



Brugge

College of Europe
Collège d'Europe



Natolin

The (un)sustainability of public debt: the elusive reality of an intuitive concept

MARTIN LARCH



DEPARTMENT OF
EUROPEAN ECONOMIC STUDIES

Bruges European Economic Research Papers

41 / 2022

The (un)sustainability of public debt: the elusive reality of an intuitive concept

Martin Larch, Head of Secretariat, European Fiscal Board

Abstract

Governments do not have to balance their budget every year. To achieve their goals they can and do borrow. In post-WWII history, some EU countries have recorded the largest increase in government debt during times of peace. This trend raises the question of what are the constraints on public finances. While they are easy to define in theory, they do not offer any practical clues. Assessing the sustainability of public debt in practice is like walking in the dark with a small flashlight trying not to step onto mines. When push comes to shove, something has to give: governments will need to cut expenditure or raise taxes, call on the central bank, ask for external help or recur to more extreme measures. In the EU/euro area, serious risks to the sustainability of public debt of member states, especially large ones, can pose a threat to the independence of the central bank and the integrity of the economic union. Mechanisms to restrain the political bias to accumulate debt yielded mixed results. Member states are polarised, one camp claiming that sustainability issues arise because there is not enough help from the centre; the other insisting that some countries do not do enough to counter risks at the national level. Both are right and wrong at the same time.

JEL Classification: E62, E65, H62, H63

Keywords: government debt, sustainability, intertemporal budget constraint, European Union

Disclaimer: The views expressed in this paper do not necessarily reflect those of the European Fiscal Board or the European Commission.

1. Introduction

The utopian land of plenty springs from our dream to overcome a fundamental predicament of the human condition: We all face resource constraints. When we are awake and lucid, economics is the dismal science that helps us deal with those constraints. In most advanced economies, the massive expansion of the welfare state in the course of the 20th century was an attempt to alleviate constraints for the less well-off. On the back of more inclusive forms of government, the privileged power of sovereigns was increasingly deployed to access and redistribute resources to support the principle of equal opportunity. In most advanced countries, the growing size of government went along with a progressive and substantial accumulation of government debt, the largest in times of peace.

To avoid any misunderstanding from the outset: The advance of the welfare state has lifted countless poor and disadvantaged people out of poverty and fostered social mobility; it is not the reason for the unprecedented accumulation of government debt. The welfare state was without any doubt a noble and splendid project. However, its implementation and governance involve a wide range of political economy issues giving rise to a tendency to run deficits and, in time, to very high government debt, at least in some countries.

With the accumulation of public debt came the awareness that in the long run even the sovereigns' privileged access to resources was subject to constraints; possibly less stringent ones than those of private agents, but still. The Covid-19 pandemic and its impact on public finances were the most recent reminder of this incontestable truth turning the sustainability of public finances into one of the burning economic policy questions of our times. The emphasis is very much on 'policy' because the sustainability of public finances is as conceptually clear as it is elusive in practice. Every master student in economics can characterise the conditions of sustainable fiscal policies. In its most succinct form, sustainability requires the present value of all future taxes to be equal to the present value of future government spending plus the initial level of debt. In other words, all government spending needs to be covered by revenues eventually, full stop.

There are two main reasons why such an exceedingly intuitive, if not obvious concept is very hard to pin down in practice. First, sustainability mainly involves the assessment of future developments, not of the past. Like other economic agents, governments do not have to balance their books every single year. Their privileged power to levy taxes constitutes a credible collateral to secure access to borrowing from capital markets whenever a government deems it useful and necessary to spend more than it earns. In fact, governments can at any given moment in time - present or future - make

use of their privileged power to access resources beyond the prevailing level of expenditure and reduce their debt. They may typically want to do it gradually in order not to chock-off economic activity or upset constituencies; but still. Second, unlike other economic agents, governments are infinitively lived and the risk of losing access to future streams of income through taxes is more of a political than an economic nature. From this perspective, the sustainability of public finances is a non-issue because technically speaking governments should always be in a position to redeem debt, until they don't.

Flagrant manifestations of unsustainable public finances such as outright government defaults have become rare events in advanced economies; they mostly happen in emerging or developing economies.¹ The last cases in the European Union were recorded in the aftermath of the post-2008 global and financial crisis when the Greek and the Cypriot government restructured some of their outstanding debt held by private lenders. It was different in the decades and centuries before WWII, when sovereign defaults happened with a certain regularity, usually, although not exclusively, after wars and/or the collapse of empires.

This paper offers a close and hopefully fresh look at the sustainability of public debt with a special focus on the EU/euro area and its member states. The renewed interest in the issue is rooted in the plain fact that in some EU countries debt-to-GDP ratios have reached levels never seen before in times of peace. The conspicuous increase recorded in the wake of the Covid-19 pandemic has only amplified a sense of concern that existed already before.

To be clear, in view of the elusive nature of the subject, our paper cannot be expected, and does not pretend to provide practical clues on when and where government debt stops being sustainable. Our main aim is to clarify some key concepts and to put some order into a public debate often characterised by partisan views.

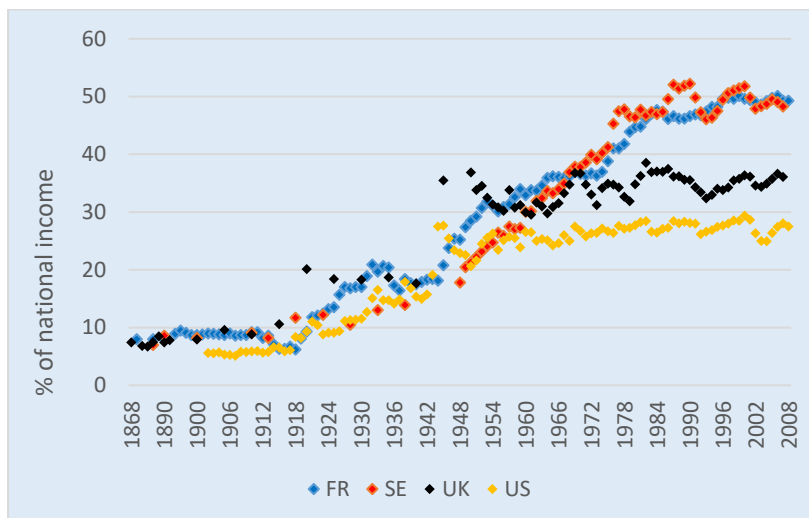
The remainder of the paper is organised as follows. Section 2 discusses long-term trends and some of the main reasons why governments accumulate debt. Section 3 reviews the intertemporal solvency constraint of sovereigns, the centrepiece of all sustainability assessments. Section 4 discusses the most commonly used instruments and methods to make an informed assessment of the sustainability of public finances. Section 5 expounds on the specificities of the EU's single currency area and clarifies implications for the sustainability of public finances. Section 6 concludes.

¹ Since 2014, the Bank of Canada and the Bank of England run a comprehensive database of sovereign defaults available at: [Crag-Database-Update-05-07-21.xlsx \(live.com\)](https://www.bankofengland.co.uk/crag/crag-database-update-05-07-21.xlsx)

2. Why do governments accumulate debt?

Governments play a distinct role in advanced economies. What makes them special is the power to access resources in the form of taxes or other levies to finance public goods and services that private actors cannot supply or supply too little. Until the end of the 19th and the beginning of the 20th century, this power was mainly used to ensure what in today's parlance is called security and defence. As a result, governments were comparatively small. Figure 1 shows the total tax bill of a small group of countries for which very long time series are available; the same profile and trend can be expected to apply to most advanced economies.

Figure 1: Tax revenues (including social security contributions) as a share of national income



Notes: FR=France, SE=Sweden, UK=United Kingdom, US=United States of America

Source: Piketty, T. (2014). *Capital in the 21st Century*. Cambridge: Harvard University Press

Until the end of WWI total tax revenues amounted to less than 10% of national income; i.e. less than every tenth dollar, pound, franc or krona of total income generated by economic agents ended up in the coffers of the state. A sharp upward trend set in towards the end of the 1920s when in most industrialised countries the Great Depression put an unprecedented number of people out of work leaving them largely to their own devices.

In societies where more egalitarian political views had gained sufficient ground and the franchise encompassed a growing share of the population, the economic and social tragedy of the Great Depression gave rise to a sea change in economic and social policies. Many governments expanded their activities beyond security and defence offering a growing number of services to help those who lost their jobs or were less well off to begin with. Mass access to public schools, the expansion of

public health care, and different forms of social protection like unemployment benefits are the most evident manifestation of this process.

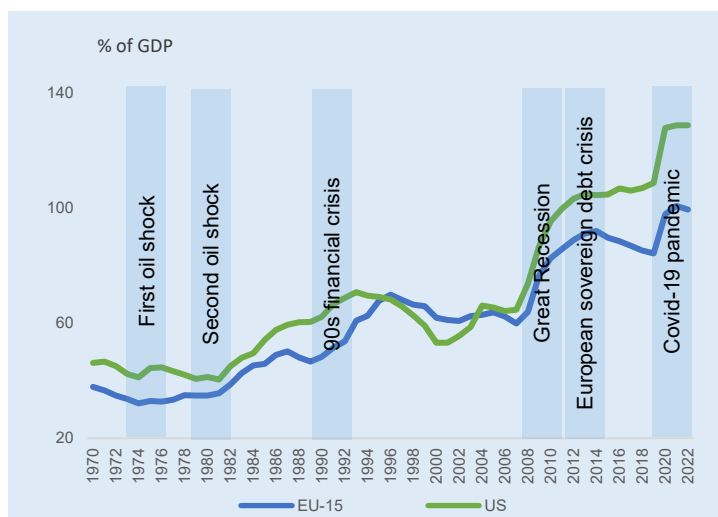
On the financing side, the expansion of the welfare state led to the impressive increase in the tax bill shown in Figure 1. Within five decades, the share of tax revenues in national income tripled or quintupled depending on the country. Sweden and France are examples of countries where the expansion of the welfare state was particularly strong and governments collected around half of total national income in the form of taxes or other levies. In countries where free-market ideologies remained stronger, such as the US and the UK, the revenue ratio levelled off at a significantly lower value, but still well above what was observed at the beginning of the 20th century.

In theory, any expansion of government activities can be achieved without recurring to deficits and debt. Governments could perfectly well limit their expenditures to the amount of available revenues. However, since the 1960s in many advanced economies the expansion of the welfare state went along with a conspicuous and continued increase in public debt. In some cases, gross public debt went well above 100% of GDP. Figure 2 illustrates the trend for the EU15 and the US. During extended periods of economic growth such as the late 1980s, 1990s and early 2000s, governments managed to stabilise or sometimes even reduce the debt-to-GDP ratio, but only temporarily. Over the longer term, the secular upward trend is clear. ²

What makes this development unique is not the increase in public debt per se. From a historical perspective, significant increases in government debt were the rule rather than the exception around wars; but they were usually reversed during times of peace. From this point of view, the secular increase in government debt-to-GDP after WWII in most advanced countries is truly unprecedented. The accumulation of public debt could have been motivated by ambitious public investment programmes, which alongside the expansion of the welfare state, may have aimed at boosting future economic growth. However, available estimates of government investment and the government capital stock do not corroborate this possibility (see for instance Kamps, 2004). The increase in government debt was largely used to finance current expenditure.

Figure 2: Gross government debt as a share GDP in EU15

² Schuknecht (2022) offers a compact and clear overview of government debt developments in the EU.



Notes: EU15 = Belgium, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Netherlands, Portugal, Finland, Sweden, United Kingdom; US=United States of America
Source: European Fiscal Board (2021)

So, why did many advanced economies accumulate large amounts of government debt after WWII if not for armed conflicts or a higher capital stock of the public sector?³ The answer lies in the way politics affects economic choices and outcomes. In other words, the secular upward trend in government debt largely originates in the prosaic gap between what is and what should be.

When the author of this article went to university in the mid-1980s, economics was still very much centred on welfare economics, that is, it looked at economic issues through the eyes of the so-called ‘benevolent dictator’, a perfect example of an oxymoron. It was probably the economists’ version of Plato’s ancient idea of the philosopher king: a wise if not all-knowing, selfless individual whose only objective is to make all people as happy as possible with the resources available. Political economy, or the question of how actual politics affects economic outcomes, started entering mainstream economics only in the late 1980s early 1990s. It is now firmly anchored in economic science although the normative view of economics still serves as the benchmark and political economy issues, as pervasive as they may be, as deviations from that benchmark.

Looking at the drivers of government debt may not provide immediate indications about its (un)sustainability, but it helps later on when discussing ways to keep government debt on a sustainable path. That said, three common and interlinked points stand out: the promotion of fiscal policy to macroeconomic stabilisation tool, the nature of economic shocks and the politics of the budget deficit.

³ Looking at the drivers of government debt may not provide immediate indications about its sustainability, but it helps us later on when discussing ways to keep government debt on a sustainable path.

Keynes' general theory of employment, interest and money of 1936 laid the foundations of macroeconomics as we know it. Most importantly, Keynes developed a framework for fighting major economic downturns, which has shaped fiscal policymaking to this day, and for good reasons. Keynes had understood that economies do not instantly adjust to negative shocks and that active fiscal policy could be used in the short run to prop up aggregate demand and fight unemployment. This fundamental insight was readily deployed after WWII to stabilise economic activity in the wake of cyclical downturns. Keynes' framework gave lawmakers a strong economic motivation and the political confidence to recur to public debt, beyond the financing of national security or public investment.

However, clear issues emerged in the 1970s and early 1980s when in spite of significant fiscal expansions, economic activity did not return to pre-recession trends leaving countries with permanently higher rates of unemployment and a higher level of government debt. In fact, starting in the 1980s the growing use of time series analysis in economics showed that the secular upward movement of economic activity rather than following a deterministic trend, was characterised by lasting scars in the wake of major economic shocks. In the technical jargon of economists, we had to realise that real GDP does not fluctuate around a linear but a stochastic trend (see Nelson and Plosser, 1982; Stock and Watson, 1988). Many economic shocks that hit advanced economies in the 1970s and later, did not originate in a shortfall of aggregate demand and or produced lasting effects on the level of economic activity. In those circumstances, fiscal stabilisation is not very effective, but policy makers kept on stepping on the fiscal gas pedal contributing to the ratcheting-up effect of government debt highlighted in Figure 2.

Keynesian economic thinking lost ground in the economics profession giving way to a revival of the neo-classical paradigm, which played down the role of the state in economic policy making including active fiscal stabilisation. To be clear, even the new paradigm offered arguments for using government debt as a buffer, notably Barro's tax smoothing theory (Barro, 1979). But the focus was more on economic efficiency rather than on fine tuning aggregate economic activity by virtue of active fiscal policy interventions.

Still, the paradigm shift in economics and the loss of confidence in the power of active fiscal stabilisation did not stop the upward trend in government debt. It brought to the fore more fundamental issues about how fiscal policy and government debt were being used in the political process. This awareness was not necessarily an epiphany. That governments may not be composed of selfless decision makers is a rather seasoned insight testified for instance by the 'Italian school' of

public finances in the 19th century.⁴ However, in the 1980s a new branch of political economy research developed aimed at explaining the growing gap between the predictions of normative macroeconomics and actual outcomes. The main contribution of this literature has been to explain why the political process is characterised by a deficit bias, that is, the tendency to finance new expenditure by raising debt rather than new revenues.

It goes beyond the scope of this paper to describe the plethora of alternative theories explaining the deficit bias; a very useful overview is offered in Drazen (2000). One common theme running through most of the models is that lawmakers cater for the interests of specific constituencies when pushing for spending projects while ignoring the impact on the overall tax burden or future generations. It is a sophisticated way of characterising an unflattering yet fundamental predicament in political decision-making: politics often is about doing easy things today and postpone more difficult decisions to the future.

Although this tendency varies over time and across countries it has left an undeniable mark on public finances. By 2019, that is, before the Covid-19 pandemic pushed most economies into deep recessions, the debt ratio of five euro-area countries, which account for more than 40% of the euro area's aggregate output, were close or above 100% of GDP and the debt sustainability analysis of the European Commission indicated high sustainability risks in the medium term. The Covid-19 pandemic and its economic impact added another 10 to 15%.

3. The government's intertemporal budget constraint

The trend towards growing government debt documented in the previous section naturally begs the question of sustainability. Governments may not have to balance their books every year, but can they run primary deficits forever? When will they have to reduce spending, increase taxes or find other ways to address increasing debt ratios? The straightforward and obvious answer to the first question is NO, government debt cannot increase forever at least not relative to the government's sources of income. The answer to the second question is much more difficult: We do not really know for certain at which point governments need to pull the handbrake. There is no definite threshold for the debt-to-GDP ratio beyond which sovereigns face sustainability constraints. Beyond some basic principles, sustainability is a very country-specific and multidimensional concept that cannot be translated into one operational rule to be applied across countries. The broad spectrum of outcomes testifies to this predicament: Japan has reached a government debt ratio of more than 250% of GDP without raising any serious doubts about the government's ability to honour its liabilities, while

⁴ See Giardina and Mazza (2016).

some economies such as Kazakhstan or Kenya defaulted on some of their sovereign debt with debt ratios of respectively around 26 and 60% of GDP.

The first and most important reason for the elusive nature of government debt sustainability is its forward-looking nature. Whether governments will be able to honour their debt depends on future developments and the future is uncertain. This truism springs from the intertemporal solvency constraint of governments, the starting point of all discussions about the sustainability of government debt. In particular, the change of government debt (ΔB_t) between any given two years is determined by the interest due on the pre-existing level of debt (rB_{t-1}) and the primary budget deficit, i.e. the difference between government spending net of interest payments G_t and government revenues T_t :

$$B_t - B_{t-1} = rB_{t-1} + G_t - T_t \quad (1)$$

Since government debt is normally expected to be serviced via the sovereign's privileged access to the income produced by economic agents, it is typically expressed in percent of GDP:

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = (r - g) \frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t} \quad (2)$$

$$b_t - b_{t-1} = \rho b_{t-1} - ps_t$$

where lower case letters stand for GDP ratios, ρ for the difference between the average interest rate on government debt r and the rate of GDP growth g ; ps denotes the primary budget balance, again in % of GDP. Solving equation (2) recursively forward in time gives the following expression:

$$b_t = \sum_{i=1}^N \frac{ps_{t+i}}{(1+\rho)^i} + \frac{b_{t+N}}{(1+\rho)^N} \quad (3)$$

where the second term on the right-hand side is assumed to go to zero as N grows very large:

$$\frac{b_{t+N}}{(1+\rho)^N} = 0 \quad \text{for } N \rightarrow \infty$$

This assumption has an important economic meaning: it states that governments will not run Ponzi games, i.e. they will not engage in an inherently unsustainable scheme where it consistently issues new debt to pay interest owed on existing debt. Hence, the governments' intertemporal solvency constraint reduces to

$$b_t = \sum_{i=1}^N \frac{ps_{t+i}}{(1+\rho)^i} \quad (4)$$

In words, equation (4) amounts to a simple statement. Government debt is deemed solvent as long as the present or future stock of debt is covered by future primary surpluses. Although very intuitive, this definition does not offer any clues about how to determine the sustainability of public finances

in practice. Most importantly, it does not impose any upper limit on the debt-to-GDP ratio. Equation (4) can be satisfied for any existing level of government debt, even if a multiple of GDP, as long as governments at some point switch from running deficits to running surpluses even if in a distant future. In point of fact, the constraint implied by equation (4) is a very mild one. The only way for a government to breach it would be to make a thoughtless announcement not to honour existing debt. In all other cases, and assuming away events that objectively limit the governments' privileged access to the resources of economic agents, it can always pledge a future course of action where revenues will exceed expenditure.

Even though the intertemporal solvency constraint imposes a very mild restriction, the law of motion in equation (2) is often used to calculate alternative debt scenarios for a range of macroeconomic assumptions going forward. Such scenarios may not provide specific clues about sustainability but still help appreciate under which conditions the government debt-to-GDP ratio will continue to increase, stabilise or decrease. For instance, they can provide tentative answers to questions like by how much does the primary budget balance have to improve to reduce debt over GDP to a certain reference value or target? or what is the impact on debt dynamics of a given increase in the interest rate or a given decline in the rate of economic growth?

An increasingly popular extension of the scenario analysis is probabilistic in nature. It consists in simulating a very large number of debt paths based on the known statistical distributions of all the variables entering equation (2), the law of motion of government debt. The results of such a stochastic method are presented as fan charts, which reveal the degree of uncertainty surrounding macroeconomic projections and the ensuing debt trajectories.

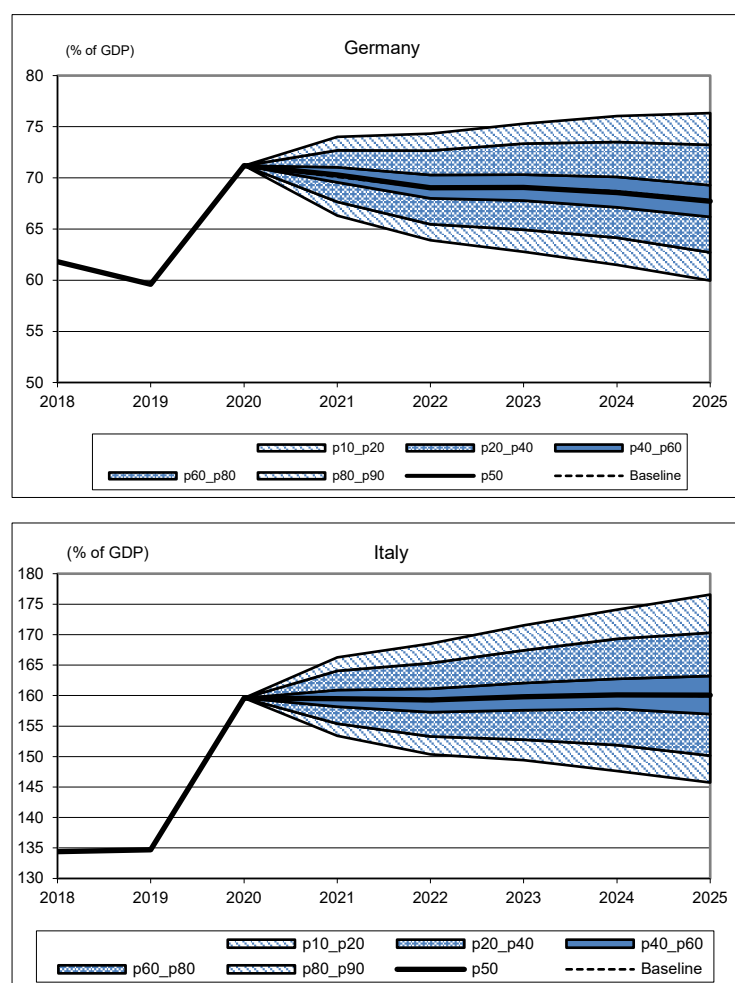
Figure 3 shows concrete examples of fan charts for two large euro area countries - Germany and Italy - taken from the European Commission's debt sustainability monitor of 2020. The charts feature the actual evolution of the debt-to-GDP ratio up to the last year for which outturn data are available (in the cases at hand 2020) followed by the distribution of the debt-to-GDP ratio over a five-year projection horizon derived from the country-specific history of economic shocks to the relevant variables. The conic shape of the distribution reflects the growing degree of uncertainty as the projection horizon increases. The width of the cone offers insights into how likely or unlikely certain outcomes can be.

Starting with Germany, the fan chart supports the following story. Considering fiscal policies known at the time the graph was produced, the most likely outcome - the baseline - was a moderate decline of the debt-to-GDP ratio over the subsequent five years. An increasing trend was not excluded, but a debt ratio of more than 80% of GDP was considered very unlikely given Germany's history of policies

and shocks. At the five-year forecast horizon, 90% of the possible outcomes were expected in a range of 16% of GDP around the baseline scenario.

Reflecting both a history of larger shocks and a higher initial level of debt, Italy's distribution of possible outcomes was much wider; at the end of the forecast horizon, almost twice as large as Germany's, namely 31%. The baseline projection pointed to a broadly stable debt ratio at around 160% of GDP, which under very fortunate circumstance was expected to drop to 145% or under very unfortunate circumstance to climb above 170%.

Figure 3: Stochastic debt projections 2021-2025



Source: European Commission

Once again, while offering insights about the spectrum of likely outcomes, neither deterministic scenarios nor a stochastic analysis provide clear answers to the question of sustainability or solvency. In practice, only a good dose of judgment and a case-by-case assessment of a wide spectrum of elements can shed some light on an ultimately elusive concept.

Before moving on to the question of how the sustainability of debt is assessed in practice, one final but important qualification on the intertemporal solvency constraint of governments is in order. Equation (4) may look like an expression that transcends historical or institutional considerations. It seems to encapsulate a truth that must hold always and everywhere: unless repudiated unilaterally, government debt is to be repaid eventually by running future budgetary surpluses. While this is correct as a very general statement, institutional developments have played a role. Until the late 1980s and early 1990s, many central banks, including in advanced countries, were under government control. Their decisions were either heavily influenced or directly taken by governments. Hence, from a historical perspective, the move towards central bank independence is a fairly recent innovation. Until then, governments had an additional instrument at their disposal to finance debt: monetary financing. More seasoned macroeconomic textbooks or books focusing on budgetary policies typically account for this possibility when characterising the intertemporal budget constraint.⁵ The respective extension of equation (2) looks as follows:

$$b_t - b_{t-1} = \rho b_{t-1} - p s_t - \Delta h_t \quad (5)$$

where the addition at the right hand-side Δh_t stands for seigniorage or the change of the monetary base in per cent of nominal GDP ($\frac{\Delta H}{Y^P}$); the monetary base is the sum of currency issued by the central bank plus the reserves commercial banks hold with the central bank. Solving equation (5) recursively forward and applying the no-Ponzi-game condition yields:

$$b_t = \sum_{i=1}^N \frac{p s_{t+i} - \Delta h_{t+i}}{(1+\rho)^i} \quad (6)$$

In words, equation (6) says that in case a government cannot borrow more on the market or does not want to increase taxes to finance higher expenditure it can recur to monetary financing, that is, it can issue new debt covered by an increase in the monetary base. To non-economists this option may look like a free lunch, but it comes with an important downside. Abundant experience has shown that if extended in time and involving significant amounts, monetary financing will eventually be self-defeating through a surge in inflation,⁶ which in turn poses a threat to the overall economic stability of a country. From this point of view, central bank independence is the institutional safeguard against the governments' temptation to soften their intertemporal budget constraint at least temporarily via monetary financing.

⁵ See for instance Buiter (1990).

⁶ The demand for money is decreasing in inflation. If inflation grows to high, fewer and fewer people and banks will actually be willing to hold the additional money printed by the central bank.

For this safeguard to function properly, economic policy makers should avert fiscal dominance. Fiscal dominance is a situation in which public finances embark on a path, which de facto puts the central bank into a difficult corner where it has to choose between pursuing its price stability objective and overall financial stability. When public finances are excessively strained, an increase in policy rates to counter inflation can have negative effects on the sustainability of public finances and destabilise the sovereign(s) involved.

4. Assessing debt sustainability in practice

In view of the almost tautological nature of the intertemporal solvency constraint of governments, more restrictive or operational criteria are used in practice to form a view of the sustainability of public finances. They typically involve the notion that government debt should not increase forever relative to some measure of the capacity to repay, which in most cases translates into a reference value for the debt-to-GDP ratio. Such reference values are not meant to directly discriminate between sustainable or unsustainable levels of government debt. They are rather used as simple points of reference for a more detailed or reasoned economic assessment. For instance, if the initial debt ratio of a given country is far above the reference value, some kind of adjustment may be considered to be necessary.

The well-known 60% of GDP reference value laid down in the EU's Stability and Growth Pact is a prominent example. The number is not underpinned by any meaningful economic reasoning. Although not formally documented, it was chosen because in the early 1990s, when the Maastricht Treaty was drawn up and signed, it was the average debt-to-GDP ratio across EU member states. Its notoriety stands in stark contrast to the actual role the reference value plays in the application of the EU fiscal rules. Concretely, a debt-to-GDP ratio of more than 60% of GDP is neither a necessary nor a sufficient conditions for recommending a fiscal adjustment. The Stability and Growth Pact encompasses a wide range of provisions, covering an equally wide range of economic and fiscal considerations that eventually feed into and determine the fiscal policy guidance issued to EU member states.

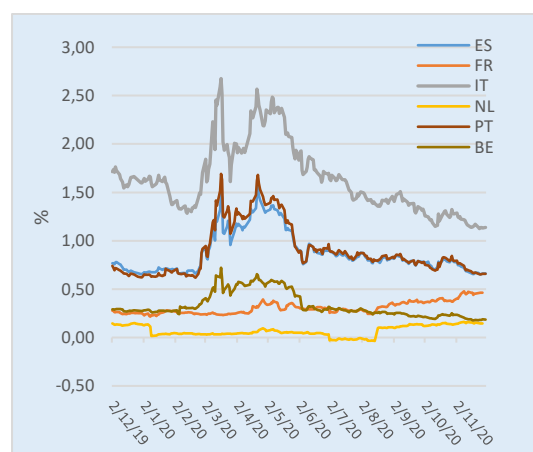
As a matter of fact, in spite of the tight net of rules and provisions of the Stability and Growth Pact, average government debt ratios in the EU have increased considerably over the years, ultimately altering the understanding or appreciation of what represents a useful reference value for the debt-to-GDP ratio. Many observers, including from prominent institutional entities, consider the 60% of GDP reference value of the Stability and Growth Pact as outdated (e.g. Francová et al., 2021) and call for new, higher ones. Are they right or wrong? In view of the inherent difficult to operationalise the solvency of governments, a higher reference value of say 100% of GDP or more would, a priori, be

equally arbitrary as the current 60% of GDP. There is, however, one practical and possibly important difference: the power of facts. Debt levels that may have been considered unsustainable decades ago, turned out to be sustainable over time. From this point of view, the ongoing and ultimately unresolved discussion about the right reference value for the government-to-GDP ratio is a probing exercise, a bit like exploring a mine field: we know they are hidden somewhere in the ground, but we do not know where.

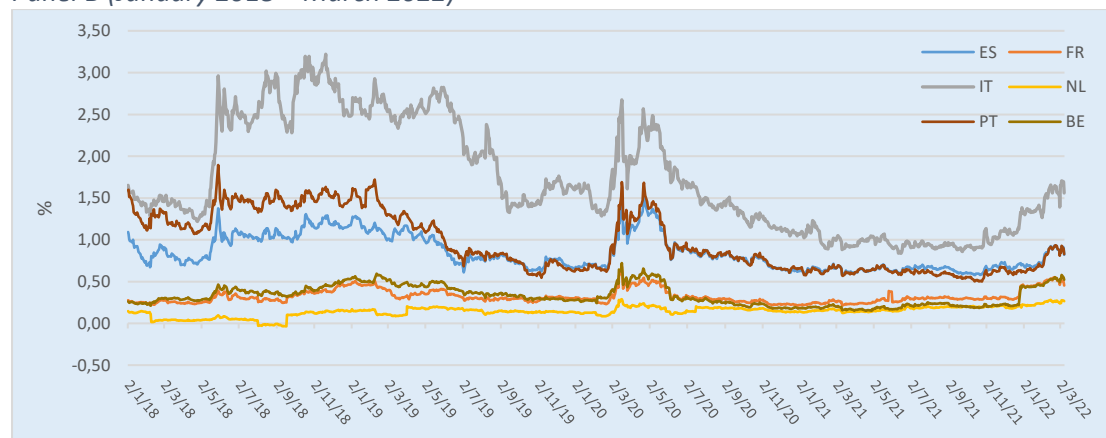
In the EU, we got a fair taste of this probing exercise right after the Covid-19 pandemic triggered a sharp and unprecedented economic downturn across all EU member states. A truly common and exogenous shock that gave rise to very diverging assessments by financial markets of how EU governments would be able to cope with the crisis. In spring 2020, right after most EU member states had adopted strict lockdown measures to contain the growing casualties of the Covid-19 virus, financial markets started asking much higher yields on debt issued by certain euro area sovereigns (see Panel A of Figure 4).

Figure 4: Yield spreads compared to the 10-year German Bund

Panel A (December 2019–November 2020)



Panel B (January 2018 – March 2022)



Notes: BE=Belgium, ES=Spain, FR=France, IT=Italy, NL=Netherlands, PT=Portugal
Source: IHS Markit

It soon became clear that unless additional resources outside the direct control of the affected national governments would be made available, sustainability could be at risk. In line with equation (2), vulnerable countries could have reacted by either announcing and initiating significant consolidation programmes (i.e. by targeting a sequence of higher future budgetary surpluses $\sum_{i=1}^N \frac{ps_{t+i}}{(1+\rho)^i}$) or with a write-down of government debt (e.g. by cutting the existing stock of debt relative to GDP b_t). However, both courses of action were excluded. Launching a consolidation programme in the middle of a pandemic that was claiming a large number of lives was considered to be unacceptable and to be too costly in terms of the long-run growth capacity of a country. A debt write-down was also excluded, most likely due to the potentially far-reaching implications for the overall financial stability of the euro area. The sovereign defaults of Greece and Cyprus during the euro area sovereign debt crisis, were rather circumscribed compared to a potential default of one or several larger countries in the single currency area.

As a result, two important decisions were taken: (i) in the short run the ECB launched the Pandemic Emergency Purchase Programme (PEPP) through which it committed to buying significant quantities of sovereign debt; and (ii) the EU agreed to the Next Generation EU initiative (NGEU), empowering the European Commission to raise EU debt to finance investment and structural reforms in the member states. The effect of both decisions on the intertemporal solvency constraint is easily explained. From a macroeconomic perspective, and leaving aside the many institutional peculiarities of the euro area, the ECB's PEPP allowed member states to increase their government debt through the expansion of the monetary base:

$$\Delta b_t = \Delta h_t + \Delta b_t^p = \rho b_{t-1} - ps_t \quad (7)$$

Equation (7) extends (2) by simply allowing for the fact that a given increase in government debt Δb_t can either be financed by selling debt to the private sector (Δb_t^p) or (directly or indirectly) to the central bank (Δh_t). While equation (7) is functionally accurate, in its communication the ECB did obviously not present the PEPP as monetary financing of sovereigns, because that would not be consistent with its mandate. It characterised the PEPP as a *“non-standard policy measure to counter the serious risks to the monetary policy transmission mechanism and the outlook for the euro area posed by the coronavirus (Covid-19) outbreak.”*⁷ The distinction between monetary financing and stabilising the monetary transmission channel in the single currency area reflects the more fundamental distinction between solvency versus liquidity. In practice, it is very tricky to tell the one

⁷ <https://www.ecb.europa.eu/mopo/implement/pepp/html/index.en.html>.

from the other: a liquidity crisis can deteriorate into insolvency or an insolvency issue can in the short term be addressed with liquidity support.

Debt raised at the EU level via the NGEU initiative is passed on to member states in the form of grants or concessional loans. When passed on as concessional loan it still increases the national debt-to-GDP ratio (Δb_t) but for countries under market pressure the increase comes with the advantage of a lower interest rate. The concessional rate results from the fact that debt issued under the NGEU initiative is backed by the commitment of all EU member states. When passed on as a grant, NGEU funds are recorded as additional revenue of national governments, which can be used to increase expenditure without affecting the deficit. Adjusting equation (2) accordingly yields:

$$\Delta b_t = \Delta b_t^{\text{NGEU}} + \Delta b_t^p = \rho b_{t-1} + \Delta G_t^{\text{NGEU}} + G_{t-1} - \Delta R_t^{\text{NGEU}} + R_{t-1} \quad (8)$$

where the increase in primary expenditure under the NGEU initiative (ΔG_t^{NGEU}) is backed by EU grants (ΔR_t^{NGEU}). From a long-term perspective, the difference between NGEU loans or grants is purely notional, as all EU debt will have to be paid by future contributions of EU member states. Hence, the NGEU initiative does not suspend the fundamental solvency principle embodied in equation (2); it simply acts as a temporary bridge for countries that find it difficult to fund themselves on the market at sustainable rates.⁸

The financial markets jitters at the onset of the Covid-19 crisis beg the more fundamental question of why all of a sudden private lenders significantly altered their assessment of some EU sovereigns who until then they had considered to be viable or at least not at imminent risk. For starters, the episode underscores in a very clear manner an obvious but crucial predicament of any forward-looking assessment: Expectations can and do change abruptly and can even become self-fulfilling. Since there is no objective way to anticipate or know whether governments will be in a position to effectively take the measures necessary to ensure solvency going forward, any significant change in the economic and political environment can shift expectations of financial markets and, in turn, affect the sustainability of the government debt.

At the same time, not all countries are equally vulnerable to changes in market expectations. As indicated above, in spring 2020 when EU governments reacted to the deadly expansion of the Covid-19 pandemic by locking down large parts of their societies and economies, yield spreads widened the most on Italian sovereign bonds. They almost doubled in a matter of weeks, reaching more than

⁸ The actual net benefit (cost) of the NGEU initiative consists in receiving more (less) concessional loans or grants via the NGEU than the present value of future payments to the EU needed to repay EU debt.

250 basis points. They posted a sharp drop after the ECB had announced the PEPP programme mid-March, and surged again in the course of April until the EU agreed the NGEU initiative. Markets also started asking somewhat higher yields from Spanish, Portuguese, French, Belgian and Irish governments, but to a much lesser degree, and remained completely relaxed about Dutch government debt.

What made Italy stand out in the eyes of the financial markets was not only a higher level of government debt-to-GDP ratio; other euro area countries were running debt levels of close to or in excess of GDP, too, notably Portugal, Belgium, France and Greece. There were at least two other important elements driving market concerns: national politics and economic growth performance.

Italy's political system is notorious for its high degree of fragmentation and instability. In its post-WWII history the country had 66 governments, which on average lasted just over one year. The government in office at the beginning of 2020 was no exception. It relied on changing collations of parties mastering a slim majority in Parliament sufficient to survive, but not large enough to agree on major budgetary interventions. Financial markets clearly shared this assessment asking for a higher risk premium to buy or hold government debt.

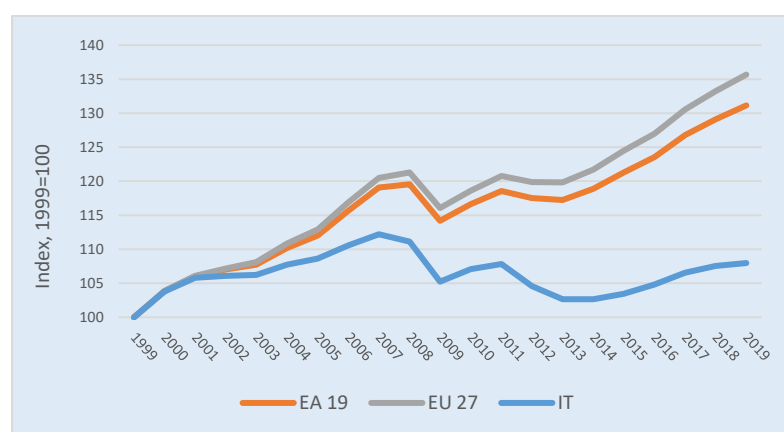
Panel B of Figure 4 highlights another even more blatant episode underscoring the import of financial markets and their assessment of political risks. In March 2018, general elections in Italy had produced a hung parliament eventually giving rise to an unlikely populist coalition between the anti-system Five Star Movement and Salvini's League. In spite of the many ideological differences, the two parties somehow converged on the idea that concerns about Italy's public debt may have been overblown in the past and that national political prerogatives would weigh more than the perimeters imposed by the EU's Stability and Growth Pact. Financial markets reacted visibly and nervously to the new political constellation giving rise to a sharp increase in yield spreads. In clear contrast to what would happen some two years later at the onset of the Covid-19 pandemic, and due to the idiosyncratic nature of the underlying issue, the re-pricing of sovereign risks was limited to Italy. The yield spreads on government bonds issued by most other euro area sovereigns did not change much.

Naturally, Italy is not the only country with a fragmented political landscape. In the last decades, the number of parties has been increasing in most if not all EU countries making the formation of stable governments more difficult. What adds to Italy's political instability is its dismal growth performance. Between 1999 and 2021 Italian real GDP increased by a meagre 0.3% on average per year, as opposed to 1.3% and 1.4% in the euro area and the EU respectively. As can be seen from equation (2), the pace of economic expansion denoted as g plays a crucial role for the sustainability of public finances: higher (lower) growth dampens (increases) the effect of interest payments and of

the primary deficit. The intuition may be obvious but still worth recalling: from a macroeconomic perspective, the level of GDP is a proxy for the government's tax base, meaning that higher rates of economic growth allow sovereigns to either finance growing expenditure programmes or accelerate the pace of debt reduction.

The implications of a slow(er) rate of economic expansion become particularly apparent when looking at cumulated rates of growth. In the last 22 years, the euro area and the EU managed to expand their level of total domestic income in constant prices by close to 30%; Italy's real GDP increased by less than 5% in the same period producing a corresponding shortfall in government revenues and making it very difficult for the country to reduce government debt relative to GDP while financing existing expenditure programmes, let alone new ones.

Figure 5: Real GDP



Notes: EA19 = Aggregate of the 19 euro area member states, EU 27=Aggregate of 27 EU member states, IT=Italy
Source: European Commission

In the recent past, prominent economists led by Olivier Blanchard argued that thanks to a secular decline in interest rates raising new debt might no longer pose a threat to the sustainability of public finances (see Blanchard et al., 2021). Their argument relies on the observation that in many countries interest rates on new government debt had fallen below the rate of economic growth - in some cases even turning negative - combined with the assumption that interest rates would stay low for an extended period. A quick look at equation (2) reveals the implications of such a low-for-long narrative: if r is smaller than g , that is, if the rate of economic growth exceeds the rate of interest paid on government debt, the government can incur new debt by running primary deficits and still keep the debt-to-GDP ratio constant or even on a declining path. While this conclusion is irrefutable in algebraic terms, there are two interrelated questions that spring to mind: (i) do or will all economies end up with interest rates lower than economic growth?; and (ii) how long will or can such a constellation last?

Finding a definitive answer to the two questions is very difficult. However, both theoretical and empirical research suggest that the interest rate on government debt also depends on the level of the debt-to-GDP ratio itself. For instance, in a very comprehensive study published in 2020, a group of IMF economists shows that higher government debt goes along with on average higher $r-g$, shorter spells of negative $r-g$, and, most importantly, larger increases in interest rates in response to an unexpected decline in domestic output or an increase of global volatility (see Lian et al., 2020). In sum, the strategy of running persistent primary deficits while $r-g$ is negative can be self-defeating and exposes governments to larger risks in the event $r-g$ turns positive again. The likely link between the level of debt and $r-g$ is borne out by recent developments in the EU. In 2013-2019, the years of economic recovery from the euro area sovereign debt crisis, when g was consistently positive and increasing, three countries recorded yields on debt issued by their sovereign higher than GDP growth: Italy, Greece and Cyprus, all of them with an average debt-to-GDP ratio of more than 100 %.

Besides politics and $r-g$, the assessment of government debt sustainability can and usually does encompass other factors. The range of potential candidates is wide. Prominent examples include:

- The adaptability of public health and social security systems to demographic change, where for instance defined benefit systems generally imply higher future deficits or unpopular political decisions;
- the share of government debt issued in foreign currency, where a higher share indicates a higher vulnerability to exchange rate fluctuations, notably depreciations of the domestic currency;
- the share of government debt held by domestic lenders, where a higher share indicates a lower risk of a unilateral restructuring of the terms of debt;
- the share of short-term debt in total government debt, where a higher share signals a higher vulnerability to increases in interest rates;
- the share of government debt held by the domestic banking sector, where a higher share offers a potential indication of how strongly the so-called sovereign-bank loop will play out in the event of a large shock; the sovereign-bank loop denotes a mutually reinforcing interaction where possible doubts about the solvency of a sovereign affect banks holding a large share of sovereign bonds or possible doubts about the solvency of domestic banks have negative repercussions on sovereigns who tend to bail out banks to avert a meltdown of the banking sector;
- debt service to government revenues, where a low ratio can signal a higher risk of not being able to service or roll-over maturing debt;

- the number of extreme weather events linked to climate change, where a higher occurrence is likely to put pressure on public budgets either with a view to mitigating climate change or covering part of the costs caused by extreme weather events.

The elements discussed and/or listed in this section are likely to feature more or less prominently in all assessments of government debt sustainability, and there can be more depending on the country context.⁹ At the same time, there is no general template or method for analysing them, weighing their relative importance and drawing conclusions. There are a thousand different ways of prognosticating and assessing all the elements that determine the course of government debt and there is no fail-proof way to divine when financial markets will lose confidence in a sovereign's capacity or determination to take corrective measures if and when needed.

To use a famous analogy from the history of the US Supreme Court, assessing the (un)sustainability of government debt is a bit like defining obscenity: you know it when you see it. This is in short the fundamental dilemma: public finances are sustainable until they are not. That is also why over time it has become good policy to put in place procedures, rules and institutions aimed at keeping fiscal policies on a prudent path and leaving enough safety margins to deal with the inevitable arrival of economic shocks.

5. Sustainability of government debt in the EU

Most EU member states (19 out of 27) have adopted the euro as their currency and more will do so in the future. In a monetary union, the sustainability of government debt assumes additional significance due to the spill-over effects national fiscal policies can produce on other member states and on the effectiveness of centralised monetary policy. If public finances in any of the individual member states go out of hand, the fallout does not stop at the borders of the country concerned. Negative developments will percolate through the entire union due to the high level of economic and financial integration. Most importantly, national fiscal authorities may not internalise the impact of their fiscal policies on the monetary commitment of the ECB, thereby affecting its capacity to deliver on its price stability objective (see, for instance, Uhlig, 2003). To address such externalities and protect the ECB from the risk of fiscal dominance, in the 1990s prior to the introduction of the euro, the EU agreed to a common set of fiscal rules called the Stability and Growth Pact and excluded bail-outs.^{10 11}

⁹ The assessment of resource rich countries will for instance include an estimation of the respective treasures of the soil and a forecast of their prices.

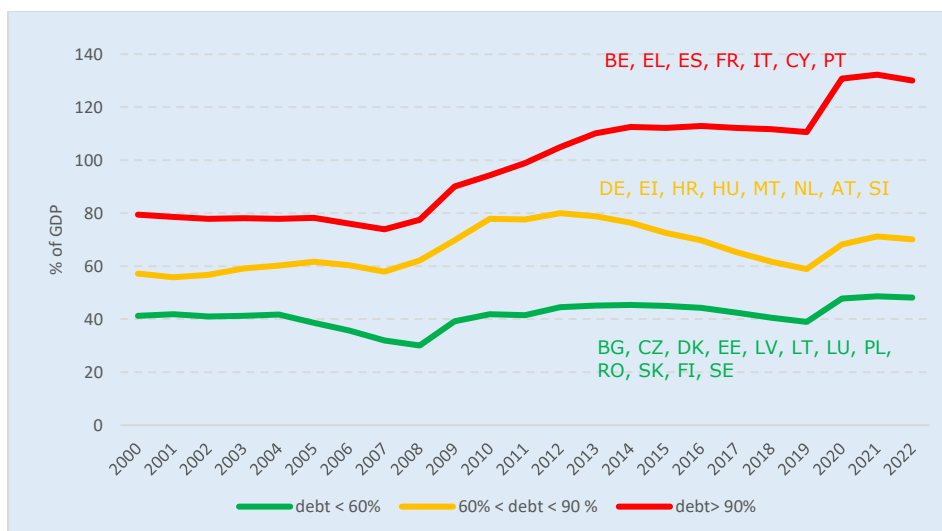
¹⁰ For a concise presentation and discussion of the SGP see Larch and Jonung (2014).

Although pursuing the same overall goal, the Stability and Growth Pact and the no-bail-out clause operate via different channels. The no-bail-out clause is a dissuasive device: It signals to member states that the Union would not jump in and take on national debt in case of troubles. Such a signal is expected to deter governments from running unsustainable budgetary policies. The Stability and Growth Pact, by contrast, is a preventive and corrective instrument setting limits to the discretion of national fiscal policy makers where the 3% of GDP reference value for the deficit and the 60% of GDP reference value for debt are the best-known road markings for national fiscal policy makers.

Did the two instruments achieve their objective? Unfortunately, there is no clear-cut answer. Experience has been very mixed since the no-bail-out clause and the Stability and Growth Pact came into force in the course of the 1990s. On one side of the spectrum, there were unequivocal episodes of unsustainable government debt. As mentioned above, two euro-area countries - Greece and Cyprus - restructured their debt or saw their debt restructured in the wake of the global financial crisis and as part of a macroeconomic adjustment programme managed by international lenders. Larger high-debt countries did not restructure their debt but still came under considerable market pressure and were forced to implement painful consolidation programmes, with or without the help of international lenders, when the economy was tanking. On the other side of the spectrum, we have countries with on average lower government debt ratios that ran fiscal policies by the book: they let government debt increase on the back of recessions to compensate for the drop in private demand and brought debt back to safer levels during upturns. Figure 6 illustrates the experience in terms of diverging debt developments.

Figure 6: Government debt to GDP, by group of EU countries

¹¹ The relevant pieces of EU legislation are very explicit about the ultimate goal of the Pact: “sound government finances as means of strengthening the conditions for price stability and for strong sustainable growth conducive to employment creation”.



Notes: Countries are grouped by the average debt-to-GDP ratio in 2011-2019. AT=Austria, BE=Belgium, BG=Bulgaria, CY=Cyprus, CZ=Czech Republic, DE=Germany, DK=Denmark, EE=Estonia, EI=Ireland, EL=Greece, ES=Spain, FI=Finland, FR=France, IT=Italy, HR=Croatia, HU=Hungary, LT=Lithuania, LU=Luxembourg, LV=Latvia, MT=Malta, NL=Netherlands, PL=Poland, PT=Portugal, RO=Romania, SE=Sweden, SK=Slovakia, SI=Slovenia.

Source: European Fiscal Board

The debate on why the fiscal framework has visibly worked for some countries but not for others is very much divided. There are basically two camps: those who blame the vulnerability of sovereigns on the incomplete nature of the single currency area, and those who lament the lack of prudent fiscal policy making on the part of high debt countries. Both camps are right and wrong at the same time. The camp blaming the incomplete nature of the single currency area puts the emphasis on the need for proper risk sharing. Pioneered in the 1960s by Robert Mundell, the theory of optimal currency areas clearly and convincingly states that a well-functioning currency union needs an instrument at the central level in charge of managing fiscal transfers to help countries hit by idiosyncratic shocks (Mundell, 1961). In today's parlance, such a mechanism is referred to as a central fiscal capacity. And indeed, the EU and euro area do not have such a central fiscal capacity. The EU budget is too small (1% of EU GDP as opposed to on average 45% of GDP of national budgets) and, more importantly, it needs to be balanced by law, i.e. it cannot record deficits. In short, there is no permanent mechanism at the EU level to share economic risks across countries and time by means of fiscal transfers. Although it involves some elements of risk sharing, by offering loans at concessional terms, the European Stability Mechanism (ESM) is generally not considered a central fiscal capacity because loans are linked to policy conditions. In the US, by contrast, there are budgetary arrangements involving the federal and state budgets, which allow Washington to channel transfers to individual states that find themselves temporarily and without their own doing in economic difficulty and with higher levels of unemployment.¹²

¹² For a detailed description of the US mechanism see Kirkegaard (2018)

The camp blaming the lack of fiscal discipline focuses on risk reduction, a condition that is equally prominent in the theory of optimal currency areas. Risk reduction stands for the capacity of a country to minimise the risk of country-specific shocks or absorb economic shocks as quickly as possible if and when they occur. It involves price and wage flexibility, the mobility of labour within and across countries as well as similar business cycles including by avoiding unwarranted fiscal expansions, which eventually reduce fiscal space needed for stabilisation purposes when an important country-specific shock hits. There are two main instruments through which the EU aims at ensuring risk reduction: (i) the convergence criteria that member states have to meet before joining the euro; and (ii) policy recommendations issued each year as part of the EU's broader policy coordination framework, the so-called country-specific recommendations (CSRs). While the impact of these policy instruments is difficult to quantify, the prevailing sense is best characterised by the title of a dedicated performance audit conducted by the European Court of Auditors in 2020: *Country-Specific Recommendations address important issues but need better implementation*.¹³ In other words, the defenders of risk sharing are of the view some member states are not making enough effort towards making their economies more resilient and fear a central fiscal capacity would further weaken the incentives for risk reduction.

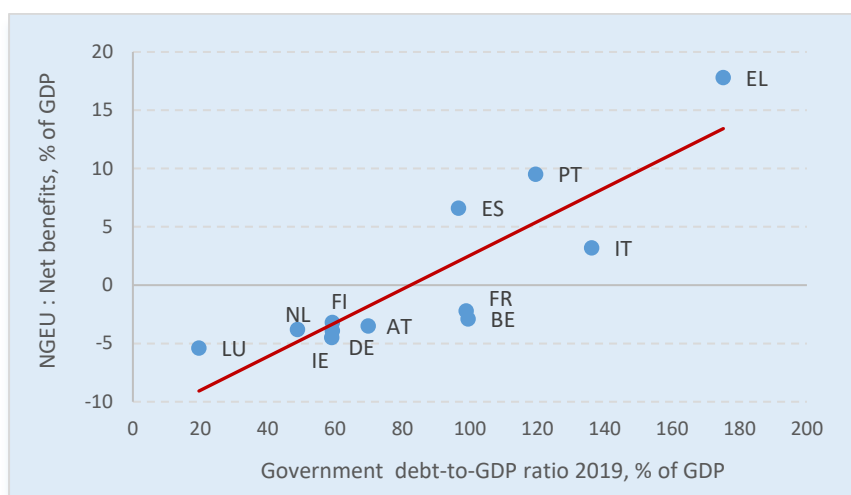
Although both camps make very valid points, they are also both wrong in the sense that they downplay the argument of the other side. Within the theory of optimal currency areas elements of risk sharing and risk reduction are two sides of the same coin. The dispute between the two camps is not about who is right or wrong from an economic point of view. It is a political struggle about the degree of economic and political integration. There are those who see merit in going for a complete Economic and Monetary Union including a genuine central fiscal capacity backed by the necessary political arrangements, and there are those who see current arrangements with the single market and stable exchange rates as sufficient. Any attempt to push either side has only hardened respective positions. Changes in the status quo are very demanding because they require changes in the EU Treaty, which can only be achieved with unanimity plus a popular referendum in some member states. Since in the current context this is a very steep obstacle to clear, innovations are still possible but typically associated with major crises when the status quo is perceived to be at risk.

The Covid-19 pandemic was the last clear case in point. In the wake of an unprecedented economic slump, financial markets started repricing sovereign risks asking yields on the debt of some sovereigns that would not have been sustainable in the long run. The risk of default of (a) large member state(s) was perceived to be tangible. As indicated in the previous section, the EU reacted

¹³ https://www.eca.europa.eu/Lists/ECADocuments/SR20_16/SR_european-semester-2_EN.pdf

on two main fronts. The ECB decided to launch a new asset purchase programme (the PEPP) with the clear aim of stabilising sovereign debt markets; and the Council of the European Union agreed to the Recovery and Resilience Facility which allows the EU to raise debt backed by future payments to the EU budget or by adopting new resources for the EU budget. Both initiatives widen, at least temporarily, the intertemporal solvency constraints of some member states (see section 4). Since the EU is not a sovereign with its own land and its own GDP, the PEPP and the RRF initiative amount to a redistribution across countries. This may be less evident for the PEPP, which is implemented by the ECB with the capital key of national banks as benchmark for the allocation across jurisdictions.¹⁴ However, the ECB made it clear that it would be flexible based on market conditions, which is another way of saying it may and did buy debt of certain sovereigns in excess of what is implied by the capital key. By contrast the redistribution is clearer for the RRF, not least because Commission documents accompanying the legislative proposal included estimates of how much each EU country would receive in terms of transfers and how much they would have to contribute later on to repay the debt incurred by the EU.¹⁵ Figure 7 plots the estimated net benefits by country against the level of government debt for the high-income countries in the EU. The pattern is clear: the RRF implies a transfer from low-debt to high-debt countries.

Figure 7: Estimated net benefits of the RRF and initial government debt in high-income EU countries



Notes: AT=Austria, BE=Belgium, DE=Germany, EL=Greece, ES=Spain, FR=France, FI=Finland, IT=Italy, PT=Portugal, LU=Luxembourg, NL=Netherlands

Source: European Commission

The PEPP and RRF are both temporary instruments. The ECB already confirmed it would end the PEPP in March 2022 as previously announced and the RRF is based on article 122 of the EU Treaty,

¹⁴ The ECB's capital key reflects the share of the participating countries in the total population and gross domestic product of the EU. The two determinants have equal weighting.

¹⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0098&from=EN>

which can only be used in exceptional occurrences beyond the control of member states. Hence, once the EU economies are back to normal the usual constraints of EU economic governance are likely to apply and the two camps of EU member states described above will continue to defend their entrenched arguments until a new major crisis leads to compromise on a new institutional innovation. The discussions around how to respond to the challenges of the Russian aggression in Ukraine are an obvious example.

However, even if in the future the EU eventually decided to go for a genuine and permanent fiscal capacity that can borrow on the market so as to share risks across countries and across time, the fundamental problem of the intertemporal solvency constraint would also apply to the EU sovereign. It may have deeper pockets than individual member states, but not bottomless ones.

6. Conclusions

Governments have a tendency to overspend and to accumulate debt. In the distant past, debt was raised to finance armed conflicts and reduced or repudiated afterwards. Since the end of WWII we have seen a secular upward trend unrelated to wars or major efforts to increase public capital. Rather, the trend has been associated with the expansion of the welfare state and by the policymakers' ambition to stabilise aggregate demand when potential output follows a stochastic rather than a stable path of expansion.

In a number of EU countries, the debt-to-GDP ratio exceeded 100% of GDP well before in 2020 the Covid-19 pandemic forced countries to mitigate the impact of the ensuing sharp economic downturn by issuing significant amounts of new debt. As a result, the sustainability of public debt is receiving growing attention unfortunately without generating new major insights about the basic question of when and why a given country's debt will become unsustainable. Assessing the (un)sustainability of public debt is and remains a murky business because it essentially involves the assessment of future developments. The most commonly used methods do not provide definitive answers and their application is more of an art than a science. The crucial concern in practice revolves around the possible response of financial markets typically at the onset of major economic shocks when sovereign risks are being reassessed in an abrupt manner leading to an increase in yields of vulnerable countries, countries with a high debt level, meagre economic prospects and complex politics.

The economic and political reasons for increasing government debt are well understood and instruments have been deployed at both the national and the EU level, to stop and possibly revert the upward trend. However, results have been mixed at best. There are countries who have

followed and will continue to follow a prudent course of action and thus manage(d) to keep government debt comparatively low or broadly stable. At the same time, there are quite a few countries who, for a number of reasons, did not manage to keep government debt from growing relative to GDP.

Whenever the second group of countries faced sudden headwinds from financial markets in the wake of shocks, the EU so far agreed to launch initiatives helping national governments in difficulties. After the global financial crisis, help was mostly linked to strict conditions and in isolated cases involved debt restructuring. In the wake of the Covid-19 pandemic – a genuinely exogenous shock claiming human lives - temporary transfer mechanisms were considered more appropriate. In both cases, the political debate revealed a deep-rooted division among member states about the ultimate goal of EU economic integration: a complete Economic and Monetary Union versus a single market with stable exchange rates. This division has implications for how issues of debt sustainability are handled in practice in the member states. However, it would be misleading to assume a genuine monetary union would solve the issue of government debt sustainability altogether. Even countries such as the US are ultimately bound by the intertemporal solvency constraint. Its status and political system may give them the credibility to access financial markets at very favourable conditions and the central bank can step in as lender of last resort more easily. But this does not mean they have found the key to the utopian land of plenty.

References

- Barro, R.J. (1979) On the Determination of Public Debt, *Journal of Political Economy*, 87(5): 940-971
- Blanchard, O., A. Leandro and J. Zettelmeyer (2021) Redesigning EU Fiscal Rules: From Rules to Standards, PIEE Working Paper 21-1.
- Buiter, H. W. (1990) Principles of Budgetary and Financial Policy, New York: Harvester Wheatsheaf.
- Drazen, A. (2000) Political Economy in Macroeconomics, Princeton: Princeton University press.
- Francová, O., E. Hitaj, J. Goossen, R. Kraemer, A. Lenarčič, and G. Palaodimos (2021) EU fiscal rules: reform considerations, ESM Discussion Paper 17.
- Giardina E., Mazza I. (2016) Public Choice, Economics of Institutions and the Italian School of Public Finance. In: Rizzo I., Towse R. (eds) The Artful Economist. Springer, Cham.
https://doi.org/10.1007/978-3-319-40637-4_4.
- Kamps, Ch. (2004) Estimates of Government Net Capital Stocks for 22 OECD Countries, IMF Staff Papers, 53(1): 120-150.
- Keynes, J. M. (1936) The General Theory of Employment Interest and Money, London: Palgrave Macmillan.
- Kirkegaard, J.F. (2018) A More Perfect (Fiscal) Union: US Experience in Establishing a 16 Continent-Sized Fiscal Union and Its Key Elements Most Relevant to the Euro Area , in: Lessons for EU integration from US history, Jacob Funk Kirkegaard and Adam S. Posen (eds) Report to the European Commission under Tender Reference 2016: ECFIN 004/A, Washington, DC.
- Larch, M. and L. Jonung (2014) The stability and growth pact of the European Union, in: The New Palgrave Dictionary of Economics, Steven N. Durlauf and Lawrence E. Blume (eds):
https://link.springer.com/referenceworkentry/10.1057/978-1-349-95121-5_2877-1
- Lian, W., A. F. Presbitero and U. Wiriadinata (2020) Public Debt and r - g at Risk, IMF working paper WP/20/137.
- Mundell, R. (1961) A Theory of Optimum Currency Areas, *American Economic Review*, 51(4): 657-665.

Nelson, Ch. R., and Ch. R. Plosser (1982) Trends and Random Walks in Macroeconomic Time Series: Some Evidence and Implications, *Journal of Monetary Economics*, 10(2):139–162.

Piketty, T. (2014) *Capital in the 21st Century*. Cambridge: Harvard University Press.

Schuknecht, L. (2022) Public Debt – The EU Perspective, CESifo Forum, ifo Institut - Leibniz-Institut für Wirtschaftsforschung an der Universität München, München, 23(1): 09-16

Stock, J.H. and Watson, M.W. (1988) Variable Trends in Economic Time Series, *Journal of Economic Perspectives*, 2(3): 147-174

Uhlig, H. (2003) One money, but many fiscal policies in Europe: what are the consequences? In: *Monetary and Fiscal Policies in EMU, Interactions and Coordination* (ed. M. Buti), pp. 29–64. Cambridge University Press, Cambridge.