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The estimation of payments from the European Union's COVID-19 economic recovery fund, Next Generation EU (NGEU), to each EU country in 2021-2026 involves uncertainties, yet the overall magnitudes can be estimated with a reasonable degree of precision. In contrast, estimating member states' contributions to the repayment of EU debt (which will be issued to nance NGEU spending) is burdened with enormous di culties, primarily related

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Politicians and the general public alike are interested in knowing how much their country will receive from the European Union's landmark economic recovery instrument, Next Generation EU (NGEU), which is intended to help the EU recover from the economic impact of COVID-19. They also want to know how much each country has to contribute to it in the future. NGEU pay-outs should be made between 2021 and 2026, and will be financed by EU borrowing from the markets. The resulting EU debt is expected to be repaid between 2027 and 2058, according to the December 2020 European Council agreement[1].

The total maximum financial envelope of NGEU comprises grants and guarantees amounting to €390 billion in 2018 prices or €420 billion in current prices, and loans amounting to €360 billion in 2018 prices or €375 billion in current prices. These amounts will be disbursed via the seven facilities of NGEU: the Recovery and Resilience Facility (RRF, €312.5 billion in grants and €360 billion in loans); Recovery Assistance for Cohesion and the Territories of Europe (REACT-EU, €47.5 billion in grants); the Just Transition Funds (JTF, €10 billion in grants); Rural Development (€7.5 billion in grants); Horizon Europe (€5 billion in grants), civil protection (RescEU, €1.9 billion in grants); and InvestEU (€5.6 billion of guarantees). All of these amounts are measured at 2018 prices.

Estimating gross pay-outs from the instrument involves uncertainties, yet the overall magnitudes can be estimated with a reasonable degree of precision because most of the allocation to countries depends on historical data (Darvas, 2020b, 2020c).
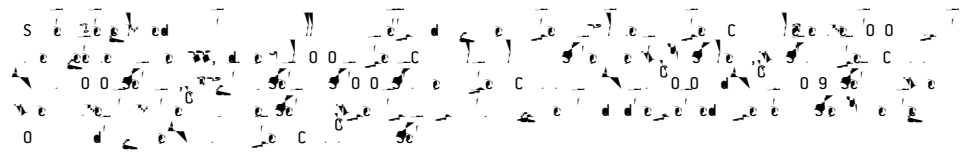
Figure 1 on the next page shows estimated allocation to countries (as a share of GNI; Darvas, 2020c) plotted against the 2020 economic shock, which is measured as the difference between the November 2020 and the November 2019 forecasts for 2020 GDP. The figure suggests that redistribution (lower-income countries get more than higher-income countries) is much more important than the insurance component (harder-hit countries get more then less-hit countries). For example, Austria and Bulgaria have been similarly hit economically, yet Bulgaria will get 11 percent of its GDP in grants, but Austria only 1 percent. Lithuania and Spain are expected to get the same 6 percent of their GNI in grants, though the Lithuanian economy was the second least-hit country in the EU in terms of the economic shock, while the Spanish economy was hit the most[2].

Estimating the national contributions to the repayment of EU debt in 2027-2058, which is necessary to estimate the net financial implications of NGEU, is however extremely difficult and depends on the assumptions made. Crucial issues relate to whether EU debt will be repaid as currently planned or rolled over, the role of eventual new 'own resources' in reducing national contributions, the distribution of EU GNI in 2027-2058, the interest rate at which the EU will borrow in 2021-2026 and the interest rate of member states, which is needed to calculate the present value of benefits and costs[3]. As regards the benefits of NGEU, an important question is if it will have a positive economic impact or not.

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1   See https://www.consilium.europa.eu/en/press/press-releases/2020/12/14/next-multiannual-financial-framework-and-recovery-package-council-moves-to-finalise-adoption/.

2   The dominant redistribution component primarily results from the Recovery and Resilience Facility's (RRF) allocation method, for which one of the three indicators is GDP *per capita*. Moreover, instead of measuring GDP *per capita* at purchasing power standards (PPS), which is the usual measure of cross-country comparison of economic development, GDP *per capita* at current price euros is used for the RRF. The European Commission has not justified this unusual choice. The cross-country allocation algorithm of ReactEU and the Just Transition Fund also heavily favour countries with lower *per-capita* income levels, for which GDP *per capita* at PPS (not at current price euros) is considered.

3   Due to the enormous difficulties in the estimation of the national contribution to the repayment of EU debt, it is surprising that the September 2020 European Central Bank *Economic Bulletin* presented such calculations without any detail about the assumptions made for 2027-2058 (Giovannini *et al*, 2020). The only information provided is: *Repayments are assumed to be made according to the distribution of countries' shares in EU grants, although in some , which is not informative about the assumptions.

is Policy Contribution discusses these issues and concludes that the possible range of estimated net bene ts is very wide and depends greatly on the particular assumptions made, yet even one-half of the estimated GDP impact of the Commission's 'low additionality' scenario would make all EU member states net nancial bene ciaries of NGEU.

2

Cash payments from the EU budget to bene ciaries in a particular member state are not the only positive e ects of NGEU. e very reason it was designed is to generate a positive economic impact throughout the EU. Traditional net balance calculations for annual EU budgets consider only cash ows between member states and the EU budget (and in fact not even all cash ows, only about 80 percent of them; see Darvas, 2019) and view the EU budget as a pure redistribution system between member states without any economic impact. Neglecting the economic impact would be even more problematic for NGEU, which is a one-o instrument.

For example, in one of the scenarios I consider, Austria would pay 1.8 percent of its annual GDP more into NGEU than the direct cash transfer from NGEU it would receive in 2021-2026, while its GDP c 9 0 0 9 180.7086 35es7 4aisscenarios I con6.1 (b)-t-2 (a)4 (g)-2 (et F-7 (er s)-2.9 (d 1s t)1 (ulhe

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e July 2020 European Council concluded that EU debt that will nance NGEU programmes will have to be repaid by 31 December 2058 in a steady and predictable way. Early repayment is also foreseen by the European Council if interest payments are less than planned, or if new own resources are introduced, underlying the determination to repay the debt (see point A7 of European Council, 2020).

However, there could be two main reasons for reconsidering the repayment plan:

- First, EU debt would necessitate national taxpayer money. My calculations suggest that the annual burden to repay maturing debt would be in the range of 0.04-0.075 percent of GNI (see section 5), which does not seem large, though it would still require some national resources. In contrast, rolling over debt at close-to-zero nominal interest rate would not incur signi cant interest costs, and in fact would imply a lower burden as a share of GDP in the future if the interest rate remains below the growth rate of output.
- Second, the EU is set to become the largest supranational bond issuer, on the back of NGEU and the European instrument for temporary Support to mitigate Unemployment Risks in an Emergency (SURE) bond issuances[8].

4

European Commission (2020a) argued that possible new direct EU budget revenues (called *"own resources"*) will *"help"* the repayment of EU borrowing for the New Generation EU instrument *"in a fair and shared way"*. At rst sight, one might think that such own resources will reduce the burden on member states to repay the debt. Unfortunately, the case is not so clear.

Own resources might reduce GNI-based contributions made to the EU budget by national nance ministries, but do not necessarily reduce countries' total contributions, if we take into account what the governments, companies and other entities that are subject to the own resources already contribute to the EU budget, and consequently what they do not contribute to national budgets.

e non-recycled plastic packaging waste levy will be paid by governments. us, governments pay a new plastic-based contribution and pay less GNI-based contribution. In this case, the overall burden on member states to repay the debt remains the same, but when the distribution of non-recycled plastic waste di ers from the distribution of GNI (which is the case, see Darvas, 2019), the c(o)14 (vs)2 (s)1 (ib)-4 4(un)7 (tr)-6.9 (S)7 ((tr)-7 (ibib)4 (ution and pI otal con)7

from this tax. e overall total burden on member states with and without an EU-wide

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Without new own resources for the EU budget, repayment of NGEU grant-spending related EU debt starting in 2027 will be proportional to the distribution of EU countries in terms of the euro value of EU GNI in 2027-2058. Net balance estimates thus need to take into account GNI forecasts for each EU country up to 2058, for which no reliable assumption can be made.

To illustrate the difficulties in making such long-horizon forecasts, GNI (or GDP) can be decomposed into three components:

1. Per-capita real income measured at purchasing power parity (PPP);
2. Price level;
3. Population.

Multiplying *per-capita* real income with the price level leads to *per-capita* nominal income, and further multiplying it by population leads to total (nominal) income. While any projection for several decades ahead is bound to be uncertain, it is easier to make assumptions about these three components separately than for total income. *Per-capita* PPP income is the standard measure of productivity and has been extensively analysed in convergence studies. The price level is related to *per-capita* income: more productive countries tend to have higher price levels. For population, long-term projections have been published by the United Nations.
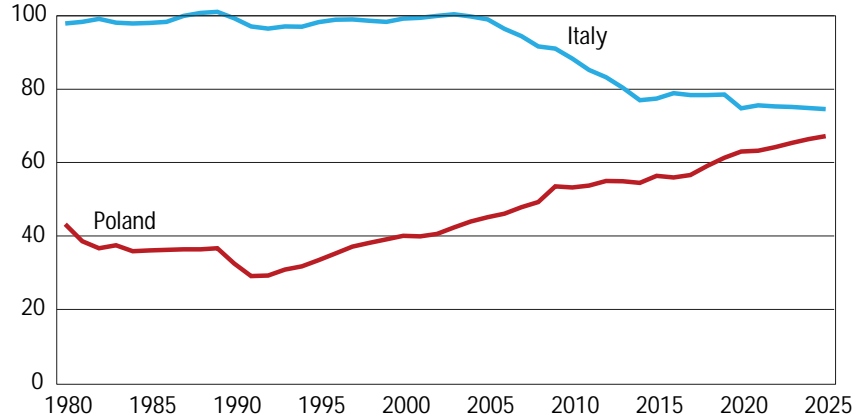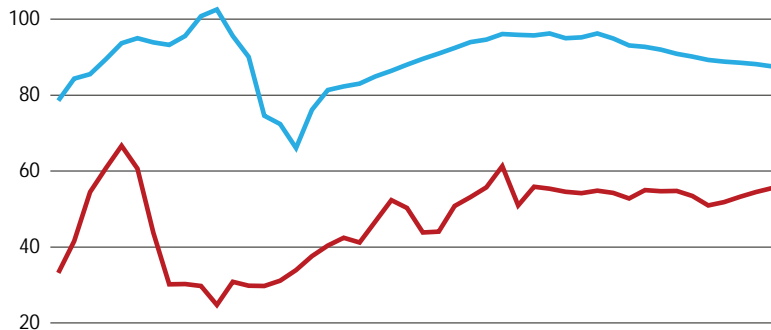
Italy had a similar real *per-capita* GDP level to Germany in the 1980s and 1990s, but now it is 25 percent lower (Figure 4). Will Italy continue to fall behind in the next four decades? Or will Italy's relative *per-capita* income stabilise at 75 percent of the German level? Or perhaps will Italy converge (at least partly) back to Germany in the coming decades?

Unlike Italy, Poland has been catching-up with Germany since the early 1990s. Will this convergence continue and if so, to what level? Could Poland reach 90 percent of Germany or even 100 percent of Germany? Or will Polish *per-capita* income even exceed that of Germany by 2058, which would result from a mechanical extrapolation of the past trend?

Any answer to these questions based on economic modelling would just re ect the assumptions made.

Price level projections up to 2058 involve similarly hard questions.

When two countries have separate currencies, the relative price level between the two countries is subject to both exchange rate swings and di erences in national in ation rates. For example, after the 1992 European Exchange Rate Mechanism crisis, the Italian lira depre-ciated signi cantly against the Deutschmark and hence the Italian price level fell relative to Germany (Figure 5). In other words, fewer Deutschmarks had to be paid for the lira price of Italian goods and services. Lira appreciation after 1995 partly compensated for the earlier depreciation. Since entering the euro area in 1999, the relative price level between Italy and Germany is determined only by di erences in in ation rates. Poland still has the zloty and thus the Polish price level relative to Germany is in uenced by both exchange rate develop-

ments (like zloty depreciation after 2008) and di erent in ation rates. How will Italy's and Poland's price levels relative to Germany evolve up to 2058?

were converging to the average of the nine higher-income EU countries, but it is uncertain to what extent this convergence will continue. For these countries, I set four alternative scenarios:

1. Baseline projection of the 2014-2025 trend;
2. A ceiling at 100 percent (ie by projecting the 2014-2025 trend, if and when relative *per-capita* GDP reaches 100 percent, it is expected to remain at 100 percent in the rest of

not converge to over 80 percent, then Italy's share of EU GNI could slightly increase from 11.9 percent in 2025 to 12.5 percent in 2058. But if Italian *per-capita* relative income continues its downward slide, while current lower-income countries continue their convergence processes, then Italy's share of EU GNI would fall to 7.9 percent by 2058. e 7.9 percent to 12.5 percent range for Italy's share of EU GNI in 2058 is rather wide and implies a major uncertainty about how much Italy would contribute to the repayment of EU debt.

Moreover, the range displayed in Figure 7 does not re ect the uncertainty in population developments, because the calculations use the median projection of the UN for all countries. Incorporating the uncertainty resulting from population projections would widen this range, as would incorporating the uncertainty about GDP developments in EU countries beyond the 13 lower-income EU countries and Italy that I already consider.

Overall, there is great uncertainty about GNI developments up to 2058.

I calculate the net nancial bene t as the present value of gross nancial bene t minus the present value of gross nancial contributions. I calculate the 2020 present value of future ben- e ts and contributions by using the country-speci c government yield curves as the discount factor, eg the one-year yield to discount the 2021 bene ts, the 20-year yield to discount the 2040 contributions, and so on. us, for countries with negative interest rates, such as Germa- ny and the Netherlands, the present value is larger than the nominal euro values in the future,

rect impacts, ultimately leading to higher output, which means higher incomes (see section 2 for further discussion). I look at two scenarios for gross benefits:

1. Only direct payments from NGEU to member states (assuming that the NGEU is a zero-sum game),
2. Direct payments from NGEU plus GDP impact.

On the GDP impact, I consider one-half of the low-additionality scenario of European Commission (2020b). Beyond the overall impact on the EU, the Commission discriminated between three country groups: above-average income (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, the Netherlands and Sweden), below-average income with high debt (Cyprus, Greece, Italy, Portugal and Spain), and below-average income and low debt (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia). For the high additionality model, the 2026 impact is estimated at 1.0 percent, 3.25 percent and 3.5 percent, respectively, for the three groups, while the impact for the EU as a whole is approximately 1.8 percent. I assume that the economic impact on the three country groups is proportionally the same for the one-half of the low-additionality scenario in each year in 2021-2043, when the Commission estimate implies a positive impact[12]. This leads to the following total cumulative economic impact expressed as percent of annual GDP: 3.7 percent for the above-average income group, 12.1 percent for the below-average income group with high debt, and 13.1 percent for the below-average income group with low debt. These values are simply the sum of annual GDP deviations from the baseline (expressed as each year's GDP), yet for a proper assessment, I calculate the present value.

There are notable differences within the two below-average income groups in terms of the expected NGEU grants received as a share of GNI (eg Greece's 11 percent vs Italy's 5 percent, and Croatia's 12 percent vs Malta's 3 percent; see Figure 1). This likely implies different impacts within these groups. Nevertheless, I do not complicate my calculations further with country-specific economic impacts on NGEU, but use the group-average value for each group members.

Whether we consider NGEU a zero-sum game, or an instrument with positive economic impact makes a huge difference for assessment of the net benefit (Table 1). This finding highlights the importance of considering the economic impacts of NGEU. The overall ranges of net benefits are very wide, for example from -2.4 percent to +1.7 percent for Germany, from 3.1 percent to 14.9 percent for Italy, and from 1.4 percent to 15.5 percent for Poland.

When the economic impact is considered, all countries are net beneficiaries under the assumptions I made. The present value of net benefits is very large, over 10 percent of GNI for central and southern European members, and even over 20 percent of GNI for Bulgaria, Croatia and Greece.

12 As noted in section 2, European Commission (2020b) presented results for 2021-2030 in a chart. There is gradual decline in the estimated impact in 2027-2030, yet the 2030 impact is still sizeable. I extrapolated the rate of decline visible on the chart, which led me to conclude that the Commission estimate vanishes by 2044 in the low-additionality scenario.

Next Generation EU is an extraordinary common action taken by EU countries and institutions in response to an extraordinary public health and economic shock. It aims to combine
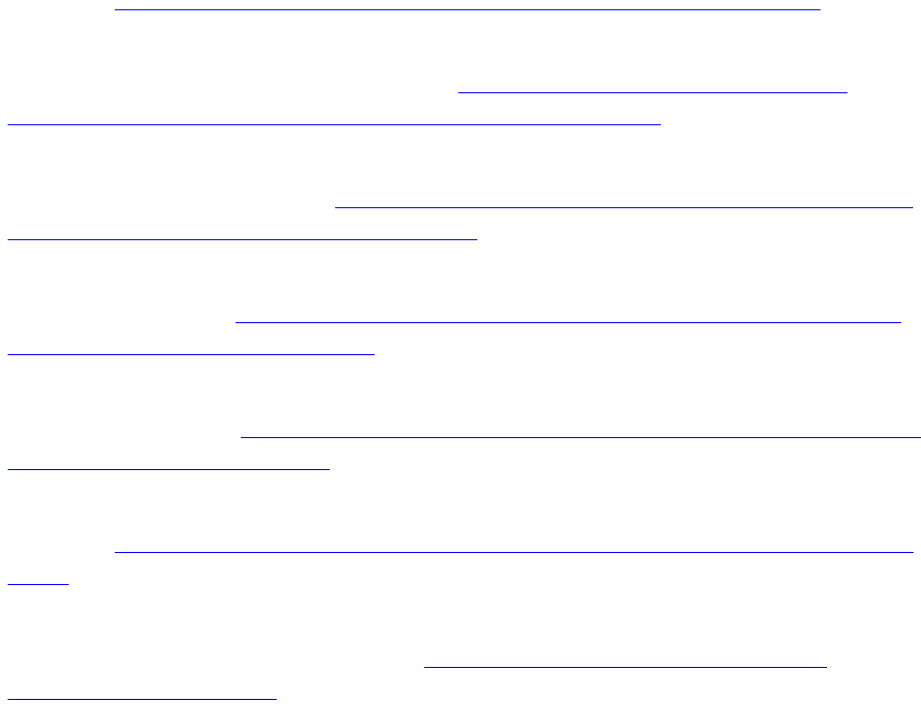
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