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# How to Assess the Growth Effect of Structural Reforms?

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and Lukas Vogel

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## How to Assess the Growth Effect of Structural Reforms?

Luis García, Julien Guigue and Lukas Vogel

### Abstract

This paper surveys tools to analyse the macroeconomic impact of structural reforms, with a focus on two general approaches: (i) econometric estimates, linking indicators of policy change to macroeconomic outcomes, and (ii) structural macroeconomic models simulating the effect of reforms on economic activity and other variables of interest. Both approaches have advantages and drawbacks. The data-driven approach (i) is flexible with respect to the policy variables that can be linked to macroeconomic outcomes, but parameter estimates are sometimes difficult to interpret from the perspective of economic theory. Structural model simulations (ii), by contrast, provide clarity on the transmission channels, but models are simplifications, and reforms must therefore often be approximated by intermediate outcomes, derived from “satellite tools”, which tends to be labourious, especially in a multi-country setting, and imperfect. Hence, model-based analysis often recurs to stylised scenarios, such as narrowing the gap towards best performers, illustrating potential gains from reforms instead of analysing actual policy trajectories. The drawbacks of the two approaches suggest that ex-ante analysis of structural reform effects at the macro level will have to remain largely qualitative at present. Without commitment to a detailed reform agenda (measures and coverage) and appropriate metrics providing a reliable quantification of reforms, an ex-ante assessment of structural reforms can provide plausible orders of magnitudes for the effects at best.

**JEL Classification:** C20, C54, E02, E17.

**Keywords:** Structural reforms, economic growth, econometric estimates, structural models.

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# 1. INTRODUCTION

**Demand for the assessment of the macroeconomic effects of structural reforms is likely to increase in EU policy coordination and economic surveillance.** In the context of their Recovery and Resilience Programmes (RRPs), Member States were asked to characterise the growth effects of the planned reforms. Additional onus on the assessment of structural reforms comes from the EU's new economic governance framework, which entered into force on 30 April 2024. The new rules encourage Member States to implement reform and investment measures suitable to improve economic growth and public debt sustainability.

**Different approaches are used to assess the impact of structural reforms on economic outcomes at the micro and macro level.** Part of the literature and policy institutions, such as the OECD, has used econometric estimates together with a production function approach, assessing, first, the impact of reforms on inputs to production (total factor productivity (TFP), labour, capital) before aggregating them to overall GDP effects (e.g., Égert and Gal 2017, Égert 2020). Work in DG ECFIN, to the contrary, has strongly relied on structural macro-economic models, notably QUEST, to investigate the impact of 'standard' (product and labour market, and tax-benefit) reforms on macro-economic outcomes (e.g., Pfeiffer et al. 2024; Varga et al. 2013; Varga and in 't Veld 2014).

**Against this background, we survey the analytical approaches or tools available and used at the European Commission, and, similarly, other policy institutions, to assess the macroeconomic impact of structural reforms.** Moving from more data-driven towards more theory-based tools, the paper discusses two approaches: (1) Econometric estimates (often characterised as "non-structural" or "reduced-form") of the impact of reforms on variables of interest at different levels of aggregation, such as investment, employment, or total factor productivity (TFP) at firm, sector, or country level, which can be combined with a production function approach to derive aggregate effects, or directly include overall economic activity as the dependent variable. (2) Model-based analysis, relying notably on versions of the European Commission's structural (micro-founded) dynamic general-equilibrium model QUEST III.

**Data-driven (reduced-form estimates) and more theory-based (structural models) approaches to the quantification of reform effects usually involve three steps:** (i) Monitor the translation of reform commitments into *actual* changes in actionable policy indicators, e.g., reflected in the fulfilment of specific targets. (ii) Establish an *equivalence* between the policy action and a change in economic fundamentals. The equivalence is obvious where the policy is a change in taxes and benefits, but less straightforward, e.g., for administrative or judiciary reforms. (iii) Investigate the *impact* of the economic action on aggregate outcomes. Data-driven methods can separate steps (ii) and (iii), notably through a production function approach, or merge them, generally at the expense of less clarity about the transmission channels. As they are simplifications of reality, structural models, by contrast, often lack obvious entry points (in the sense of exogenous variables to be shocked) for many types of reforms beyond taxation and standard labour and product market policies, and they therefore often require satellite tools for step (ii) (the translation of detailed policy action into exogenous model variables or parameters) before being able to gauge wider economic implications. Econometric estimates for intermediate variables from approach (1) can serve as satellite tool in this context, helping to translate policy action into more stylised scenarios for model simulations.

**The different data requirements impose limits on the feasibility of reform impact assessments.** To start with, it is difficult to quantify the impact of planned reform where they lack sufficient detail for a thorough quantitative assessment, which is often the case. The formulation of relatively specific targets I, as in the case of the RRP, can mitigate this shortcoming. Pre-implementation assessments are, hence, necessarily stylised, providing at best an order of magnitude for plausible effects. Where *detailed* information on reforms is available (especially *post-implementation*), it can be used with existing elasticities for an ex-ante impact assessment. T into model scenarios, as an alternative, becomes very time consuming where there are many countries and policy

measures to consider, especially when, in step ii, policy shocks as input for model simulations need to be calibrated case-by-case with the help of data-driven satellite tools. Proper ex-post analysis requires data on the output variables of interest, meaning that sufficient time will have to elapse after the implementation of a reform.

**This survey focuses on the impact of reforms on economic activity and its components, but many considerations also apply to other dimensions of economic effects.** Other than the effect on economic activity, structural reforms have also been analysed with respect to their distributional effects (e.g., Roeger et al. 2021) and their impact on macroeconomic stability, or economic resilience (e.g., Duval and Vogel 2008). The challenges of measuring structural reforms and, possibly, translating them into structural macro models remain the same. A model-based analysis of distributional effects requires models, or combinations of models, with a sufficient degree of heterogeneity among agents along categories of interest (e.g., various skill and income groups).

**The remainder of this survey moves from the more data-driven to the more theory-driven approach.** Section 2 reviews regression-based econometric studies that evaluate effects of structural reforms on intermediate or macroeconomic outcome variables. These empirical studies can provide self-standing insights at different levels of aggregation, but also serve as an input for growth accounting based on production functions, or as ‘satellite tools’ for simulations with more complex structural models. Section 3 illustrates how specific structural reforms have been analysed in directorate-general for economic and financial affairs (DG ECFIN) structural macro model QUEST over shorter and longer horizons. Section 5 summarises the discussion and concludes.

## 2. REGRESSION-BASED ECONOMETRIC ANALYSIS

**Reduced-form regression analysis provides a flexible tool to assess the effect of reforms on economic outcomes.** The econometric reform assessment requires reforms to be quantifiable in a comparable way across time and across countries. Econometric analysis typically focuses on selected intermediate variables, such as TFP, employment, investment, or business dynamics, at firm, sector, or aggregate level. Reduced-form regressions are flexible with respect to the policy variables to be related to economic outcomes. Policy variables do not even need to be measures on a metric scale, but can also be coded on an ordinal scale, including reform dummies and their interaction with macroeconomic and other framework conditions (e.g., de Haan and Wiese 2022, Duval and Furceri 2018).

**Data-driven approaches are particularly useful in policy areas where transmission channels to aggregate variables are less obvious, but which have become increasingly relevant in terms of reform commitments.** While ‘standard’ product and labour market reforms remain important, other areas of reform, such as the efficiency of public administration, judiciary, or education systems, have increasingly moved into the focus. Half of the milestones and targets of the EU’s Recovery and Resilience Facility (RRF) relate to governance and public sector efficiency in a broader sense, such as administrative efficiency and administrative burden, including digitisation of the public administration, rule of law and the efficiency of the judiciary, and education and training systems (Graph 1).<sup>1</sup> The importance for economic development of framework conditions and institutions in a broad sense (beyond narrowly defined product and factor market policies) has also been (re)emphasised by the Nobel memorial prize in economics in 2024.<sup>2</sup>

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<sup>1</sup> The category “rest” includes reforms in areas such as the renewable energy and energy networks, health care and social policies, SME competitiveness, and upskilling. See also Bańkowski et al. (2022). While the Fenix database as such is not publicly accessible, the underlying programmes and reform measures by Member State are published in the respective Council Implementing Decisions (CID).

<sup>2</sup> See the Committee’s [popular science](#) and [scientific](#) backgrounds. For ‘standard’ product and labour market reforms, we refer readers to the OECD’s large body of work, summarised, e.g., in Égert (2020), and Égert and Gal (2017).

**A methodological challenge for the regression-based approach is the possible endogeneity of structural reforms.** When economic reforms are more likely to be implemented in times of crises, e.g., parameter estimates will likely be biased. This applies over the business cycle and to long-term trends.<sup>3</sup> Micro-level data are better able to address the endogeneity problem, through experimental or quasi-experimental research design (e.g., regression discontinuity design) to assess the impact of specific reforms on households, firms, or sectors. The setup requires micro data and a reform that only affects a part of the population. The main drawback, however, is that these results are difficult to generalise, as they strictly apply to the specific reform, country, and circumstances under study. With macroeconomic data, addressing endogeneity becomes (even) more challenging. When exact implementation dates of reforms are known across multiple countries, including through “narrative databases” (e.g., Aumond et al. 2022, Duval et al. 2018), and if there are enough reform and non-reform episodes, it may be possible to construct a counterfactual group and employ an event study approach (e.g., MacKinlay 1997), or a simple Difference-in-Differences (DiD) design. When reforms are not directly observed but represented by proxy variables, such as indicator scores, an event study approach is not feasible. A possible alternative in this case is to identify an external factor that generates exogenous variation in the indicator and apply instrumental variable (IV) techniques. However, since finding valid exogenous instruments is often challenging, a common alternative is to control for as many variables as possible that may influence the likelihood of implementing reforms, such as election dates, the cyclical position of the economy, or the budget deficit. These variables can be included directly as controls, or used in a first-step estimation, to determine the probability of reforms occurring, together with an inverse probability weighting scheme, weighting observations inversely according to the predicted probabilities obtained from the first step (e.g., de Haan and Wiese 2022). Modelling interdependence between macroeconomic conditions and reforms explicitly through systems of equations, such as vector autoregression (VAR) models, is generally unfeasible given the low frequency of reform events and associated indicator changes.

Graph 1. Milestones and targets related to reforms in the RRF by policy area, EU27 aggregate



Note: The size of a given box shows the share of the corresponding number of RRP milestones or targets, by policy area related to public administration.

Source: European Commission, Fenix dashboard.

<sup>3</sup> Over the business cycle, e.g., reform effects risk being exaggerated if reforms are implemented more often during recessions and too much of the subsequent recovery is ascribed to them. Over the longer term, e.g., pension reforms tend to respond to population ageing, i.e., being more frequent in countries with a less positive outlook in terms of per capita GDP.

**The empirical literature on the impact of public sector and governance reform is diverse in terms of focus and country coverage.** Table 1 provides a non-exhaustive list of empirical studies on public sector and governance reform. It contains 23 studies, which cover the following policy areas: regulatory quality and complexity (3 studies), life-long learning (1), control of corruption (6), comprehensive justice reforms (1), judicial efficiency, measured in terms of time to resolve court cases (6), reduction of red tape (1), e-government (2), public procurement (2), and general government effectiveness (1).<sup>4</sup> For each study, the table reports i) the explanatory variable (policy indicator/reform measure), ii) the dependent variable (the economic impact under scrutiny), iii) the country and time coverage, iv) whether the reform impacts a component of the production function directly or indirectly, and v) the study's main findings, including the range of estimated effects. Of the 23 papers, 15 use a cross-country panel-data approach, which may include groups of countries larger than the EU27, to assess the impact of reforms on company creation (business dynamism), firm-level productivity, corporate investment, the employment rate, and per capita GDP. The remaining eight studies focus on single countries (Italy and Spain) and exploit regional, local, or sectoral variations. Overall, the studies in Table 1 find a positive impact of governance reforms on economic outcomes, but magnitudes are difficult to compare given the different focus (dependent variables) and data coverage. Forthcoming work by Guigue and Kátay (2024) on the dynamic effects on governance reform provides estimates for the full set of EU Member States.

**The types of independent variables also differ across studies, often more akin to policy outputs rather than actual measures.** Studies focusing on the impact of corruption and anti-corruption policies, e.g., typically consider indicators measuring individual and/or business *perceptions* of corruption as independent variable, which is already a policy outcome (but likely affected also by other drivers) rather than an 'objective' metric of policy action. Other studies (e.g., the ones on judicial efficiency) rely on 'objective' measurement (e.g., time to resolve court cases), with indicators closer to being policy-actionable, but it remains unclear which precise action will move the indicator by how much (e.g., which policy action – such as procedural simplifications, digitisation, or better staffing of courts – will reduce the time needed to resolve cases by a certain amount). Hence, even these studies provide a comparative perspective on the need or scope for reforms more than a metric for assessing actual policy measures. Finally, the independent variables may also not always be available for all EU countries. The reported studies under the better regulation sub-area in Table 1 are an example: there are no indicators on legislative production at regional government level across all EU countries as not all have regional parliaments.

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<sup>4</sup> The scarcity of studies on, e.g., the impact of e-government illustrates the importance of further empirical work, given the prominence of such reforms, e.g., in the EU's RRF and the case for focusing scarce resources on investments and reforms with comparatively large "multipliers" in terms of efficiency gains.



Table 1. **Review of literature on the economic impact of public sector reforms**

| Reform areas and effect on GDP   |                             |                                  | Dependent, independent variables, estimated economic impact and references |  |  |  |
|----------------------------------|-----------------------------|----------------------------------|--|--|--|--|
| Reform area                      | Reform sub-area             | Direct / indirect GDP effect (*) | Dependent variable   | Independent variable   | Findings / Data sources  | Author(s)  |
| <b>Policy development</b>        | Better regulation           | Indirect                         | Number of firms  | Regulatory complexity (i.e., number of new regulations)                | <ul style="list-style-type: none"> <li><b>Findings:</b> The volume of Spain 's regulations is negatively related to the total number of firms in Spain, especially so in the case of limited liability companies (which are larger firms).                             <ol style="list-style-type: none"> <li>A 1% increase in the volume of adoption of new regulations in Spain is, on average, related to a reduction in the number of companies, ranging from -0.523% and -0.0415%, depending on the estimation.</li> <li>A 1% increase in the volume of adoption of new regulations in Spain is, on average, related to a reduction in the number of limited liability companies, ranging from -0.959% and -0.00248%, depending on the estimation.</li> </ol> </li> <li><b>Data sources:</b> Firm level data for Spain at the province level from INE's Business registry over 1998-2016 and authors' own data set on new regulations by year.</li> </ul> | <a href="#">Mora-Sanguinetti and Perez Valls (2021)</a> , tables 2 and 3 |
|                                  |                             | Direct                           | Regional hourly productivity   | Regulatory complexity of regulations (i.e., legibility of legislation) | <ul style="list-style-type: none"> <li><b>Findings:</b> There is a negative relationship between measures of "qualitative" complexity of regulations, such as lack of clarity of laws (legibility) and regional labour productivity. A 1% improvement in the legibility of regional legislation is associated with an average increase in regional productivity of [0.0642%, 0.0769%].</li> <li><b>Data sources:</b> Sample of Spanish regions, all regional regulations adopted over 1978-2019 and regional value added per hour.</li> </ul>  | <a href="#">De Lucio and Mora-Sanguinetti (2022)</a> , table 1           |
|                                  |                             | Direct                           | Real GDP growth  | Regulatory quality   | <ul style="list-style-type: none"> <li><b>Findings:</b> for each additional 0.1 standard deviation units in the Worldwide Governance Indicator (WGI) on regulatory quality,<sup>5</sup> on average real GDP growth increases by approx. 0.5–0.6 percentage points, ceteris paribus.</li> <li><b>Data sources:</b> panel data set covering eight countries (five emerging market economies and three developed economies) over 1996–2018 and involving WGIs and a set of control variables.</li> </ul>  | <a href="#">Misi Lopes et al. (2023)</a> , table 3                       |
| <b>Human resource management</b> | Skills                      | Direct                           | Firm output  | Firms' spending on training  | <ul style="list-style-type: none"> <li><b>Findings:</b> On average, a 10 percent increase in investment in training per employee raises firm output by 0.32 percent. This effect is larger in Eastern and Southern Europe than in Northern and Western Europe.</li> <li><b>Data sources:</b> Firm level data for EU27 countries and UK on investment in training from three waves of the EIB Investment Survey (EIBIS), covering the financial years 2015 to 2017, combined with financial and balance-sheet information from Bureau van Dijk's Orbis database.</li> </ul>   | <a href="#">Brunello et al. (2020)</a> , table 8                         |
|                                  | Anti-corruption / integrity | Direct                           | Income per capita  | Corruption   | <ul style="list-style-type: none"> <li><b>Findings:</b> <ol style="list-style-type: none"> <li>A one standard deviation within-country improvement in the Worldwide Governance's control of corruption indicator is associated with 6.8% higher per capita income.</li> <li>A one standard deviation cross-country improvement in the Worldwide Governance's control of corruption indicator is associated with 45.8% higher per capita income.</li> </ol> </li> </ul> <p>Note: the author also reports similar sizeable GDP effects coming from rule of law reforms. He goes on to say that changes in the rule of law and corruption cannot be added up, as they are</p>   | <a href="#">Egert (2022)</a> , table 3A                                  |

<sup>5</sup> This indicator captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

|                              |                             |          |                                 |  |   |   |
|------------------------------|-----------------------------|----------|---------------------------------|--|---|---|
| Public sector accountability |                             |          |                                 | highly correlated with one another.                  |   |   |
|                              |                             | Direct   | Investment                      | Corruption   | <ul style="list-style-type: none"> <li>• <b>Data sources:</b> Worldwide governance indicator control of corruption covering around 100 countries and income per capita data for the same countries.</li> <li>• <b>Findings:</b> <ol style="list-style-type: none"> <li>a) A one-step increase (i.e., improvement) in the corruption index<sup>6</sup> is, on average, associated with around [3.2 p.p., 0.95 p.p.] increase in the ratio of investment to GDP, depending on the estimation specification.</li> <li>b) The study also finds that corruption is negatively related with government expenditure on education, educating being an important determinant of economic growth.</li> </ol> </li> <li>• <b>Data sources:</b> two indices of corruption from The international Country Risk Guide and The Economist Intelligence Unit covering 100 and 67 countries and spanning over 1982-1995 and 1980-83, respectively.</li> </ul> | <a href="#">Mauro (1996)</a> , tables 1a and 1b                 |
|                              | Anti-corruption / integrity | Direct   | Foreign direct investment (FDI) | Corruption   | <ul style="list-style-type: none"> <li>• <b>Findings:</b> <ol style="list-style-type: none"> <li>a) A one-step increase (i.e., deterioration) in the corruption index is, on average, associated with [9%, 60%] reduction in the flow of Foreign Direct Investment, depending on the estimation.</li> <li>b) The author also finds an equivalence between increases in corruption and increases in the tax rate on multinational firms.</li> </ol> </li> <li>• <b>Data sources:</b> two indices of corruption from The Economist Intelligence Unit and Transparency International plus data on FDI covering 14 source and 45 host countries.</li> </ul>   | <a href="#">Wei (1997)</a> , tables 2 to 5                      |
|                              |                             | Direct   | Foreign direct investment (FDI) | Institutional quality (including lack of corruption) | <ul style="list-style-type: none"> <li>• <b>Findings:</b> There is an empirical relation from the quality of a host country's institutions (including lack of corruption and efficiency of justice) to FDI inflows. To illustrate, comparing a host country <math>j_1</math> with a 'lack of corruption' variable equal to 1 (i.e., high level of corruption) to a country <math>j_2</math> with the lowest level of corruption (variable equal to 4), <math>j_2</math> is estimated to receive 7.9 times more FDI than country <math>j_1</math>.</li> <li>• <b>Data sources:</b> Data of FDI for 52 countries over 1985-2000. Institutional quality measured through the Institutional Profiles (IP) database, which is a survey carried out in 2001 by the French Ministry of Finance in 52 countries, which allow researchers to look at 75 institutional characteristics according to their role in attracting FDI.</li> </ul>          | <a href="#">Bénassy-Quéré et al. (2007)</a> , table 2, column 4 |
|                              | Anti-corruption / integrity | Direct   | Labour supply                   | Corruption   | <ul style="list-style-type: none"> <li>• <b>Findings:</b> A one-unit increase in the corruption index increases the emigration rate of high skilled workers by [0.21 p.p., 0.32 p.p.], depending on the corruption index used and the estimation technique (FE; GMM or IV). The author claims that this relationship is causal.</li> <li>• <b>Data sources:</b> The migration dataset covers information for 20 OECD destination countries and 115 countries origin for the years 1995-2010 in 5-year intervals. Three measures of corruption (i.e., the main independent variable) are used: i) Transparency International's corruption perceptions' index (TI); ii) the estimate of corruption from Kaufmann et al. (2013); iii) the International Country Risk Guide Corruption index.</li> </ul>  | <a href="#">Cooray and Schneider (2016)</a> , tables 1, 2 and 3 |
|                              |                             | Indirect | Tax revenues                    | Corruption   | <ul style="list-style-type: none"> <li>• <b>Findings:</b> An improvement of one standard deviation of the Control of Corruption Index is associated with an increase of about [3.1, 14.5] percentage points in the revenue-to-GDP ratio (depending on the estimation technique used (OLS, IV).</li> <li>• <b>Data sources:</b> 2017 data for control of corruption index and average 2015-2017 data for the government revenue ratio covering developed and developing countries excluding oil exporters.</li> </ul>  | Table 2.1.2 of online annex 2.1 of <a href="#">IMF (2019)</a>   |
|                              |                             | Direct   | Firm productivity (i.e., value  | Comprehensive justice                                | <ul style="list-style-type: none"> <li>• <b>Findings:</b> Comprehensive judicial reforms (i.e., those simultaneously improving quality, decision speed, and access to justice) and with a project budget over 5% of the judiciary's annual budget for a given country, improve firm perceptions of the judiciary by 0.15 standard deviation for all</li> </ul>  | <a href="#">Chemin (2020)</a> , table 3 columns 1 and 2         |

<sup>6</sup> The corruption index used in this publication is the simple average of the indices produced by Political Risk Services (compiled by IRIS, for 1982-95) and Business International (for 1980-83).

|                                |                       |                          |                                  |  |   |   |
|--------------------------------|-----------------------|--------------------------|----------------------------------|--|---|---|
|                                | reforms               |                          | added per worker)                | reforms  | <p>firms. This translates into a 0.09 standard deviation increase in firm productivity but only in sectors relying on relationship-specific investments,<sup>7</sup> which are particularly dependent on well-functioning judiciaries.</p> <ul style="list-style-type: none"> <li>• <u>Data sources</u>: 74 developing and central eastern European countries reporting judicial reforms over 2006-2016.</li> </ul>                                   |   |
| Efficiency of justice          | Indirect              | Business dynamism        | Efficiency of commercial justice | <ul style="list-style-type: none"> <li>• <u>Findings</u>: A 1% reduction in the time needed to resolve litigious commercial cases is associated with an increase of 4.11% in the number of companies.</li> <li>• <u>Data sources</u>: 14-18 EU countries over 2010-2014.</li> </ul>  | <a href="#">Bove and Elia (2017)</a> , table 4  |   |
|                                | Direct                | Firm productivity        | Efficiency of labour justice     | <ul style="list-style-type: none"> <li>• <u>Findings</u>: At the firm level, this paper finds a negative effect of the length of labour procedures on firm productivity. A 1% reduction in the length of labour procedures leads to an increase in firm level productivity of [7%, 24%] depending on the estimation technique used (FE, RE).</li> <li>• <u>Data sources</u>: The study combines data on Italian labour disputes with firm level data from Aida produced by Bureau van Dijk. Observations cover the period from 2006 to 2009 and are broken down at the province-industry level using the number of employees at the end of the budget year.</li> </ul> | <a href="#">Gianfreda and Vallanti (2013)</a> , table 5   |   |
|                                | Direct                | Employment rate          | Efficiency of labour justice     | <ul style="list-style-type: none"> <li>• <u>Findings</u>: Labour trial length hinders the employment rate for specific categories of workers, i.e., women, young, and low-skilled individuals, while increasing the inactivity rate of the same groups.</li> <li>• <u>Data sources</u>: Based on data on labour trials for private and public sector workers at the district level (26 in total) for Italy and LFS data at the regional level.</li> </ul>  | <a href="#">Gianfreda and Vallanti (2020)</a> , table 3   |   |
|                                | Direct                | Business investment rate | Efficiency of civil justice      | <ul style="list-style-type: none"> <li>• <u>Findings</u>: There is a positive and significant correlation between efficiency of the civil justice system (proxied by the civil court congestion rate) and business investment in Spain. A 1 p.p. reduction in court congestion rate is associated with an increase of [0.0073 p.p., 0.0145 p.p.] in the business investment rate.</li> <li>• <u>Data sources</u>: Firm level data for Spain from Banco de España's Central Balance Sheet Data over 2002-2016 combined with statistics from Spain's General Council of the Judiciary grouped at the provincial level.</li> </ul>  | <a href="#">Mora-Sanguinetti (2021)</a> , table 2   |   |
|                                | Direct                | TFP                      | Efficiency of civil justice      | <ul style="list-style-type: none"> <li>• <u>Findings</u>: the elasticity of TFP with respect to the length of civil proceedings is around 0.03, so a 1% decrease in the length of the civil procedures is associated with an increase in firm TFP by around 3%.</li> <li>• <u>Data sources</u>: estimation of TFP at the provincial level based on firm level data for Italy and estimated data on length of civil procedures in Italy at provincial level over 2008 and 2018.</li> </ul>  | <a href="#">Ciapanna et al. (2022)</a> , table 6  |   |
|                                | Direct                | GDP per head growth      | Efficiency of justice            | <ul style="list-style-type: none"> <li>• <u>Findings</u>: inefficiencies in the operation of judicial systems, measured alternatively as (a) lengthier court proceedings, (b) lower rates of clearance of accumulated unresolved cases, (c) increasing burden of pending cases and (d) a high inflow of new cases, all pose obstacles to growth in GDP per head.</li> <li>• <u>Data sources</u>: four indicators of judicial efficiency (i.e., clearance rate, disposition time, incoming caseload, pending caseload) provided by European Commission's Justice Scoreboard) on economic growth, for the European Union countries.</li> </ul>                           | <a href="#">Kapopoulos and Rizos (2024)</a> , tables 1 and 2  |   |
| <b>Public service delivery</b> | Reduction of red tape | Indirect                 | Company birth rates              | Cost and procedures for starting a   | <ul style="list-style-type: none"> <li>• <u>Findings</u>: The higher the level of red tape barriers, the lower entry dynamics: <ul style="list-style-type: none"> <li>○ The company birth rate will, on average, increase by 0.00157 p.p. following a one percentage point decrease in the cost of starting a business.</li> <li>○ The company birth rate will, on average, increase by 0.00285 p.p. following a unit decrease</li> </ul> </li> </ul> | <a href="#">Ciriaci (2014)</a> , table IV.1 |

<sup>7</sup> The author puts this example: consider a buyer asking a seller to produce a customised good. Once this good is produced, the buyer can renegotiate prices down since there is no other buyer for this good. Anticipating this, the seller does not enter this relationship. No customised goods are produced, and the economy is trapped in producing generic goods to avoid this issue. One solution to this dilemma is to uphold contracts via third-party enforcement.

|                                    |                                |          |  |  |   |  |
|------------------------------------|--------------------------------|----------|--|--|---|--|
|                                    |                                |          |  | company  | <ul style="list-style-type: none"> <li>in the number of procedures needed to start a company. <ul style="list-style-type: none"> <li>○ A decrease of one day in the average time needed to conclude the procedures to export will increase company birth rates by between 0.00282 and 0.00295 p.p.</li> </ul> </li> <li>• <b>Data sources:</b> Covers 16 EU countries plus UK over 2004-2011.</li> </ul>  |  |
|                                    | E-government                   | Direct   | Real GDP per head growth   | E-government maturity  | <ul style="list-style-type: none"> <li>• <b>Findings:</b> the implementation of an e-government in developing economies causes a robust positive impact on real GDP per head growth. A 1% increase in e-government increases economic growth by 0.20%, e-government being measured with an indicator capturing the extent of online availability of the government, telecom infrastructure, and human capital.</li> <li>• <b>Data sources:</b> 122 developing economies over the period 2003–2015.</li> </ul>   | <a href="#">Majeed (2020)</a>                                |
|                                    | E-government                   | Indirect | Corruption   | E-government use   | <ul style="list-style-type: none"> <li>• <b>Findings:</b> A one step increase in the use of e-government over 1996–2006 is associated with a [0.017 p.p., 0.021 p.p.] improvement in the control of corruption index in non-OECD countries.</li> <li>• <b>Data sources:</b> Panel of 149 countries with two time periods of observations: 1996 and 2006. Corruption is measured with the Worldwide Governance control of corruption index. The e-government variable was compiled by a research team headed by Darrell M. West of Brown University in 2006. It consists of an assessment of 1782 national government web sites for 198 nations.</li> </ul>  | <a href="#">Andersen (2009)</a> , table 1                    |
| <b>Public Financial Management</b> | Public procurement             | Indirect | Prices paid for equivalent procured goods and hence, budgetary savings | Institutional characteristics of Italy's contracting authorities | <ul style="list-style-type: none"> <li>• <b>Findings:</b> the institutional characteristics of Italy's contracting authorities<sup>8</sup> are associated with differences in prices paid for equivalent goods, unlike non-institutional characteristics, such as the location and size of the contracting authority: the average town government pays 13% more, the average regional government pays 21% more, social security institutions pay 22% more and ministries pay 40% more relative to universities (i.e., a semi-autonomous body) for out-of-Consip equivalent goods (Consip is Italy's Central Purchasing Body).</li> <li>• <b>Data sources:</b> detailed information on individual purchases of 21 generic goods by 208 Italian public bodies between 2000 and 2005.</li> </ul> | <a href="#">Bandiera et al. (2009)</a> , table 2             |
|                                    | Public procurement             | Direct   | Public investment  | Single Market Scoreboard public procurement composite indicator  | <ul style="list-style-type: none"> <li>• A one-point increase in the overall public procurement performance score is associated with an increase in public investment of about 0.05 to 0.07 percentage points of GDP.</li> <li>• Regressions are estimated over a panel of 30 European countries (EU28, Liechtenstein and Norway) observed over the period of 2015–2018, as well as a cross section of three-year average data.</li> </ul>  | <a href="#">Belhocine and Jirasavetakul (2020)</a> , table 6 |
| <b>Other</b>                       | General government performance | Direct   | Firm productivity  | Government efficiency  | <ul style="list-style-type: none"> <li>• <b>Findings:</b> On average, a one-step increase in government efficiency is associated with a 0.713% and 0.133% increase in Italian firms' output per employment cost and gross value per employee cost, respectively.</li> <li>• <b>Data sources:</b> firm level data for more than 400,000 Italian firms from Orbis. Government efficiency estimated as the average of efficiency scores at the provincial level using Data Envelopment Analysis (DEA) factoring in inputs and outputs from the following 5 areas: healthcare, education, civil justice, childcare and waste disposal. Data referred to 2007.</li> </ul>  | <a href="#">Giordano et al. (2015)</a> , table 4             |

(\*): Direct effect: the independent variable influences employment and / or investment and /or productivity; Indirect effect: the independent variable influences employment and / or investment and /or productivity through another variable.

<sup>8</sup> Italian contracting authorities can be broadly grouped in three institutional classes: Napoleonic bodies (e.g., central ministries), local and regional governments, and semi-autonomous bodies (e.g., universities and Social Security). These three categories are subject to different procurement laws, and they differ by the level of autonomy and by the rigidity of their budget constraint.

**Quantitative objectives to which Member States committed in the Recovery and Resilience Plans (RRPs) may provide a valuable input for the quantification of reforms that could feed into regression-based analysis or model-based assessments.**

In view to permit monitoring of progress of the plans, a dedicated database (FENIX) has been developed by the European Commission services since 2021, which provides information on the measures (i.e., investments or reforms) and a schedule of objectives to which the Member States committed to secure funding by the Commission. According to this database, the RRF is composed of 4,671 measures and sub-measures, consisting of 7,098 milestones or targets. Whilst the milestones refer to a commitment to achieve a processual or normative step (e.g., related to legislations enactment, including preparatory steps, or tendering), targets refer to quantifiable outputs (e.g., the number of staff to be recruited in the central ministries, or the number of trainings to complete). The 4,671 measures and the related milestones or targets, i.e. normative steps or quantitative outputs scheduled throughout the duration of the plans, are split amongst 51 policy areas, set to unfold between 2021 and 2026. Six out of the 51 policy areas of the Recovery and Resilience Facility (RRF) can be directly related to public administration.<sup>9</sup> These six areas account for 1,271 measures or sub-measures, of which 574 are reforms, and 597 are investments. The 1,271 measures related to public administration account for 2,674 milestones and targets, reduced to 1,315 for the milestones and targets strictly attached to reforms (as opposed to investments). Overall, reforms related to public administration account for 41.4% of all reforms, and 49.1% of total reform-related milestones and targets.

**The targets within the RRFs linked to reforms of public governance are multifaceted and cover a broad range of policy objectives.**

A possible quantification of their economic impact would therefore require some specific treatment of the database to identify targets eligible for a quantification. Out of the 700 targets (quantitative outputs) committed by the Member States and related to public administration, circa 170 concern final targets<sup>10</sup> and present a sufficiently clear or quantifiable output. Those targets concern a relatively broad scope of quantitative commitments. Some targets refer to control of corruption, for instance by assigning IT equipment to purchase for the judicial system to enhance fraud detection, providing trainings to staff specialised in anti-corruption, and assigning fulfilment rates in position vacancies in the judicial administration. A significant number of targets aim to enhance the digitalisation of public administration, by recruiting data scientists, implementing data systems, or data warehouses, developing applications and digital interfaces, and ensuring the digitalisation of public services for citizens and businesses. Some targets intend to improve government efficiency by assigning objectives formulated in terms of the percentage increase of tax revenue collected (as a % of GDP), the implementation of monitoring mechanisms for public administration (measured in % of the target), and training to staff in central administrations. Some targets also refer to the improvement of public procurement procedures, through objectives of acceleration of tendering procedures, or the completion of dedicated trainings. Regarding state-owned enterprises (SOEs), targets can be a reduction of temporary appointments to the management of SOEs, or the number of SOEs subject to transparent procedures. Lastly, the improvement of justice systems includes targets pertaining to the creation of mediation centres, the delivering of judicial trainings, and actual enrolments of students in judge schools.<sup>11</sup>

**Existing studies report results in various ways, which sometimes complicates comparability.**

Nine studies of the 23 in Table 1 report elasticities linking the percentage change of the dependent variable to the percentage change in the independent variable. The studies on the effect of reducing corruption (the largest group in number) quantify the effect on the dependent variable of a change in the independent variable by one standard deviation.<sup>12</sup>

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<sup>9</sup> Adult learning, including continuous vocational education and training; recognition and validation of skills; effectiveness of judicial systems; effectiveness of public administration and national systems, including minimising administrative burden; e-government, digital public services (including digitalisation of transport) and local digital ecosystems; fiscal policy and fiscal governance; rule of law reforms.

<sup>10</sup> An assessment of the macroeconomic impact in the medium or long term would usefully focus on final targets, i.e. disregard the intermediate targets related to the same measure, to avoid double counting of policy action.

<sup>11</sup> A similar mapping of reforms has been undertaken recently in the Staff Working Document (SWD) on the [Ukraine Plan](#).

<sup>12</sup> Standard deviations can be converted into per-cent deviations from the sample mean by dividing the standard deviation by the sample mean of the respective variable, which is known as the coefficient of variation. The usefulness of the transformation to derive a unit

**The interpretation of results with respect to the persistence of reform effects is often not straightforward.** While the studies reported in Table 1 often have multi-year horizons, rather than following a static approach with within-period effects only, it remains challenging to project the long-term effects and derive exogenous shock paths that could be used in simulations with dynamic structural models or a simpler production-function approach. With estimation over a limited number of years it is often unclear whether effects are transitory or permanent. Dynamic specifications of the estimation equation, which include lags of the dependent variable among the regressors, distinguish between contemporaneous and lagged effects, making it possible to derive cumulative effects over various time horizons. Local projections (Jordà 2005) provide impulse responses over different time horizons, without imposing constant autoregressive coefficients from period to period, but they require a long enough time dimension of the data that encompasses the projection horizon of interest. Both approaches face the challenge that imprecise parameter estimates may not allow distinguishing between competing hypotheses, such as the distinction between temporary versus permanent growth effects.<sup>13</sup>

**The same holds for the interpretation of results with respect to the size of economic effects.** Regarding the strength of the impact, partial elasticities, captured by regressions of economic outcomes on reforms and a set of control variables (the latter's inclusion, e.g., being an attempt to mitigate the problem of reform endogeneity, as explained above) can yield large partial effects, which are difficult to rationalise on the basis of theoretical models (e.g., large effects of judiciary efficiency on TFP) and difficult to understand from a general-equilibrium perspective (e.g., estimated productivity gains from an extension of public services, neglecting possible effects of higher public sector activity on public finances and labour supply in the business sector).

## 2.1. FEEDING REDUCED-FORM ESTIMATES INTO A PRODUCTION FUNCTION

**Regression-based estimates of the impact of structural reforms on the main determinants of potential output (TFP, capital, and employment) can be fed into a production function to derive an overall impact on economic activity of actual or potential policy measures.** The most prominent example is arguably the OECD's framework for structural reform assessment. In its current form (Égert and Gal, 2016 and 2017), it uses panel-data for OECD economies for several policy areas and policy indicators to estimate the impact of a 'typical reform' on employment and capital (usually both in per-capita terms), and TFP.<sup>14</sup> The econometric specification includes several control variables. The framework then derives the impact of a reform in a particular area on long-run (per capita) output through a calibrated Cobb-Douglas production function:

$$(1) \quad \Delta \ln \left( \frac{Y}{N_{pop}} \right) = \frac{1}{1-\alpha} \Delta \ln(TFP) + \frac{\alpha}{1-\alpha} \Delta \ln \left( \frac{K}{Y} \right) + \Delta \ln \left( \frac{L}{N_{wa}} \right) + \Delta \ln \left( \frac{N_{wa}}{N_{pop}} \right),$$

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multiplier depends on the underlying econometric specification. When a variable enters in log (differences), per-cent deviations are the appropriate unit; when indicators enter in levels, where, e.g., the change in the PMR score from 5 to 4 is considered comparable in terms of impact to a change from 2 to 1, transformation to per-cent changes is not informative. Also, in the context of controlling corruption, World Bank WGI indicators are already standardised, making them comparable across different dimensions of governance, and they have zero sample mean, so that transformation into a coefficient of variation would not be appropriate.

<sup>13</sup> In structural models, the temporary or permanent nature of effects is determined instead by the structure of the model equations. For a detailed discussion of the difficulty to distinguish between temporary and permanent effects and associated theories of economic growth in empirical work, with a focus on the role of education, see Sianesi and van Reenen (2003).

<sup>14</sup> A 'typical reform' is defined as the average reform size for the country sample and time dimension considered. Average reform size, in turn, is defined as the average size of indicator change within a 2-year window, when policy indicators change in the direction of reform (not weighted by country size). For an extension to non-OECD economies see Égert (2020). The aggregation into long-run (potential) GDP effects is similar to the production function approach of the European Commission's EUCAM for potential output assessment presented in Box 1.

with  $N_{wa}$  being working-age population,  $N_{pop}$  total population, and  $\alpha=0.33$  the elasticity of output with respect to capital.<sup>15</sup> Recent OECD work (Botev et al., 2022) has extended the assessment of structural reform effects also to household disposable income as dependent variable.

**The OECD work focuses on established areas of reform and policy indicators.** They include product market regulation, labour market policies (employment protection, ALMP, and wage setting institutions), tax, benefit and pension systems, and R&D support (Egert 2016, Égert and Gal, 2016 and 2017). Quantification relies on the OECD's PMR<sup>16</sup> and EPL indicators, the spending on ALMP, the coverage of wage bargaining and minimum wage legislation, tax wedges and benefit generosity for typical household compositions, and the pension age.<sup>17</sup> Some of these indicators are easier to interpret and to relate to policy than others. Benefit replacement and tax rates, e.g., are easily understandable in quantitative terms and in their potential impact on labour supply and investment. The interpretation of PMR and EPL scores, to the contrary, is less clear, and there is no unique mapping between policies and the aggregate indicator values. Instead, given that the PMR and EPL indicators are both built on a series of sub-indicators, different combinations of sub-indicator values can give the same overall score without necessarily being identical in their economic implications. Still, it is in principle possible for each legislated goods or labour market reform to derive implications for PMR and EPL scores of the respective country, because the construction of the indicators (including the weighting of sub-indicators) is known and transparent.<sup>18</sup>

**The regression-based reform assessment framework provides coefficients for the impact on TFP, employment, and capital of reforms of unit size.** Multiplied with the 'typical' reform size, i.e., the sample average across countries and time, these coefficients give the macro impact of a 'typical' reform. Graph 2 summarises the estimated impact of typical reforms on per capita GDP in the medium and long term for the OECD country sample (up to 34 countries) during 1985-2015.<sup>19</sup>

**The OECD framework only covers 'standard' economic reforms, which can be measured in a comparable manner thanks to existing indicators (product and labour markets, redistribution through taxes and benefits).** In particular, the set of policy variables does not include public administration or governance reforms, which have gained prominence at EU level in the context of the RRP (see above). Given their increased prominence, a recent contribution by Égert (2022) makes a step towards including public sector reforms in the assessment framework to explore their impact on TFP, employment and the capital stock, but the number of variables is restricted. In addition, the analysis builds on the World Bank's Worldwide Governance Indicators (WGI), which are not actionable variables, i.e., they do not reflect proper policy action. Instead, the WDI measure *perceptions* among the population

<sup>15</sup> Equation (1) can be derived from a standard Cobb-Douglas production function  $Y = TFP(K^\alpha L^{1-\alpha})$  by dividing both sides by population size, taking log differences, subtracting per capita income growth on both sides, and dividing both sides by  $1 - \alpha$ . Depending on the measure of productivity –  $TFP$  in a production function of type  $Y = TFP(K^\alpha L^{1-\alpha})$  versus labour-augmenting technological progress ( $h$ ) in  $Y = K^\alpha (hL)^{1-\alpha}$ , equation (1) can also be written with  $\Delta \ln TFP \equiv (1 - \alpha) \Delta \ln h$ . While the OECD approach tends to consider the medium- and long-term effect of policies on the capital stock relative to GDP ( $K/Y$ ), estimates for the impact on the investment rate ( $I/Y$ ) can be used analogously given the long-run relation  $\Delta \ln(K/Y) = \Delta \ln(I/Y)$ .

<sup>16</sup> In particular, the assessment focuses on the regulation of network industries as measured by the sectoral indicator ETRC (Regulation in Energy, Transport and Communications).

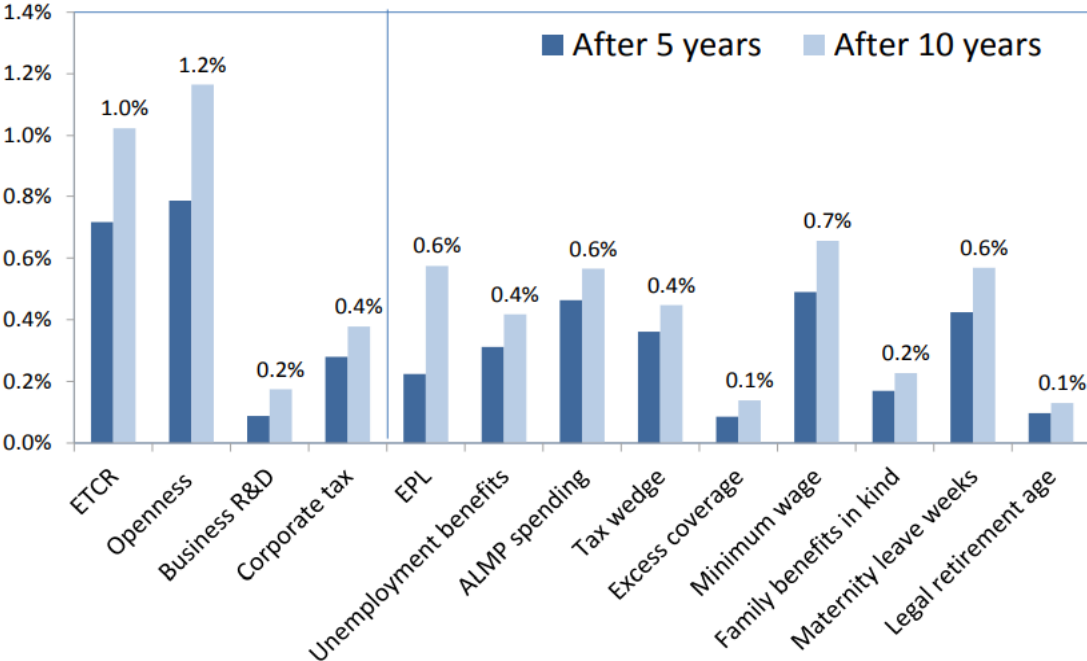
<sup>17</sup> The work builds on previous OECD 'growth accounting' exercises, such as Barnes et al. (2013) and Bouis et al. (2011), as well as on empirical work concentrating on specific areas of reforms, such as Bassanini and Duval (2006).

<sup>18</sup> In this spirit of transparency, the OECD provides a PMR simulation tool to uncover the impact of specific product market reforms on sub-indicators and the overall score. Elements of the PMR are, e.g., legal barriers to business activity and competition, administrative costs, state control and public ownership, and barriers to trade and FDI. The construction of indicators can change over time, however. This might be necessary and welcome to better reflect economic realities (e.g., the increased role of IT services in total activity), but it also causes breaks in the series, making comparisons over time difficult or even impossible.

<sup>19</sup> The underlying parameter/multiplier estimates for reforms of unit size are provided in Égert and Gal (2016). Follow-up work has explored 'country-specific policy effects', which can be understood as the idea that effects of a policy change of certain size may depend on the starting point in terms of indicator levels, or on the institutional setting in general. See Égert and Gal (2018). The threshold values tested in Égert and Gal (2018) give rise to significant non-linear effects only in a limited number of cases, however. Structural model-based assessments, furthermore, accommodate the possibility of diminishing or increasing returns to reforms insofar as the starting point in terms of structural policies is captured by the calibration of structural parameters (e.g., mark-up size, degree of price and wage stickiness, or tax and benefit replacement rates). Effects of multiple structural reform shocks tend to be fairly additive in structural macro models (even if the latter are not linearised), instead, unless the economy operates close to an occasionally binding constraint, such as the effective lower bound on policy interest rates.

with respect to government effectiveness, rule of law, political stability, and corruption. The link between policies and perceptions is likely to be fragile and not immediate.<sup>20</sup>

Graph 2. **Impact of structural reforms of typical size on per capita GDP**



Note: ETRC is the OECD indicator of product market regulation in the energy, transport and communication sectors; openness refers to openness to trade; business R&D is business sector spending on R&D; EPL is the OECD indicator on employment protection legislation; ALMP is active labour market policies; tax wedge is the labour tax wedge; excess coverage refers to the excess coverage of wage agreements; for family benefits in kind and maternity leave, increases are considered as reforms. The typically observed reform size is defined as the average of all two-year policy changes in the direction of reform that were observed over two consecutive years in the sample. Table 3 of Égert and Gal (2016) reports the size of typical reforms within the sample.

Source: Égert and Gal (2016).

**Estimates for the impact of public sector reform on intermediate variables can equally be combined with a production-function framework.** Table 2 shows a selection of studies taken from Table 1 with a quantification of the impact on GDP per capita based on the OECD’s production function approach. The selection focuses on studies establishing an impact of public sector reforms on TFP, employment, or investment, and which have a cross-country dimension in the analysis, so that data on the explanatory variables is generally available to map EU economies with respect to past policy changes or the scope for future reforms. Table 2 provides orders of magnitude for the GDP effects of public sector reform and, at the same time, illustrates the variation or uncertainty surrounding these estimates, underlining that results can be fragile and should be interpreted cautiously.<sup>21</sup> A economy-wide production function is also employed in the EU Common Agreed Methodology (EUCAM) for potential

<sup>20</sup> Perception of public sector quality, e.g., appears to vary with the economic situation. For the same set of policies, perceptions are more positive during a boom compared to a recession. Alternative indicators with wide coverage exist, e.g., the Fraser Institute’s Economic Freedom of the World index, but the latter is equally a perception-based measure.

<sup>21</sup> In Table 2, column 3 indicates the impact of a one-unit change in the (policy) variable of interest on intermediate variables (TFP, employment, investment, and business dynamics) according to the respective study mentioned in column 1. Column 4 then transforms the impact on intermediate variables into long-run per-capita income effects based on the production function summarised in equation (1) or using direct estimates if provided in the respective study mentioned in column 1.



output and output gp estimation, but there reforms are (partly) reflected in potential output without EUCAM being itself a method to assess the impact of these reforms (see Box 1).

Table 2. **GDP per capita effects associated with changes in selected policy variables**

| Source                                    | Policy variable                                       | Impact on factors of production  | GDP per capita effect (based on OECD production function approach)   |
|---|---|--|--|
| <b>Egert (2022)</b>                       | Control of corruption                                 | A one standard deviation improvement (1.0) in the Worldwide Governance's control of corruption indicator is on average associated with 6% higher employment and 40% higher TFP.                                    | On average, a one standard deviation improvement in the Worldwide Governance's control of corruption indicator could lead to 46% higher per capita income.   |
| <b>Mauro (1996)</b>                       | Corruption <sup>22</sup>                              | A one-step increase (i.e., improvement) in the corruption index is on average, associated with around [3.2 p.p., 0.95 p.p.] increase in the ratio of investment to GDP, depending on the estimation specification. | Assuming a depreciation rate of 6% and trend growth of 2% per year, a permanent investment increase of the given size could raise K/Y by 12-40 p.p. in the long run. Following the growth-accounting approach in Egert and Gal (2017), real GDP per capita in the long run could rise by 2-6%. (*) |
| <b>Belhocine and Jirasavetakul (2020)</b> | Single Market Scoreboard public procurement indicator | A one-point increase in the overall public procurement performance score is associated with an increase in the public investment of about 0.05 to 0.07 percentage points of GDP.                                   | On average, a permanent increase in the public investment rate by about 0.05 to 0.07 percentage points of GDP could lead to an increase of GDP per head of around 0.1% in the long run. (**)   |
| <b>Brunello et al. (2020)</b>             | Firms' spending on training                           |  | A 10 percent increase in investment in training per employee raises firm output by 0.32 percent.   |
| <b>Ciriaci (2014)</b>                     | Cost and procedures for starting a company            | The company birth rate will on average increase by 0.00157 p.p. following a one percentage point decrease in the <i>cost</i> of starting a business.   | On average, a one percentage point decrease in the cost of starting a business (as % of capital income) could lead to an increase of GDP per head between 0.000002% and 0.000005%. (***)   |
|   |   | The company birth rate will on average increase by 0.00285 p.p. following a unit decrease in the <i>number of procedures</i> needed to start a company.  | On average, a unit decrease in the number of procedures needed to start a company could lead to an increase of GDP per head between 0.000004% and 0.000009%. (***)   |

Note: Based on a selection of studies from Table 1.

(\*) Note that the possible GDP effect (in %) depends on the baseline level of the capital stock (for EU27 around 350% of GDP for the estimation period of Egert and Gal, 2017), because the per-cent increase in the capital stock associated with a certain increase in the investment share depends on the initial capital stock.

(\*\*) These estimates are on the high side as the output elasticity of public investment is, generally speaking, lower than that of private investment (elasticity of output w.r.t. capital). Bom and Ligthart (2014) report values of 0.1-0.2, depending on the type of public investment, which is lower than the 0.33 for private capital used in the OECD production function approach.

(\*\*\*) Based on Anderton et al. (2019), which suggests that an increase in the business churn (entry/exit) rate by 1 pp is associated with TFP improvement of 0.1-0.2% in the short term (coefficient on churn rate entering with 1-year lag).

**Further work could explore the assessment of selected specific administrative reforms (e.g., public administration, the judiciary and governance).** Such an exploration would need to start from identifying sufficiently policy-actionable structural indicators. Depending on indicator availability, outputs from such an exercise may rather refer to the micro level and/or intermediate variables (such as firm dynamics, productivity, employment, or investment), and, therefore, the analysis may only cover specific

<sup>22</sup> The corruption index used by Egert (2022) is the simple average of the indices produced by Political Risk Services (IRIS dataset) for 1982-95 and Business International for 1980-83.

variables or sectors, with possible limitations for what concerns direct estimates of the GDP effects. An analysis along these lines might, nonetheless, provide useful input for model simulations, taking into account the necessary caveats.

**One needs to be careful when using the production function approach to project the overall impact of certain reforms.** Decomposing growth with a production function is useful and appropriate for breaking down output effects into the contribution of various factors based on observed data. By contrast, the approach can yield misleading results when translating the impact of reforms on production factors into an overall output effect. The reason is that estimates for the impact of a reform on factor input are often derived from reduced-form models that evaluate the long-term impact of the reform on selected factors after the economy has fully adjusted. Plugged into the production function, such endogenous adjustment is usually disregarded, however. E.g., when a labour market reform increases labour supply, as established by a reduced-form estimate, the real GDP effect is then derived from the production function by multiplying the employment effect by the labour coefficient in the production function (labour share). While an increase in per-capita labour supply that raises the marginal return to capital is likely to also increase the capital stock per capita, this endogenous adjustment of other variables, such as investment, is often neglected with this approach. Options to tackle the problem are a direct assessment of the impact of reforms on real GDP in regression analysis (at the cost of less information about transmission channels), an assessment of the long-run effect of a reform on all production factors that can then be aggregated into a long-run GDP effect, or feeding the first-round economic effect into a structural macroeconomic model to derive the general-equilibrium response of other production factors and real GDP (see section 4).

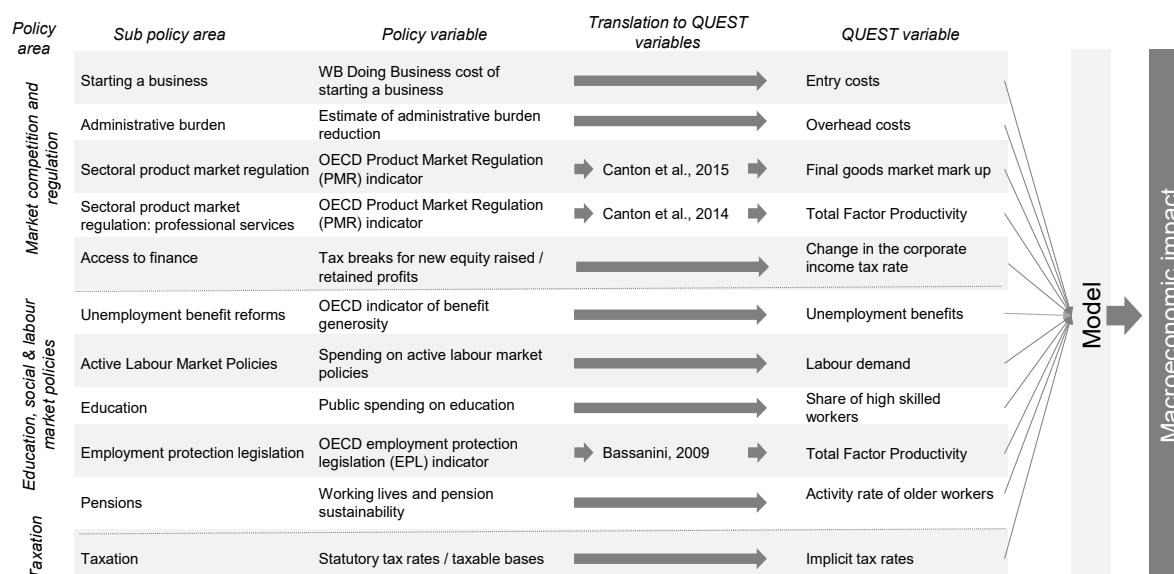
## 2.2. USING ESTIMATES TO CALIBRATE MODEL SIMULATIONS

**Estimated relations between reforms and intermediary economic variables can serve as ‘satellite tool’ to calibrate scenarios for model simulations.** As structural economic models are simplifications of reality, they tend to include a very limited set of policy variables that would provide a direct access to analysing the effect of reforms. Regression-based satellite tools can then be used to map reform measures without direct equivalent in the structural model onto available exogenous model variables for the purpose of model simulations to derive macroeconomic implications (Graph 3). This mapping tends to focus on intermediate reform outcomes that can be used to calibrate the size and profile of shock processes. Examples include the mapping of indicators of market competition onto firm mark-ups or TFP, the mapping of investment in education onto human capital, the mapping of child-care provision onto labour force participation, or the mapping of taxation reforms onto implicit tax rates (ITRs).

**Concerning satellite tools for the mapping of public sector reform, TFP, labour skills, public investment, or overhead costs are intermediate variables for possible use in macro model simulations.** These variables exist as exogenous variables in the QUEST model and can, hence, be shocked directly. Other intermediate variables, such as business dynamism (firm entry and exit rates) or FDI (as opposed to overall investment), would need additional translation, e.g., into product mark-up reduction (more competition), or productivity effects (market ‘cleansing’, technology diffusion).

**When using reduced form estimates to calibrate shock processes, double counting of reform effects should be avoided.** Regression analysis may, e.g., find a positive impact of reforms on investment and on employment, but one may be the consequence of the other, or of third factors. A reform may increase labour force participation, implying an increase also in investment demand, or a reform may increase incentives to invest, also strengthening the demand for labour, and a reform leading to a persistent increase of TFP will increase both investment and labour demand (e.g., Burgert et al. 2020). It is therefore important to be “granular” in the satellite tools, mapping reforms onto appropriate exogenous supply-side variables instead of targeting endogenous variables that are determined by the interaction of demand and supply across markets.

Graph 3. Mapping reform measures onto model variables: examples from QUEST



#### Box 1. THE EU'S COMMONLY AGREED METHODOLOGY

The EU's commonly agreed methodology (EUCAM) for estimating potential output and output gaps implicitly accounts for structural reforms in potential output and output gap estimates, based on a production function approach to potential output, which can be considered as very simple structural model in which production is determined by aggregate supply. While EUCAM is not, and not intended to be, a method to assess the impact of structural reforms, the medium-term effects of the latter are picked up through four channels:

1. Geographical desks incorporate the impact of legislated structural reforms into their forecasts for employment, investment, and overall GDP, in the ECFIN Autumn Forecast 2024, e.g., up to 2026.
2. On the employment side, the EUCAM has a structural anchor for the non-accelerating wage rate of unemployment (NAWRU). Labour market reforms are reflected in the NAWRU anchor. More precisely, the NAWRU converges to the structural unemployment rate over time, where the structural unemployment rate depends on structural characteristics of the labour market in the respective country at a given time (Hristov et al. 2017).
3. The impact of pension reforms on labour-market participation is picked up through the Ageing Working Group's Cohort Simulation Model (see Havrik et al. 2014).
4. The projection of Total Factor Productivity (TFP) is done in such a way that the TFP effects included in the country desks' near-term forecasts persist over the medium term. Moreover, there is a trend reversal built into the TFP projections, such that trend TFP for the EU27 as a whole rises from 0.4% in 2024 to 0.7% in 2029 and to 0.8% in 2034 in the recent projections. This reflects an implicit "benefit of the doubt" given the ongoing structural reform efforts by the Member States.

Hence, in the EUCAM approach reform effects (informally) enter desk forecasts on employment, investment, and GDP, which then affect longer-term (potential) trends. As medium-term behaviour is based on the near-term forecasts, the reform effects that materialise outside the forecast horizon are only partly and implicitly covered (e.g., through the NAWRU anchor and the cohort model).

## 3. MACROECONOMIC MODEL SIMULATIONS

**Structural model can be and have been used in ECFIN in two directions, i.e. trying to gauge the impact of actual reforms, or stylised scenarios of reducing reform gaps.** The first approach is labourious, especially in a multi-country setting, and includes the translation of policy actionables into exogenous model variables. The second approach illustrates potential benefits from catching up with best performers in a particular policy area, but it does normally not specify which policies are needed in detail to close existing performance gaps.

### 3.1. ASSESSMENT OF ACTUAL POLICY MEASURES

**When it comes to quantifying the economic impact of *specific* reform measures (i.e., reforms put in place by a given country at a given moment in time), macro-economic models are only of limited use.** Models can be used to quantify the impact of stylised, illustrative reforms, but the translation of concrete country-specific measures into a macro model like QUEST is much more challenging, because the measures are often difficult to quantify in depth or scope, and it is not easy to map specific reform measures onto model variables. Models are simplifications of reality, with only a limited set of exogenous variables and parameters, so that it is not straightforward in many cases to determine the appropriate ‘entry point’ for policy simulations, as already explained in subsection 2.2, describing the use of econometric estimates as satellite tools.

**One attempt to map actual reforms into model (policy) shocks has been a pilot study in 2016, where ECFIN tried to quantify the impact of structural reform measures as specified in National Reform Programmes (NRPs) in the preceding three years.** The study included Spain, France, Italy, and Portugal. The *backward-looking* quantification exercise examined in detail recently implemented reform measures, and used the available information to map these policy changes onto QUEST model variables that could be shocked in a simulation (European Commission 2016).

**For a subset of reform measures, a direct translation into structural indicators was possible.** For instance, for changes in unemployment benefit generosity, the impact of measures on the net replacement rate (UB) could be computed and directly fed into the model. When the impact of tax measures on implicit tax rates (ITRs) was calculated with the Euromod model, these tax rates could then be directly shocked in the QUEST model (see Graph 3 above).<sup>23</sup> But for most quantifiable measures, the calibration of shocks had to rely on ‘indirect’ approaches (‘satellite tools’), using intermediate indicators. For example, for product market reforms, ECFIN desk officers used the underlying questionnaires of the OECD PMR indicators to calculate the impact of reform measures on the indicator scores. Then, using regression analysis on the relationship between PMR indicators and estimated time-varying goods market mark-ups allowed projecting the change in mark-ups following the reforms (additional assumptions had to be made, however, about the speed of adjustment). Similarly, for policy measures affecting employment protection, desks officers could calculate the implied changes in the Employment Protection Legislation (EPL) indicators, which was then translated into a productivity shock based on regression analysis (here too, assumptions had to be made about the speed of adjustment).<sup>24</sup>

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<sup>23</sup> As most tax reforms are part of a fiscal consolidation effort, this pilot study tried to isolate the structural component of tax changes. For this purpose, ITR changes were compensated by offsetting tax measures ‘across-the-board’ such that the policy was ex-ante budgetary neutral. For example, a cut in the PIT was compensated in the model simulations by increases in taxes on consumption, labour, and profits (proportionally). Thus, the focus of the analysis was on the structure of the tax system, notably reforms shifting the tax burden from distortionary to less distortionary taxes (under ex-ante revenue neutrality).

<sup>24</sup> It is also possible to selectively extend existing models to capture or endogenise additional transmission channels. Endogenous technological change was introduced into the QUEST model for the analysis of innovation policies, something that would not be possible in a model with purely exogenous TFP. Similarly, other contributions to the literature have introduced business dynamics (firm entry and exit) in otherwise standard DSGE models, endogenising price mark-ups (e.g., Cacciatore et al. 2016 and 2021), or have separated intensive (hours per worker) and extensive (number of workers) margins of employment to allow for a richer discussion of labour market policies (e.g., Cacciatore and Fiori 2016).

**It should be noted that this exercise was *post-implementation* and only took into account reforms for which sufficiently detailed information was available.** Hence, the information basis is very different from announced reforms, for which typically less information is available. Furthermore, the reforms at the time related predominantly to ‘standard’ areas such as product market regulation and regulated professions, which could be mapped onto PMR indicators and then onto mark-ups (as model input) through the estimated relationship between these two variables. As shown in Graph 1 in section 2, reforms included in the RRP, by contrast, are often of wider or different in scope, including areas such as the judiciary system and public administration. In the absence of well-established transmission channels, reforms in these areas are more difficult to map onto variables in a macro model. In line with the discussion in section 2, one could imagine a mapping onto TFP or overhead costs, with a risk of double counting should one reform be mapped onto several exogenous variables in the model. Therefore, the mapping of reform measures onto model variables remains somewhat subjective and often incomplete. Eventually, only around one quarter of all “identified” reform measures could be quantified and were included in the study’s pilot simulations. At the same time, the exercise proved to be very time- and resource-intensive, both for desk officers and horizontal units, precluding a repetition of the exercise for all Member States. As a consequence of the limitations to identifying reforms, the cross-country comparison or ranking of Member State reform efforts was also problematic. For example, some Member States might have implemented easily quantifiable tax measures, while others enacted very important but unquantifiable, with the given tools, legislative measures.

### 3.2. ILLUSTRATIVE REFORM SCENARIOS

**More often, macro models have been used to quantify the impact of *potential* reforms, relying on more stylised assessments with standardised shocks or typical reforms based on average changes over past periods.** In the first publication of the QUEST R&D model (Roeger et al., 2008), stylised simulations were reported of unit-size shocks (e.g., 1 pp mark-up shock, 1 pp tax shift). The OECD (Égert and Gal 2017) alternatively defines a “typical reform” as the average change (across countries and time) of the policy variable within a two-year window when policy in a particular area moves into the direction of reform (see also subsection 2.1). Such stylised simulations are not directly useful to assess structural reforms in a particular country as the mapping and quantification of specific policy measures is not straightforward in most cases. The stylised exercises can provide a benchmark and illustrate the potential gains from structural reforms, however.

Graph 4. **Structural indicators considered for the halving-the-gap scenario**

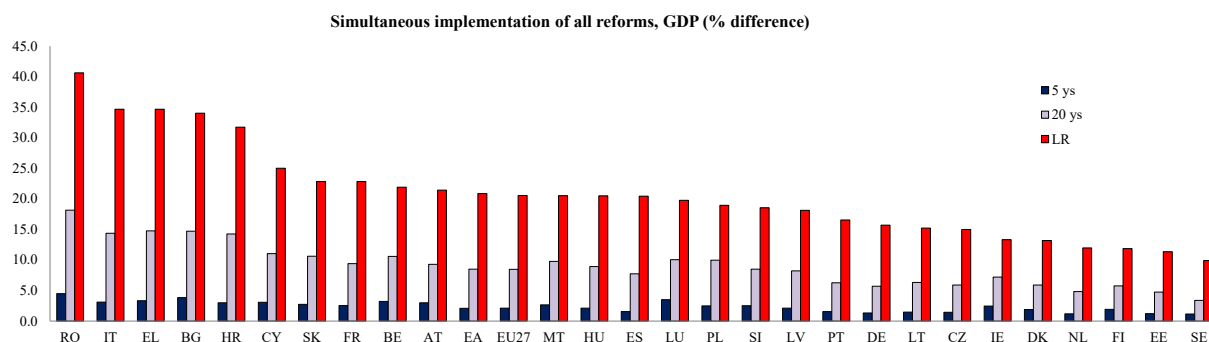
|                         |  | AT   | BE   | BG   | CY   | CZ   | DE   | DK   | EE   | EL   | ES   | FI   | FR   | HR   | HU   | IE   | IT   | LT   | LU   | LV   | MT   | NL   | PL   | PT   | RO   | SE   | SI   | SK   | Target |
|-------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| Market competition      | PMR indicator                                    | 1.44 | 1.69 | 1.93 | 1.80 | 1.30 | 1.08 | 1.02 | 1.29 | 1.56 | 1.03 | 1.37 | 1.57 | 1.43 | 1.32 | 1.38 | 1.32 | 1.19 | 1.68 | 1.28 | 1.54 | 1.10 | 1.45 | 1.34 | 1.86 | 1.11 | 1.29 | 1.52 | 1.05   |
|                         | Entry costs (%)                                  | 10.4 | 6.7  | 7.4  | 7.0  | 7.3  | 8.9  | 1.2  | 1.9  | 2.6  | 7.3  | 4.3  | 1.8  | 11.4 | 6.2  | 2.4  | 17.0 | 1.9  | 4.2  | 3.0  | 11.3 | 5.0  | 20.7 | 3.6  | 5.7  | 2.6  | 2.2  | 6.8  | 1.6    |
| Tax reform              | Labour to consumption tax revenue ratio          | 2.1  | 2.0  | 0.8  | 1.1  | 1.7  | 1.1  | 1.7  | 1.2  | 1.1  | 1.9  | 1.5  | 2.0  | 0.7  | 1.2  | 1.4  | 1.9  | 1.4  | 2.0  | 1.1  | 1.0  | 1.7  | 1.2  | 1.2  | 1.2  | 2.1  | 1.4  | 1.6  | 0.8    |
|                         | Share of high-skilled (%)                        | 8.5  | 9.0  | 3.3  | 6.6  | 6.5  | 7.7  | 11.2 | 7.7  | 5.3  | 6.5  | 11.3 | 6.1  | 5.5  | 5.6  | 10.7 | 1.8  | 7.3  | 9.8  | 5.1  | 7.6  | 11.0 | 6.7  | 7.9  | 5.6  | 12.7 | 7.5  | 4.1  | 11.7   |
| Skill enhancing reforms | Share of low-skilled (%)                         | 14.4 | 21.3 | 17.5 | 17.5 | 6.2  | 13.4 | 18.5 | 9.8  | 23.2 | 38.7 | 9.9  | 19.6 | 14.2 | 15.0 | 16.3 | 37.8 | 5.0  | 20.7 | 8.8  | 14.8 | 20.4 | 7.4  | 47.3 | 21.0 | 13.9 | 11.2 | 8.6  | 6.2    |
|                         | PISA score                                       | 491  | 500  | 427  | 438  | 495  | 500  | 501  | 526  | 453  | 482  | 516  | 494  | 472  | 479  | 505  | 477  | 480  | 477  | 487  | 487  | 459  | 502  | 513  | 492  | 428  | 503  | 504  | 469    |
| Labour market reforms   | Non-participation (% 25-55ys): - low-skilled     | 17.5 | 22.2 | 26.2 | 13.7 | 20.1 | 21.2 | 22.1 | 21.8 | 13.9 | 13.0 | 21.5 | 17.5 | 20.8 | 19.6 | 23.3 | 20.8 | 26.3 | 12.9 | 20.0 | 13.6 | 17.6 | 26.2 | 9.5  | 23.2 | 15.2 | 15.0 | 27.1 | 11.8   |
|                         | - medium-skilled                                 | 6.9  | 19.6 | 18.1 | 20.4 | 17.2 | 16.2 | 13.9 | 17.4 | 27.8 | 17.8 | 17.6 | 15.3 | 22.9 | 20.6 | 31.2 | 27.7 | 14.9 | 22.5 | 17.3 | 21.7 | 15.4 | 24.8 | 8.7  | 27.6 | 11.6 | 11.4 | 18.9 | 5.3    |
|                         | - high-skilled                                   | 5.9  | 6.3  | 4.6  | 7.5  | 10.3 | 6.9  | 4.0  | 7.4  | 5.1  | 7.0  | 5.8  | 5.0  | 4.6  | 9.4  | 6.3  | 10.8 | 3.5  | 5.7  | 5.5  | 5.0  | 4.7  | 6.4  | 3.5  | 3.8  | 3.5  | 3.5  | 11.2 | 3.5    |
|                         | Elderly participation (% 55-64ys): - low-skilled | 20.7 | 24.9 | 14.1 | 17.6 | 18.3 | 11.6 | 13.1 | 9.6  | 22.3 | 14.9 | 17.2 | 21.8 | 13.8 | 18.5 | 19.4 | 18.7 | 8.8  | 23.5 | 9.6  | 18.8 | 16.2 | 24.7 | 15.3 | 16.3 | 8.9  | 29.3 | 19.7 | 9.1    |
| non-                    | - medium-skilled                                 | 9.7  | 8.3  | 7.1  | 5.7  | 6.6  | 6.4  | 5.4  | 5.7  | 9.5  | 5.5  | 6.8  | 8.7  | 11.8 | 8.6  | 5.5  | 6.2  | 7.4  | 9.2  | 7.1  | 4.0  | 5.2  | 11.8 | 3.5  | 10.8 | 3.6  | 11.1 | 8.4  | 3.7    |
|                         | - high-skilled                                   | 4.1  | 3.6  | 4.6  | 1.9  | 2.9  | 3.1  | 1.4  | 3.6  | 4.0  | 3.4  | 2.9  | 2.6  | 3.1  | 3.0  | 2.8  | 2.9  | 3.5  | 3.2  | 3.1  | 2.8  | 2.5  | 3.4  | 2.7  | 5.2  | 1.7  | 2.5  | 3.6  | 1.6    |
|                         | Benefit replacement rate* (%)                    | 67.8 | 56.6 | 32.5 | 50.5 | 37.7 | 51.5 | 60.7 | 41.9 | 40.7 | 41.9 | 59.7 | 49.9 | 39.2 | 30.0 | 62.3 | 48.0 | 45.2 | 57.3 | 58.0 | 51.5 | 48.0 | 46.9 | 39.1 | 33.2 | 64.0 | 49.8 | 40.1 | 48.7*  |
| R&D measure             | R&D subsidy (% GDP)                              | 0.19 | 0.21 | 0.00 | 0.00 | 0.03 | 0.06 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.00 | 0.03 | 0.18 | 0.16 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 | 0.20 | 0.00 | 0.00 | 0.10 | 0.00 | 0.23   |

Note: Darker shades correspond to larger gaps vis-à-vis the benchmark. Details on the quantification are provided in the source paper.

Source: Pfeiffer et al. (2024).

**Modelling at ECFIN In recent years has mostly followed a benchmarking approach.** Based on a large set of structural indicators, the scenario assumes Member States to close half of the gap vis-à-vis the best performers. In the most recent version (Pfeiffer et al. 2024), the indicators cover labour market reforms, revenue-neutral tax shifts, product market competition and regulation, human capital investment, and innovation policies (Graph 4).<sup>25</sup>

Graph 5. **Output response to structural reforms – halving the gap towards the best performers**



*Note:* Percent difference of real GDP from no-reform baseline over different horizons; LR shows the long-run results, i.e. when the economy has reached a new steady state. The underlying simulation assumes that all countries simultaneously close half of their respective gaps to the three best performing EU Member States in the respective policy area.

*Source:* Pfeiffer et al. (2024).

**The closing-the-gap approach points to important reform potential and associated efficiency gains, which manifest in rising activity.** Closing half of the gap in the respective areas implies very sizeable reforms in many cases. Reforms of these size may not be attainable or realistic in the short run, but the approach illustrates the potential gains from narrowing existing gaps (Graph 5). A breakdown by reform area suggests that tax and labour market reforms dominate in terms of GDP effects in the short and medium run, whereas human capital investment and R&D support policies dominate in the longer run (Graph 6).<sup>26</sup>

**The time profile of the reported effects depends crucially on the assumed implementation lags.** While structural reforms boost GDP in the medium to long term, one should not expect large positive effects in the short term already.<sup>27</sup> A slower (more gradual) implementation of reforms will delay positive GDP effects. Given the uncertainty around implementation lags, the focus has therefore been more on the long-run effect.

**The benchmarking approach is silent on which reform measures precisely can close half of the gaps, and the methodology is therefore not directly applicable to a post-implementation**

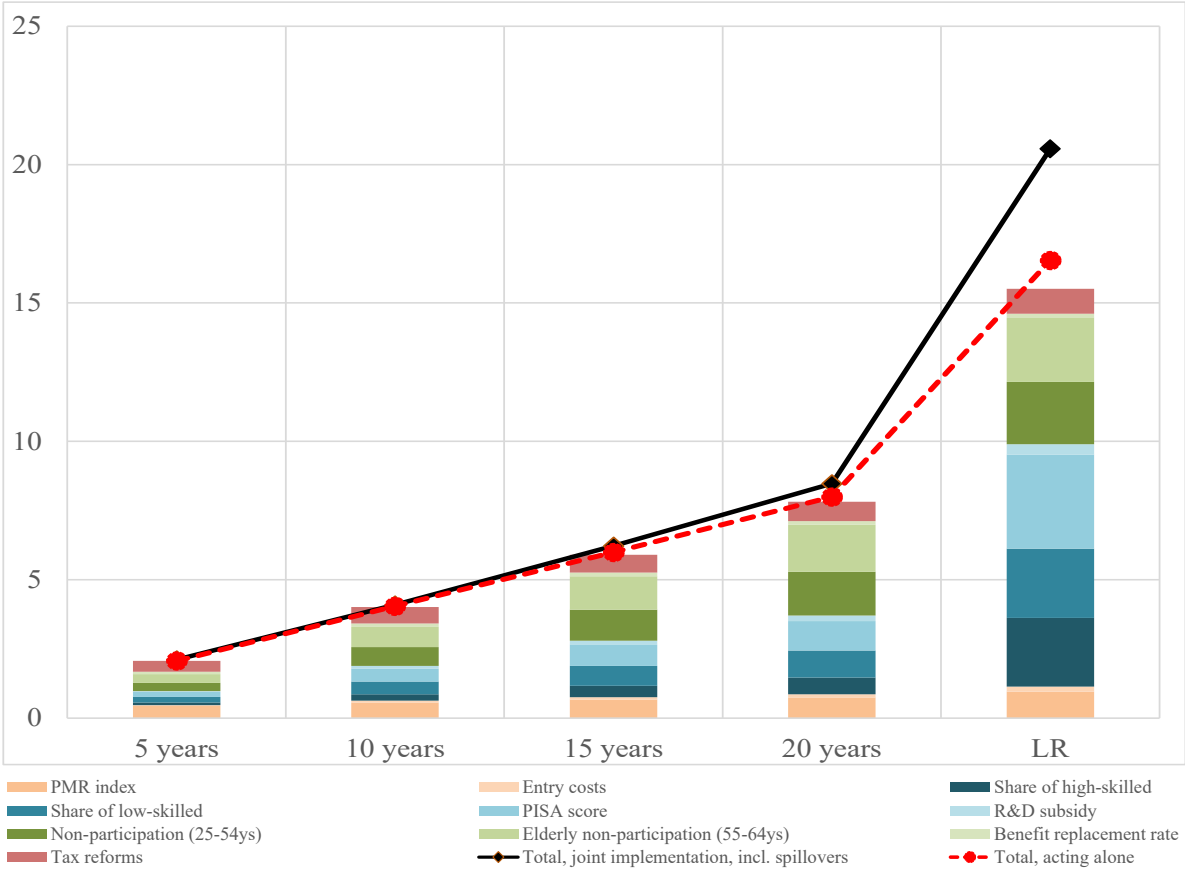
<sup>25</sup> Earlier narrowing-the-gap analysis for Southern European Member States (Portugal, Spain, Italy, and Greece) is documented in Varga et al. (2013). The approach was then extended to all Member States in the benchmarking paper by Varga & in 't Veld (2014), now updated by Pfeiffer et al. (2024). Roeger et al. (2021) used the benchmarking approach focusing on labour market reforms and their distributional effects.

<sup>26</sup> Regarding employment, tax and labour market reforms dominate the short to medium run effect, in the longer run education reforms become important as well. Those reforms that raise labour productivity have typically smaller employment effects, while reforms that increase labour market participation have no direct impact on productivity.

<sup>27</sup> Another factor that plays a role in the short and medium term is the interaction with monetary policy. It has been argued that the short-run effect of reforms is negative at the zero lower bound, when monetary policy cannot accommodate the reform shock, i.e., structural reforms can be contractionary on impact when they are deflationary, leading to higher *real* interest rates (Eggertsson et al., 2014). QUEST model simulations show that the short-term output response to reforms can, indeed, be negative at the zero lower bound, but such negative effects tend to be small and short-lived in a model incorporating a variety of transmission channels, including investment and international trade (Vogel 2017).

**assessment of actual reforms.** It is difficult to establish a direct link between action in certain areas and the extent to which observed gaps can be closed (see also section 2). The approach, instead, shows the *potential* gains from reforms in different areas, and they are shown to be large. It is by design only showing a partial closure of the observed gaps in GDP per capita, as it only includes selected reform shocks that can be simulated with the model. Differences in economic performance across EU Member States result from a complex interplay of various factors, many of which are not captured in the analysis.<sup>28</sup>

Graph 6. Real GDP effects after 5, 10, 15 20, and 50 years, by reform areas



*Note:* Percent difference from no-reform baseline. The graph shows results for the EU27, aggregating outcomes for individual countries. Bars depict effects per reform (implemented in one country and one reform at a time and aggregated into a synthetic EU-wide effect). The black line refers to a simulation covering all reforms and countries simultaneously, while red lines report results obtained from simulations for one country at a time (all reforms), ignoring spillover effects from joint reform implementation.

*Source:* Pfeiffer et al. (2024).

<sup>28</sup> Among the other factors mentioned in the literature are differences in managerial practices, educational quality, matching of skills, the quality of private and public capital, and trade integration.

## 4. CONCLUSIONS

**This paper has surveyed tools to analyse the macroeconomic impact of structural reforms.**

The discussion has focused on two broad approaches: econometric estimates, linking indicators of actual policy change to macroeconomic outcomes (ex post), and structural macroeconomic models simulating the effect of reforms on economic activity and other variables of interest, often based on stylised reform scenarios.

**Both approaches have advantages and drawbacks.** The data-driven regression-based approach is flexible with respect to the policy variables that can be linked to macro outcomes. Focus on intermediate outcomes (TFP, employment, capital accumulation) in combination with a production function approach improves the understanding of the main transmission channels. But the flexibility of the approach also implies that reduced-form parameters are difficult to interpret at times and the estimated parameter size sometimes difficult to rationalise from the perspective of economic theory. Furthermore, reduced-form regressions of macroeconomic outcomes on reform indicators face the problem of potential endogeneity of reforms. Structural model simulations, by contrast, provide a theoretically consistent general-equilibrium perspective, with clarity on the transmission channels and the dependence of the results on other policies (fiscal policy, monetary policy) and economic framework conditions. Yet, models are simplified structures, and reforms must therefore often be approximated with intermediate outcomes, such as TFP or labour supply, derived from “satellite tools”. This translation tends to be labourious, especially in a multi-country setting, and imperfect, making it difficult to feed the model (ex post) with “true” reform episodes. Instead, model-based analysis has often resorted to stylised scenarios, e.g. a narrowing of the gap towards the best performers, which illustrates the potential to gain from the implementation of reforms.

**The respective drawbacks suggest that analysis of structural reform effects at the macro level remains surrounded by large uncertainties.** In the absence of strong commitment to a very detailed reform agenda (measures and coverage), any pre-implementation assessment of structural reforms can provide orders of magnitudes for plausible effects at best. In addition, outcomes of a significant number of reforms are not measured by metrics that lend themselves to straightforward integration into econometric or economic models. Given the importance of the question of reform effects, including for economic policy coordination, the feasibility of more detailed assessments ahead of and after the implementation of reforms deserves further efforts and should be revisited continuously in the light of data-related and methodological advances.



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