

II. Assessing public debt sustainability: some insights from an EU perspective into an inexorable question

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The 2010-12 euro area sovereign debt crisis revealed severe debt vulnerabilities in a number of European countries. In response, international institutions have considerably strengthened the frameworks they use to assess debt sustainability. In the EU, since 2012, the European Commission has started to closely monitor and assess on a regular basis Member States' debt sustainability, as part of the EU's overall economic surveillance framework. This article takes stock of the difficulties inherent in debt sustainability analysis (DSA), as shown by the last financial crisis, and describes some important (recent and ongoing) methodological advances in DSA frameworks. Challenges include the difficulty to distinguish in real time liquidity crises from solvency problems, current debates on appropriate debt threshold levels and debt burden indicators, and striking the right balance between breadth of analysis and the need for concise and clear conclusions. The recent and ongoing changes made to DSA frameworks include the development of probabilistic tools, a greater consideration of feedback effects, the increasingly broad range of fiscal risks examined, and a greater focus on the institutional dimension of debt sustainability.

II.1. Introduction

Long thought as a question restricted to emerging countries or to the long-term dimension for advanced economies, public debt sustainability concerns have been brought to the fore by the euro area sovereign debt crisis. Since then, the EU has made several institutional changes that significantly contributed to mitigating debt sustainability risks. These changes include a strengthened European governance framework, in particular to reform the fiscal rules, and crucial components of a Banking Union, such as the Single Supervisory Mechanism (SSM), the Single Resolution Mechanism (SRM), and the Banking Recovery and Resolution Directive (BRRD). Important crisis management tools were also created such as the European Stability Mechanism (ESM) and other EU crisis management instruments.

Some 10 years since the beginning of the global financial crisis, public debt sustainability remains a critical issue in the euro area in the light of multiple challenges. Public debt ratios are still high in some – often large – countries⁽⁸⁶⁾. Significant spending pressures stemming from an ageing population are expected to materialise over the medium to long term. There are major uncertainties around future

productivity trends and labour market developments. Last, but not least, major economic challenges, related in particular to climate change and environmental change, may pose new fiscal risks.

Against this backdrop, debt sustainability has become increasingly complex to define and assess. Country experiences over the last decade has revealed some shortcomings in past approaches to debt sustainability analysis. International institutions such as the IMF, the European Commission and the ECB have adapted and substantially enhanced the frameworks they use to assess debt sustainability. Despite these improvements, some authors consider that assessing debt sustainability is to some extent ‘an art rather than a science’⁽⁸⁷⁾, and by others ‘mission impossible’⁽⁸⁸⁾.

This article takes stock of the difficulties inherent in debt sustainability analysis (see Section II.2), and describes some important (recent and ongoing) advances in debt sustainability analysis (DSA) frameworks (see Section II.3). It focuses on the key aspects (see Graph II.1), and does not seek to cover all related issues⁽⁸⁹⁾.

⁽⁸⁶⁾ In the euro area, the great recession led to an increase in government debt from 65% of GDP in 2007 to a peak of almost 95% in 2014. In 2019, three euro-area countries had a debt to GDP ratio close to or above 120% of GDP (Greece, Italy and Portugal), in four euro-area countries it was above 90% of GDP (Belgium, Spain, France and Cyprus) and in three euro-area countries it was above 60% of GDP (Ireland, Austria, Slovenia).

⁽⁸⁷⁾ Sturzenegger, F. and J. Zettelmeyer (2006), ‘Debt Defaults and Lessons from a Decade of Crises’, *MIT Press*.

⁽⁸⁸⁾ Wyplosz, C. (2011), ‘Debt sustainability assessment: mission impossible’, *Review of Economics and Institutions*, Vol. 2, No 3, Fall 2011.

⁽⁸⁹⁾ Moreover, the article does not cover on-going developments related to the Covid-19 crisis and implications on public finances.

Graph II.1: Debt sustainability analysis: a snapshot of the key challenges



Source: Authors

II.2. Defining and assessing debt sustainability: challenges remain

This section discusses the conceptual difficulties and practical challenges related to debt sustainability (analysis). It focuses on the three main issues that arose during the last financial crisis: the difficulty to distinguish in real time liquidity crises from solvency problems (see Section II.2.1), the challenge of determining a universal critical level of debt and of using appropriate debt burden indicators (see Section II.2.2), and the delicate balance to strike between the ‘streetlight effect’ and the risk of over-complexity (see Section II.2.3).

II.2.1. Distinguishing in real time liquidity crises from solvency problems

Conceptual considerations

Economic theory traditionally equates debt sustainability to government solvency. Solvency is typically anchored to a government’s intertemporal budget constraint, which essentially captures the government’s ability to meet its current and future financial obligations. More precisely, the condition for solvency is that, over an indefinite time horizon, the government can continue to pursue its fiscal policies by raising enough revenue (in current value) to cover all non-interest spending and to service its outstanding debt ⁽⁹⁰⁾.

Although in theory solvency is well defined, in practice it escapes an easy assessment. The condition for solvency is inherently forward-looking, and rests on a number of simplified macroeconomic and fiscal assumptions. For instance, prediction of future government debt, revenues and spending over an infinite horizon needs for being operationally implemented an approximation of the infinite horizon with a finite long-term horizon. It then requires forecasting the future course of fiscal policy (i.e. primary balances), and formulating a set of assumptions on macroeconomic variables subject to considerable uncertainty over the long term (such as economic growth, the cost of borrowing and the non-discretionary part of the primary balance).

Furthermore, the traditional solvency condition imperfectly factors in potential risks associated to (existing) debt levels. The solvency condition equates to ensuring that debt trajectories are not on an increasing or explosive path over the long term. By adopting a purely forward-looking approach, it can (in theory) deem any government solvent, regardless of its current stock of debt, as long as the government’s commitment to generate the required (sometimes large) primary surpluses is considered credible and consistent with macroeconomic projections ⁽⁹¹⁾. But the credibility of this commitment is likely to weaken when existing debt is high, requiring a correspondingly high and sustained primary surplus to service debt.

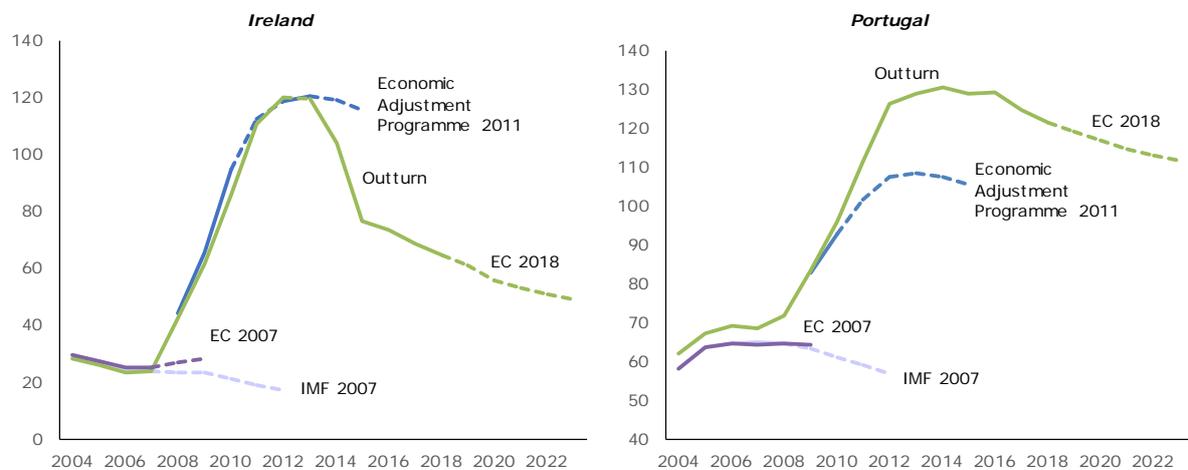
As the condition for solvency is in essence a medium- to long-term concept, it also largely excludes more immediate constraints that may hinder a government’s ability to repay its debt. Countries with fundamentally solid public finances and deemed to have a sustainable debt, from a long-term solvency perspective, may not be immune to rapid deteriorations of their fiscal position and to refinancing risks in periods of sharp economic downturn or financial crises. Such refinancing issues can occur in the event of tensions on global financial markets giving rise to

surpluses to achieve solvency. See Section II.4 for more on the interest-growth rate differential and debt dynamics.

⁽⁹⁰⁾ Blanchard, O., Chouraqui, J.C., Hagemann, R.P. and N. Sartor (1990), ‘The Sustainability of Fiscal Policy: New Answers to an Old Question’, *OECD Economic Studies*, No 15. This definition holds under ‘normal’ economic conditions (i.e. for a positive interest to growth rate differential). For instance, if the interest to growth rate differential was negative (over the long term), then the government would no longer need to generate primary

⁽⁹¹⁾ For example, Blanchard et al. (1990, op. cit.) recall that the solvency condition may even hold if the debt to GDP ratio increases forever (to any level), as long as it does not increase asymptotically at a rate greater than the growth-adjusted interest rate. ‘Because of discounting, two different levels of debt to GDP ratio far in the future can imply nearly exactly the same sustainable tax rate today. In the limit, over an infinite horizon, they make no difference.’

Graph II.2: Projected and outturn government debt before the crisis / pre-programme / and current situation in Ireland and Portugal



Source: European Commission, Eurostat, IMF.

contagion effects, or when faced with a lumpy debt repayment schedule ⁽⁹²⁾. In extreme cases, *liquidity* crises may force a debt default, despite debt being deemed sustainable according to the standard definition. As liquidity pressures often materialise through strong increases in interest rates, and the cost of government borrowing rises, with potential effect on longer-term debt dynamics, government solvency can be weakened (*self-fulfilling* crises) ⁽⁹³⁾. Therefore, solvency and liquidity are clearly interrelated concepts, and the boundary between the two can become blurred during crises. Since a failure to service debt is the main manifestation of unsustainability, both concepts are equally important when assessing debt sustainability ⁽⁹⁴⁾.

The emergence of new official lenders, such as the ESM, providing concessional loans with much

longer maturities and lower interest rates than standard IMF instruments, has also led to a rethink of the liquidity versus solvency dichotomy. On the one hand, ‘ESM-type’ official lending can help mitigate rollover risk (through longer maturities), while containing public debt dynamics (through durably lower interest rates). On the other hand, some authors argue that by making more debt immune to rollover risk over the lending period, such official lending may raise the average stock of public debt in the long term, eventually increasing exposure to ‘fundamental’ risks at the time of market re-entry ⁽⁹⁵⁾ ⁽⁹⁶⁾.

Practical considerations based on selected examples

Assessing liquidity and solvency risks, and whether financial market stress may lead to a solvency problem, is at the core of DSA frameworks. This is not only necessary to correctly and swiftly identify potential debt sustainability risks (*surveillance*

⁽⁹²⁾ Conversely, an insolvent government may well go for a long time without facing liquidity concerns e.g. in the event of low global risk aversion, or a too lenient appreciation of risks by investors.

⁽⁹³⁾ Countries hit by a liquidity crisis may also be forced to apply stringent austerity measures that force them into a recession, thereby reducing the effectiveness of these austerity programmes. The combination of high interest rates and deep recessions is even more likely to turn the liquidity crisis into a solvency crisis. Such ‘bad’ equilibrium is discussed in De Grauwe, P. and Ji, Y., 2013, ‘Self-fulfilling crises in the Eurozone: an empirical test’, *Journal of International Money and Finance*, No 34.

⁽⁹⁴⁾ It is important to note that, though solvency risks generally build up slowly, history teaches that they can sometimes appear more quickly. This may happen when major contingent liabilities materialise, leading to a sudden worsening of the fiscal position. The Greek case is another example where a sharp deterioration in the fiscal position as of 2008, compounded with market confidence weakening, led to a reassessment of solvency risks in 2011.

⁽⁹⁵⁾ See Corsetti, G., Erce, A. and T. Uli (2018), ‘Debt sustainability and the terms of official support’, *CEPR Discussion Paper*, No 13292. These authors also call for DSA frameworks to give a greater focus on the analysis and management of payment flows over time, rather than simply focusing on debt shocks and trajectories. These aspects are mentioned in section II.2.3 (on gross financing needs) and in section II.3.2 (on feedback effects).

⁽⁹⁶⁾ Moreover, it should be noted that requesting official financing is itself considered by international institutions (e.g. the IMF and the European Commission) to be a sign of fiscal stress (see for example, Baldacci, E., Petrova, I., Belhocine, N., Dobrescu, G. and S. Mazraani (2011), ‘Assessing fiscal stress’, *IMF Working Paper*, No 11/100.).

function)⁽⁹⁷⁾, but also in critical cases when countries request official financial support. Indeed, ‘sustainable debt’ is a pre-requisite to access official lending from key international institutions (notably the IMF and the ESM). Misjudgements on ex ante debt sustainability may later prove particularly costly (for example, leading to financial sector instability, or requiring particularly severe fiscal adjustments).

Distinguishing (pure) liquidity from broader sustainability (solvency) risks is, however, challenging in practice. For example, before the global financial crisis, countries such as Ireland, Spain and Cyprus - and to a lesser extent Portugal - had relatively low (or moderate) government debt-to-GDP ratios and were not deemed to face debt sustainability risks. During the crisis, large negative shocks to their public finances, coupled with financial market pressure, led to major hikes in government debt (see Box I.1 in Section II.2.3 for more details on the drivers).

Given these developments, and as these countries requested official financial support, international institutions substantially reviewed their assessment of public debt sustainability risks over time. For instance, Ireland and Portugal were deemed to face substantial risks, with debt projected to peak at a high level over the projection period, and only slightly moderate by the end of the period (see Graph II.2)⁽⁹⁸⁾. Almost a decade after the crisis, these countries now have more favourable debt sustainability assessments (notably driven by more positive macro-financial assumptions)⁽⁹⁹⁾, while financial market perceptions have greatly improved. These examples show how liquidity pressures in times of crisis can substantially change investors’ perception about the sustainability (solvency) of sovereign debt, and may eventually affect sustainability itself. They also illustrate how

heavily debt sustainability assessments rely on underlying assumptions⁽¹⁰⁰⁾.

II.2.2. Factoring in debt level in the analysis

How high is ‘too high’ debt?

Over and above the sole consideration of future debt trajectories to assess sustainability, an abundant literature stresses the fiscal vulnerabilities associated with high levels of debt. This has notably led international institutions to factor in debt risk thresholds (or benchmarks) as a pivotal element in their DSA frameworks. Heavy debt burdens are detrimental to sustainability in multiple ways. For example, they undermine the ability of a country to withstand negative shocks (reduced ‘fiscal space’)⁽¹⁰¹⁾, and may restrict long-term economic growth. Pioneered by Reinhart and Rogoff⁽¹⁰²⁾, this literature remains fairly controversial. The results are highly contingent on which underlying concept of risk-threshold is used, the methodology used to estimate it, the geographical sample and the time span chosen.

Table II.1 summarises the main concepts of risk threshold found in the literature, with estimation methods and results from samples of advanced economies⁽¹⁰³⁾. As the results show, determining precisely what constitutes ‘too high’ debt remains

⁽⁹⁷⁾ For example, for the IMF, in the context of the Article IV surveillance reports; for the European Commission, in the context of the European Semester, the EU economic policy coordination framework. In this latter case, the DSA results are also used as a basis to formulate policy prescriptions (*policy advice function*).

⁽⁹⁸⁾ In a 2010 staff report for Ireland, the IMF warned that ‘risks to the baseline scenario are substantial, as illustrated by alternative scenarios and bound tests’.

⁽⁹⁹⁾ In particular, both countries have lower implicit interest rates (outturn and projected). Ireland has also experienced a particularly robust economic growth since 2014.

⁽¹⁰⁰⁾ Another illustration relates to the difficulty of setting plausible fiscal assumptions in a context of structural breaks, where the historical evidence of primary balances of one country may not be a good guide for the future (e.g. Greece, or outside of the EU, Turkey in the early 2000s).

⁽¹⁰¹⁾ The term ‘fiscal space’ corresponds to the difference between the current level of debt and the estimated debt ‘limit’ (see Table I.1). This ‘limit’ corresponds to the level beyond which a government is at risk of losing access to financial markets. High debt makes the debt accumulation process very sensitive to variations in interest and growth rates, which is likely to bring the debt ratio closer to its ‘limit’.

⁽¹⁰²⁾ Reinhart, C. M., and K. S. Rogoff (2010), ‘Growth in a Time of Debt,’ *American Economic Review*, No 100, May.

⁽¹⁰³⁾ References used in this table are: Chudik, A., Mohaddes, K., Pesaran, M. and M. Raissi (2017), ‘Is there a debt-threshold effect on output growth?’ *The Review of Economics and Statistics*, No 99(1), March. Gosh, A., Kim, J., Mendoza, E., Ostry, J., and M. Qureshi (2013), ‘Fiscal fatigue, fiscal space and debt sustainability in advanced economies’, *The Economic Journal*, No 123, February. Fall, F. and J.-M. Fournier (2015), ‘Macroeconomic uncertainties, prudent debt targets and fiscal rules’, *OECD Economics Department Working Paper*, No 2015(48), June. European Commission (2019), ‘Fiscal Sustainability Report 2018’, *European Economy Institutional Paper*, No 094, January. Berti, K., Salto, M. and M. Lequien (2012), ‘An early-detection index of fiscal stress for EU countries’, *European Economy Economic Paper*, No 475. Pamiés Sumner, S. and Berti, K. (2017), ‘A complementary tool to monitor fiscal stress in European economies’, *European Economy Discussion Paper*, No 049.

Table II.1: Risk thresholds: estimations based on recent selected papers

Concept	Paper	Estimation method	Sample	Results
Growth related threshold (debt level beyond which growth is negatively impacted)	Chudik et al. (2017)	Dynamic, heterogeneous panel data regression with cross-section-dependent errors	19 advanced economies	Weak support for 80% of GDP (no statistically significant threshold when using more advanced estimation techniques). More robust results for countries with a rising debt-to-GDP ratio.
Debt limit (debt level beyond which market access is lost)	Gosh et al. (2013)	Model that combines a fiscal reaction function with a market reaction function	Advanced economies	190% of GDP (on average). Above 90-100% of GDP, 'fiscal fatigue' sets in.
Prudent debt threshold (debt level ensuring that debt remains below a certain threshold with a high probability)	Fall and Fournier (2015)	Stochastic model with a fiscal reaction function	EA	For a debt threshold conventionally set at 65% of GDP (with a 75% probability to remain below it), prudent debt levels range from 35% in Greece and Ireland to around 50% in Austria.
Non-increasing debt cap (debt level ensuring that debt does not increase with a high probability)	European Commission (2019)	Stochastic model	EA	80% of GDP (EA), with important country differences.
Debt distress threshold (debt level beyond which a risk of fiscal stress* is detected)	Berti et al. (2012), Pamies Sumner and Berti (2017)	Signalling approach	EU + 9 OECD countries	68% of GDP

(1) The relatively high level found by Gosh et al. (2013) is driven by the low level of interest rates.
 * Fiscal stress episodes correspond to situations of either public debt default or restructuring, request of (large) official financing, financial market stress (loss of market access, important increase of spreads), and internal domestic default (high inflation).

Source: See references.

an hazardous question, with studies suggesting that critical levels could lie within an *average* range of 70 - 100% of GDP for advanced economies. Despite the uncertainties surrounding these estimates, DSA frameworks may still need to use these thresholds as reference values for the assessment, especially in the context of regular surveillance, while taking into account other relevant (country-specific) factors.

Is debt the best indicator to assess debt sustainability?

Traditionally scaled by GDP⁽¹⁰⁴⁾, the level of government debt is arguably the central measure for sustainability analysis. For the EU and euro area, government debt presents the advantage of being defined and measured according to agreed statistical norms (known as the 'Maastricht

debt')⁽¹⁰⁵⁾, with consistency over time and across countries. Nonetheless, growing considerations related to the maturity structure of debt, in particular in the presence of high levels of official lending, the management of payment flows over time and the liquidity dimension of debt sustainability analysis call for considering additional indicators.

A practical indicator that has gained popularity in recent years is government gross financing needs. First, this synthetic indicator, defined as the sum of the budgetary deficit ('new debt'), debt amortisations and other flows⁽¹⁰⁶⁾ produces a

⁽¹⁰⁴⁾ In some cases, alternative scaling variables may be more relevant, such as GNI for Ireland, or public tax revenue for countries with a more limited capacity to levy tax revenue.

⁽¹⁰⁵⁾ For the purpose of the Excessive Deficit Procedure (EDP) in the Economic and monetary union (EMU), as well as for the Growth and Stability Pact, the current Protocol 12, annexed to the 2012 consolidated version of the Treaty on the Functioning of the European Union, provides a complete definition of government debt. See for example Eurostat, (2016), 'Manual on Government Deficit and Debt – Implementation of ESA 2010 – 2016 edition'.

⁽¹⁰⁶⁾ Such as bank recapitalisation costs (if not already registered in the budgetary deficit), privatisation proceeds, arrears clearance, or valuation effects.

direct measure of potential refinancing risks. In some cases, this indicator can be deemed to provide a more accurate measure of the actual government debt burden. By definition, gross financing needs (GFN) are typically highly correlated to the debt level itself. But in cases where the share of concessional debt is particularly high, this indicator can provide a different insight into the actual debt burden⁽¹⁰⁷⁾. This is the case of Greece, for example, given the extraordinarily concessional terms applying to its government debt⁽¹⁰⁸⁾⁽¹⁰⁹⁾.

Some limitations should be borne in mind, however, when using this indicator in debt sustainability frameworks. Unlike government debt, GFN is neither governed by common statistical guidelines, nor defined by a common approach (it falls outside of the scope of official government finance statistics). This generates potential discrepancies in its measurement and comparability (see Table II.2). These discrepancies can relate to the accounting method used (cash versus accrual terms), the categories of debt instruments considered (only debt securities or all government debt), the scope of other flows considered, and the statistical sources used. This is a shortcoming to bear in mind, notably when applying standardised risk-thresholds to GFN⁽¹¹⁰⁾.

Furthermore, gross financing needs do not capture all aspects of liquidity risk. Additional indicators related to the ‘finance-ability’ of GFN are required, such as the composition of the investor base (in

terms of domestic versus foreign holders, institutional sectors – e.g. banks, other financial institutions, etc. – and public versus private holders), and the currency composition of debt. These complementary indicators allow assessing a country’s vulnerability to sudden (foreign) outflows⁽¹¹¹⁾⁽¹¹²⁾.

Table II.2: **GFN estimations in 2018 across institutions in selected countries**

	Short-term/liquidity measure		Medium-term measure	
	COM (FSR 2018)	IMF (Fiscal Monitor Oct. 2018)	COM (FSR 2018)	IMF (Art. IV reports 2018)
BE	15,0	17,4	17,4	16,6
DE	6,9	3,5	11,0	11,6
IE*	4,0	7,0	6,3	7,0
ES	17,3	17,2	17,0	17,4
FR	15,7	10,1	18,3	6,8
IT	18,9	22,2	21,2	20,4
LV	3,7	:	3,9	5,6
CY*	2,2	7,4	18,1	8,2
NL	6,4	6,7	9,4	-0,5
PT*	12,9	13,2	12,5	13,0

(1) * Refers to post-programme countries where official loans still represent a significant share of government debt. The short-term/liquidity measure only includes debt-securities amortisations (and official loan repayments for post-programme countries in the measure computed by the European Commission). The medium-term measure includes all debt amortisations (except for the part corresponding to currency and deposits in the measure computed by the European Commission). More information can be found in the European Commission Fiscal Sustainability Report 2018.

Source: European Commission, IMF.

II.2.3. Balancing the risk of the ‘streetlight effect’ against the risk of over-complexity

Another challenge when assessing debt sustainability in practice is the range of factors that need to be considered in the analysis. Past sovereign debt crises proved that assessments should examine many aspects, in addition to the fiscal indicators discussed so far. As highlighted in Section II.2.2, debt sustainability risks are not simply a matter of high (on-balance sheet) debt or GFN ratios. Restricting the analysis to the latter could result in understating debt vulnerabilities

⁽¹⁰⁷⁾ This is because concessional debt has by definition more favourable lending terms than market debt (e.g. in terms of interest rate and repayment profile). Even in cases of countries where debt is contracted on market terms, GFN can prove an interesting complementary indicator to the debt level, by reflecting the maturity structure of debt (e.g. in case of countries issuing bonds with very long maturities).

⁽¹⁰⁸⁾ IMF (2015), ‘Greece – preliminary draft debt sustainability analysis’, *IMF Country Report*, No 15/165, June.

⁽¹⁰⁹⁾ In this case, compared to alternative measures of debt burden that explicitly factor in the repayment profile of debt (such as the present value of debt), GFN presents the advantage of not relying on a normative choice regarding the discount rate (see for example Schumacher and di Mauro (2015) in <https://voxeu.org/article/debt-sustainability-puzzles-implications-greece> for an illustration of the sensitivity of the present value of debt estimate to the choice of the discount rate).

⁽¹¹⁰⁾ For example, in its DSA framework for market-access countries, the IMF uses standard risk thresholds for GFN of 15% of GDP (for emerging countries) and 20% of GDP (for advanced economies) respectively. The European Commission makes similar estimations for European economies (see Pamies Sumner, S. and Berti, K. (2017), op. cit.).

⁽¹¹¹⁾ Such indicators are traditionally monitored by international institutions (e.g. the IMF and the European Commission), although less emphasised than debt and GFN indicators. Standardised risk thresholds are also applied for some of these variables (see IMF (2013), ‘Staff guidance note for public debt sustainability analysis in market access countries’, May, and European Commission (2019), op. cit.).

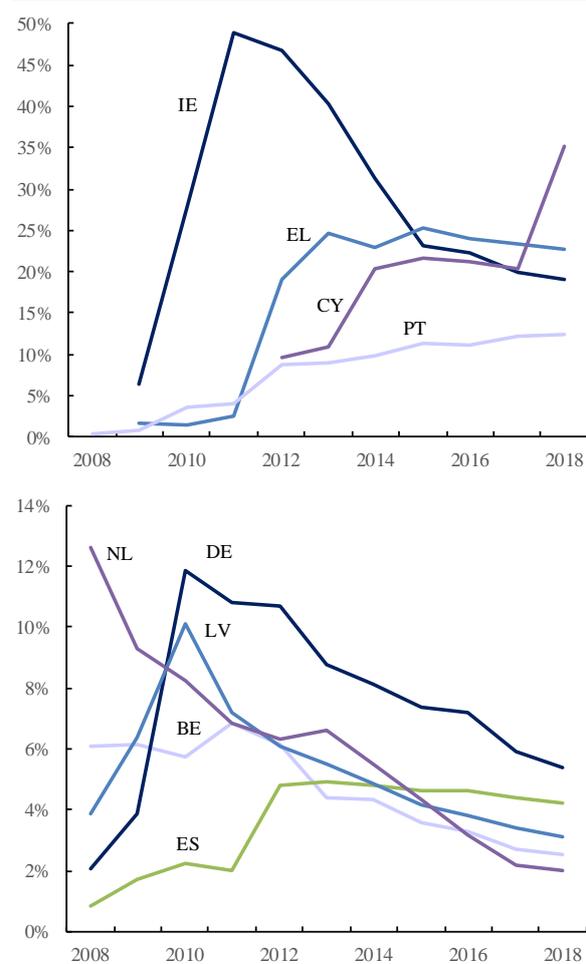
⁽¹¹²⁾ In that respect, monitoring external financing needs and the external position is also important (see Section II.2.3), particularly for non-euro-area Member States.

(and the risk of the ‘streetlight effect’, meaning that the analysis is focused on more direct and easily available variables). For instance, in addition to analysing actual government liabilities, looking into the presence of *contingent* liabilities⁽¹¹³⁾, and at the broader macro-financial situation is clearly critical to assess public debt sustainability. However, including these aspects, which are often more difficult to examine and to directly link to debt sustainability, may result in an over-complex assessment.

Contingent liabilities arise from explicit or implicit government guarantees to local governments and to public and private companies. Such liabilities can have a substantial impact on public finances if the contingency materialises, posing risks to debt sustainability. The 2008 financial crisis that put a fiscal strain on public finances in several countries illustrates the importance of monitoring contingent liabilities in DSA frameworks, especially those stemming from the banking sector⁽¹¹⁴⁾. For the euro area, the impact of government intervention in the financial sector on government debt peaked during the last crisis at above 10% of GDP in nine Member States including Germany, the Netherlands, Austria and Slovenia, and in the countries that benefited from EU/IMF financial assistance (Ireland, Greece, Cyprus and Portugal)⁽¹¹⁵⁾. In recent years, several of these countries seem to have recovered some of the initial costs, and their improved financial stability meant they did not need to renew the expiring government guarantees issued as part of support packages for financial institutions⁽¹¹⁶⁾.

Although the contingent liabilities risks were reduced as a result of the introduction of the SSM and the SRM, as part of the Banking Union (as well as the BRRD), some risks linked to the banking sector remain.

Graph II.3: Impact of government financial support measures on government debt in selected euro area countries, % of GDP



Reading note: In the Netherlands, government support measures in the banking sector led to an increase of the debt-to-GDP ratio of 12.6 pps. of GDP in 2008. The fiscal costs of these support measures were largely recovered since then, with a residual effect on debt estimated at 2 pps. of GDP.

Source: Authors' calculations based on Eurostat data.

Factoring in the overall macroeconomic soundness of a country is also critical in assessing fiscal vulnerabilities. In the EU and euro area, the accumulation of both external (e.g. large current

impact on debt levels appears long-lasting. Cyprus is also a notable exception, where support measures particularly added to the debt in 2018, on the back of financial support operations related to the sale of a government-owned bank.

⁽¹¹³⁾ Such liabilities typically don't appear on governments' balance sheets, although in the EU, they are subject to a specific reporting to Eurostat (see European Commission (2019), op. cit. and Section II.3.2).

⁽¹¹⁴⁾ The specific need to monitor contingent liabilities stemming from the banking sector is linked to the close relationship between the sovereign sector and banks. For instance, the last financial crisis triggered substantial government intervention to support the banking sector, in turn straining public finances, raising market concerns about the creditworthiness of some governments, and rises in sovereign yields. This further weakened banks' balance sheets, with the need for governments to recapitalise vulnerable domestic banks.

⁽¹¹⁵⁾ Eurostat (2019), 'Eurostat Supplementary Table for Reporting Government Interventions to Support Financial Institutions', *Background note*, April 2019.

⁽¹¹⁶⁾ European Central Bank (2018), 'Economic Bulletin', *Issue 6*, September 2018. The initial fiscal impact was reversed thanks to the income generated from the support measures, (such as dividends received on shares in financial institutions and fees received for public guarantees, and the sale of financial assets). However, this is not the case for other countries, for which the

account imbalances) and internal imbalances (an accumulation of excess private debt or housing bubbles) during the 2000s were key factors in triggering sovereign debt crises, and the need for financial assistance in some cases (see Box II.1 for selected examples). Some of the countries that turned out to be most vulnerable to such crises were considered until then to be examples of fiscal rigour.

The empirical literature highlights that the build-up of macro-financial imbalances compared to fiscal slippages played a stronger role in recent fiscal crises⁽¹¹⁷⁾. In general, high public debt coupled with unfavourable developments in the real economy aggravate the prospects for debt sustainability. In the EU, these conclusions led to the creation of the Macroeconomic Imbalance Procedure (MIP) in 2011 (as part of the overall reform of the EU's economic surveillance framework)⁽¹¹⁸⁾. Analysing the potential impact of macroeconomic developments on debt sustainability may, however, appear less straightforward than the monitoring of fiscal variables. The range of policy fields potentially concerned is wide, the interactions between the different variables and their link to debt sustainability complex and less direct.

Overall, balancing the risk of the 'streetlight effect' with the risk of over-complexity is a delicate task. As discussed, ensuring that there is no blind spot in the surveillance of fiscal vulnerabilities means looking at a wide range of factors. At the same time, users of DSA results, in particular policy-makers, often request synthetic assessments and clear conclusions on the risks to debt sustainability. Therefore, there may be a trade-off to make between the required scope and granularity of the assessment, and the tractability of DSA frameworks in terms of 'aggregation' of the information and sharpness of the conclusion⁽¹¹⁹⁾.

⁽¹¹⁷⁾ Cerovic, S., Gerling, K., Hodge, A. and P. Medas (2018), 'Predicting Fiscal Crises', IMF Working paper, No 18 / 181. Bruns, M. and T. Poghosyan (2016), 'Leading Indicators of Fiscal Distress: Evidence from the Extreme Bound Analysis', *IMF Working Paper*, No. 16/28. This is also evident from the indicator used by the Commission to assess risks of short-term fiscal stress (the S0 indicator), in which macro-financial variables are found to have the highest predictive power.

⁽¹¹⁸⁾ The MIP also aims at addressing large current account surpluses, as they are the counterpart of external liabilities and deficits in partner countries, and may reflect growing creditor risk and a possible misallocation of resources.

⁽¹¹⁹⁾ Corsetti, G. (2018), 'Debt sustainability assessments: the state of the art – euro area scrutiny', *Study requested by the ECON Committee of the European Parliament*, November.

Box II.1: The role of macroeconomic imbalances in past fiscal crises in the EU/euro area: selected cases

In the euro area, the recent sovereign debt crisis was rooted in macro-financial imbalances in several countries. This Box reviews selected cases.

In **Ireland**, the government debt-to-GDP ratio increased rapidly from 25% in 2007 to almost 100% of GDP in 2010, notably due to the government's intervention to support the banking sector. Rapid credit expansion and loosening lending standards resulted in the banking sector becoming highly exposed to the buoyant housing market. When the financial and housing market collapsed in early 2000s (prior to the crisis), the banking sector faced massive losses that triggered a confidence crisis. Government bond spreads started to widen as from mid-2010. Uncertainty, both about the health of the banking system and the size and nature of the government support to the financial sector, fuelled market perceptions that government finances were unsustainable. As this 'sovereign-bank loop' gained momentum, the government lost market access at favourable interest rates and requested financial assistance from the EU and the IMF in November 2010 ⁽¹⁾.

In **Spain**, the deterioration of public finances due to the severe crisis caused government debt to surge from a low of 35.6% of GDP in 2007 to almost 100% in 2013. Prior to the crisis, an extended credit boom had fuelled the housing and construction bubble, which had led to the build-up of several imbalances, including high indebtedness of the private sector and excessive reliance on external financing. The adjustment of the housing sector that started in mid-2008 put the banking sector under severe stress, given a high accumulation of stock of real-estate related assets and the low capitalisation of some banks. The worsening recession and uncertainty about the solvency of the Spanish banking crisis and its large recapitalisation needs, worried investors about possible government intervention and their impact on the size of the debt. In 2012, the Spanish government officially requested financial assistance to recapitalise the banking sector ⁽²⁾.

In **Cyprus**, government debt increased from under 60% of GDP in 2007 to over 100% by 2013, also primarily due to government support to the banking sector. Cyprus had enjoyed strong growth in the first decade of the millennium, twice that of the euro area. During this period, a strong inflow of foreign capital (mainly deposits) allowed the current account deficit to keep widening, while fuelling credit growth in the domestic economy. Dynamic activity in the real-estate sector fed the build-up of the asset boom. Losses from the high exposure to Greek debt and a deterioration in loan quality in Cyprus led to the banking sector recording substantial capital shortfalls. Concerns about the sustainability of its public finances and a weakened financial sector led to consecutive downgrading of Cypriot sovereign bonds, and the country became unable in mid-2011 to refinance itself. The Cypriot authorities requested financial assistance from the EU and the IMF in June 2012 ⁽³⁾.

Latvia, which originally had a negligibly low government debt, also experienced a substantial increase in the debt-to-GDP ratio from under 8% in 2007 to close to 50% in 2010. Prior to the crisis, high current account deficits, unsustainable growth, and a credit boom turned into a financial and balance of payments crisis. Despite this sharp rise, the level of government debt did not cause heightened concerns on overall fiscal sustainability. Instead, solvency concerns were over the substantial external debt burden, mainly due to high indebtedness in the household and corporate sector ⁽⁴⁾. This led the country to request financial assistance from the EU and the IMF in 2008.

⁽¹⁾ European Commission (2011), 'The Economic Adjustment Programme for Ireland', *European Economy Occasional Papers*, No 76. IMF (2015), 'Ireland: Lessons from its Recovery from the Bank-Sovereign Loop', *European Departmental Paper Series*.

⁽²⁾ European Commission (2011), 'The Economic Adjustment Programme for Portugal', *European Economy Occasional Papers*, No. 79.

⁽³⁾ European Commission (2013), 'The Economic Adjustment Programme for Cyprus', *European Economy Occasional Papers*, No. 149.

⁽⁴⁾ IMF (2009), 'Republic of Latvia: Request for Stand-By Arrangement—Staff Report; Staff Supplement; Press Release on the Executive Board Discussion; and Statement by the Executive Director for the Republic of Latvia', *IMF Country Report*, No. 09.

II.3. Recent changes to DSA frameworks: state of the art and ongoing changes

The challenges identified in the previous section have led international institutions such as the IMF, the European Commission and the ECB to adopt – and strengthen over time – comprehensive frameworks to assess debt sustainability. These frameworks have in common that they take a multidimensional approach, notably encompassing both solvency and liquidity aspects, and are based on a range of fiscal and macro-financial indicators.

This multidimensional approach is well reflected in the IMF definition of debt sustainability⁽¹²⁰⁾: ‘in general terms, public debt can be regarded as sustainable when the primary balance needed to at least stabilise debt under both the baseline and realistic shock scenarios is economically and politically feasible, such that the level of debt is consistent with an acceptably low rollover risk and with preserving potential growth at a satisfactory rate.’ The European Commission framework provides a risk assessment by time dimension, where the analytical tools used are tailored to the type of risk analysed⁽¹²¹⁾ ⁽¹²²⁾. The ECB uses a rich framework and discusses the possibility to derive from it a single score for debt sustainability risk⁽¹²³⁾.

⁽¹²⁰⁾ See IMF (2013), op. cit.

⁽¹²¹⁾ For example, a composite indicator is used to assess short-term risks, based on a broad range of fiscal and macro-financial variables (the S0 indicator). This vulnerability indicator builds on past episodes of fiscal crises, and has the advantage of relying on outturn data (*backward-looking approach*). Medium-term risks are mainly assessed through standard debt projections (*forward-looking approach*). These projections correspond *stricto sensu* to the DSA component of the Commission’s medium-term fiscal sustainability framework (complemented by a medium-term fiscal sustainability indicator, the S1 indicator). The assessment of long-term risks is based on long-term budgetary projections and a fiscal gap indicator to meet the traditional solvency condition (the S2 indicator).

⁽¹²²⁾ The Commission analysis is published on a regular basis in several documents, in particular in the Fiscal Sustainability Report and the Debt Sustainability Monitor. For example, European Commission (2019), op. cit.; European Commission (2018), ‘Debt Sustainability Monitor 2017’, *European Economy Institutional Paper*, No 071, January; European Commission (2014) ‘Assessing public debt sustainability in EU Member States: a guide’, *European Economy Occasional Paper*, No 200, September.

⁽¹²³⁾ Bouabdallah, O., Checherita-Westphal, C., Warmedinger, T., de Stefani, R., Drudi, F., Setzer, R. and Westphal, A. (2017), ‘Debt Sustainability Analysis for Euro Area Sovereigns: a Methodological Framework’, *ECB Occasional paper series*, No 185, April.

This section focuses on some important recent and ongoing advances in institutional DSA frameworks. In particular, it describes the development of probabilistic tools, and the consideration of feedback effects (see Section II.3.1), the increasingly broader mapping of fiscal risks (see Section II.3.2), and the greater focus on the institutional dimension of debt sustainability (see Section II.3.3).

II.3.1. Probabilistic DSAs and feedback effects

Probabilistic DSAs: using stochastic projections

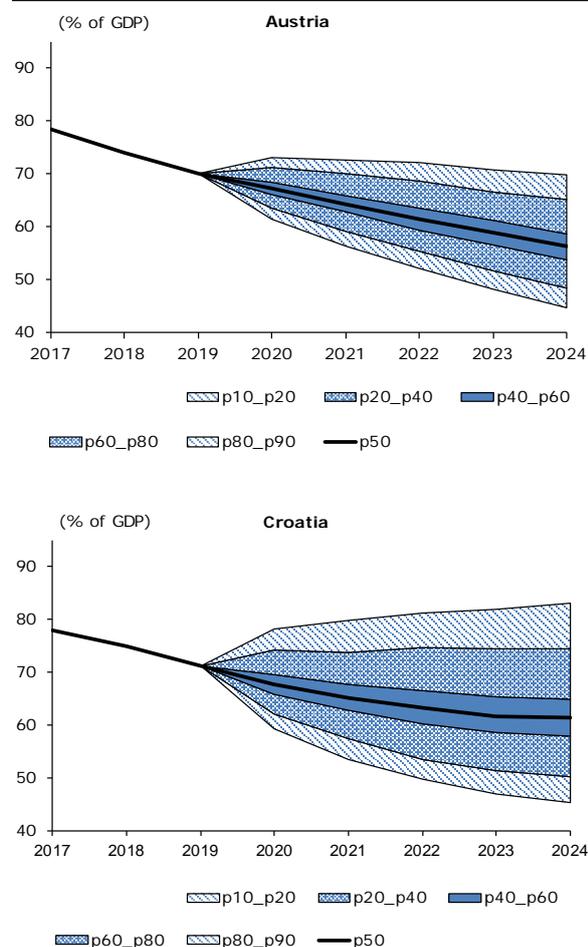
Given the critical role of underlying assumptions and to assess uncertainties, probabilistic methods are increasingly being used. In recent years, various international institutions have complemented their ‘conventional’ (deterministic) DSA with stochastic projections. Building on the value-at-risk approach used by financial institutions, stochastic projections allow for a probabilistic analysis of debt sustainability, on the basis of a very high number of scenarios⁽¹²⁴⁾. Compared with more standard stress tests analyses, stochastic projections have the advantage of producing a distribution of debt paths corresponding to a wide set of macroeconomic conditions, with shocks calibrated to reflect country-specific historical patterns. They also take into account the interdependencies between the individual underlying variables. Interestingly, this method enables deriving a probability of occurrence of different debt paths. Hence, summarised in the form of ‘fan charts’, the results give information on the size of the uncertainty surrounding debt projections, and allow for an explicitly probabilistic analysis of debt sustainability (see Graph II.4). Stochastic projections can also offer a particularly useful robustness check for judgement-based baseline assumptions in DSAs, particularly in the context of programmes where such assumptions have been shown to be overly optimistic⁽¹²⁵⁾ ⁽¹²⁶⁾.

⁽¹²⁴⁾ Celasun, O., Debrun, X. and J. Ostry (2006) ‘Primary Surplus Behaviour and Risks to Fiscal Sustainability in Emerging Market Countries: a Fan-Chart Approach’, *IMF Working Paper*, No 06/67.

⁽¹²⁵⁾ IMF (2019), ‘2018 Review of Program Design and Conditionality’, *IMF Policy Paper*, May.

⁽¹²⁶⁾ Such optimism bias would be notably driven by the fear of costly economic and political costs associated to default or debt restructuring (see Sturzenegger, F. and J. Zettelmeyer (2007), ‘Creditors’ losses versus debt relief: results from a decade of

Graph II.4: Stochastic debt projections: Austria versus Croatia



Reading note: these graphs show that the estimated uncertainty, and hence sustainability risk, is likely to be higher for Croatia compared to Austria in 2024, despite a relatively similar initial and projected debt ratio (in the central scenario). From around 70% of GDP in 2019, the debt level in Croatia is expected to range between around 45% and 83% of GDP in 2024 with a probability of 80%. For Austria, the debt level (also close to 70% of GDP in 2019) would range between 45% of GDP and 70% of GDP with a probability of 70% in 2024.

Source: European Commission Debt Sustainability Monitor 2019 (forthcoming)

However, stochastic projections should not be viewed as a silver bullet to assess debt sustainability. First, the results are only as informative as the inputs and methods used to generate them. There are different ways to generate stochastic projections, and the results are sensitive to the choice of methodology (e.g. historical variance-covariance matrix, vector auto-

regression)⁽¹²⁷⁾, of variables assumed to be stochastic⁽¹²⁸⁾, of assumptions (in terms of shock distribution)⁽¹²⁹⁾ and to the quality of the data. These frameworks also require reasonably long time series to produce reliable estimations, which can make them less suitable for countries for which the availability of economic data sets are typically shorter. This approach also assumes (even more than conventional stress tests) that historical patterns (in terms of the volatility of each variable, correlation between them) are relevant to future trends. But this may not be a valid assumption, especially in case of structural change in economic policies (as for countries requesting financial assistance). Related to this, stochastic projections may tend to overestimate the magnitude of risks faced by countries coming out of difficult economic times due to the persistence of past events or policy effects⁽¹³⁰⁾.

Incorporating feedback effects

Important feedback effects are present in the 'basic' debt accumulation equation. Another methodological practical challenge when projecting debt is that all underlying variables respond to each other endogenously⁽¹³¹⁾. For example, fiscal adjustment is likely to affect economic growth, interest rates and possibly inflation for some years. As widely documented in the literature, the fiscal

⁽¹²⁷⁾ The two approaches to stochastic debt analysis typically used by international institutions differ mainly in the way shocks are defined. The historical variance-covariance matrix method relies on the historical variance-covariance matrix of shocks. A second approach, which is increasingly becoming popular in DSA frameworks, relies on an unrestricted vector auto-regression (VAR) model to derive the variance-covariance matrix of shocks. The VAR approach allows for embedding a more detailed information that accounts for the historical volatility of the key non-fiscal determinants of the debt dynamics. All variables are jointly endogenous, meaning that each variable fluctuates according to its past values and the past values of all the other variables (policy persistence).

⁽¹²⁸⁾ Typically, stock-flow adjustments are assumed to be exogenous, while this variable can significantly contribute to the debt dynamic.

⁽¹²⁹⁾ For instance, in the historical variance-covariance matrix method, shocks are assumed to be normally distributed, when in fact their *actual* historical ('true') distribution may differ from the normal distribution. As shocks can be asymmetric or can occur more often during crises, drawing shocks from the *actual* historical distribution has the advantage of capturing the asymmetry (skewness) in the distribution of shocks to better reflect reality.

⁽¹³⁰⁾ Another drawback of this method is that by appearing more sophisticated and comprehensive (than deterministic projections), stochastic projections may give the impression of providing a description of all possible future outcomes.

⁽¹³¹⁾ Corsetti, G. (2018), op. cit.

sovereign debt crises', *Journal of the European Economic Association*, April–May, 5(2-3):343–351).

multiplier on growth itself depends on the monetary policy stance, as well as cyclical conditions. Governments are also likely to respond to a deterioration of macroeconomic conditions by discretionary fiscal policy. But as debt increases, financial market lending conditions tend to deteriorate, and governments may eventually tighten their primary balance.

With a view to making more ‘realistic’ debt projections, international institutions are putting a greater focus on incorporating these feedback effects in their DSA frameworks. For example, the IMF, the European Commission and the ECB take into account fiscal multiplier effects on economic growth. Some scenarios also include the ‘fiscal reaction function’, which explicitly factors in the endogenous reaction of the primary balance to debt accumulation (and other factors), based on econometric estimations. In addition, the reaction of market interest rates (premia) to debt increases is reflected in some of the scenarios. With a view to putting a greater focus on cash flow and debt management, the ESM proposes to explicitly account for debt financing decisions in terms of instrument maturity (and interest rates) when projecting debt and gross financing needs⁽¹³²⁾. The IMF’s method allows for the different variables to interact in different ways in its DSA framework for market-access countries.

At the same time, it is important to ensure that DSA frameworks remain fairly simple and transparent, given their role in policy discussions. Although improving the emphasis on feedback effects is an interesting way to potentially improve the plausibility of projections, the DSA tool should remain tractable. The risk otherwise may be to replace a simple (simplistic) framework by a complex ‘black box’. More sophisticated instruments do not necessarily improve the assessment (‘do not break the impossibility principle’), and transparency is a virtue in and by itself for the assessment⁽¹³³⁾. Furthermore, except when used for the purpose of granting financial assistance (the ‘hard DSA’ necessitating a clear-cut assessment of debt sustainability), the DSA tool also serves a pedagogical purpose for policymakers.

For instance, long-term debt paths that include the impact of population ageing should not be taken to be a forecast, but a conditional projection, *all else being equal*, illustrating the need for policy action.

Lastly, as illustrated by a wealth of empirical literature, the relationship between the different variables of interest is often non-linear, and context or time-dependent. This applies to the fiscal multiplier, the fiscal reaction function, or interest rate developments. Interest rates can be particularly delicate to model, in a context where market expectations and dynamics can switch rapidly. Hence, the assumed form of the relationship and elasticities will have a bearing on the results, and should be properly discussed in DSA frameworks (see the example of the feedback loop between interest rates and debt in the Greek DSA)⁽¹³⁴⁾.

II.3.2. Looking at a broader mapping of fiscal risks

Conventional fiscal risk analyses have underplayed the magnitude and nature of shocks affecting public finances. DSA frameworks traditionally considered a set of stress test scenarios, calibrated in a way to remain ‘plausible’ (e.g. based on historical patterns), and essentially capturing macro-financial risks, such as shocks to economic growth, interest rates or exchange rates. Yet, fiscal shocks tend to be much larger and more diverse in nature than assumed in conventional fiscal risk analyses. Macroeconomic shocks taking the form of sharp falls in GDP, and leading to large increases in debt ratios, have been relatively frequent. Other sources of major shocks include financial crises, the realisation of (other) contingent liabilities and natural disasters⁽¹³⁵⁾. In the euro area since the mid-1990s, during episodes of debt increases, debt-to-GDP increased by up to 10 pps. of GDP in one year (and as much as +25 pps. of GDP in Ireland and Greece), due to large stock-flow adjustments and a severe contraction in economic activity. These past events differ somehow to the type of shocks typically simulated in DSA frameworks, which have an impact of less than 5 pp. of GDP after one year, even when

⁽¹³²⁾ Athanosopoulou, M., Consiglio, A., Erce, A., and S. Zenios (2018), ‘Risk management for sovereign financing within a debt sustainability framework’, *ESM Working papers series*, No 31, August.

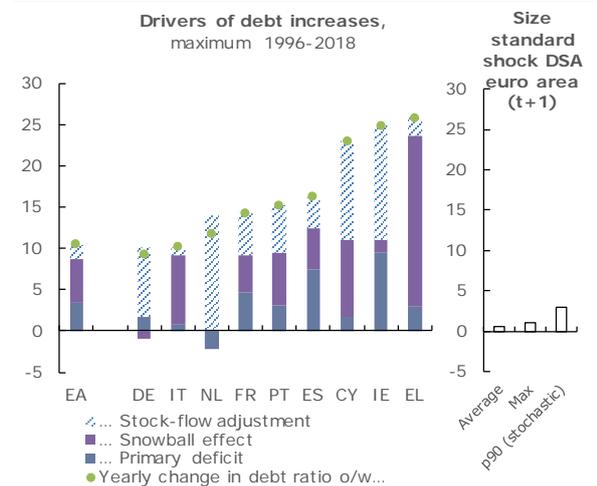
⁽¹³³⁾ Wyplosz, C. (2011), op. cit.

⁽¹³⁴⁾ Alcidi, C. and D. Gros (2018), ‘Debt Sustainability Assessments: the State of the Art – Euro Area Scrutiny’, *Study requested by the ECON Committee of the European Parliament*, November.

⁽¹³⁵⁾ Bova, E., Ruiz-Arranz, M., Toscani, F. and H. Elif Ture (2016), ‘The fiscal costs of contingent liabilities: a new dataset’, *IMF Working Paper*, No 16/14.

factoring in the worst outcomes of stochastic projections (see Graph II.5) ⁽¹³⁶⁾.

Graph II.5: Drivers of large debt increases since the mid-1990s in the euro area and in selected countries, and size of a standard shock in a DSA (pps. of GDP)



(1) Standard shocks include shocks to the interest rate, economic growth and the primary balance. Here, the effect on the debt-to-GDP ratio - after one year - of a standard combined shock on interest rate and GDP growth is shown (EA average and maximum effect), as well as the one derived from the stochastic projections (90th percentile).

Source: Ameco, European Commission.

International institutions and national authorities are progressively strengthening their debt sustainability analysis by factoring in a wider range of fiscal risks ⁽¹³⁷⁾. The IMF, the European Commission and the ECB already include a tail risk analysis in their DSA frameworks, mainly focused on contingent liabilities linked to the banking sector. The European Commission and the ECB frameworks also contain a broader monitoring of contingent liabilities ⁽¹³⁸⁾. With a view to assessing fiscal sustainability in the medium- to long-term, the UK Office for Budget Responsibility (OBR)

⁽¹³⁶⁾ The design of standard shocks is fairly similar in the European Commission and the IMF frameworks.

⁽¹³⁷⁾ A better analysis and management of (broad) fiscal risks by national authorities is notably encouraged by the IMF (2016), 'Analysing and Managing Fiscal Risks: Best Practices', *IMF staff paper*, June.

⁽¹³⁸⁾ This monitoring is supported by EU provisions: for instance, under Council Directive 2011/85/EU, Eurostat collects and publishes data on contingent liabilities (including government guarantees, off-balance PPPs, non-performing loans of government and liabilities of government controlled entities classified outside of general government). Furthermore, in the context of the EDP, Eurostat has collected and published data on government interventions to support financial institutions since 2009.

provides a thorough analysis of fiscal risks that range from macroeconomic, financial sector, specific spending and tax receipts, balance sheet and interest rate risks ⁽¹³⁹⁾. The European Commission, in the context of its long-standing analysis of long-term fiscal sustainability, examines a broad range of scenarios, including lower productivity growth, higher costs stemming from technological change in the healthcare sector, and higher gains in life expectancy ⁽¹⁴⁰⁾.

Looking forward, DSA frameworks could be improved by broadening the analysis to include 'new' fiscal risks. These new risks include natural disasters and climate change risks, as well as broader environmental risks that have been on the rise in recent decades (see Graph II.6). Considering the far-reaching impact of climate change and the particularly high exposure of many of its members, the IMF recently introduced in its DSA framework for low-income countries a specific stress test related to the risk of natural disasters ⁽¹⁴¹⁾.

The OECD also encourages better assessments of disaster-related contingent liabilities and including the results in fiscal risk assessment processes ⁽¹⁴²⁾, while the OBR sets out tentative elements of a framework for considering climate-related fiscal risks in its latest Fiscal Risks Report. In addition to including direct impacts on public finances and economic growth ⁽¹⁴³⁾, there are also major risks on the financial sector stemming from climate change ⁽¹⁴⁴⁾, with potential effects on public debt

⁽¹³⁹⁾ OBR (2019), 'Fiscal Risks Report', July. This report also includes a severe fiscal stress test, including a scenario of a deep recession, with asset prices and the pound falling sharply, and lasting effects on potential output.

⁽¹⁴⁰⁾ European Commission Fiscal Sustainability Report 2018 (op. cit.) and European Commission / EPC (2018), 'The 2018 Ageing Report – Economic and budgetary projections for the 28 EU Member States (2016-2070)', *European Economy Institutional Paper*, No 079, May.

⁽¹⁴¹⁾ IMF (2018), 'Guidance Note on the Bank-Fund Debt Sustainability Framework for Low Income Countries', February.

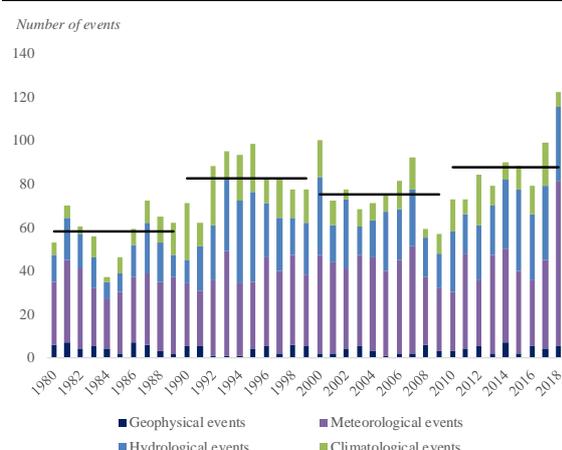
⁽¹⁴²⁾ OECD (2019), 'Fiscal Resilience to Natural Disasters lessons from country experiences', *OECD publication*.

⁽¹⁴³⁾ Direct impacts on public finances include higher public spending due to extreme weather events and to policies designed to ensure the transition to a low-carbon economy (the latter also likely lowering tax receipts). Indirect impacts on public finances are notably linked to reduced economic activity, at least in the short- to medium-term, as a result of extreme weather events and gradual global warming (e.g. through adverse effects on productivity).

⁽¹⁴⁴⁾ Bank of England (2017), 'The Bank of England's response to climate change', *Quarterly report 2017/Q2*.

sustainability (in the form of a contingent liability). Assessing the impact of climate change and other environmental risks on public finances is clearly an important avenue to pursue in further developing DSA frameworks. However, this is challenging given the multiple interactions and mechanisms involved. Other new fiscal risks relate to recent technological change and financial trends, such as the digitalisation of the economy, with major consequences for tax bases ⁽¹⁴⁵⁾, and developments in the non-bank financial sector ⁽¹⁴⁶⁾.

Graph II.6: Incidence of relevant natural loss events in Europe since 1980



(1) Geophysical events include earthquakes, tsunamis, volcanic activity. Meteorological events include tropical cyclones, extratropical storms, convective and local storms. Hydrological events include flood and mass movement. Climatological events include extreme temperature, drought and forest fires. Accounted events have caused at least one fatality and/or produced normalised losses greater or equal to USD 100,000, 300,000, 1 million or 3 million (depending on the assigned World Bank income group of the affected country).

Source: Munich RE, NatCatService

II.3.3. The institutional dimension of debt sustainability

In addition to fiscal and macroeconomic variables, institutional factors merit consideration when assessing debt sustainability. A vast literature suggests that deep structural and institutional

⁽¹⁴⁵⁾ For instance, the OBR (2019, op. cit.) deems that it is likely that a declining share of activity will be taxable on current policies, and that the downside risks to tax bases will mainly be for the short-to-medium term.

⁽¹⁴⁶⁾ The size of the non-bank financial sector (sometimes called shadow banking) has risen significantly over the last ten years, and can pose systemic risks (see ECB (2019), 'Financial Stability Review', May), with potential direct and indirect fiscal implications (see OBR (2019), op. cit.). Hence, this can be seen as a contingent liability.

features are key supporting factors to debt sustainability ⁽¹⁴⁷⁾. Several empirical papers emphasise a broad set of institutional indicators relevant to the assessment of debt sustainability, ranging from *institutional features of fiscal policy* (fiscal governance frameworks, institutional arrangements for fiscal risks and debt management), to *broader governance aspects* of a country (such as government effectiveness, rule of law, or control of corruption), and to *broader political characteristics* (including political stability, or the nature of the political regime). Even with a similar set of financial ratios and macroeconomic performance, two countries with differences in structural and institutional features will have a very different risk profile ⁽¹⁴⁸⁾.

Recognising the importance of governance and institutional factors in debt sustainability analysis, international institutions increasingly factor in - directly or indirectly - these aspects in their DSA frameworks. For instance, in its framework for market-access countries, the IMF makes a broad differentiation between countries (emerging markets versus advanced economies), implicitly reflecting institutional features ⁽¹⁴⁹⁾. The ECB uses a set of 'governance and political risk' indicators, as part of its assessment of sovereign debt sustainability. The ESM considers a range of 'institutional parameters' in its analysis of sovereign vulnerabilities ⁽¹⁵⁰⁾. Institutional features are also embedded in credit rating agencies' analyses and sovereign ratings, also as a way to capture countries' willingness to repay their debt.

Measuring institutional factors is obviously challenging, and the indicators selected determinant for the diagnosis. The most commonly used synthetic indicators are mainly based on

⁽¹⁴⁷⁾ Reinhart, C., Rogoff, K. and Savastano, M. (2003), 'Debt Intolerance', *Brookings Papers on Economic Activity* 1, 1-74. Reinhart, C.M. and K. S., Rogoff (2009), 'This Time is Different: Eight Centuries of Financial Folly', Princeton University Press.

⁽¹⁴⁸⁾ Fournier, J. M. and M. Bégin (2018), 'Sovereign defaults: evidence on the importance of government effectiveness', *OECD Economics department working papers*, No 1494.

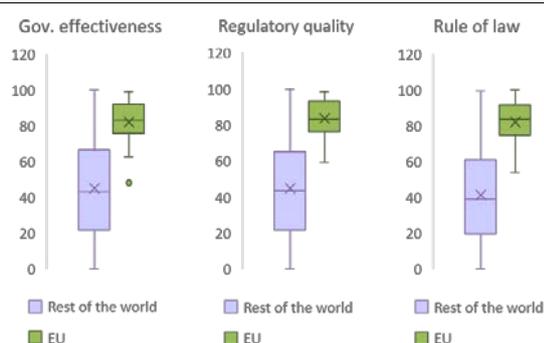
⁽¹⁴⁹⁾ This manifests itself through the use of higher risk thresholds for countries considered to have a stronger debt-carrying capacity (such as advanced economies). In the IMF framework for low-income countries, the consideration of institutional factors is even more explicit with the use of the CPIA (*Country Policy and Institutional Assessment*) in the composite indicator of debt-carrying capacity, which is the basis for benchmark differentiation.

⁽¹⁵⁰⁾ Lennkh, R. A., Moshhammer, E. and V. Valenta (2017), 'A comprehensive Scoreboard for Assessing Sovereign Vulnerabilities', *ESM Working Paper series*, No 23.

perception-based measures of governance, and could be subject to systemic biases⁽¹⁵¹⁾. The empirical evidence that links debt sustainability to such measures has also mainly been collected on a set of emerging countries. In the EU and euro area, the quality of institutions appears on average higher and less heterogeneous than in other parts of the world (see Graph II.7).

European Stability Mechanism (ESM) and other EU crisis management instruments.

Graph II.7: **Selected governance indicators, EU versus other countries**



Source: World Bank.

A broader (qualitative) approach should be favoured, examining the full range of stakeholders, institutions and arrangements supporting debt sustainability. For instance, in the euro area, several actors and governance frameworks contribute to debt sustainability. Given the decentralised fiscal policy setup, national governments are pivotal players to debt sustainability. Nonetheless, the high degree of economic and monetary integration in the EU and euro area implies the presence of significant spillovers, so debt sustainability issues in one country matter to the rest of the Union.

In this context, the EU has created and strengthened a significant suite of common institutional arrangements over the years. These include a stronger European governance framework, in particular on reformed fiscal rules, the new MIP and the European Semester process, crucial components of a Banking Union, such as the Single Supervisory Mechanism and the Single Resolution Mechanism, and the Banking Recovery and Resolution Directive. Important crisis management tools were also created such as the

⁽¹⁵¹⁾ For a detailed discussion of the concept of institutional factors, see European Commission Fiscal Sustainability Report 2018, Box 1.2.

II.4. Conclusion

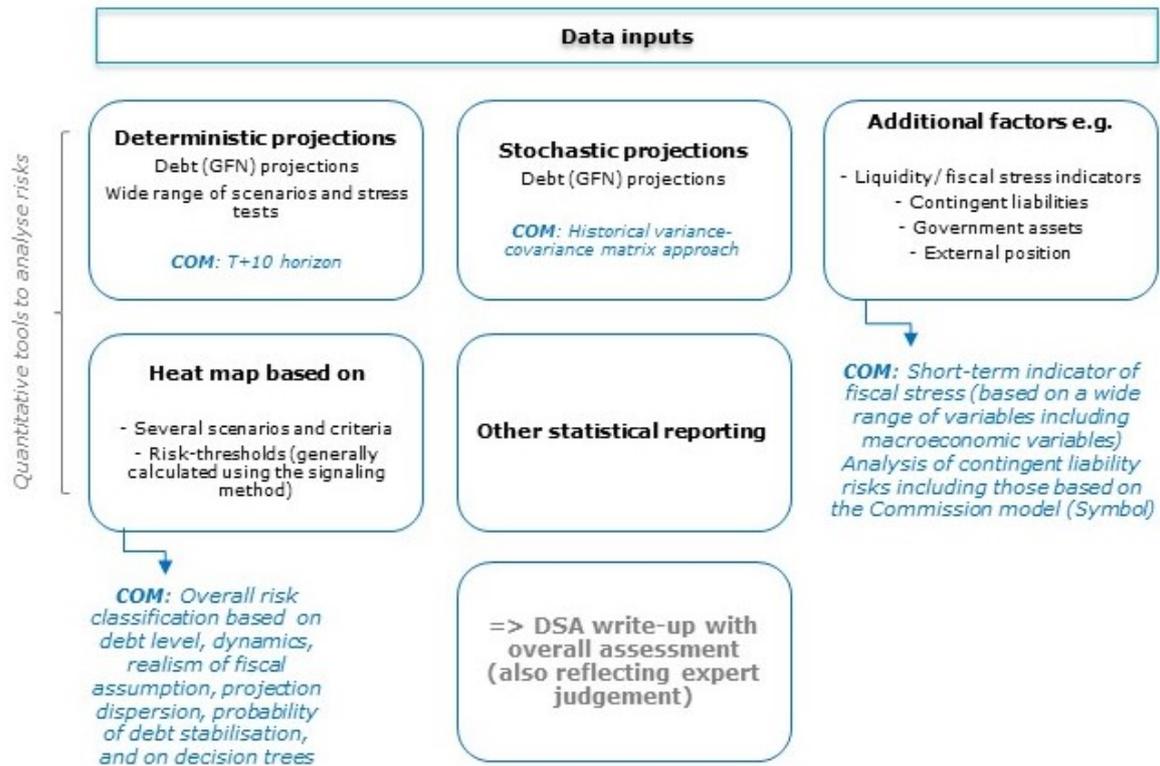
The euro area sovereign debt crisis was a stark reminder that debt sustainability must be closely monitored, even in advanced economies. Although the current low level of interest rates contribute, to some extent, to reducing risks to debt sustainability⁽¹⁵²⁾, disruptive events in the short-term, and longer-term expected increases in public spending (notably linked to an ageing population and to climate change phenomenon) are significant challenges. Furthermore, fiscal buffers in many EU countries are substantially more limited than they were before the global financial crisis (six Member States, including some large economies, have debt ratios close to 100% of GDP).

Debt sustainability analysis therefore remains an essential component in the fiscal risk management toolkit, serving multiple purposes (ranging from macroeconomic surveillance, economic policy recommendations, to financial assistance). In the EU and euro area, this analysis is an integral part of the overall fiscal and macroeconomic governance framework.

To meet new challenges, international institutions (notably the IMF, the European Commission and the ECB) have strengthened their debt sustainability frameworks over the past years (Graph II.8 illustrates the current frameworks), and several additional improvements are ongoing. A wide range of fiscal risks, multiple interactions, and institutional factors are some of the many aspects that need to be reflected in the analysis. That way, debt sustainability analysis is an analytical framework, based on an increasing number of tools, rather than relying on a single calculation. However, the ‘art’ element to the assessment is here to stay, given the inevitable conceptual and practical difficulties of the analysis, and the need to carefully interpret quantitative results.

⁽¹⁵²⁾ Recently, Blanchard (2019, ‘Public Debt and Low Interest Rates’, *American Economic Review*, *American Economic Association*, Vol. 109(4), April.) argued that (durably) lower interest rates decrease the fiscal and the economic costs of public debt, providing a less negative insight on risks associated to high public debt. At the same time, other authors challenge the fact that the interest-growth rate differential has been (and will remain) negative for long periods (see Checherita-Westphal, C. (2019), ‘Interest rate-growth differential and government debt dynamics’, *ECB Economic Bulletin*, Issue 2/2019).

Graph II.8: Debt sustainability analysis frameworks in the main international institutions: stylised presentation



(1) This chart illustrates in a stylised fashion the key components of the main international institutions current DSA frameworks (IMF, European Commission and ECB). The blue text highlights the specific features of the Commission's framework.

Source: Authors