

Maia, Guido; Garcia, Márcio Gomes Pinto; Maia, Pedro

**Working Paper**

## Fiscal space in an era of central bank activism

Texto para discussão, No. 692

**Provided in Cooperation with:**

Departamento de Economia, Pontifícia Universidade Católica do Rio de Janeiro

*Suggested Citation:* Maia, Guido; Garcia, Márcio Gomes Pinto; Maia, Pedro (2022) : Fiscal space in an era of central bank activism, Texto para discussão, No. 692, Pontifícia Universidade Católica do Rio de Janeiro (PUC-Rio), Departamento de Economia, Rio de Janeiro

This Version is available at:

<https://hdl.handle.net/10419/279444>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

TEXTO PARA DISCUSSÃO

No. 692

Fiscal Space in an Era of Central Bank  
Activism

Guido Maia  
Marcio Garcia  
Pedro Maia



DEPARTAMENTO DE ECONOMIA  
[www.econ.puc-rio.br](http://www.econ.puc-rio.br)

# Fiscal Space in an Era of Central Bank Activism

Guido Maia \*

Márcio Garcia †

Pedro Maia ‡

January, 2022

## Abstract

Central banks' liabilities are still often excluded from debt sustainability analyses, despite the enormous expansions in central banks' balance sheets that we have witnessed in recent years. In this paper, we construct a dataset that consolidates both general government and central bank balance sheets and argue that this metric allows for fairer comparisons across countries. The findings highlight the increasingly important role played by central banks in managing and altering the profile of the privately-held sovereign debt. In addition, they shed light into the impact of FX reserves accumulation and QE on reducing the debt maturity, which cannot be captured by traditional general government debt metric.

---

\*Department of Finance, LSE

†Department of Economics, Pontifical Catholic University of Rio de Janeiro

‡Amia Capital

# 1 Introduction

Fiscal space is often defined as the budgetary room that allows a government to provide resources for public policies without undermining debt sustainability. The sustainability of a debt-load is given by the expectation around its trajectory – the best way to put it is in a negative statement: a sustainable debt should not be ever rising <sup>1</sup>, when properly measured as a percentage of GDP . For that to hold, ultimately the debt needs to be backed by the public capacity to repay it.

Delimitating well this budgetary room demands forecasting several unpredictable variables and has been a key challenge for the profession for a while, but even more so as COVID19 shock hit the global economy and created a great demand for government additional spending. Additionally, determining what the notion of what ‘debt sustainability’ entails has become more blurred in this era of Central Bank activism, whereby large balance sheet expansions have lowered public debt costs at the expense of a shortening of overall public liabilities average maturity.

It is not only the increasing central bank activism that has changed the economic landscape. During the past decades, the interaction between the balance sheets of the central bank and its respective treasury became much more complex across developed and emerging economies. What liabilities of the central bank and the treasury should be considered part of the public debt? The answer to this question is key for many economic issues, in special to debt sustainability analysis.

Here, we attempt to answer the question of what constitutes public debt by building a comparable time-series for a wide sample of countries. For that, we compiled balance sheet data from general governments and central banks from 18 different countries and the Eurozone and calculate the consolidated public debt held by private agents which is the debt that actually needs to be considered and display a sustainable trajectory. In a nutshell, what we do is to consolidate General Government and Central Banks’ balance sheets, excluding intra-government holdings. In Figure 1, one can see the comparison between our measure of public debt held by private agents – Consolidated Public Debt – and the traditional general government debt measure – “GG Debt” –, as a percentage of GDP in 2020.

This exercise of aggregating central banks’ public sector’s balance sheets not only gives us a more comparable and precise public debt time series across countries but also should allow

---

<sup>1</sup>The famous Stein’s law summarizes the idea: If something cannot go on forever, it will stop ([https://en.wikipedia.org/wiki/Herbert\\_Stein](https://en.wikipedia.org/wiki/Herbert_Stein)).

us to analyse the impact of both FX reserves accumulation (a phenomenon pertaining mostly to the Emerging Economies landscape) and Quantitative Easing (QE) on the aggregate public sector's liabilities as one navigates through an intricate web of intra-government claims and dues.

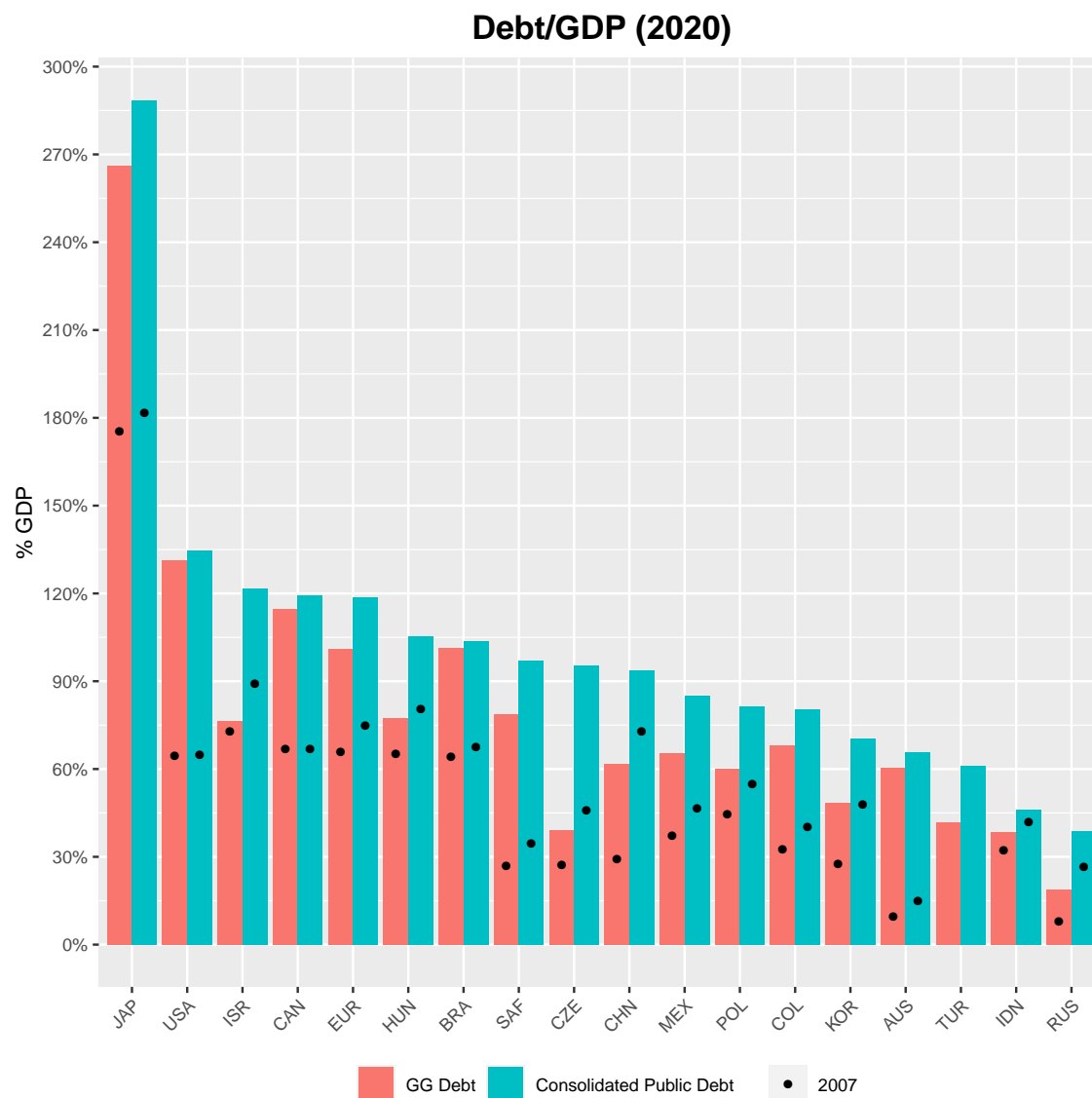


Figure 1: Debt Metrics (% GDP) - GG Debt vs. Consolidated Public Debt

Once we establish the trade-offs between the different perimeters of debt, we turn our attention back to the debate about debt sustainability. Much has been written (Blanchard (2019), Summers and Furman (2020), Reis (2021)) about how potentially lower levels of global interest rates have brought into question the usage of the Debt/GDP ratio as a representative metric of debt vulnerability. The same ratio level may be sustainable for one level of interest rates but explosive for others and thus ignoring interest rates to focus only on the Debt/GDP misleads any analysis of debt trajectory. Examples are aplenty, running from Japan which has displayed debt-loads north of 200% of GDP for long, but also more recently to a few Eurozone countries (Italy and Greece most prominently) that faced an acute sovereign debt crisis in early 2010's and now, with even higher debt ratio, have been upgraded by rating agencies.

In fact, if one assumes lower interest rates to be a structural phenomenon, the boundaries for Debt/GDP sustainability naturally become greatly expanded. The obvious risk, however, becomes mislabelling a temporary phenomenon as a permanent one. The debt literature is plenty of examples of how self-fulfilling debt crises may arise when investors risk aversion increases, turning a previously sustainable debt level into an unsustainable one. That risk is ever more present the more reliant is a government on short(er)-term funding since longer maturities provide a longer window for an adjustment to be made in case interest rates rise abruptly. The shortening of debt can happen through a change in the issuance profile of Treasury bills and bonds, but also with a fast-growing Central Bank balance sheet – as long-term Treasury bonds are “swapped” for short-term Central Bank’s reserves liabilities.

Our database allows us to extend our analysis to assess how CB activism has impacted aggregate public sector liabilities’ average maturity across our same sample of countries. Figure 2 compares debt average maturity in 2020 under our metric and the traditional General Government one and shows the importance of considering central bank’s assets and liabilities when calculating the public debt maturity. Since central bank liabilities are typically overnight, including it in our metric leads to lower levels of debt maturity compared to the General Government maturity. However, as one can see in Figure 2, this effect is not constant nor proportional, and can alter the relative ordering of countries in terms of debt maturity.

In Section II, we discuss a number of interesting cases and individually detail how some central banks and governments’ recent policies ended up affecting the maturity of their respective public debt even in cases where the maturity under the traditional metric stayed constant. Usually, the larger is the Central Bank’s balance sheet; the largest will be the difference between the series generated by the two metrics. This sheds light into the dangers of fast expanding indebtedness enabled by the shortening of maturities that QE represents.

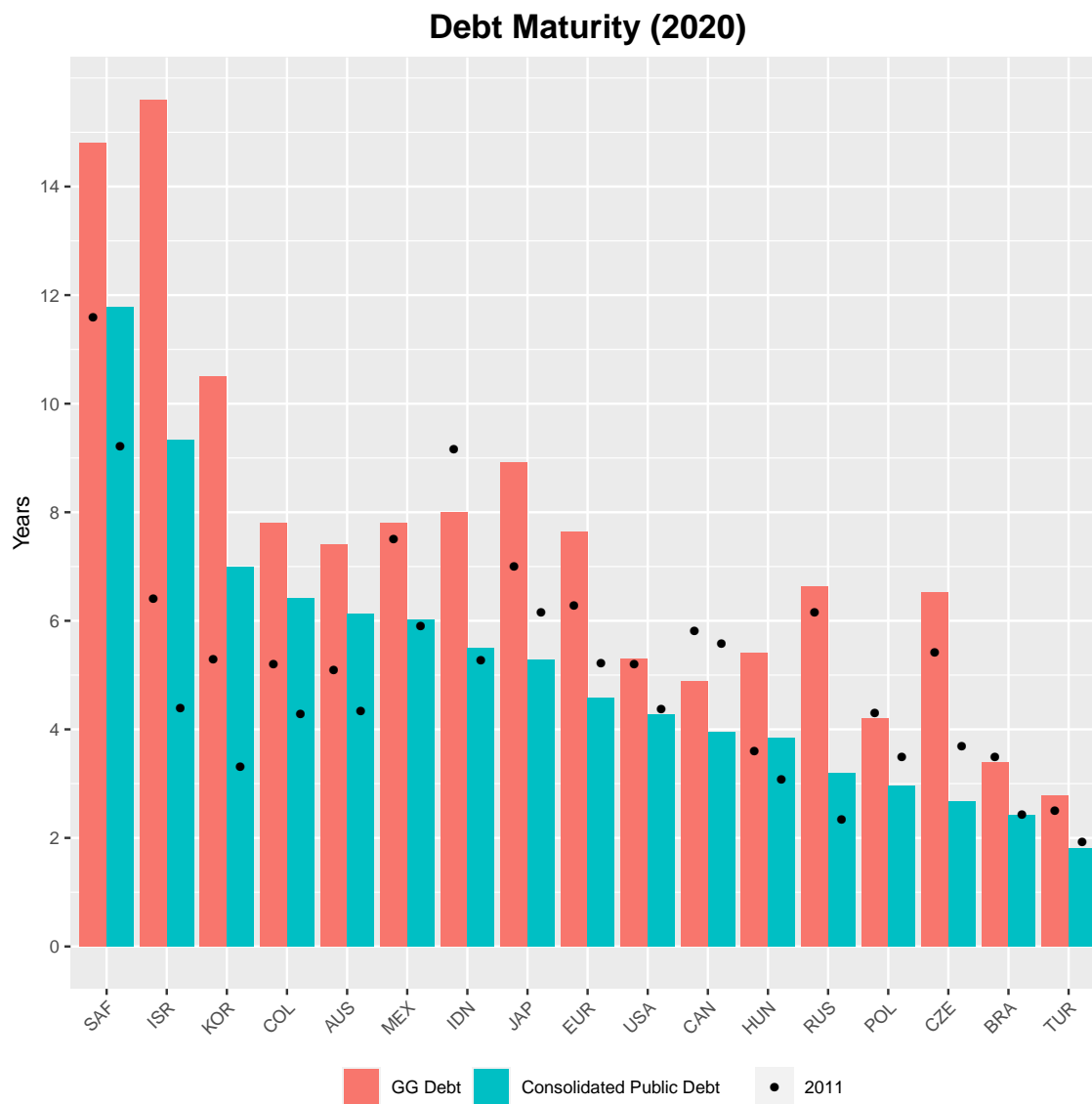


Figure 2: Debt Maturity (% GDP) - GG Debt vs. Consolidated Public Debt

**Literature Review** — As explained in the introduction, the sustainability of debt depends on the expectations around its trajectory. Economic literature establishes that if market expectations are such that the capacity (or willingness) to repay a debt stock is no longer present, financial disorganization often takes place under the form of either nominal debt restructuring (the traditional avenue when debt is mostly denominated in FX) or “real” local-currency debt restructuring via a step level change in the price level (Sims (2003)).

In most economies, both the general government and the central bank have an active role in debt markets and are able to alter the profile of the public debt that is held by private

agents. For instance, Nöh (2019) provides evidence on several countries that the relationship between debt size and maturity is affected by central bank activities. In a more specific case, Greenwood et al. (2015) points to the Federal Reserve playing an important role in terms of debt management in the US and discusses the different conflicts that may arise with the U.S Treasury.

Even though central banks affect the debt profile and expectations when they manage their balance sheet, most debt metrics often ignore them and take into account only general government liabilities. However, as claimed by Reis (2017), as long as the central bank liabilities are backed by the overall fiscal authorities, they count for the fiscal burden just as another government liability. For this reason, we argue here that any relevant measure of public debt should include central bank liabilities and exclude any intra-government holdings.

In that sense, the closest paper to this one is Filardo et al. (2012), which also makes the argument for a consolidated debt of the public sector (government and the central bank). Their approach, however, is focused on the general implications for the monetary transmission mechanism while this paper focuses on debt sustainability by creating a more thorough database with the goal of making fiscal burdens more comparable across countries.

Another factor in which sovereign debt stocks differ from each other, in addition to their size, is maturity and there is an extensive literature that discusses the trade-offs between a longer and a shorter-term debt. Barro (1995) and Cochrane (2001) discuss how longer maturities might help debt sustainability against interest rate fluctuations and fiscal shocks, respectively. In addition, Cole and Kehoe (2000) argues that too short maturities may lead to a confidence crisis on the government refinancing ability that may force debt default. On the other hand, governments usually can issue short-term debt at a lower cost since it carries lower inflation risk (Missale and Blanchard (1994)), while also providing investors with liquidity and storage services (Krishnamurthy and Vissing-Jorgensen (2013), Greenwood and Vayanos (2014)).

As one would expect, central bank activities also impact these trade-offs and the maturity structure of the debt. As discussed by Greenwood et al. (2015) and Reis (2017), recent quantitative easing policies implemented by central banks shift the composition of the sovereign debt held by the public from longer-term bonds towards overnight reserves. Consequently, there is a shortening in public debt maturity which can have an impact on its trajectory and sustainability. This paper contributes to this discussion by compiling data on consolidated debt maturity, comparing it with general government debt maturity and showing how they differ across countries with different QE and debt management policies.



## 2 Consolidating the Public Sector Balance Sheet

The most traditionally used indicator for the level of debt and the sustainability of public finance is the General Government debt, which encompasses the central, state and local government debts. This metric does not include central banks, even though in modern economies they are responsible for issuing money and reserves – liabilities backed by the sovereign government.

Additionally, central banks and general governments can hold each other’s liabilities in their balance sheets. In practice, these holdings work as intra-government debt since both GG and CB debt are backed directly or indirectly by the same sovereign government. However, using the GG debt metric to calculate the public debt ignores this feature and does not consider how central banks’ balance sheets affect the aggregate public sector accounts.

When analysing fiscal space and public debt sustainability, the main source of concern is the sovereign government ability to repay its dues. For this reason, we argue that intra-government holdings should be excluded from the analysis since one can always repay itself. Hence, the debt load held by the private sector is the relevant variable in the discussion here. This is because only the government obligations with private agents are de facto subject to defaults.

In order to address these concerns, we construct our metric for public debt held by the private sector by consolidating the general government and central bank’s debt, excluding intra-government holdings. This allows us to measure the full debt load that is backed by the sovereign government and that actually needs to be repaid to a third party.

We believe this approach is best suited to grasp fully the growing complexity of public balance sheets. The 2020 global pandemic has clearly accelerated a trend of ever-swelling CB’s balance sheets, which emerged post the 2008/9 financial crisis. On top of this acceleration seen in advanced economies (Figure 3), the main novelty during 2020 was that emerging economies also embraced enthusiastically that trend (Figure 4).

In most of the cases, as quantitative easing is deployed in the secondary markets, the net impact on the size of privately-held public debt is not altered. That is not to be generalised, though, as some Central Banks already finance governments directly (Indonesia being an example) in moments of acute financial distress. In any case, even if the size of public balance sheets held by public may not always change, its profile does change as CBs swap (often long dated) bonds for reserves, an overnight liability. In short, we believe the new statistic we produce here allows for a straightforward cross-country comparison of the different dimensions of indebtedness beyond what we believe to be the obsolete perimeter of the General Government (GG) excluding the Central Bank.

We make use of IMF statistics to assure comparability throughout this section. Most of the major advanced (except for the UK and Switzerland where data is incomplete) and emerging economies are part of IMF's SRF (Standardised Report Forms) which allows us to map out properly intra-government assets and liabilities when consolidating public debt held by the private sector. Our approach can be easily visualised in the stylised balance sheets in Figure 5.

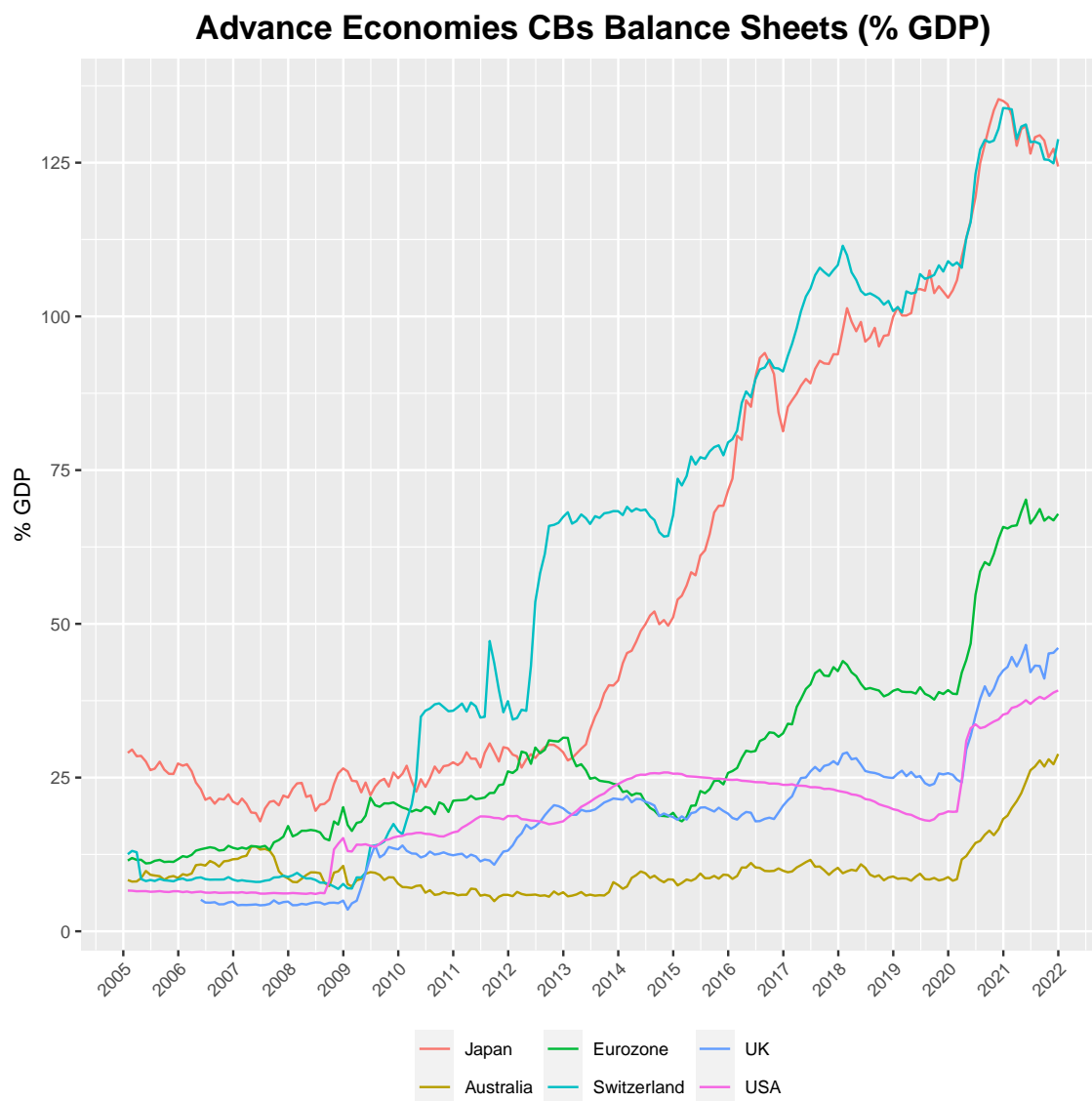


Figure 3: Central Banks' Balance Sheet Size – Advanced Economies

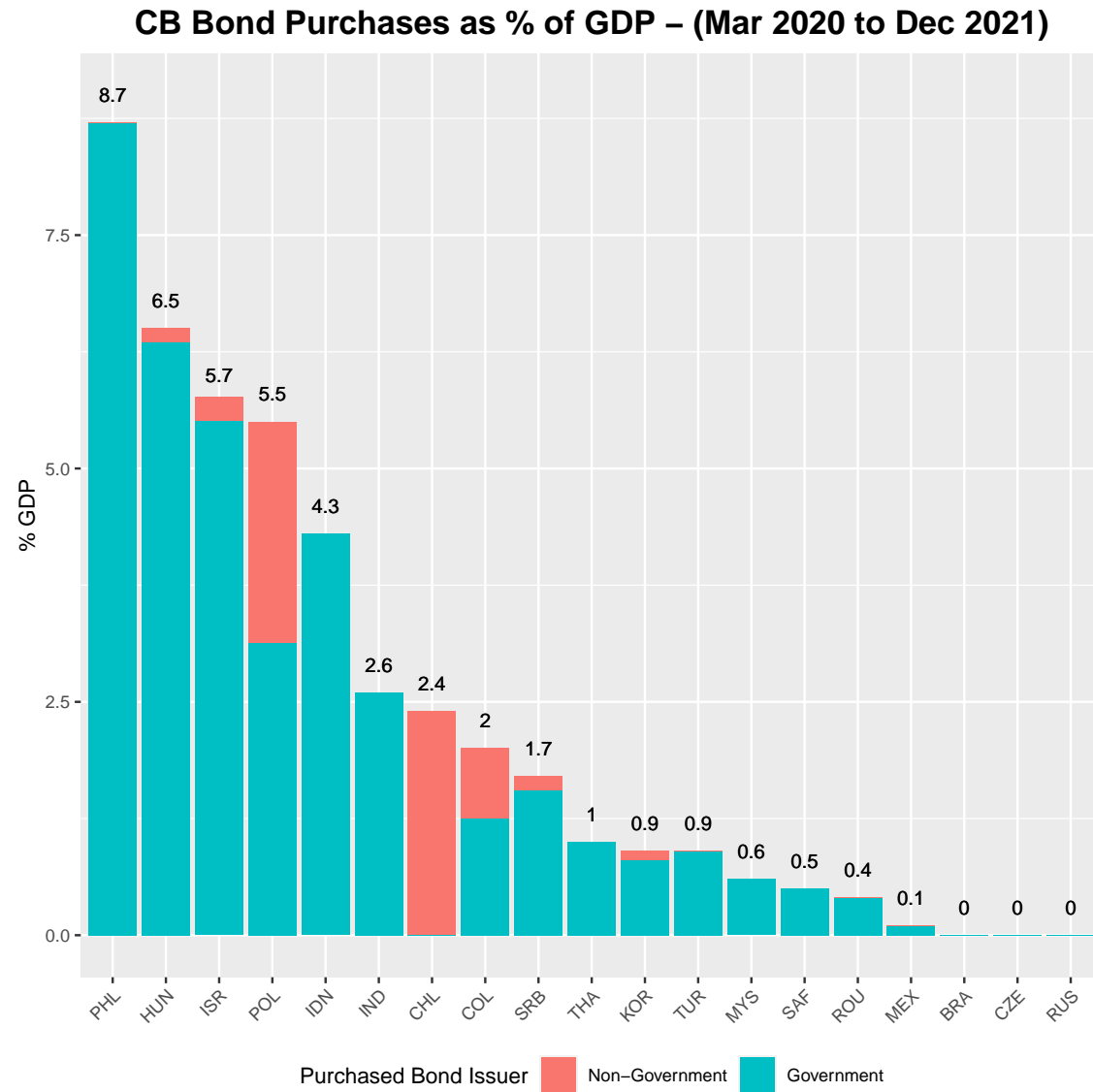


Figure 4: Total QE Bond Purchases - Emerging Countries

GG Balance Sheet	
Assets	Liabilities
<i>GG Treasury Deposits at CB (D)</i>	<i>GG Debt (A): Privately or CB-held</i>

CB Balance Sheet	
Assets	Liabilities
<i>Net Foreign Assets</i>	<i>Local CCY Liabilities to Private Sector (B)</i>
<i>GG Debt held by CB (C)</i>	<i>GG Treasury Deposits at CB (D)</i>
<i>Other Private Assets</i>	<i>Equity</i>

Figure 5: General Government and Central Bank's Stylized Balance Sheets

In essence, all non-contingent public sector liabilities with the private sector are taken into account – most notably the general government (GG) debt, but also the Central Bank (CB) local currency liabilities, which most often is composed mostly of bank reserves. For simplicity, we consolidate foreign currency liabilities (which are often a smaller component) on the asset side under Net Foreign Assets. From GG and CB liabilities, we exclude intra-government liabilities which can be either in the format of Central Bank assets (as a result of asset purchases or Treasury transfers for liquidity management) or liabilities (GG Treasury deposits at the Central Bank). Privately-held public debt is the consolidation of the four series shown in the table above ( $A + B - C - D$ ). The results of our method for most of the major global economies in 2020 can be visualised in Table 1.

The table allows one to analyse the specificity of the balance sheets country by country and yet be able to derive one simple metric of consolidated indebtedness. Here we believe it is important to delve into some of the most interesting cases, helping to illustrate the benefits of this approach.

We start with Japan, which has been experimenting with CB balance sheet policies for longer than anyone else. As a result, the Bank of Japan (BoJ) displays the largest balance sheet among the countries we observe in the table: its local currency liabilities amounted to 119.5% of the GDP in 2020 . It is important to note, however, that this does not impact its absolute or relative positions when it comes to indebtedness. That is so because the bulk of BoJ QE has taken place on public assets. Therefore, all that happened was an exchange of liabilities: instead of holding all the public debt in the format of Japanese GG bonds, the private sector has now exchanged a large amount of that for CB reserves. No big changes in size of debt, only on its duration.

	GG and CB Liabilities (% GDP)						
	GG Debt (A)	Rank	CB Local CCY Liability ex-equity (B)	Govt Debt in CB Asset (C)	Govt Deposits at CB (D)	Consolidated Public Debt (E = A+B-C-D)	Rank
<b><u>Majors:</u></b>							
Australia	60.4%	13	16.8%	6.0%	5.6%	65.6%	17
Canada	114.6%	3	26.7%	18.2%	3.9%	119.2%	4
Eurozone	101.1%	5	52.9%	30.0%	5.4%	118.6%	5
Japan	266.2%	1	130.8%	95.4%	13.0%	288.5%	1
United States	131.2%	2	33.5%	22.6%	7.6%	134.5%	2
<b><u>Latam:</u></b>							
Brazil	101.4%	4	50.3%	27.4%	20.7%	103.5%	7
Chile	32.8%	19	33.5%	0.2%	0.0%	66.1%	16
Colombia	68.2%	10	15.8%	2.3%	1.4%	80.3%	14
Mexico	65.5%	11	21.5%	0.0%	2.1%	85.0%	12
<b><u>EMEA:</u></b>							
Czech Republic	39.1%	17	64.5%	0.0%	8.1%	95.5%	9
Hungary	77.4%	8	34.5%	2.5%	3.9%	105.5%	6
Israel	76.5%	9	52.1%	3.8%	3.3%	121.5%	3
Poland	60.0%	14	26.4%	2.7%	2.3%	81.4%	13
Russia	18.9%	20	29.5%	0.3%	9.4%	38.8%	20
South Africa	78.8%	7	21.0%	1.4%	1.2%	97.2%	8
Turkey	41.7%	16	22.2%	2.0%	0.7%	61.2%	18
<b><u>Asia:</u></b>							
China	61.7%	12	37.6%	1.6%	4.0%	93.7%	10
India	89.3%	6	7.0%	6.9%	0.0%	89.5%	11
Indonesia	38.5%	18	16.5%	6.8%	2.1%	46.1%	19
South Korea	48.4%	15	23.8%	1.6%	0.4%	70.3%	15

Table 1: General Government and Central Bank's Liabilities - 2020

The Brazilian case is an interesting illustration on how the conduct of monetary policy by a central bank can distort the ranking of public indebtedness. Different from most CBs in the world, the Brazilian Central Bank (BCB) until 2021 did not have at its disposal a voluntary deposit facility. As such, open market operations were all conducted with GG bonds. As the country accumulated international reserves during the 2000's, BCB requested an increasing amount of bonds from the national treasury (increasing CB holding of GG debt and GG deposits at the CB – both much larger than peers) to conduct sterilization operations and, therefore, achieve its interest rate targets. What in other countries would have no impact on GG debt (CB deposit facilities would grow as it accumulated FX reserves on the asset side of the balance sheet), in the Brazilian case inflated debt somewhat. Recently changes in voluntary deposit legislation have taken place, but have yet to be fully embraced by the BCB and its counterparties. This helps explaining the fact that Brazil displays the smallest increase in debt stock as we move from GG to Consolidated Public Debt concept.

On the other end of the spectrum, the greatest disparity between GG debt and Consolidated Public Debt takes place in Czechia. By pursuing an FX-peg policy between 2013 and 2017, the Czech National Bank expanded its reserves at a brisk pace. The incurrence of that liability took place in exchange for an equally large accumulation of FX reserves, adding complexity to the public balance sheet in the form of currency mismatch. Switzerland, whose data are not available, faces exactly the same issue and, we believe, would display a similar pattern if its data were included. Our metric, by dramatically increasing the perceived debt stock of the country relative to the traditional GG metric, first is more accurate in reflecting public liabilities and, second, sheds light into the outsized currency mismatch within public balance sheet.

Clearly, not every debt is incurred the same way, though. Issuing debt to fund government expenses is meant to have a different impact on sovereign solvency than doing so to finance the acquisition of a liquid asset. There are therefore merits in being able to compile a measure of (net) debt that takes central banks' assets into account, while not making a judgement on the benefits of such a strategy. Breaking those assets down into different categories, as we do in Table 2, also sheds light on the ensuing discussion, beyond optimal balance sheet size, on its optimal composition. Once again, IMF SRF data enables us to do exactly that.

Emerging economies generally hold the bulk of its liquid assets in the format of foreign exchange reserves, whereas across major economies private credit has grown in importance – Japan and Europe were pioneers there, but since the COVID-pandemic credit easing has grown in importance. Finally, we add Central Banks' equity (which encompasses revaluation accounts) as an “asset”. As CB equity is normally just a temporary state of affairs – a transient balance after the marking of a profit, but before having transferred that back to (or being reimbursed from) the Treasury – we opt to think of it as local currency (often liquid as profits get transferred by fiscal year-end to the Treasury) asset.

When deducting CB liquid assets from public debt we, again, leave aside any judgement on its optimal composition and the different mismatches and risks incurred (FX, credit spreads or even equity risk). Using therefore the simplifying assumption that an effective mark-to-market will itself take care of these risks when it comes to the snapshot of solvency at a given moment, we build a “Net Public Debt” metric.

It is evident that except for Japan and Europe, emerging economies tend to have larger CB assets (and therefore lower net debt), mostly because of large FX reserve holdings. When it comes to Czechia, for instance, the net debt figure, by taking into account the accumulation of large amount of FX assets, adjusts for what is an absolute high level of indebtedness when we look for the gross figures.

	CB Assets (% GDP)			Net Public Debt	
	CB NFA (F)	CB Private Asset (G)	CB Equity (H)	Net Aggregate GG + CB Debt (I = E-F-G-H)	Rank
<b><u>Majors:</u></b>					
Australia	3.4%	8.8%	1.4%	52.1%	13
Canada	0.0%	8.5%	0.0%	110.7%	3
Eurozone	5.1%	25.9%	8.0%	79.8%	6
Japan	-3.8%	46.7%	7.5%	238.1%	1
United States	-0.8%	11.9%	0.2%	123.2%	2
<b><u>Latam:</u></b>					
Brazil	26.0%	1.3%	4.4%	71.8%	8
Chile	15.1%	17.2%	-1.0%	34.7%	17
Colombia	21.9%	1.1%	9.5%	47.9%	14
Mexico	18.7%	3.1%	0.3%	62.9%	10
<b><u>EMEA:</u></b>					
Czech Republic	64.0%	0.0%	-0.4%	31.9%	18
Hungary	21.2%	13.3%	2.6%	68.3%	9
Israel	43.2%	1.7%	-3.5%	80.1%	5
Poland	23.8%	2.5%	2.6%	52.4%	12
Russia	40.1%	5.3%	16.2%	-22.8%	20
South Africa	18.5%	1.7%	0.6%	76.3%	7
Turkey	13.2%	8.6%	1.5%	38.0%	16
<b><u>Asia:</u></b>					
China	22.3%	13.7%	0.0%	57.7%	11
India	-0.2%	0.4%	0.0%	89.3%	4
Indonesia	12.2%	0.4%	2.9%	30.6%	19
South Korea	21.4%	2.1%	1.3%	45.5%	15

Table 2: Central Bank Assets and Net Public Debt - 2020

Taking into account the equity line (which encompasses revaluation accounts) also enhances the assessment of solvency in moments of sharp changes in asset prices. One of the advantages of holding a large amount of FX reserves is that, when facing a devaluation of the local currency, a country would improve its solvency position. But as different countries adopt different fiscal years and different approaches to CB-Treasury relationship, that improvement in solvency might have not yet been reflected in the GG balance sheet at a specific point in time (e.g., before the CB has transferred its profits). Our metric will capture that at any point in time, expressing as fair a solvency picture as possible given current mark-to-market. For instance, Russia has traditionally run the Central Bank of Russia (CBR) with large excess equity, whereas in 2020, amidst a sharp depreciation of the BRL, the BCB had for a few months double-digit (in % of GDP) equity, which was then transferred to national

treasury alleviating its liquidity position.

Whereas India, Indonesia and South Africa stand out for having the “simplest” CB balance sheets when it comes to non-public assets the latter wins when it comes to orthodoxy: different than its Asian peers, the SARB has kept itself more extricated from the National Treasury. Despite that CB orthodoxy, South Africa comes close to the top of the league on public indebtedness together with India, Brazil, Hungary and Israel. Amongst Advanced economies, the European situation is improved relative to US one given the large amount of credit easing it has engaged on, therefore reducing consolidated “net public debt”.

### 3 A Framework to Quantify Fiscal Room

Having defined and quantified what we deem to be a more thorough measure of indebtedness, we consider other necessary steps to achieve sound policy description. Even after adjusting for a debt measure that correctly encompasses the total public sector instead of only the general government, the most traditional metric – Debt/GDP – still does not allow a full assessment of debt sustainability. Since it is a snapshot that does not take into account the forward-looking dynamics around GDP growth, budget balances and the outsized impact of real interest rates trajectories, the Debt/GDP metric does not provide any information about a country’s ability to repay its debt in the future, which is what matters in terms of policy evaluation. Although debt levels for emerging economies are usually much lower than for advanced ones, the fact that the private sector is willing to carry debt issued by the latter at much lower real interest rates has a clear bearing on what are the relative boundaries for indebtedness: much larger in advanced economies than in emerging markets.

In this setting, the use of a simple, transparent and forward-looking rule that takes into account interest payments such as the one elaborated by Furman and Summers (2020) has many appeals and is a sensible starting point. To escape the stock/flow dilemma when analysing debt sustainability, they take the flow/flow shortcut and state: “policymakers need not worry about the fiscal outlook as long as the debt service-to-GDP ratio, measured in real terms is expected to stay comfortably inside the historical experience over the next decade and does not spiral upwards over that period.”

As one can see, they focus on two main criteria for a sustainable debt trajectory: i) real interest rates should not exceed potential GDP growth and; ii) the expectations must be such that this situation is not expected to change in the near future. The rationale behind this idea is that the smaller is  $g - r$ , the larger is the government need to run primary



surpluses. In addition, forecasts for the long run – 10 years ahead or so – have a large degree of inaccuracy. In the distant future, any problematic social arrangement in terms of debt sustainability should be politically reversible and, for these reasons, policymakers should focus on the short- and medium-term indicators.

The vulnerability to interest rate (or inflation) shocks is the key source of uncertainty in such a rule. This is particularly true if one is running it on the wrong dataset. For the sake of simplicity, taking to an extreme we could imagine a country, in which the Treasury has a large debt load, engaging in an outsized fiscal expansion. Its respective Central Bank, by pursuing something resembling a yield curve control (YCC) policy, tries to cap the yields at long tenors of the curve. Looking only at the general government (GG) debt as most commentators concentrate on, one could be misled to conclude that because the Treasury finances cheap/below the rate of potential GDP growth, fiscal room is extremely large. In this hypothetical case the degree of confidence that policymakers could draw by extrapolating presently low interest rates into the future is very low: the consolidated public sector is actually issuing very short overnight liabilities to the private sector in the form of Central Bank reserves as the long-tenor debt issued by the GG is only an intra-government holding.

The idea here is that it's not only the size of the consolidated debt load that matters for sovereign solvency purposes, but also its maturity and exposure to interest rate fluctuations. While issuing short-term debt is usually cheaper for the public sector because it reduces the interest rate risk that investors must bear, it also increases the volatility of debt services which leads to greater fiscal risk. Understanding this trade-off is fundamental to assess the sustainability of the public debt trajectory and it's only possible when one considers the consolidated GG and CB debt. This is because the CB is able to issue liabilities with maturities different from those issued by the GG and thus the profile of privately-held public debt may differ from that of GG debt. Table 4 provides some examples of these differences in maturity, which were accentuated in recent years with many CBs using QE as a monetary policy instrument.

As we argue here, the transfers between the GG and the Central Bank do not carry any relevance in terms of fiscal sustainability since both of them are part of the public sector. For this reason, when using a metric based on interest payments, one must consider only transfers to the private sector. One way to do this is as in Furman and Summers (2020): calculate the total amount of interest paid on Treasury bonds and subtract any remittance to the Central Bank. This approach requires an additional layer of data that allows the identification of the recipients of interest payments and relies on discrete and sometimes arbitrarily timed intra-government transfers that can make empirical tests difficult.

Our approach of consolidated liabilities in chapter I simplifies data analysis by providing

a direct measurement of public debt owned by the private sector and, as a consequence, not needing to rely on imprecise (or low frequency) intra-government remittances information. This is done by weighting the average debt maturity of privately-held GG debt and CB local currency liabilities, which typically are overnight by nature.

It also allows us to estimate the maturity transformation effect of central bank quantitative policies on overall public sector debt and permits one to run different shocks in each component of public sector balance sheet independently which may allow for better identification strategies in empirical exercises. Here we use BIS data whenever available and complement it with national data sources when data is unavailable or published only with long lags.

The impact of QE policies is self-evident in Table 3. To delve further in some of the interesting particular cases, we plot the historical evolution of average maturity for the consolidated debt for a few countries in Figure 6 below.

Date	Country	GG Debt Average Maturity (Years)	Consolidated Public Debt Average Maturity (Years)	Consolidated Public Debt Average Maturity (% GG Debt Average Maturity)	Date	Country	GG Debt Average Maturity (Years)	Consolidated Public Debt Average Maturity (Years)	Consolidated Public Debt Average Maturity (% GG Debt Average Maturity)
2010	Australia	4.90	4.03	82.3%	2010	Israel	6.20	4.27	68.9%
2015	Australia	6.80	5.84	85.9%	2015	Israel	6.80	4.50	66.1%
2020	Australia	7.40	6.14	82.9%	2020	Israel	15.60	9.34	59.9%
2010	Brazil	3.36	2.23	66.4%	2010	Japan	6.67	5.88	88.2%
2015	Brazil	4.44	3.12	70.3%	2015	Japan	8.42	6.13	72.8%
2020	Brazil	3.39	2.42	71.4%	2020	Japan	8.92	5.28	59.2%
2010	Canada	6.00	5.73	95.5%	2010	Korea	5.00	2.70	53.9%
2015	Canada	6.50	6.24	96.1%	2015	Korea	7.23	4.82	66.6%
2020	Canada	4.89	3.95	80.9%	2020	Korea	10.50	6.99	66.6%
2010	Chile	13.50	4.22	31.2%	2010	Mexico	7.10	5.62	79.1%
2015	Chile	11.46	5.75	50.2%	2015	Mexico	7.80	6.17	79.1%
2020	Chile	-	-	-	2020	Mexico	7.80	6.02	77.2%
2010	Colombia	5.10	4.18	82.0%	2010	Poland	4.30	3.38	78.7%
2015	Colombia	6.28	5.38	85.6%	2015	Poland	4.30	3.33	77.5%
2020	Colombia	7.81	6.41	82.1%	2020	Poland	4.20	2.96	70.4%
2010	Czech Republic	5.78	3.74	64.7%	2010	Russia	5.58	1.81	32.5%
2015	Czech Republic	4.98	2.83	56.9%	2015	Russia	7.32	3.73	51.0%
2020	Czech Republic	6.53	2.68	41.0%	2020	Russia	6.64	3.20	48.1%
2010	Eurozone	6.40	5.55	86.8%	2010	South Africa	10.60	8.55	80.6%
2015	Eurozone	6.58	5.40	82.0%	2015	South Africa	15.70	12.21	77.7%
2020	Eurozone	7.65	4.58	59.9%	2020	South Africa	14.80	11.79	79.7%
2010	Hungary	2.90	2.48	85.5%	2010	Turkey	2.48	-	-
2015	Hungary	3.60	2.69	74.6%	2015	Turkey	4.53	2.95	65.2%
2020	Hungary	5.40	3.83	71.0%	2020	Turkey	2.78	1.80	64.9%
2010	India	9.78	7.38	75.5%	2010	USA	4.90	4.21	85.9%
2015	India	10.50	7.88	75.1%	2015	USA	5.61	4.59	81.9%
2020	India	11.33	10.42	92.0%	2020	USA	5.30	4.28	80.7%
2010	Indonesia	8.58	5.16	60.1%					
2015	Indonesia	9.29	6.33	68.2%					
2020	Indonesia	8.00	5.50	68.7%					

Table 3: GG and Consolidated Public Debt Maturities – 2010, 2015 and 2020



Figure 6: Debt Maturity Evolution - GG Debt vs. Consolidated Public Debt

Starting with the US, its trajectory of consolidated public debt average maturity is not very concerning. It entered the QE-era on the low side when compared to other advanced economies, but despite engaging on aggressive QE from early on, it has seen Treasury issuance compensate for CB-led shortening of maturities. So, in absolute terms, up until 2019, average maturity was being extended even if the gap between GG debt and consolidated public debt has been widening. Relative to other countries, smaller QE programmes as a share of GDP has also been of help to explain the outcomes above.

Europe, on the other hand, has embraced balance sheet expansion much later, but by 2015 it was seeing a very brisk pace of QE. If up to 2014/15 maturity extension was not really an option at the disposal of many sovereigns facing high debt costs amidst heightened market skepticism on overall debt sustainability, post-QE GG clearly seek to extend debt maturities, but the ECB purchases more than compensated, dragging average debt maturities somewhat lower.

The fiscal-monetary arrangement of Europe clearly makes the analysis of a consolidated public sector debt sustainability muddier, as the project of a monetary union has not been followed through with fiscal integration. To the extent one focuses – as most analysts do – on national (as opposed to overall Eurozone, which would entail aggregating CB balances) debt sustainability only, the GG average maturity expansion observed since 2012 should play a larger role and, therefore, one might say that the gap between the two series above has been instrumental in improving overall sustainability in most of European periphery. That has come at the expense of more vulnerability (maturity shortening) in the only common balance sheet: ECB one.

The largesse of BoJ balance sheet at first sight would be suggestive of a very short overall public debt, but in fact, its maturity has probably fallen by less than one would have expected since the emergence of Abenomics. The massive quantitative expansion embarked on since Governor Kuroda came to the helm of BoJ was neutralised by the Japanese Treasury taking a much more active stance in elongating its issuance profile. Once more the gap between the two series is emphasizing the role of QE, but also suggesting that some degree of policy coordination is in place to avoid a more acute shortening of liabilities. Alternatively, one could think of the private-sector demand for duration assets (reflected in relative price for longer assets) as the guidepost for the issuer and to the extent it finds itself deprived from long-dated assets bought by the CB, the Treasury just steps-in to fill that gap as it deems related costs to be attractive for its own debt issuance strategy.

Brazil has historically run very short-dated debt, which leave it more vulnerable to large moves in short-term real rates. The extension of GG debt maturity between 2005-2015 has been counterbalanced by BCB policy of accumulation of FX reserves exerting downward

pressure on overall public debt maturity. Average maturity of consolidated public debt fell materially in 2020 during the pandemic.

While the fall in GG issuance horizon is a product of higher fiscal uncertainty and lower demand for longer assets, CB balance sheet also played a counterintuitive role in this trend. BCB was one of the few major EM CBs not to engage in QE in 2020, when several Treasuries saw themselves unable to fund in markets. But balance sheet expansion took place endogenously: an outsized currency depreciation generated a similarly large mark-to-market profit in Brazilian Reais terms that was ultimately credited to the Treasury (which by then was struggling to replenish its eroding cash balances reserves) and then reinjected in the economy increasing CB local currency liabilities. The effects on debt average maturity transformation were pretty similar to those of a QE programme, but achieved through means of FX depreciation .

In the Czech Republic, the FX-peg policy we discussed earlier has clearly left its mark from 2013 onwards, to the point that the country now displays one of the shortest overall debt maturities across our sample. Significantly increasing the sensitivity of its budget to overnight interest rates in a way is the price paid for the large FX reserves cushion that has been built. That result is exactly what one would expect as a country gives up monetary policy independence in favour of an FX policy. But what is interesting here is that even if the peg was a transitory policy, its marks are permanent (as long as FX reserves are not greatly reduced). This might be less of a macroeconomic worry for a small open-economy like Czechia, where often rates play second-fiddle for FX anyway.

Finally, South Africa sits in the other extreme. The country has disputed the global leadership on average maturity rankings with the UK. Amongst emerging economies is by far the country displaying the longest average maturity of its debt. Interestingly, despite fast growing interest rate burden in its budget, South African National Treasury has continued with its strategy to elongate its debt. Having one of the largest debt loads in EM and yet the longest debt in the world is often a bit of a conundrum for many investors, who increasingly demand more premium for long SA long bonds. The length of the debt clearly buys a lot of time for any needed fiscal adjustment, but that happens at the expense of the budget slowly being hollowed out by interest rate expenses increasing the political-economy tension in the system.

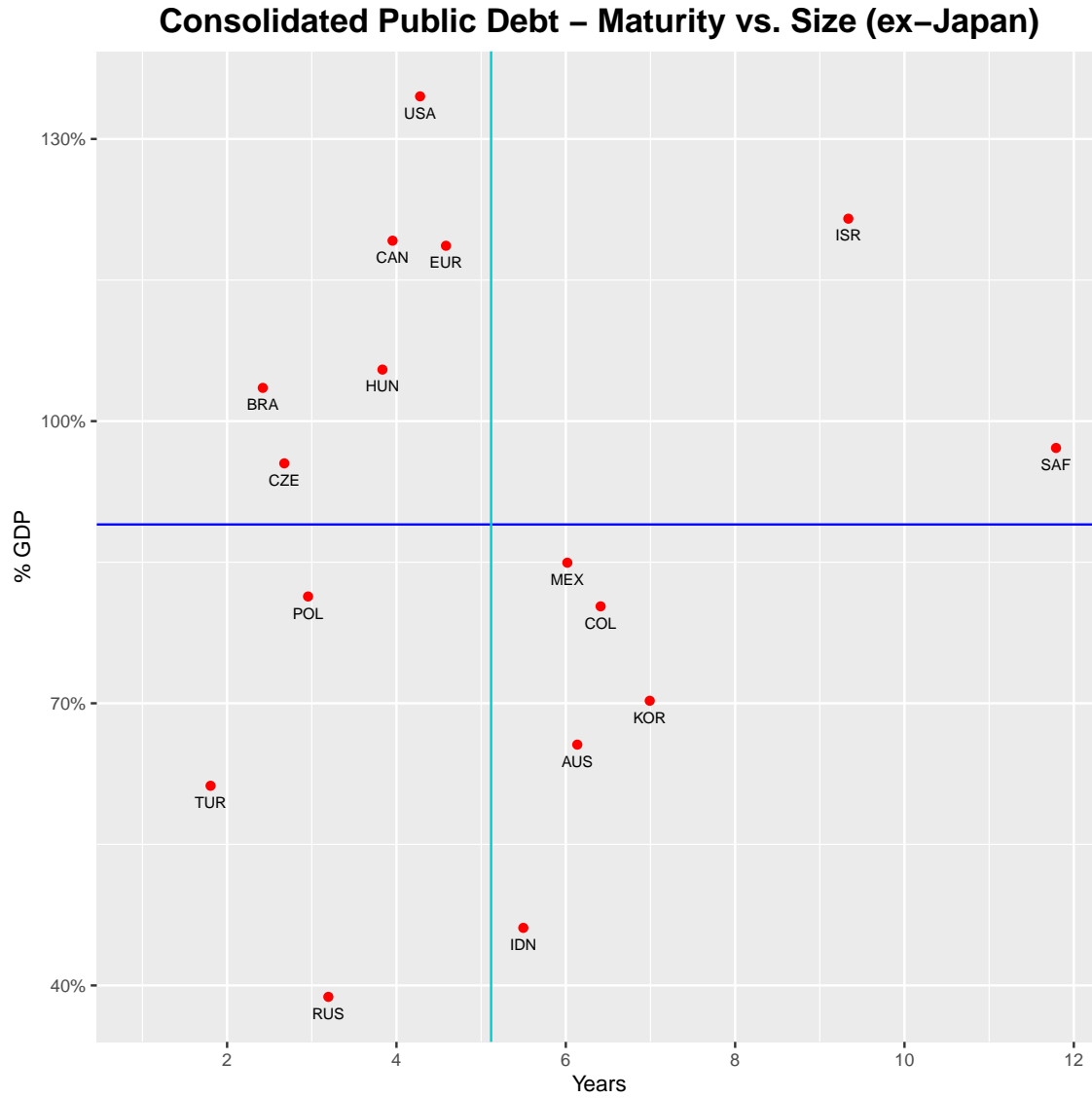


Figure 7: Maturity and Size of the Consolidated Public Debt

## 4 Conclusion

Central banks play an important role in debt markets all around the world, impacting the size and the profile of privately-held sovereign debts. Still, their balance sheets are often ignored by most used debt metrics and there is a shortage of data on consolidated debt in most countries. This paper revises the discussion about how to properly measure sovereign debt and argues that, due to the trend of greater central bank activism in recent years, there is an increased need to use a metric that consolidates both general government and central bank balance sheets in order to make fiscal burdens comparable across countries.

In this context, the new dataset presented in this paper not only provides evidence that simple general government data is insufficient for debt sustainability analysis but also helps to shed light on the impact of policies such as FX reserves accumulation and QE on the profile of privately-held sovereign debt. The findings suggest that even when the overall size of sovereign debt is kept constant, these policies may reduce the maturity and duration of the debt load, which can lead to greater fiscal and rollover risks. These effects on debt trajectory and sustainability cannot be captured by the traditional metrics that focus only on general government and ignore central banks' role in debt management.

Overall, this paper contributes to the discussion on debt sustainability in a world where sovereign debt is jointly managed by the general government and the central bank. The compiled dataset is a step forward in this direction and intends to provide input to future empirical researches on the topic. Looking forward, there are still a lot to be investigated in terms of the interaction between joint debt management, yield curves and market expectations that, ultimately, determines how much fiscal room a sovereign government has when implementing its desired policies.

## References

1. Barro, R. (1995). “Optimal Debt Management”. *NBER Working Paper* No 5327
2. Blanchard, O. and Missale, A. (1994). “The Debt Burden and Debt Maturity”. *The American Economic Review*, v. 84 (1): 309-319.
3. Cochrane, J. (2001). “Long-Term Debt and Optimal Policy in the Fiscal Theory of the Price Level”. *Econometrica*, v. 69 (1): 69-116.
4. Cole, H. and Kehoe, T. (2000). “Self-Fulfilling Debt Crises”. *Review of Economic Studies*, v. 67 (1): 91-116.
5. Filardo, A., Mohanty, M. and Moreno, R. (2012). “Central Bank and Government Debt Management: Issues for Monetary Policy”. *BIS Papers* No 67.
6. Furman, J. and Summers, L. (2020). “A Reconsideration of Fiscal Policy in the Era of Low Interest Rates. *Presentation to the Hutchins Center on Fiscal Monetary Policy and Peterson Institute for International Economics*.
7. Greenwood, R., Hanson, S., Rudolph, J. and Summers, L. (2015). “The Optimal Maturity of Government Debt”. *The \$13 Trillion Question*, *Brookings Institution Press*, 2015.
8. Greenwood, R., Hanson, S., Rudolph, J. and Summers, L. (2015). “Debt Management Conflicts Between the U.S. Treasury and the Federal Reserve”. *The \$13 Trillion Question*, *Brookings Institution Press*, 2015.
9. Greenwood, R., Hanson, S., Stein, J. (2015). “A Comparative-Advantage Approach to Government Debt Maturity”. *The Journal of Finance*, v. LXX (4), August 2015.
10. Greenwood, R. and Vayanos, D. (2014). “Bond Supply and Excess Bond Returns”. *Review of Financial Studies*, v. 27 (3): 663-713.
11. Krishnamurthy, A. and Vissing-Jorgensen, A. (2013). “The Aggregate Demand for Treasury Debt” *Journal of Political Economy*, v. 120 (2): 233-267.
12. Nöh, L. (2019). “Increasing Public Debt and the Role of Central Bank Independence for Debt Maturities”. *European Economic Review*, v. 119 (2019): 179-198.
13. Reis, R. (2017). “Can the Central Bank Alleviate Fiscal Burdens?”. *The Economics of Central Banking*, *Oxford University Press Handbook of Economics*, March 2019
14. Reis, R. (2017). “Central Banks Going Long”. *Monetary Policy and Financial Stability: Transmission Mechanisms and Policy Implications*, *Banco Central de Chile*: 43-81, 2019.
15. Sims, C. (2003). “Fiscal Aspects of Central Bank Independence”. *CESifo Working Paper Series* 547, CESifo.