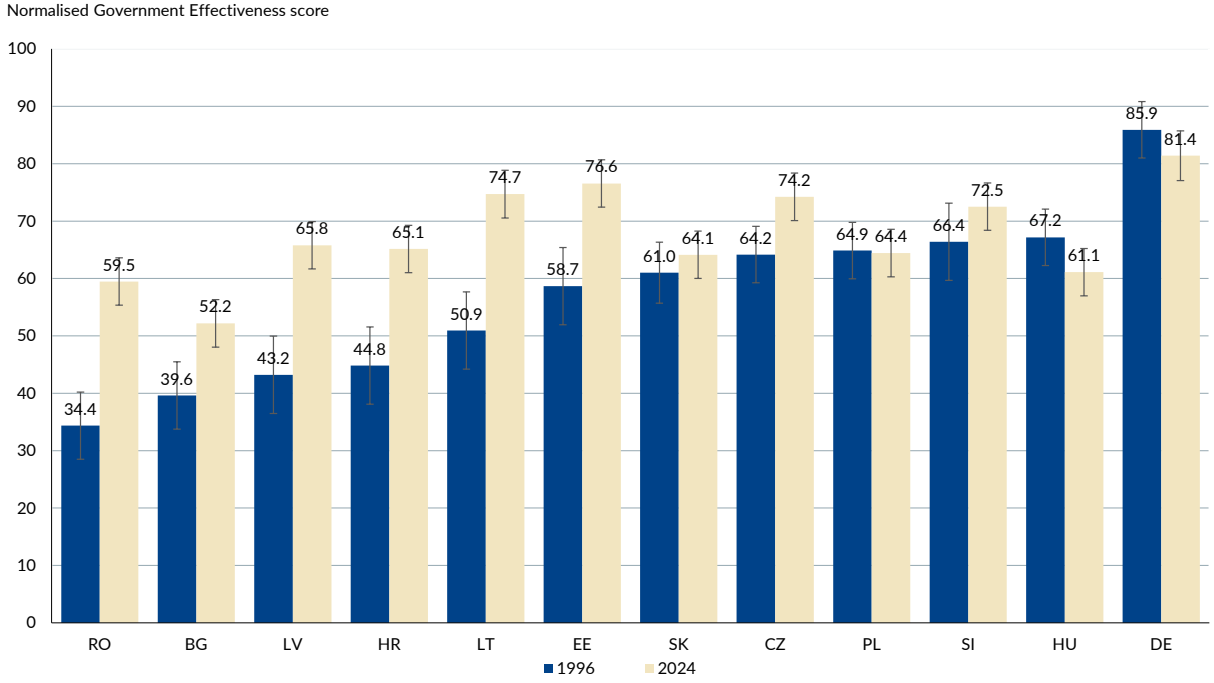
idiosyncratic noise, yielding a more robust estimate of underlying government performance than any individual source.

Consistent with this, the use of composite and perception-based indicators in public sector DEA applications is well established. For example, Afonso et al. (2024) and Chrysanthakopoulos et al. (2025) construct DEA output measures based on composite indices of public sector performance that explicitly combine objective indicators with perception-based variables, including the Corruption Perceptions Index and survey-based measures from the World Economic Forum. Similarly, the IMF (2025) employs frontier-based efficiency measures that incorporate survey-based assessments of service quality alongside quantitative indicators.

Chart 4 shows the Government Effectiveness scores, normalised to a 0–100 scale, in the CESEE-11 and Germany (as a benchmark) for the years 1996 and 2024. The whiskers indicate the corresponding ±1 standard deviation around the point estimate, representing the 68% confidence interval. Differences across countries and over time are statistically significant when confidence intervals do not overlap. As the chart shows, several countries have made significant progress, while others have stagnated or regressed. Most CESEE countries have improved their Government Effectiveness scores over time, with particularly strong gains in Romania, Croatia and the Baltics (all significant at the 90% confidence level). In addition, Bulgaria and Czechia also recorded improvements statistically significant at the 68% confidence level. As a result, Estonia, the CESEE leader in government effectiveness, now outperforms 89% of countries worldwide. This performance is broadly comparable to that of Germany, which has lost some ground over the past three decades (though not to a statistically significant extent), indicating overall stagnation in governance quality. Similarly, government effectiveness in Hungary, Poland, Slovakia and Slovenia has largely remained flat, with no meaningful and sustained improvement over nearly 30 years.

Chart 4

Government effectiveness: 1996 vs. 2024



Source: World Bank (Worldwide Governance Indicators). Note: Numbers above the bars indicate the Government Effectiveness score normalised between 0 and 100. The whiskers show a 68% confidence interval around the score.

A decomposition of the change in the Government Effectiveness score between 1996 and 2024 (see annex 7.1) indicates that developments in CESEE have been driven primarily by changes in underlying governance indicators, while changes in indicator weights and global normalisation played only a minor role. Within the set of underlying indicators, improvements have been concentrated in those capturing perceptions of bureaucratic quality, policy implementation and institutional effectiveness. These contributions are consistently positive across countries, reflecting broadly improved administrative capacity over time. By contrast, indicators reflecting perceived infrastructure quality, competitiveness, and aspects of human capital performance – such as the alignment of education systems with economic needs – often stagnated or deteriorated, thereby dampening overall progress. Other perception-based indicators related to service delivery and business conditions show no consistent pattern and, on average, contributed only marginally to changes in the Government Effectiveness score.

4 Government spending efficiency analysis

4.1 Data Envelopment Analysis methodology

To assess how efficiently government spending is converted into government effectiveness, we apply a Data Envelopment Analysis (DEA) as introduced in seminal papers by Charnes et al. (1978) and Banker et al. (1984) and as recently used by Afonso et al. (2024) and Chrysanthakopoulos et al. (2025) to examine government efficiency. DEA is a non-parametric frontier technique that evaluates the relative efficiency of decision-making units (DMUs) – in our case, countries in a given year – by comparing their ability to transform inputs into outputs. DEA can accommodate multiple heterogeneous inputs and outputs without requiring specific functional assumptions; it only requires inputs and outputs to be measured on a consistent numerical (cardinal) scale.

Efficiency is defined as the ratio of weighted outputs to weighted inputs, with weights chosen endogenously to maximise each DMU's score under the constraint that no DMU exceeds a score of one. In an input-oriented DEA, the objective is to minimise the inputs required to achieve a given level of output, whereas an output-oriented DEA seeks to maximise outputs for a given amount of inputs. Both approaches produce efficiency scores between zero and one, with a score of one indicating that the DMU lies on the efficiency frontier.

A key distinction in DEA concerns the assumption about returns to scale. Under constant returns to scale (CRS), inputs and outputs are assumed to change proportionally – i.e., doubling inputs (in our case, government expenditure) would double outputs (government effectiveness). In contrast, variable returns to scale (VRS) allow for economies or diseconomies of scale, reflecting more realistic situations where increasing government expenditure leads to disproportionate changes in outputs. Within VRS, we can further distinguish between increasing (IRS) and decreasing returns to scale (DRS), which imply that doubling inputs leads to more (IRS) or less (DRS) than a doubling of outputs. The formal derivation of these concepts is provided in annex 7.2.

Comparing CRS and VRS efficiency scores allows us to derive scale efficiency. When the two scores coincide, the DMU operates at the most productive scale and is therefore scale-optimal. If they differ, the unit is scale-inefficient. Scale inefficiency can arise in two forms, depending on the underlying returns to scale. Under IRS, the DMU is inefficient because it is "too small," meaning that increasing inputs would lead to more-than-proportionate gains in performance. Under DRS, the DMU is "too large," so that additional inputs yield less-than-proportionate increases in output – implying that reducing input would improve efficiency.

Countries operating under IRS are typically smaller and fail to exploit fixed costs or network effects; scaling up their inputs would improve efficiency by yielding more-than-proportionate output gains. By contrast, countries operating under DRS tend to have large and complex systems that suffer from coordination failures, bureaucratic frictions, or congestion effects; scaling up their inputs would deteriorate efficiency. Annex 7.3 provides a simple illustrative example to enhance intuitive understanding of these cases and also explains how to determine whether a DMU operates under IRS or DRS.

Before turning to the interpretation of the DEA results, it is useful to briefly summarise the key implications of the methodology and clarify what DEA efficiency scores do – and do not – represent. Three points are particularly important for understanding the forthcoming results.

First, a country may exhibit both IRS and DRS, depending on whether the assessment is input- or output-oriented. Moreover, the CRS assumption is stricter, as it imposes a linear rather than a convex efficiency frontier, typically leading to higher measured inefficiency in both orientations.

Second, a higher efficiency score (especially a score of 1) does *not* imply that a country's government is normatively "better" than that of another country with a lower score. Lying on the efficiency frontier simply means that, given a country's combination of government expenditure (input) and government effectiveness (output), no other country (or weighted combination of countries) in that year produced more output with the same or fewer input, or used fewer inputs to achieve the same or greater output. Hence, DEA efficiency scores are strictly *relative*, confined to the sample and the year under consideration, and do not capture absolute governance quality or institutional capacity. Rather, they identify relative efficiency and potential peer comparators, whose interpretation must account for country-specific factors such as income levels, institutional maturity and historical path dependencies.[10]

Third, DEA does not identify causal relationships between inputs and outputs but provides a descriptive, relative efficiency assessment based on observed input-output combinations. Accordingly, the observed association between inputs and outputs should not be interpreted as reflecting a unidirectional causal effect. Causality may also run from outputs to inputs; for example, in the context of our application, more effective governments may be better able to mobilise revenues and, in turn, sustain higher levels of public spending.

4.2 Interpreting DEA efficiency scores

Over the whole observation period from 1996 to 2024, the average input-based efficiency score in CESEE (under the more realistic VRS assumption) amounted to roughly 0.86, which is slightly above that of the rest-of-the-EU (RoEU) benchmark group[11] (about 0.83). This suggests that, on average, CESEE countries tend to be marginally more efficient in keeping inputs lean than the benchmark group. In a stark contrast, however, their output-oriented efficiency values are much lower on average (about 0.75 versus 0.88), pointing to a deeper challenge in translating spending into governance outcomes. Charts 5 and 6 provide a more granular perspective and underscore that the persistent difference between CESEE countries and benchmarks in the RoEU lies not in input-side efficiency but almost entirely in the output-side conversion of spending into governance outcomes.

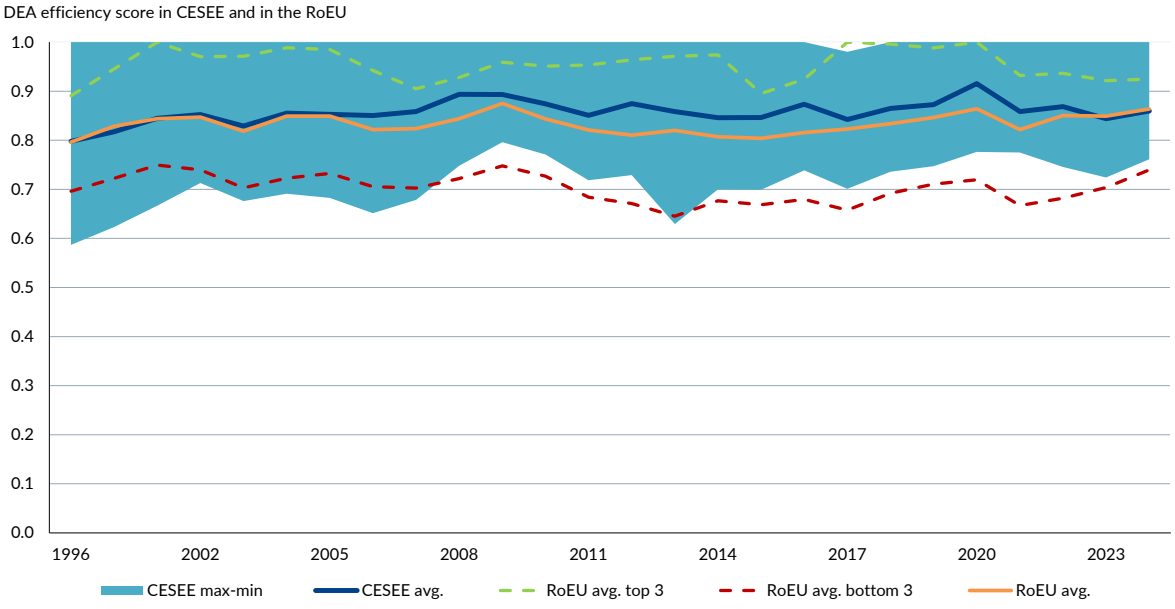
[10] This point will be crucial for interpreting cases where relatively poor countries (e.g., Romania in 1996) achieve comparatively high or even highest efficiency scores.

[11] The RoEU benchmark group contains 26 EU countries excluding the 11 CESEE countries. Ireland is also excluded due to highly volatile macroeconomic and fiscal data, partly driven by multinational corporations. Simple cross-country averages are reported.

As chart 5 shows, average input-based DEA efficiency across the CESEE region (blue line) was most of the time slightly above the RoEU benchmark (orange line) – in fact, in all years from 2006 to 2022. Peak levels were achieved before the global financial crisis in 2008 and the outbreak of the COVID-19 pandemic in 2020. Since 2020, however, CESEE's positive efficiency gap vis-à-vis the RoEU has narrowed, eventually converging to the same level as the RoEU from 2023 onwards. In addition to regional averages, chart 5 displays the CESEE minimum-maximum range (turquoise ribbon), while the green and red dashed lines represent the average of the three best- and three worst-performing RoEU countries based on their average efficiency scores over the entire period under review. The ribbon indicates that in all years except 2017, at least one CESEE country lay on the efficiency frontier and thus achieved maximum efficiency. Another noteworthy observation is that the CESEE min-max range has narrowed visibly, indicating convergence towards higher efficiency levels within the region, with even the least efficient CESEE country consistently achieving a higher efficiency score than the three worst-performing RoEU countries (France, Greece, Italy) in most years since 2009. As regards the top three RoEU countries (Finland, Luxembourg and the Netherlands), they have lost some ground since 2021. This mainly reflects a deterioration in Finland's score, while other RoEU countries – notably Cyprus, Denmark and Malta – have moved up to the frontier in recent years.

Chart 5

Input-based DEA efficiency in CESEE vs. the rest of the EU (variable returns to scale)



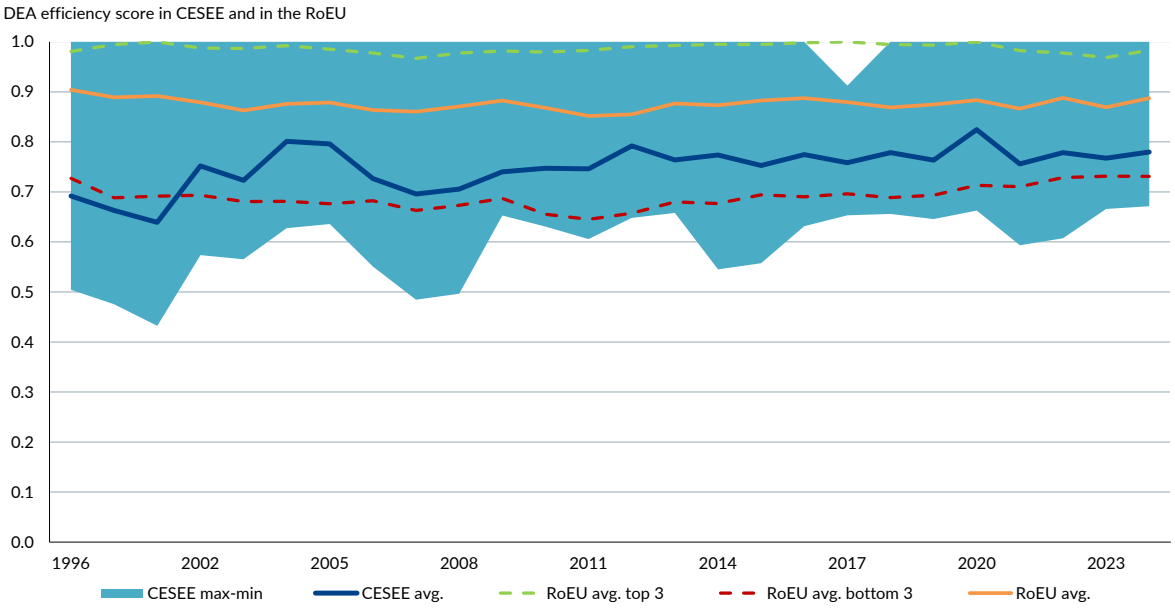
Source: Authors' calculations based on World Bank (WGI) and Eurostat (Newcronos) data.
Note: Data Envelopment Analysis (DEA) efficiency scores are based on assuming variable returns to scale (VRS). Ireland is excluded due to highly volatile macroeconomic and fiscal data, partly driven by multinational corporations. Rest of the EU (RoEU) = EU-26 bar CESEE 11; RoEU avg. top 3: Finland, Luxembourg, Netherlands; RoEU avg. bottom 3: France, Greece, Italy.

Chart 6 depicts output-based DEA efficiency in an analogous manner, but conveys a markedly different picture. CESEE has consistently lagged behind the RoEU average throughout 1996–2024. While RoEU scores fluctuated between 0.85 and 0.9 over the entire period, CESEE scores averaged 0.72 until 2011 and improved only modestly to 0.77 thereafter. Thus, although the gap has narrowed somewhat, it remains substantial. Turning to dynamics, CESEE recorded notable gains in the early 2000s, coinciding with EU accession and strong incentives for governance reform and institution-building. This was followed by a pronounced decline in the second half of the 2000s and a gradual recovery up to around

2012. Since then, efficiency levels have broadly plateaued (aside from a temporary uptick in 2020), leaving CESEE still well below the RoEU average. At the same time, the positive margin vis-à-vis the three worst-performing RoEU countries (Greece, Italy and Portugal in the case of output-based efficiency) has narrowed noticeably, reflecting CESEE's relative improvement. This aggregate pattern masks considerable cross-country heterogeneity. The CESEE min-max range has remained consistently wider than for input-based efficiency over most of the past three decades, with some countries operating at the efficiency frontier, while others persistently rank among the least efficient in the EU.

Chart 6

Output-based DEA efficiency in CESEE vs. the rest of the EU (variable returns to scale)



Source: Authors' calculations based on World Bank (WGI) and Eurostat (Newcronos) data.
Note: Data Envelopment Analysis (DEA) efficiency scores are based on assuming variable returns to scale (VRS). Ireland is excluded due to highly volatile macroeconomic and fiscal data, partly driven by multinational corporations. Rest of the EU (RoEU) = EU-26 bar CESEE 11; RoEU avg. top 3: Finland, Luxembourg, Netherlands; RoEU avg. bottom 3: Greece, Italy, Portugal.

Turning to the country level, we first identify which countries shape the min-max efficiency ranges shown in the previous two charts[12]. Tables A.1 and A.2 in the annex provide heat maps of input- and output-based efficiency scores for CESEE and other EU countries from 1996 to 2024, where lower (higher) efficiency scores are represented by deeper red (green) shades. The maps reveal three salient features. First, frontier performance – defined as an efficiency score of 1 – is episodic and country-specific. Among CESEE countries, Lithuania stands out, having reached the efficiency frontier in most years, except for the late 1990s and for 2005–2011. In addition, Bulgaria, Estonia and Romania attained frontier status in several years, particularly in the first half of the sample period, while Slovakia did so once in 2008. In the

[12] As mentioned above, when interpreting individual country efficiency scores, it must be borne in mind that these are strictly relative measures, confined to the sample and the specific period under consideration. In particular, changes in DEA efficiency scores between two periods may reflect two distinct mechanisms. On the one hand, a country may change its own input-output ratio and thereby improve or deteriorate its efficiency relative to the frontier. On the other hand, the frontier itself is not static but may change its position and shape between periods. As a consequence, even if a country's input-output combination remains unchanged, its DEA efficiency score may vary due to shifts in the underlying production frontier. Changes in productivity can therefore be decomposed into a component reflecting efficiency change and a component capturing shifts of the frontier (technological change). This decomposition is provided by the so-called Malmquist index (see, e.g., Cooper et al., 2007), which we compute as a robustness check. While a detailed discussion of the results would go beyond the scope of this paper, it can be noted that for most CESEE countries and episodes the technological change component is close to unity, suggesting that the frontier remained broadly stable. Accordingly, observed changes in efficiency can, to a large extent, be attributed to country-specific developments.

years when these countries did not reach the frontier, they often remained close to it in the input-based metric, a pattern likewise observed for Latvia and Czechia.

Second, the input-based heat map displays considerably more green tones for the CESEE region than the output-based map. Apart from Estonia and Lithuania as well as a few other countries with isolated years of frontier performance, output efficiency scores remain generally relatively low, suggesting that CESEE countries are less able than the EU's best performers to translate efficient resource use into commensurate outcomes. Romania exemplifies this pattern, as it recorded comparatively high input-based scores in most years, but comparatively low output-based scores in periods when it did not lie on the frontier.

A noteworthy corollary follows from the Romanian example: When a country – such as Romania in 1996 – achieves full input efficiency, it lies on the frontier and therefore, by definition, also attains maximum output efficiency. By contrast, even small deviations from the frontier can lead to disproportionately large declines in output efficiency. In Romania's case, years in which it fell only slightly short of the frontier were associated with marked drops in output efficiency. This mechanism also helps explain the sometimes surprisingly large differences in output efficiency among countries with similar input-based efficiency scores, such as Bulgaria and Romania. For example, in 1996 both countries performed comparably on inputs, yet Romania lay exactly on the frontier, whereas Bulgaria missed it by a small margin. Given the steepness of the frontier in this region characterised by both comparatively small input and output levels, this small shortfall translated into a very low output efficiency score for Bulgaria. We illustrate this in the charts and provide further details in annex 7.4.

Overall, the efficiency analysis in this section, together with the annex, underscores the importance of smart peer benchmarking. The most relevant comparators for CESEE countries may be the best CESEE episodes themselves, particularly years in which CESEE peers reached the frontier, supplemented with small, advanced economies that define the EU, and in some cases even the global, frontier.

4.3 Scale (in)efficiencies

While the previous analysis highlighted the gap between input- and output-based efficiency in CESEE, it remains to be clarified whether these patterns arise primarily from the size of government or from inefficiencies in the spending-to-performance nexus. To this end, comparing efficiency scores under constant (CRS) and variable returns to scale (VRS) allows us to assess whether countries operate at their most productive scale or whether deviations from it contribute to observed inefficiencies.

As expected, in the vast majority of EU countries, CRS-based efficiency scores lie below VRS scores in both input- and output-oriented models (results are not reported, but available upon request). The resulting scale efficiency (SE, defined as the ratio of CRS to VRS scores) varies substantially across CESEE countries on the input side. On average, it is significantly lower in CESEE than in the EU benchmark countries, indicating that many CESEE countries, unlike most of their RoEU counterparts, operate further away from their optimal scale.

On the output side, average SE values are slightly higher in CESEE than in the RoEU over the sample period. This suggests that CESEE governments operate, on average, closer to their output-maximising scale. At the same time, as shown above, a sizeable gap in VRS output efficiency persists between CESEE and the RoEU. Taken together, these findings indicate that weaker governance outcomes in CESEE primarily reflect technical inefficiency in translating public inputs into institutional outputs, rather than suboptimal government size. In other words, CESEE countries appear to lag behind mainly in the

effectiveness with which public spending is translated into governance performance, whereas government size itself seems, from an efficiency perspective, at least as appropriate as in the more advanced EU benchmark countries.

The observation that the RoEU countries exhibit slightly lower SE on the output side than CESEE is economically plausible. One possible explanation is that many advanced EU countries operate large welfare states characterised by ageing-related spending pressures, institutional complexity and administrative layering. In DEA terms, these governments may appear somewhat oversized, suggesting that they operate slightly beyond the output-maximising scale.

The identified returns-to-scale (RTS) patterns corroborate this conjecture and add further nuance (results are not reported, but available upon request). For CESEE, the input-oriented RTS results indicate that countries operate under IRS across the board. This means that, relative to their peers, they look "too small" in input space. Consequently, scaling up spending – if well targeted – could move them closer to efficient scale. This is, however, not necessarily something CESEE-specific, as several other EU countries display increasing returns to scale (IRS) as well. In contrast, the output-oriented RTS results indicate that several CESEE countries such as Croatia, Czechia, Hungary, Poland, Slovenia or Slovakia, as well as most RoEU countries, exhibit a decreasing returns-to-scale (DRS) pattern in most years, implying that proportional input increases yield less-than-proportionate output gains at their current positions. As exemplified in annex 7.3, this combination of input-oriented IRS and output-oriented DRS is not contradictory, it is perfectly possible and economically meaningful. It reflects the fact that the local RTS classification depends on the projection point on the frontier, which differs by orientation. The empirical implication is that while these CESEE countries have room to expand their spending in a targeted manner (as suggested by input-oriented IRS), additional spending alone is unlikely to deliver proportionate improvements in governance unless its composition and implementation also improve. In contrast, however, some countries such as Bulgaria, the Baltics, or Romania have operated predominantly under IRS also in the output-oriented perspective in recent years. This suggests that the public sector in these countries is relatively too small compared to its optimal production scale. As a result, scaling up operations could generate more-than-proportionate increases in outputs, indicating substantial unrealised scale economies.

Overall, spending levels per se appear to be less of a constraint. The key bottleneck lies in the production process through which spending is translated into outcomes. From an efficiency perspective, this implies that CESEE countries would benefit more from scaling up well-designed spending than from further austerity. For most CESEE countries, however, this conclusion comes with an important caveat: Any rise in spending must be well-targeted and accompanied by improvements in the allocation, management and institutional use of public resources. Apart from some recent cases, simply increasing inputs across the board would mostly fail to resolve output-side inefficiencies and could even erode the relatively solid input efficiency seen so far.

5 Concluding remarks

This paper examined the evolution of government size, effectiveness, and – by means of DEA – spending efficiency in eleven CESEE EU member states over the period from 1996 to 2024. Three broad insights emerge: First, CESEE governments have remained comparatively lean, even as public spending has risen moderately and shifted towards higher wage and investment shares. Second, improvements in government effectiveness have been uneven, reflecting divergent institutional trajectories and persistent

weaknesses in perceived infrastructure quality, competitiveness and human capital performance across parts of the region. Third, and most importantly, the efficiency analysis points to an input-output disconnect: While CESEE countries generally maintain relatively contained spending levels, their ability to convert these inputs into better governance outcomes remains limited. From an input-based efficiency perspective, CESEE countries perform broadly in line with the RoEU average – having outperformed the latter for much of the earlier period but converging more recently. However, a sizeable and persistent gap remains in output-based efficiency. In particular, although that gap has narrowed somewhat over time, output-based efficiency has largely stagnated since around 2012 at levels well below the EU benchmark. This asymmetry suggests that the main challenge is not the containment of public inputs, but their effective transformation into outcomes.

The fact that efficiency scores in CESEE have largely ceased to improve since around 2012 may be attributed to several factors. First, reform momentum appears to have weakened following EU accession as external incentives for institutional upgrading diminished – a trend that likely already contributed to the deterioration observed in the late 2000s and has continued to weigh on performance thereafter. Second, governance setbacks in some countries, particularly related to the rule of law and institutional quality, may have reduced the efficiency of public resource allocation. Third, declining marginal returns to structural fund absorption may have set in, as early gains from addressing infrastructure gaps and other "low-hanging fruit" were gradually exhausted.

Returns-to-scale patterns further reinforce the interpretation of an input-output disconnect. Governments in the region tend to operate at suboptimal (too small) input scales, as reflected in widespread increasing returns to scale in the input-oriented specification, indicating that CESEE countries operate below their optimal scale from an input-efficiency perspective. From the output-based perspective, the results are a bit more nuanced. A majority of CESEE countries exhibit decreasing returns to scale in the output-oriented dimension over time, implying that additional government spending would generate only limited improvements in governance outcomes. However, in recent years, some countries have shown evidence of increasing returns to scale also in the output-oriented specification, suggesting that their public sectors may be below optimal scale from both input- and output-oriented perspectives.

Taken together, our findings indicate that inefficiencies are primarily driven by frictions in administrative capacity and institutional quality that hinder the effective translation of spending into performance, rather than by a systematic misalignment of government size. However, for a subset of countries, scale constraints remain relevant, as indicated by increasing returns to scale in both input- and output-oriented specifications.

These findings carry several policy implications: First, DEA frontier positions should not be misread as indicators of high absolute performance. They reflect only relative efficiency within the sample and do not necessarily imply that frontier countries deliver strong governance outcomes. Benchmarking should therefore combine high-performing CESEE observations with comparisons to small, advanced economies that define the European and global efficiency frontier. Second, strengthening government performance in most CESEE countries will require a focus on the quality – not merely the quantity – of public spending. Further enhancing administrative capacity, modernising public financial management systems, improving expenditure composition and reinforcing policy implementation mechanisms are likely to yield larger and more sustainable gains than continued emphasis on fiscal restraint. Third, where fiscal space permits, well-targeted increases in productive spending – particularly in infrastructure, human capital and institutional capacity – could help countries move closer to their efficient operating scale. The case for targeted infrastructure spending is reinforced by recent ECB evidence on sizeable technical efficiency

gaps in public investment in transport infrastructure across the EU (Haroutunian et al., 2026). However, broad-based spending expansions without corresponding improvements in allocation, governance and implementation processes are unlikely to yield proportionate gains and may even erode existing efficiency advantages.

Future research could examine more systematically whether government spending efficiency can be improved through the reprioritisation of specific expenditure categories, e.g. depending on their productivity content. Moreover, it would be of interest to investigate how changes in government efficiency affect macroeconomic outcomes in CESEE. Building, for instance, on the frameworks developed by Afonso et al. (2024) and Chrysanthakopoulos et al. (2025), future work could assess whether higher government efficiency increases trust in government and reduces debt burdens – or concerns about debt sustainability – thereby enhancing both the legitimacy and the resilience of public institutions.

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7 Annex

7.1 Decomposition of the change in the Government Effectiveness score

The Government Effectiveness score is constructed as a normalised weighted average of multiple underlying indicators over time, where indicator values, weights, the mean, the standard deviation and even the number of indicators may change between two points in time t_0 and t_1. Consequently, a change in the Government Effectiveness score can be decomposed into its component contributions.

The normalised weighted Government Effectiveness score at time t is defined as:

$$\frac{\sum w_i^{(t)} x_i^{(t)} - \mu^{(t)}}{\sigma^{(t)}} \qquad (1)$$

where $x_i^{(t)}$ and $w_i^{(t)}$ are, respectively, the value and weight of indicator i at time t. $\mu^{(t)}$ stands for the mean across all countries at time t so that the mean over the full sample period (1996–2024) is normalised to zero[13]. $\sigma^{(t)}$ is the standard deviation across countries at time t.

We now want to compute the change

$$\Delta Y = Y^{(1)} - Y^{(0)} \qquad (2)$$

and decompose it into three additive components:

$$\Delta Y = \text{change in indicator values } (\Delta X) + \text{change in weights } (\Delta W) + \text{change in normalisation } (\Delta \text{Norm})$$

Inserting equation (1) into equation (2), by adding and subtracting the same terms, ΔY can be rewritten as:

$$\Delta Y = \frac{\sum w_i^{(1)} x_i^{(1)} - \mu^{(1)}}{\sigma^{(1)}} - \frac{\sum w_i^{(0)} x_i^{(0)} - \mu^{(0)}}{\sigma^{(0)}} + \left(\frac{\sum w_i^{(1)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}} - \frac{\sum w_i^{(1)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}}\right) + \left(\frac{\sum w_i^{(0)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}} - \frac{\sum w_i^{(0)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}}\right) \qquad (3)$$

Reshuffling the terms results in:

$$\Delta Y = \left(\frac{\sum w_i^{(1)} x_i^{(1)} - \mu^{(1)}}{\sigma^{(1)}} - \frac{\sum w_i^{(1)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}}\right) + \left(\frac{\sum w_i^{(1)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}} - \frac{\sum w_i^{(0)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}}\right) + \left(\frac{\sum w_i^{(0)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}} - \frac{\sum w_i^{(0)} x_i^{(0)} - \mu^{(0)}}{\sigma^{(0)}}\right) \qquad (4)$$

which simplifies to:

$$\Delta Y = \frac{\sum w_i^{(1)} (x_i^{(1)} - x_i^{(0)})}{\sigma^{(1)}} + \frac{\sum (w_i^{(1)} - w_i^{(0)}) x_i^{(0)}}{\sigma^{(1)}} + \left(\frac{\sum w_i^{(0)} x_i^{(0)} - \mu^{(1)}}{\sigma^{(1)}} - \frac{\sum w_i^{(0)} x_i^{(0)} - \mu^{(0)}}{\sigma^{(0)}}\right) \qquad (5)$$

This decomposition allows us to break down the overall change in the normalised score into three interpretable parts. The first term reflects changes in underlying indicator values, the second captures the change in weights, and the third term (the difference in brackets) reflects normalisation effects, i.e. changes in the global benchmark over time.

Based on our data (not shown here, but available upon request), changes in underlying indicator values constitute the dominant driver of government effectiveness developments in CESEE countries over the period from 1996 to 2024, reflecting substantive improvements in governance-related dimensions. For almost all countries, this component contributes positively, with particularly strong effects in the Baltic states, Romania and Croatia, while Hungary represents the only case with a slightly negative contribution. By contrast, both normalisation effects and changes in indicator weights play only a minor role for most countries. Although weight adjustments can be non-negligible in individual cases and occasionally offset

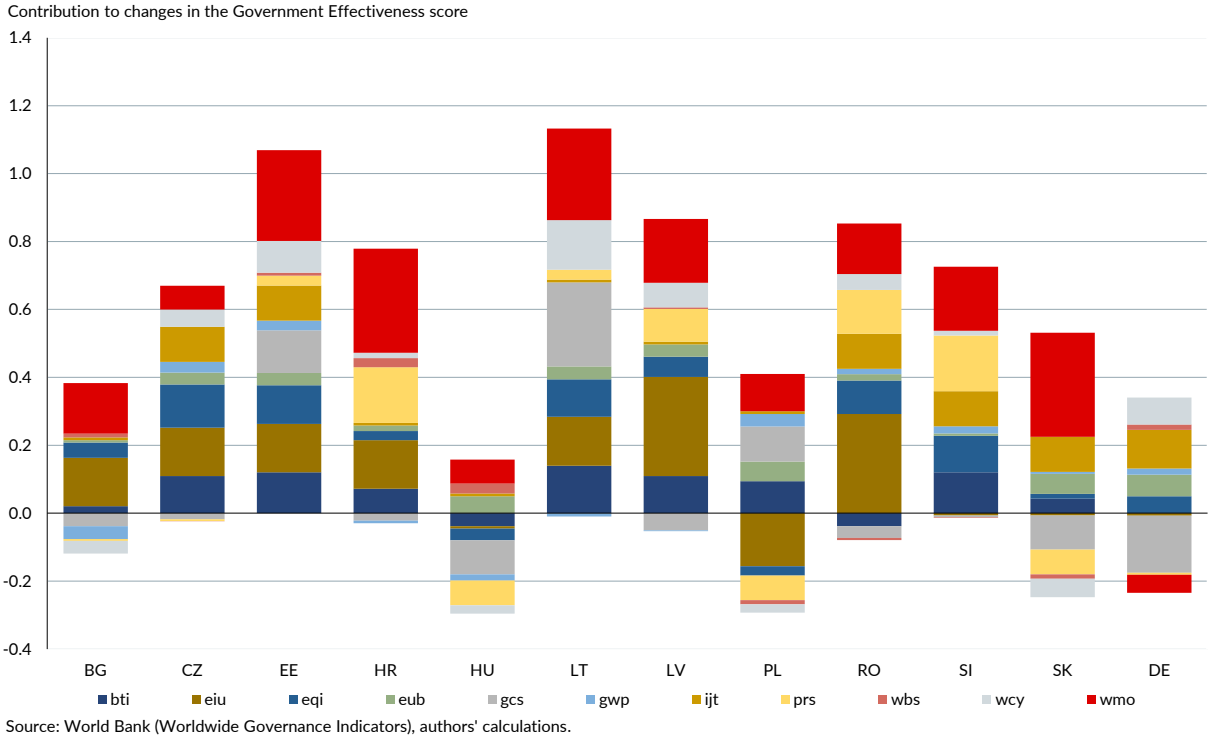
[13] See World Bank (2025) for revisions to the aggregation model that allow the global average of governance to vary over time.

underlying improvements, they do not alter the overall picture. Taken together, this implies that the evolution of Government Effectiveness scores primarily reflects genuine changes in underlying governance indicators rather than methodological effects.

Analogously to the decomposition in equation (5), we extend the analysis to a more granular level by focusing on the component of government effectiveness changes attributable to underlying indicator values. Chart A.1 depicts this component, decomposing it into the contributions of individual indicators and sources. The resulting contributions can be grouped into three broad categories. First, a group of indicators shows consistently positive contributions across most countries. These indicators capture perceptions of core dimensions of state capacity, including the quality of bureaucracy, policy implementation and overall administrative effectiveness (EIU, PRS, BTI, WMO, as well as to a lesser extent EQI and IJT; see chart A.1). Improvements along these dimensions are widespread and have constituted the main source of progress in government effectiveness across CESEE over the past three decades. Second, a smaller but distinct group of indicators exhibits negative contributions in a number of countries, thereby dampening overall improvements. These indicators relate to perceived weaknesses in structural dimensions such as infrastructure quality, competitiveness and the alignment of education systems with economic needs (GCS), suggesting that shortcomings in these areas have offset part of the gains in administrative capacity. Finally, a third group of indicators shows no consistent cross-country pattern, with contributions that are generally small and heterogeneous. These indicators reflect broader perceptions of service delivery, business conditions and public sector performance (EUB, GWP, WCY, WBS), indicating that developments in these dimensions have been uneven and have not played a decisive role.

Chart A.1

Contribution of individual indicator values to changes in the Government Effectiveness score between 1996–2024



Source: World Bank (Worldwide Governance Indicators), authors' calculations.

Note:

BTI – *Bertelsmann Transformation Index* (resource efficiency; stability/performance of democratic institutions);

EIU – *Economist Intelligence Unit* (quality of bureaucracy);

EQI – *University of Gothenburg, European Quality of Government Index* (quality of healthcare and education systems);

EUB – *European Union Barometer* (trust in regional and local public authorities; trust in government);

GCS – *WEF Global Competitiveness Survey* (efficiency of transport services; quality of roads; quality of primary education);

GWP – *Gallup World Poll* (quality of public transportation, roads and highways, and the education system);

IJT – *Crisis24 Country Security Assessment Rating*;

PRS – *PRS Group, International Country Risk Guide* (quality of bureaucracy);

WBS – *World Bank Enterprise Surveys* (transport, electricity and tax administration as obstacles);

WCY – *IMD World Competitiveness Yearbook* (adaptability of government policy to economic changes; infrastructure for distributing goods and services; impact of the shadow economy; tax evasion as a constraint);

WMO – *World Resources Monitor* (infrastructure disruption; state failure).

Only indicators with a non-zero contribution to the change in the Government Effectiveness score are shown. The decomposition can only be performed using the underlying (non-normalised) governance estimates, which are expressed in standard normal units and range approximately from -2.5 to 2.5. For further details, see: https://www.worldbank.org/content/dam/sites/govindicators/doc/GE-2025.pdf (accessed on 21 May 2026).

7.2 Data Envelopment Analysis – formal derivation

Formally, in the input-oriented Data Envelopment Analysis (DEA) model under the assumption of constant returns to scale (CRS), efficiency of country *i* is obtained by solving:

$$min\ \theta$$

$$s.t.\ \ -y_i + Y\lambda \geq 0$$

$$\theta\, x_i - X\lambda \geq 0$$

$$\lambda \geq 0$$

with x_i being the input vector for country *i*, in our case government expenditure in % of GDP. y_i stands for the output vector for country *i*, in our application this is the Government Effectiveness score provided by the World Bank within the Worldwide Governance Indicators. X, Y are the input/output matrices over all countries. λ stands for the intensity weights and θ is the input contraction factor.

Intuitively, the input-oriented DEA in our exercise searches for the largest proportional reduction in government spending (θ) such that the government is still able to achieve its current Government Effectiveness score (y_i), if it were operating as efficiently – in the sense of using the minimum input ($X\lambda$) for a given output ($Y\lambda$) – as a non-negative linear combination of the best-performing countries observed.

If the CRS assumption is replaced by a more realistic variable returns-to-scale (VRS) assumption, the implication is that the technology becomes locally convex. Formally, the convexity constraint is thus added to the previous formal definition:

$$I1'\lambda = 1$$

Hence, the reference units under VRS are built as a convex combination (weighted average) of observed decision-making units (DMUs). If θ=1, the country is efficient. If θ<1, the country could reduce its input θ times – or by (1- θ)% – while still attaining the same output.

Analogously, the output-oriented solution problem under CRS is defined as:

$$max\ \varphi$$

$$s.t.\ \ -\varphi\, y_i + Y\lambda \geq 0$$

$$x_i - X\lambda \geq 0$$

$$\lambda \geq 0$$

where φ is the output expansion factor. Again, under the VRS assumption the convexity constraint comes on top:

$$I1'\lambda = 1$$

Hence, intuitively, under the output-oriented approach, DEA seeks to answer how much more output a country *i* could produce if it used its resources as efficiently as (a linear (under CRS) or convex (under VRS) combination of) the best-performing countries. If $\varphi = 1$, the DMU is efficient. If $\varphi > 1$, it is inefficient and could proportionally increase its outputs φ times[14].

7.3 Intuition and determination of increasing and decreasing returns to scale

As depicted in chart A.2, let us assume that we have three efficient (i.e., lying on the frontier) countries with the following input/output combinations:[15] A (Input = 10; Output=24); B (20; 60); C (35; 84). The VRS frontier is the piecewise-linear hull connecting these points, the red line in the chart: slope A/B = (60 - 24) / (20 - 10) = 3.6; slope B/C = (84 - 60) / (35 - 20) = 1.6. Hence, the small-to-medium scale in section AB has a steeper marginal output and marks the IRS region, since an increase of input by 100% (from 10 to 20) raises the output by more than 100% (precisely 150% from 24 to 60). In contrast, the higher scale in BC has flatter marginal output – a 75% increase in input (from 20 to 35) brings a less-than-proportionate increase in output, namely by 40% from 60 to 84. The section BC thus marks the decreasing returns-to-scale (DRS) region.

Under CRS, the frontier is the linear ray going through the origin and the frontier DMU with maximum output/input ratio. In our case, it is point B which has the highest output/input ratio, namely 60/20 = 3. Hence, the dashed pink line would form the CRS frontier.

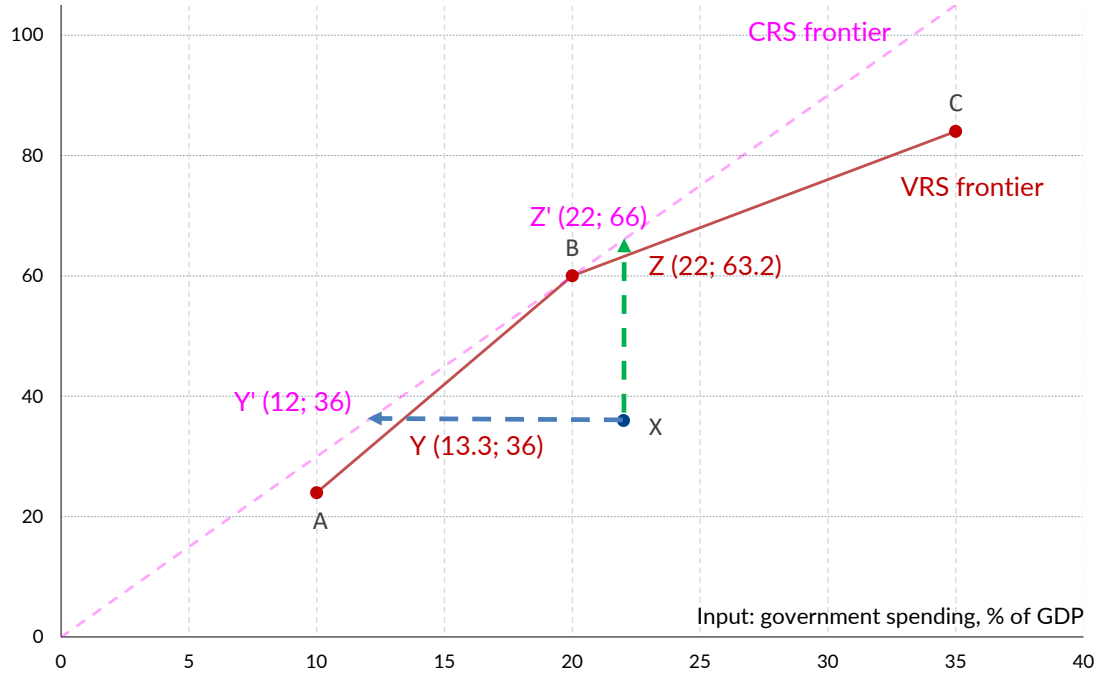
[14] Sometimes, the (in)efficiency factor is reported as the inverse value of φ to be bounded, i.e. ≤ 1. In that case, it can be interpreted as the share of potential output that is currently achieved relative to the efficient frontier.

[15] In line with our actual data, the input can be thought of as government spending in % of GDP, while the output is the normalised Government Effectiveness score.

Chart A.2

Inreasing (input-oriented) vs. decreasing (output-oriented) returns to scale

Output: government effectiveness (normalised)



Source: Authors' depiction.

Now, we consider a DMU X with input 22 and output 36. In the input-oriented efficiency analysis, we are asking: By how much could X reduce input, while keeping output at 36? Under VRS, this entails solving the following simple equation for x:

$$y(x) = 24 + 3.6 * (x - 10)$$

Setting $y(x)$=36, results in $x \approx 13.3$.

Hence, the input-oriented efficiency frontier under VRS (red line) for the DMU X is defined by the point Y(13.3; 36). Because the input-oriented projection of X lies in the AB section of the frontier, input-oriented X operates under increasing returns to scale (IRS). The input-oriented (in)efficiency score amounts to 13.33/22 ≈ 0.6, suggesting that the DMU X could reduce its input by approximately 40%, while keeping its output constant. If we did not assume VRS but CRS, then X would be projected not on the red but rather on the dashed pink line with a slope of 3. Hence, the input-oriented projection of X on the frontier under CRS would be Y'(12; 36). The (in)efficiency score would thus amount to 12/22 ≈ 0.545.

When we proceed with the output-oriented approach and ask - how much could X increase output while keeping its input at 22? – we essentially project X vertically on the frontier. In other words, we solve the following equation:

$$y(x) = 60 + 1.6 * (x - 20)$$

Setting x=22, gives $y(22) = 63.2$.

The output-oriented frontier for X is defined by Z(22; 63.2) and the efficiency score equals 36/63.2 ≈ 0,57. Hence, if X were to become output-efficient, it would increase its output by about 76% (i.e. 63.2/36), while keeping its input constant. Since the output-based projection of X on the frontier lies in the DRS segment of the frontier, X is DRS under the output-oriented approach. Under the CRS assumption, the projection of X on the frontier would be defined by Z'(22; 66) and the (in)efficiency score would thus amount to 36/66≈ 0.55.

But how can we determine in practice whether a DMU operates under IRS or DRS? If a DMU is not operating under CRS – i.e., its CRS efficiency score differs from its VRS score – a restricted DEA model with non-increasing returns to scale (NIRS) is estimated. This specification allows for DRS but not IRS. If the NIRS efficiency score equals the unrestricted VRS score, the restriction is not binding and the DMU must therefore operate under DRS, implying that it is effectively "too large." By contrast, if the NIRS score is lower than the VRS score, the restriction becomes binding when increasing returns are ruled out. This indicates that the DMU operates under IRS and is therefore "too small."

7.4 Efficiency frontiers in example years

Chart A.3 below plots the country cloud for three sample years – 1996, 2009 and 2024 – in a coordinate system indicating input (government spending) and output (government effectiveness). The efficiency frontier is defined by the outermost country points (in red) connected by a red line.

To illustrate the conclusions that can be drawn from these efficiency frontier charts, consider again the example of Bulgaria and Romania already introduced in section 4.2. These two countries appear very similar in terms of their input-output ratios. In 1996, Romania lies on the frontier (co-defining it with Cyprus, Luxembourg and the Netherlands), while Bulgaria is positioned slightly inward. Bulgaria's horizontal distance to the frontier is relatively small, indicating high input-based efficiency (0.91), but its vertical distance is much larger, implying a comparatively low output-based efficiency score (0.51). The picture changes markedly in 2009, when Bulgaria moves onto the frontier, attaining – by definition – an efficiency score of 1 in both metrics. Romania, by contrast, slightly shifts inward despite little change in its absolute input and output levels compared with 1996. As a result, Romania retains a very high input efficiency (0.99), but because the frontier is steep in that region of the chart, its vertical distance to the frontier remains considerable, as reflected in a significantly lower output efficiency score (0.75). Over time, Bulgaria and Romania alternate in co-defining the bottom-left segment of the frontier. However, given the steep slope in that section, even a slight movement away from the frontier results in a sharp decline in output efficiency. DEA output (in)efficiency scores should therefore be interpreted against this background[16].

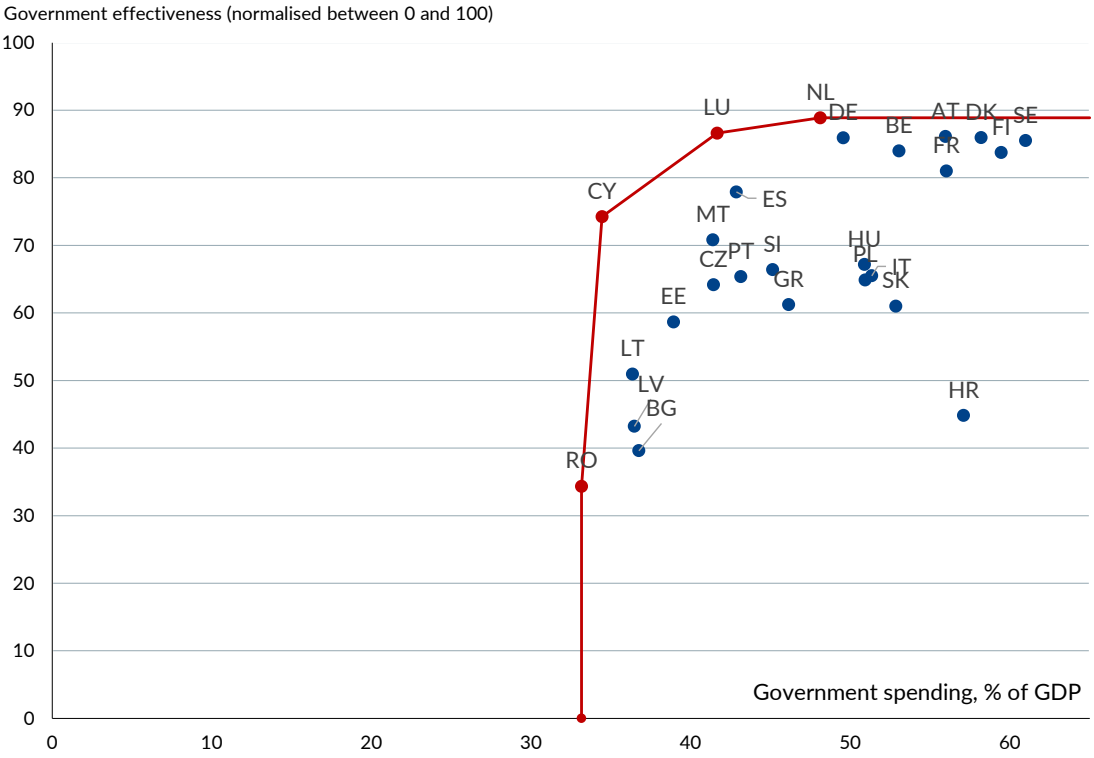
Compared with 2009, by 2024 several CESEE countries had moved noticeably further away from the efficiency frontier, now defined by Luxembourg, Lithuania, Cyprus and Malta. For instance, input-based efficiency scores deteriorated significantly in Slovakia, Poland and Romania, while output-based scores deteriorated sharply in Bulgaria (which lay on the frontier in 2009), and, to lesser extent, in Romania and Slovakia. At the same time, some CESEE countries experienced notable efficiency improvements between 2009 and 2024, particularly in terms of output efficiency. This was most evident in Lithuania,

[16] An analogous situation can arise with respect to input (in)efficiency, as illustrated in the case of the Netherlands and Austria in 1996. While the Netherlands lie on the frontier, Austria falls just short of it. Although Austria exhibits very high output efficiency (0.97), its horizontal distance from the frontier is quite substantial, resulting in comparatively low input efficiency (0.74).

which moved onto the frontier, but also in Czechia, Estonia and Latvia, which recorded relatively strong increases in their output-based efficiency scores.

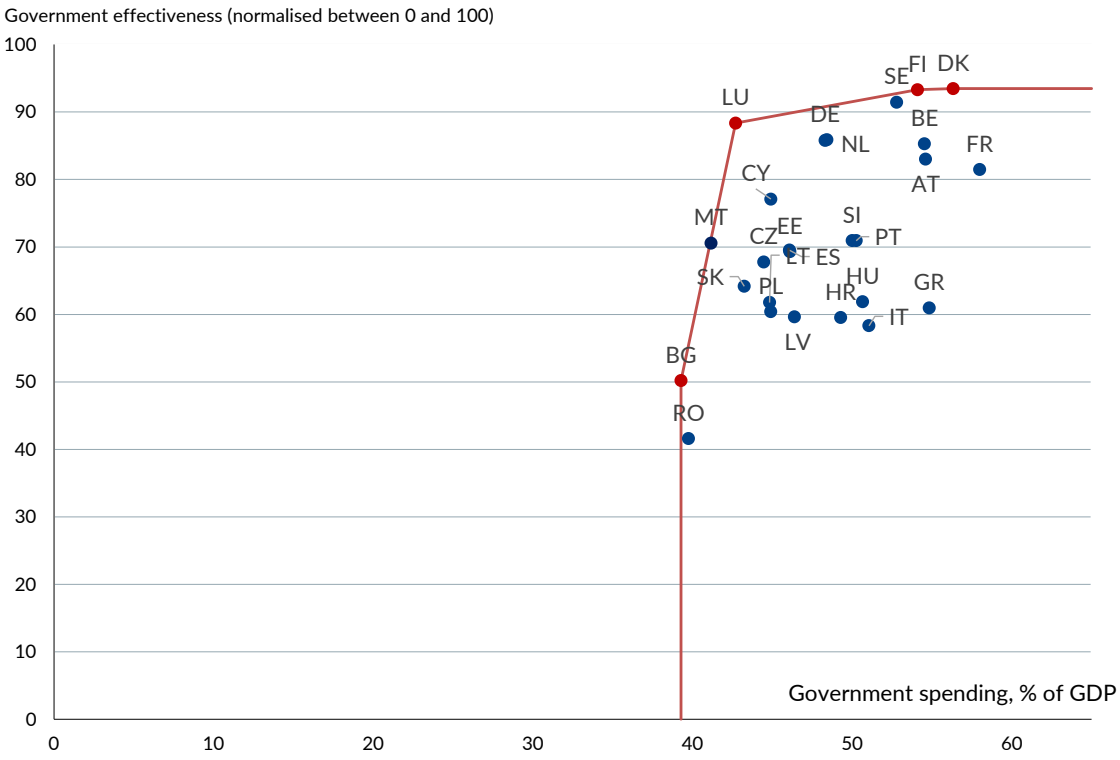
Chart A.3

Efficiency frontier 1996 (VRS input- and output-based)



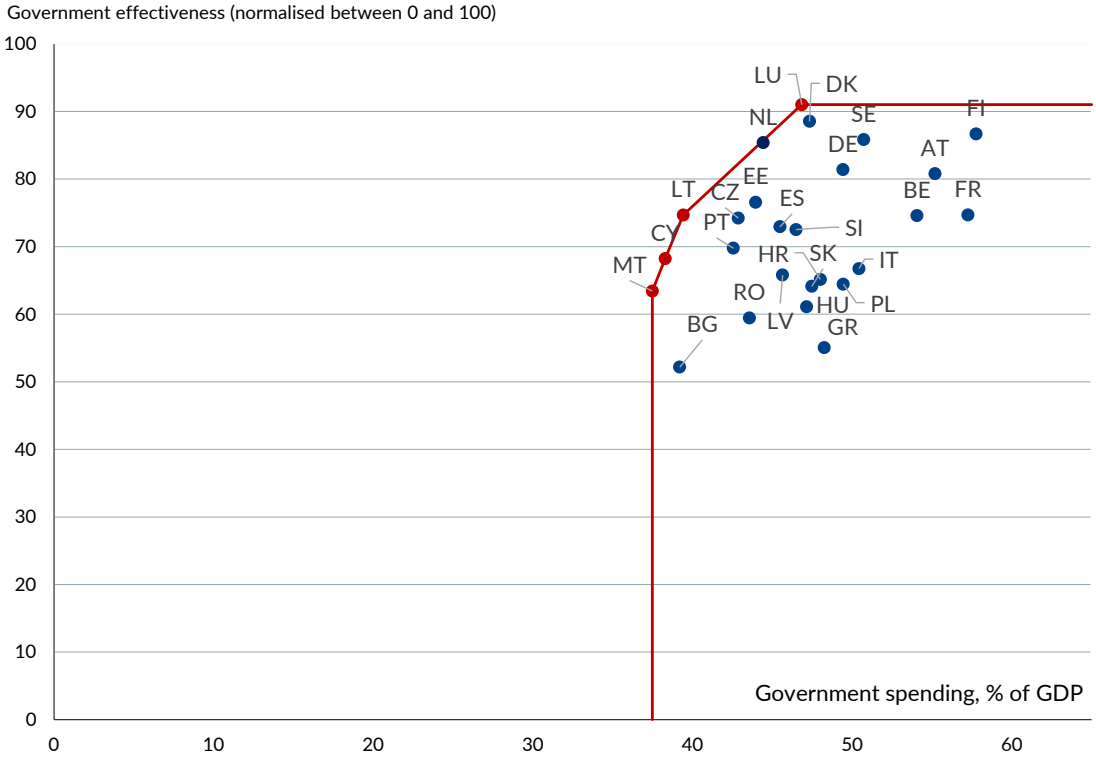
Source: Eurostat (Newcronos), World Bank (WGI), authors' calculations.

Efficiency frontier 2009 (VRS input- and output-based)



Source: Eurostat (Newcronos), World Bank (WGI), authors' calculations.

Efficiency frontier 2024 (VRS input- and output-based)



Source: Eurostat (Newcronos), World Bank (WGI), authors' calculations.

Note: Efficiency scores are based on assuming variable returns to scale (VRS). Ireland is excluded due to highly volatile macroeconomic and fiscal data, partly driven by multinational corporations.

Table A.1

Heat map
Input-based DEA efficiency (VRS)

	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
BG	0.91	1.00	0.85	0.89	0.87	0.89	0.91	1.00	0.90	0.98	1.00	1.00	1.00	1.00	0.95	0.81	0.87	0.99	0.94	0.91	0.95	1.00	0.90	0.89	0.92	0.96
CZ	0.82	0.84	0.90	0.81	0.69	0.81	0.80	0.81	0.84	0.90	0.92	0.90	0.86	0.83	0.84	0.84	0.85	0.89	0.85	0.86	0.86	0.91	0.84	0.89	0.90	0.92
EE	0.87	0.88	1.00	0.99	0.97	1.00	1.00	1.00	1.00	0.94	0.89	0.98	1.00	0.97	0.98	0.99	0.92	0.91	0.86	0.94	0.93	0.97	0.94	0.99	0.92	0.92
HR	0.59	0.62	0.67	0.71	0.68	0.69	0.72	0.75	0.73	0.79	0.81	0.78	0.72	0.76	0.75	0.72	0.74	0.75	0.74	0.75	0.75	0.78	0.77	0.81	0.77	0.79
HU	0.67	0.70	0.77	0.71	0.69	0.70	0.68	0.65	0.68	0.75	0.80	0.78	0.73	0.73	0.71	0.70	0.70	0.74	0.70	0.74	0.76	0.82	0.78	0.75	0.72	0.79
LT	0.93	0.83	0.92	1.00	1.00	1.00	0.99	0.97	0.96	0.96	0.90	0.90	0.90	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00
LV	0.92	0.88	0.96	0.97	0.95	0.93	0.93	0.87	0.93	0.91	0.87	0.82	0.83	0.90	0.89	0.88	0.88	0.89	0.83	0.83	0.87	0.95	0.80	0.83	0.82	0.83
PL	0.67	0.77	0.85	0.78	0.74	0.78	0.76	0.76	0.79	0.83	0.90	0.84	0.82	0.84	0.83	0.83	0.85	0.84	0.80	0.82	0.84	0.88	0.86	0.85	0.76	0.76
RO	1.00	0.95	0.94	1.00	0.98	1.00	1.00	0.94	0.90	0.97	0.99	0.92	0.90	0.95	1.00	0.98	0.98	0.99	0.97	0.98	0.95	0.99	0.93	0.89	0.87	0.86
SI	0.76	0.75	0.76	0.74	0.71	0.73	0.72	0.73	0.78	0.82	0.82	0.77	0.72	0.75	0.63	0.72	0.73	0.77	0.78	0.83	0.84	0.84	0.79	0.82	0.83	0.84
SK	0.64	0.75	0.68	0.76	0.84	0.88	0.86	0.88	0.94	1.00	0.94	0.93	0.88	0.90	0.87	0.83	0.80	0.84	0.82	0.85	0.85	0.94	0.83	0.85	0.74	0.79
AT	0.74	0.78	0.74	0.77	0.77	0.79	0.83	0.76	0.75	0.75	0.77	0.78	0.78	0.78	0.76	0.76	0.76	0.76	0.77	0.80	0.82	0.81	0.74	0.80	0.81	0.76
BE	0.76	0.78	0.76	0.80	0.74	0.83	0.79	0.76	0.74	0.74	0.78	0.77	0.74	0.74	0.74	0.71	0.71	0.69	0.65	0.69	0.69	0.73	0.70	0.75	0.74	0.73
CY	1.00	1.00	1.00	0.97	0.84	0.91	0.90	0.85	0.87	0.92	0.93	0.92	0.88	0.73	0.85	0.70	0.84	0.89	0.87	0.76	0.87	0.92	0.87	0.97	0.91	1.00
DE	0.83	0.82	0.78	0.80	0.77	0.86	0.87	0.85	0.85	0.85	0.88	0.86	0.89	0.91	0.91	1.00	1.00	0.91	0.92	0.91	0.90	0.90	0.82	0.88	0.87	0.86
DK	0.71	0.76	0.72	0.78	0.85	0.91	0.91	1.00	1.00	1.00	1.00	0.79	0.81	0.76	0.83	0.73	0.73	0.76	0.79	0.82	0.83	0.89	1.00	1.00	0.95	0.97
ES	0.85	0.88	0.95	1.00	1.00	0.95	0.97	0.87	0.88	0.89	0.89	0.85	0.81	0.76	0.81	0.80	0.83	0.84	0.80	0.84	0.85	0.82	0.77	0.82	0.84	0.86
FI	0.67	0.84	1.00	1.00	1.00	1.00	1.00	0.95	0.86	0.93	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.77	1.00	1.00	1.00	1.00	0.88	0.83	0.78	0.78
FR	0.69	0.70	0.71	0.70	0.69	0.75	0.76	0.68	0.67	0.69	0.73	0.71	0.69	0.69	0.67	0.66	0.66	0.65	0.63	0.68	0.69	0.72	0.68	0.69	0.71	0.69
GR	0.74	0.74	0.76	0.75	0.70	0.70	0.72	0.73	0.71	0.71	0.73	0.71	0.64	0.61	0.56	0.68	0.64	0.69	0.67	0.70	0.73	0.70	0.66	0.69	0.72	0.78
IT	0.67	0.73	0.78	0.77	0.71	0.73	0.72	0.70	0.73	0.76	0.78	0.76	0.72	0.71	0.70	0.69	0.70	0.70	0.67	0.70	0.72	0.74	0.67	0.67	0.68	0.75
LU	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.96	1.00	1.00	1.00	1.00	1.00
MT	0.83	0.86	0.90	0.86	0.74	0.81	0.79	0.79	0.82	0.88	1.00	0.99	0.90	0.92	0.95	0.92	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00
NL	1.00	1.00	1.00	0.91	0.91	0.97	1.00	0.88	0.86	0.86	0.88	0.85	0.86	0.89	0.91	0.92	0.93	1.00	1.00	1.00	1.00	1.00	0.91	0.99	0.99	1.00
PT	0.79	0.82	0.85	0.84	0.75	0.73	0.72	0.74	0.76	0.81	0.82	0.75	0.74	0.77	0.74	0.69	0.75	0.79	0.76	0.81	0.82	0.86	0.81	0.85	0.89	0.91
SE	0.67	0.73	0.71	0.75	0.79	0.82	0.81	0.77	0.86	0.87	0.94	0.90	0.86	0.88	0.87	0.83	0.79	0.78	0.81	0.82	0.82	0.89	0.85	0.89	0.86	0.88

Note: Efficiency scores are based on assuming variable returns to scale (VRS). Ireland is excluded due to highly volatile macroeconomic and fiscal data, partly driven by multinational corporations.

Table A.2

Output-based DEA efficiency (VRS)

	1996	1998	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
BG	0.51	1.00	0.49	0.58	0.58	0.67	0.66	0.67	0.56	0.64	1.00	1.00	1.00	1.00	0.66	0.55	0.56	0.72	0.67	0.66	0.69	1.00	0.59	0.61	0.72	0.71
CZ	0.74	0.72	0.67	0.72	0.70	0.77	0.80	0.76	0.71	0.75	0.76	0.74	0.73	0.73	0.74	0.78	0.78	0.83	0.86	0.84	0.81	0.83	0.80	0.86	0.87	0.90
EE	0.72	0.67	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.82	0.77	0.92	1.00	0.93	0.96	0.97	0.85	0.85	0.86	0.93	0.90	0.94	0.88	0.99	0.90	0.90
HR	0.50	0.50	0.59	0.57	0.57	0.63	0.64	0.63	0.64	0.65	0.65	0.63	0.61	0.65	0.66	0.66	0.63	0.63	0.65	0.67	0.65	0.66	0.71	0.71	0.71	0.72
HU	0.76	0.75	0.76	0.73	0.70	0.72	0.70	0.70	0.65	0.66	0.67	0.66	0.65	0.65	0.68	0.71	0.70	0.69	0.69	0.69	0.67	0.71	0.72	0.70	0.67	0.67
LT	0.66	0.58	0.55	1.00	1.00	1.00	0.92	0.84	0.78	0.66	0.69	0.71	0.76	1.00	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.96	1.00	1.00	1.00	1.00
LV	0.56	0.61	0.56	0.84	0.82	0.81	0.79	0.70	0.70	0.66	0.66	0.69	0.69	0.77	0.79	0.79	0.76	0.77	0.75	0.77	0.80	0.84	0.74	0.73	0.74	0.74
PL	0.73	0.66	0.64	0.60	0.65	0.65	0.67	0.64	0.62	0.66	0.68	0.69	0.69	0.71	0.73	0.78	0.77	0.74	0.71	0.74	0.72	0.71	0.70	0.70	0.68	0.71
RO	1.00	0.48	0.43	1.00	0.58	1.00	1.00	0.55	0.48	0.50	0.75	0.69	0.65	0.78	0.77	0.73	0.72	0.71	0.67	0.69	0.65	0.77	0.62	0.68	0.68	0.71
SI	0.76	0.68	0.65	0.66	0.71	0.73	0.72	0.73	0.73	0.78	0.78	0.73	0.72	0.74	0.71	0.79	0.80	0.83	0.83	0.84	0.83	0.85	0.82	0.82	0.79	0.80
SK	0.69	0.65	0.66	0.61	0.70	0.84	0.85	0.77	0.79	1.00	0.72	0.75	0.70	0.76	0.70	0.74	0.71	0.74	0.73	0.73	0.69	0.80	0.72	0.77	0.67	0.70
AT	0.97	0.95	0.97	0.93	0.91	0.93	0.94	0.92	0.91	0.91	0.89	0.92	0.87	0.87	0.89	0.93	0.92	0.93	0.90	0.89	0.92	0.95	0.92	0.92	0.88	0.89
BE	0.94	0.92	0.93	0.92	0.88	0.89	0.90	0.87	0.86	0.88	0.91	0.90	0.91	0.90	0.92	0.89	0.91	0.87	0.80	0.81	0.79	0.80	0.80	0.83	0.80	0.82
CY	1.00	1.00	1.00	0.94	0.84	0.90	0.90	0.85	0.85	0.89	0.86	0.90	0.89	0.84	0.89	0.81	0.81	0.83	0.88	0.75	0.82	0.82	0.76	0.96	0.88	1.00
DE	0.97	0.93	0.93	0.88	0.86	0.89	0.91	0.93	0.95	0.94	0.94	0.90	0.92	0.95	0.97	1.00	1.00	0.99	0.97	0.95	0.96	0.94	0.92	0.93	0.88	0.89
DK	0.97	0.97	0.96	0.97	0.96	0.99	0.98	1.00	1.00	1.00	1.00	0.95	0.96	0.94	0.95	0.95	0.96	0.97	0.94	0.96	0.96	0.98	1.00	1.00	0.96	0.97
ES	0.90	0.90	0.91	1.00	1.00	0.95	0.97	0.84	0.83	0.81	0.77	0.75	0.75	0.75	0.80	0.79	0.81	0.81	0.80	0.82	0.80	0.78	0.78	0.80	0.80	0.83
FI	0.94	0.98	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.98	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	0.99	0.96	0.93	0.95
FR	0.91	0.88	0.90	0.84	0.86	0.87	0.90	0.85	0.86	0.89	0.87	0.85	0.84	0.85	0.84	0.87	0.89	0.88	0.85	0.87	0.86	0.86	0.86	0.87	0.83	0.82
GR	0.69	0.63	0.62	0.62	0.65	0.69	0.67	0.68	0.65	0.65	0.65	0.62	0.59	0.58	0.62	0.62	0.61	0.59	0.62	0.63	0.65	0.68	0.67	0.68	0.61	0.61
IT	0.74	0.69	0.71	0.69	0.66	0.64	0.65	0.62	0.60	0.61	0.63	0.64	0.61	0.64	0.66	0.64	0.65	0.67	0.64	0.65	0.65	0.67	0.67	0.71	0.73	0.73
LU	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	1.00	1.00	0.99	1.00	1.00
MT	0.82	0.78	0.74	0.71	0.70	0.76	0.77	0.78	0.80	0.83	0.99	0.96	0.79	0.82	0.90	0.87	0.90	1.00	1.00	1.00	1.00	1.00	0.91	0.93	1.00	1.00
NL	1.00	1.00	1.00	0.96	0.96	0.98	1.00	0.95	0.95	0.95	0.95	0.94	0.95	0.97	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.95	0.98	0.98	1.00
PT	0.75	0.74	0.74	0.76	0.74	0.71	0.71	0.74	0.74	0.76	0.77	0.71	0.73	0.75	0.76	0.77	0.82	0.81	0.83	0.79	0.78	0.80	0.80	0.80	0.86	0.85
SE	0.96	0.95	0.97	0.94	0.93	0.93	0.93	0.93	0.95	0.96	0.99	0.97	0.96	0.97	0.96	0.98	0.97	0.97	0.96	0.95	0.95	0.98	0.95	0.96	0.91	0.94

Note: Efficiency scores are based on assuming variable returns to scale (VRS). Ireland is excluded due to highly volatile macroeconomic and fiscal data, partly driven by multinational corporations.

Address: Otto-Wagner-Platz 3, 1090 Vienna
PO Box 61, 1011 Vienna, Austria
Website: www.oenb.at

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