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Sovereign Debt

Leonardo Martinez, Francisco Roch, Francisco Roldan and Jeromin Zettelmeyer*

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ABSTRACT: This paper surveys the literature on sovereign debt from the perspective of understanding how sovereign debt differs from privately issue debt, and why sovereign debt is deemed safe in some countries but risky in others. The answers relate to the unique power of the sovereign. One the one hand, a sovereign has the power to tax, making debt relatively safe; on the other, it also has control over its territory and most of its assets, making debt enforcement difficult. The paper discusses debt contracts and the sovereign debt market, sovereign debt restructurings, and the empirical and theoretical literatures on the costs and causes of defaults. It describes the adverse impact of sovereign default risk on the issuing countries and what explains this impact. The survey concludes with a discussion of policy options to reduce sovereign risk, including fiscal frameworks that act as commitment devices, state-contingent debt, and independent and credible monetary policy.

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Author's E-Mail Address:	lmartinez4@imf.org, froch@imf.org, froldan@imf.org, jzettelmeyer@imf.org

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WORKING PAPERS

Sovereign Debt

Prepared by Leonardo Martinez, Francisco Roch, Francisco Roldan and Jeromin Zettelmeyer

1. Introduction

Sovereign debt—debt issued by national governments—is an unusual sort of asset. In the context of the domestic financial system, it is often viewed as safe and liquid—at least safer and more liquid than privately issued debt. The deep reason for this is the sovereign's power to tax future income. Buying and selling sovereign debt help economic agents cope with liquidity shocks, smooth consumption, and realize investment opportunities.

But there is also another perspective on sovereign debt. This focuses on the difficulty of enforcing sovereign debt contracts, particularly if the holders of debt are foreign investors. The problem is not necessarily the lack of a legal framework: sovereign debtors can issue debt in foreign jurisdictions whose legal systems are removed from the influence of the debtor. Rather, the problem is that in the event of default, foreign courts rarely have the power to force a sovereign to hand over assets, since most of these assets are located within the sovereign's borders. This raises the question why externally held sovereign debt can exist at all.

The first perspective dominates in advanced countries, in which large volumes of tradeable debt are held by domestic residents that the government cannot politically afford to default on. The second tends to dominate in emerging markets and developing countries, where political institutions may be weaker and external and domestic debt markets may be segmented. Importantly, however, both perspectives are two sides of the same coin, namely, the extraordinary power of the sovereign. In the first case, what makes sovereign debt special is the sovereign's power to tax; in the second, its power over its own territory and assets.

This paper aims to help readers understand the assumptions and drivers behind both characterizations of sovereign debt, and what they imply for the economy—that is, the benefits of safe sovereign debt and the costs of living with sovereign risk. It does so by providing an overview of the enormous literature on sovereign debt held by private creditors. This literature dates back to the early 1980s and was originally focused on the question of why externally held sovereign debt can exist at all—or equivalently, on the costs of default. More recently, the literature has tried to measure these default costs and disentangle them from the output dislocation that might be inducing default, to study how the presence of sovereign risk changes the properties of the macroeconomy in emerging markets, and (very recently) to shed light on the valuation and sustainability of sovereign debt in advanced countries.

The article starts by summarizing some of the unique characteristics of sovereign borrowing, and then briefly describes the main institutional features of the sovereign debt market. It then discusses the uses and implications of default-risk free sovereign debt. This is useful both as a benchmark and because it has been the empirically relevant case for many advanced countries. We then switch gear and recall answers to some of the core questions of the literature on externally held sovereign debt: what are the costs of default? What causes defaults? Finally, we describe the implications of sovereign risk—living in the shadow of possible default, even if default never materializes. It ends by describing some strategies for how sovereign risk might be reduced.[1]

2. Why sovereign borrowing is different

Sovereign borrowing and borrowing by private parties (households and corporations) have broadly similar motives. Like private agents, governments borrow to finance long-lived investments. Furthermore, just like households borrow to smooth their consumption through periods of temporary hardship, there are good reasons for governments to borrow in recessions and reduce public debt in good times. Countercyclical borrowing supports private consumption smoothing by maintaining government services that cannot be easily substituted (such as law enforcement, public health and public education), and by stabilizing the income of households that cannot easily borrow themselves (for example, by keeping public employment stable and paying unemployment benefits in recessions). At the same time, it avoids the distortions that would be created by fluctuating tax rates (Barro, 1979), and the contractionary effect of raising taxes in the middle of a recession.[2]

But sovereign borrowing also has distinctive features. These imply that the costs of borrowing by sovereigns may not be the same as the borrowing cost of private parties, and that the economics of sovereign defaults may differ from that of personal or corporate bankruptcy.

Consider first the case where sovereign debt is default-risk free. This case is empirically relevant for countries with large domestic debt markets and domestic institutions that enforce repayment (e.g., because governments need to respect constitutional principles or because they face prohibitive political penalties from defaulting on their citizens). In such cases, the key difference

[1] Some of the material presented in sections 2 and 4-7 of this paper, draws on surveys by Sturzenegger and Zettelmeyer (2007), Hatchondo et al. (2007), Panizza et al. (2009), and Willems and Zettelmeyer (2022).

[2] As we explain in Section 8, sovereign risk challenges this view of the optimality of countercyclical fiscal policy.

between privately issued and sovereign debt is that the latter is both safer and more liquid. While private domestic borrowers can post collateral, they often do not have sufficient collateral to fully eliminate borrowing constraints. In contrast, sovereign debt is backed by a "collateral" of sorts: the power to tax in the future. One implication, which we elaborate on in Section 4, is that governments that can issue "safe" debt may be able to sustain positive debt without ever having to generate primary surpluses to repay it, as investors are willing to hold this debt because of its unique safety and liquidity features.

In emerging and developing economies, as well as some advanced countries in crisis times, however, sovereign debt is not safe. One reason for this is that the repayment of sovereign debt, may be more difficult to enforce, particularly when the debt holders are foreign investors. While domestic courts can enforce corporate and household debt, they are subject to laws that can be changed by the sovereign. Foreign courts are outside the reach of a sovereign, but they cannot dictate repayment. What they can do, and have increasingly done since the 1990s, is to issue an order which gives a private creditor the right to attach sovereign assets. Most of these assets, however, are located inside the sovereign's national borders, where the sovereign will not allow them to be attached. Hatchondo and Martinez (2011) and Wright (2002) discuss how attempts to attach sovereign assets have had limited success.

Finally, an important difference between sovereign and privately issued debt is that the former is affected by politics (Alesina and Tabellini, 2005; Persson and Svensson, 1989). For example, a politician who cares mostly about the period during which she will be in office may not fully internalize the costs of issuing debt. Moreover, some governments could decide to borrow strategically to bind the hands of future governments with different political preferences.

To summarize, sovereign debt is very different from privately issued debt, but the differences do not all point in the same direction.[3] They depend on the institutional and political characteristics of the issuer, the identity of the creditor, the liquidity of the domestic debt market, and integration of domestic and international debt markets. These characteristics can have an important influence on whether sovereign debt is a boon or a source of problems. An important question, which we will return to at the end of this survey, is whether policy can influence these characteristics.

[3] There are other operational motives for the governments to issue sovereign debt such as developing security markets or enhancing the monetary policy transmission.

3. Sovereign bond market basics

The sovereign debt market is the oldest and largest bond market in existence. As of end-2018, the amount of global debt securities issued by general government exceeded $45 trillion (BIS, 2019). Securities-level data on sovereign borrowing is available from the 1800s, particularly for advanced economies (Flandreau et al, 2010). Hall et al (2021) construct series for all US debt since independence. Meyer, Reinhart, and Trebesch (2021) compile a database of foreign-currency government bonds traded in London a New York since 1815 covering 91 countries.

Government debt plays a crucial role in financing governments worldwide and serves as a benchmark for capital costs and long-term bank loans (Neumeyer and Perri, 2005; Mendoza and Yue, 2012). Government bonds are initially sold in primary markets with the purpose of raising funds. Auctions (e.g., Dutch style or minimum-price offering) are widely used in developed countries as they prove more cost-effective and transparent, while countries in which a smaller number of bidding institutions might create collusion concerns tend to resort to syndication, underwriting, or tap sales (Kimmel, 2019). Governments structure issuances to affect their redemption profile across the yield curve as well as to control their rollover, exchange rate, and interest rate risks. Secondary markets convert government securities which arise from long-term financing needs into the liquid instruments demanded by market participants for portfolio or collateral purposes. Monitoring secondary markets is critical to the government's debt strategy, as new information is typically reflected in secondary market prices. Primary and secondary markets support each other, as higher liquidity in secondary markets improves participation (and prices) in primary markets as securities become easier to offload (see also Passadore and Xu, 2020) while issuing at key maturities in primary markets can support the growth of secondary markets by creating a benchmark yield curve to anchor prices.

Sovereign bonds differ with respect to governing law (domestic or foreign), financial terms (currency denomination, maturity, amortization profile, floating or fixed rate, nominal or CPI-indexed), and non-financial contractual provisions such as listing requirements; cross-default, acceleration, and negative pledge clauses; and majority restructuring provisions. These provisions protect allow bonds to be traded, protect investor interests and in some cases determine conditions for changing the payment terms. They typically follow a market standard that tends to change slowly (Gelpern, Gulati and Zettelmeyer 2019). Advanced countries almost always issue under

domestic law, while emerging markets and developing economies (EMDEs) have tended to issue under foreign law (typically New York or English). However, the share of domestic debt in total debt of EMDEs has been rising from about 30 percent to 46 percent between 2000 and 2020 (IMF 2021).

Currency composition is a major issue influencing the risk of sovereign bonds from the perspective of both the issuer and the borrower. While most advanced economies issue debt in their own currencies, the governments of emerging and developing markets often find this difficult or too expensive. Most foreign currency debt is denominated in US dollars, with Japanese yen, euros, UK sterling, or Swiss francs playing minor roles (Arsanalp et al, 2019). The causes and consequences of foreign currency issuance, sometimes referred to as "original sin," studied by a long literature pioneered by Eichengreen and Hausmann (1999), are still a matter of research and debate to which we return in Section 10. More recently, some emerging countries have managed to develop local capital markets and issue bonds denominated in local currency (see, for example EBRD 2010).

Since government debt is usually traded in secondary markets, the holders of bonds are difficult to track. Non-residents may participate in domestic bond markets and vice versa. As Broner, Martin, and Ventura (2010) point out, this effectively removes a sovereign's ability to impose different terms of repayment to different agents (selective defaults). OECD (2019) compile information on the investor base for sovereign debt of OECD countries and how it has changed over time. They highlight the increasing role of domestic and foreign central banks and institutional investors (insurance companies, investment funds, pension funds) in the 2010s, as well as how domestic central bank demand seems to crowd out domestic private bank demand. Arslanalp and Tsuda (2014, updated) provide similar decompositions for EMs.

4. Safe sovereign debt[4]

This section focuses on the case of an economy in which investors regard government debt as default-risk free. In such a setting, sovereign debt could be "special" in the sense that it provides

[4] This section draws on Willems and Zettelmeyer (2021).

liquidity services to investors facing borrowing constraints. This could have important implications for the pricing and sustainability of sovereign debt.

To see this, consider the benchmark case in which financial markets are complete and there are no constraints to private borrowing. In this setting, it can be shown that in the presence of rational investors—which rules out "Ponzi games" in which sovereigns roll over their debts forever—the market value of outstanding debt must be equal to the net present value of expected future primary surpluses calculated using stochastic discount factors (Bohn, 1995). This relationship is sometimes referred to as the (model-based) intertemporal government budget constraint (IGBC). The use of stochastic ("risky") discount rates rather than risk-free rates reflects the fact that—although debt is default-risk free—the market value of debt fluctuates, exposing the investor to risks.[5]

In a setting in which investors/consumers are borrowing constrained (e.g., because of scarce collateral), buying a liquid asset which can be sold in times of need is the only way to smooth consumption. Aiyagari and McGrattan (1998) elegantly show how safe sovereign debt backed by future taxes can be isomorphic to a loosening of borrowing constraints. Such an asset may also be the only way of ensuring that investors/consumers have sufficient liquidity to realize productive investment opportunities when these arise (Woodford 1990). As a result, sovereign debt may "crowd in" investment and raise growth. These welfare enhancing effects—consumption smoothing, higher investment—arise independently of any welfare enhancing effects due to government spending financed by debt.

In principle, liquidity could also be provided by private financial intermediaries. However, Holmstrom and Tirole (1998) show that when the liquidity needs of investor/consumers are correlated and private borrowing is constrained, aggregate shocks will result in a shortage of private liquidity. In such a setting, the government can achieve a Pareto improvement by issuing sovereign debt. In effect, the power to tax consumers' future endowments enables the government to commit funds on behalf of private agents. Sovereign debt offers a workaround that enables private agents to borrow against their future income after all. As a result, holding sovereign debt provides a service to investor/consumers that exists independently from its value as a claim on future primary surpluses.

[5] In particular, the sovereign will seek to repay debt in booms, when the marginal utility of consumption is low, and issue additional debt in recessions, when the marginal utility of consumption is high. This debt needs to be absorbed by private investors.

This insight has important implications for the question of whether today's debts in advanced economies can be repaid without some combination of high inflation, financial repression, or even default (contradicting the assumption that advanced country debt is default risk free). Several authors, such as Olijslagers et al. (2021) and Jiang et al. (2021), have argued that there is an inconsistency between today's high debt levels, primary fiscal balances that are expected to remain in deficit far into the future, and low (expected) inflation. In other words, model-based forecasts of primary surpluses and stochastic discount factors suggest that the IGBC, *value of debt stock* = E{*PV(future primary surpluses)*} is violated. Jiang et al. (2021) refer to this as the "valuation puzzle". One interpretation for this is that markets are expecting higher future primary surpluses than seems to be justified based on the past fiscal behavior of countries. Validating these market expectations will require atypically large fiscal adjustments. If governments are not capable of such adjustments, the IGBC will eventually be restored through an unexpected—and possibly disruptive—event that lowers the value of the debt stock.

However, as observed in recent papers by Berentsen and Waller (2018), Brunnermeier et al. (2020), and Reis (2021), these conclusions might change if the liquidity services provided by safe government debt in the presence of private borrowing constraints are taken into account. In that case, the intertemporal government budget constraint contains an extra right-hand-side term:

$$\textit{value of debt stock} = \mathrm{E}\{\textit{PV(future primary surpluses)}\} + \mathrm{E}\{\textit{PV(future service flow)}\}.$$

This implies that positive levels of debt could be sustainable even if the government never produces primary surpluses. The fact that government debt provides liquidity services enables an issuing sovereign to mine a (finite) bubble.

Importantly however, the expanded IGBC will continue to set a limit for sustainable primary deficits—it is just that this limit is looser in the presence of a service flow. This implies that "overmining" the bubble—pushing the debt above what seems justified by the right-hand side of the expanded IGBC—could be dangerous. To the extent that the fiscal adjustment that is required to bring the present value of future primary surpluses back in line with debt stock remains plausible, markets may expect such fiscal adjustment, allowing the government to temporarily "overmine" the bubble. But beyond that point, the bubble might burst ift investors lose faith in the safe asset status of the debt (Farhi and Maggiori, 2018). The result would be a sharp, disruptive tightening of the IGBC. In light of this risk, governments for whom the market value of the debt

significantly exceeds the present value of forecast future primary surpluses should start thinking about managing down their debt levels.

5. Sovereign debt restructurings and defaults

We now turn to the case when debt is not default-risk free. To understand the economic implications, it is worth starting by describing some of the stylized facts and costs associated with sovereign default, before turning to the implications of sovereign *risk* (even in the absence of default) for economic performance.

There are different definitions of a sovereign default. From a legal perspective, a default event is a contractually specified breach of the debt contract—most notably, a failure to pay scheduled debt service beyond the grace period specified in the contract. On this basis, the academic literature and policy institutions such as the IMF distinguish between "preemptive" debt restructurings (renegotiation of debt terms before a payment has been missed) and "post-default" restructurings. According to Asonuma and Trebesch (2016), 38% of debt restructurings between 1978 and 2010 were preemptive (i.e., prior to a payment default). Not surprisingly, preemptive restructurings tend be quicker, with an average negotiation time of 12 months, than post-default restructurings (60 months). In contrast, credit-rating agencies tend to define as default an episode in which the sovereign makes a restructuring offer at terms that are less favorable than the original debt.[6]

Sovereign defaults and restructurings have occurred in cycles, reflecting the boom-bust nature of international capital flows. According to Mitchener and Trebesch (2021), there are four main peaks in emerging market defaults in the last 200 years: in the 1830s, the 1880s, the 1930-40s, and the 1980s. More than half of emerging market countries were in default during these periods. All waves included many Latin American countries, but the 1930-40s wave triggered by the Great Depression was global, and the 1980s defaults included many African and some Asian developing countries. Advanced countries defaulted less frequently. At least 10 percent of advanced economies were in default during and immediately after the Napoleonic wars in the early 19th century, during a long period from the 1830s to the 1870s, and during the 1930s-40s. In 2012,

[6] Peter (2002) discusses the rating agencies' definitions of default.

Greece became the first advanced country since the 1960s to undergo a deep debt restructuring (Zettelmeyer, Trebesch and Gulati, 2013).

A debt restructuring typically leads to new payment promises involving a combination of lower principal, lower interest payments, and longer maturities (according to Dvorkin et al., 2021, by 3.4 years on average). The promised cash flows can be summarized as a present value, which is typically evaluated at the secondary market yield prevailing immediately after a debt restructuring (the "exit yield"). The losses suffered by investors, known as the "haircut", can be measured as the percentage difference between this present value and the value of the pre-restructuring debt.

There are two conventions for computing the haircut. Market practitioners tend to compare the present value of the new debt with the *face value* of the old debt (HM):

$$HM = 1 - \frac{Present\ value\ of\ new\ debt\ obtained\ in\ the\ restructuring}{Face\ value\ of\ old\ debt\ surrendered\ in\ the\ restructuing}.$$

Apart from convenience, a justification for this approach is that in defaults (but not in pre-default restructurings) old debt is typically accelerated, i.e., becomes due and payable immediately. At that moment, the face value and the present value of the old debt coincide.

An alternative measure, proposed by Sturzenegger and Zettelmeyer (2007, 2008) and used in much of the empirical academic literature, compares the present value of the new and old (originally promised) payment stream, both evaluated at the exit yield (HSZ):

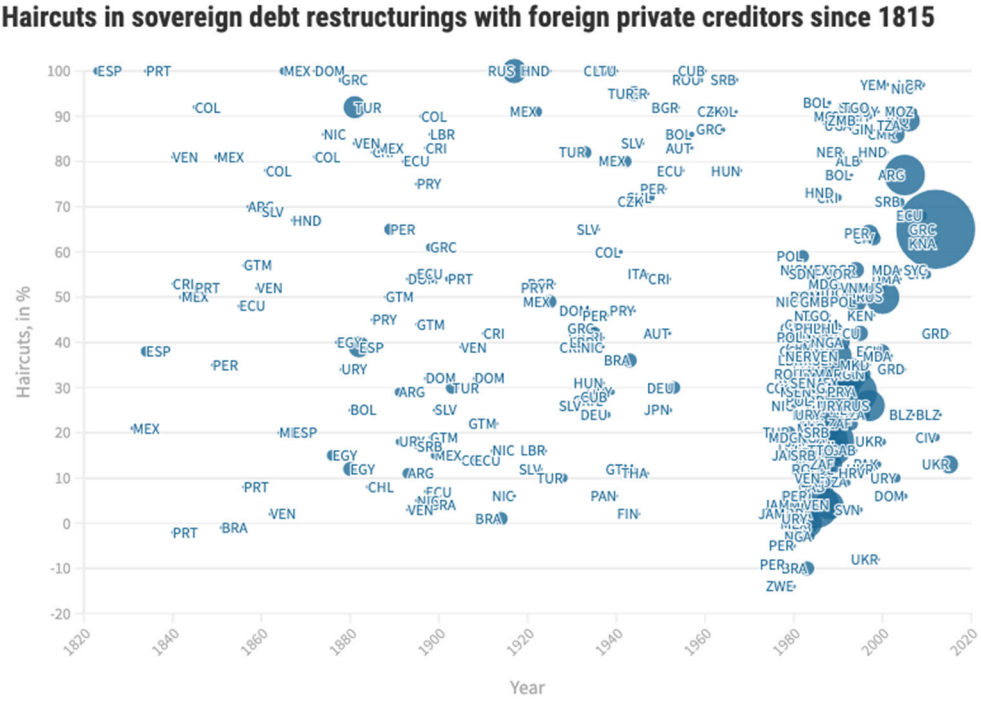
$$HSZ = 1 - \frac{Present\ value\ of\ new\ debt\ obtained\ in\ the\ restructuring}{Present\ value\ of\ old\ debt\ surrendered\ in\ the\ restructuing}.$$

The HSZ measures the loss experienced by creditors accepting a restructuring exchange offer compared to a counterfactual in which they would have been repaid with the same probability as the investors accepting the offer. If the accepting creditors' decision was rational, they were expecting to lose more than HSZ by rejecting the restructuring offer. In that sense, HSZ is a measure of the harshness of the restructuring.[7]

[7] Because HSZ discounts the face value (expected amortizations) of the old debt using the (fairly high) exist yield, it tends to deliver lower estimates of investor losses than HM. Hatchondo et al. (2014) question the interpretation of HSZ as a measure of investors' losses associated with a debt restructuring, showing that while the crisis that preceded a restructuring lowered the market value of sovereign debt, the restructuring often seems to have increased this market value.

Figure 1 presents HSZs computed by Meyer et al. (2021) for more than 300 sovereign debt crises since 1815.[8] They find an average HSZ of 44 percent. Haircuts are typically smaller in preemptive debt restructurings than in post default restructurings (18 vs. 48 percent according to Asonuma and Trebesch, 2016) and larger for short-term debt than for long-term debt (Asonuma et al., 2017).

Figure 1



Source: Meyer et al. (2021).

Note: Size of each circle represents the nominal value of debt restructured, expressed in 2009 US$.

6. The costs of sovereign defaults

If there were no costs of defaulting, sovereigns would always want to default. Anticipating this, investors would never lend to sovereigns and there would be no sovereign debt. Hence, for sovereign debt to exist, it must be more costly for a sovereign to default than to pay back its debt in at least some circumstances. Conversely, for sovereign defaults to exist, there must be some circumstances in which it is more costly for a sovereign to pay back its debt than to default.

[8] Note that the figure shows some events with negative HSZ. According to Meyer et al. (2021), these events occurred in early stages of a crisis when to avoid defaulting on debt payments, sovereigns may be willing to postpone payments even at a very high interest rate. They were typically followed by other restructurings with larger haircuts. Cases of total debt repudiation (HSZ = 100 percent) correspond to extreme events such as wars, revolutions, or the break-up of empires.

The insight that the existence of sovereign debt requires default costs has motivated an extensive literature, both theoretical and empirical, that tries to pinpoint such costs. These can be grouped into four classes (Panizza et al., 2009): financial penalties in the form of higher borrowing costs and/or capital market exclusion, direct sanctions and trade costs, reputational spillovers, and domestic financial and political costs.

Access to and costs of external borrowing

The paper that created the modern sovereign debt literature, by Eaton and Gersovitz (1981) showed that in the absence of any other enforcement mechanism, defaults could be deterred by the threat of permanent exclusion of the borrower from international capital markets. As the literature quickly pointed out, this radical punishment is implausible on both theoretical and empirical grounds: theoretically, because it benefits both creditors and the debtor to eventually resume borrowing; and empirically, because indefinite capital market exclusion of a defaulting country from international capital markets is extremely rare. This said, *temporary* exclusion periods can be both theoretically rationalized (Cole et al. 1995; Kletzer and Wright, 2000; Wright, 2002) and are empirically observed (Cole et al. 1995; Cruces and Trebesch, 2013). Furthermore, sovereign borrowing costs rise after defaults, although the effects are temporary (Özler, 1993; Flandreau and Zumer, 2004). Cruces and Trebesch (2013) find that the extent of the rise is associated with the investor losses in the default, with a one standard deviation increase in investor losses associated with a medium-term increase in the costs of borrowing by 120 basis points. The effect can no longer be detected after about 7 years.

In the last 20 years or so, exclusion from international capital markets has become more effective as a channel of legal enforcement of sovereign debt contracts issued under foreign law. While court orders rarely lead to successful attachment of assets of the debtor, they have sometimes allowed the holders of defaulted bonds to interfere with cross-border payments to other creditors who had previously agreed to a debt restructuring. Most famously, a 2011 New York court decision ordered Argentina not to pay the holders of restructured bonds unless “holdout creditors” that had refused to accept these bonds were also paid. It enforced this order by threatening to sanction private parties that helped Argentina evade the order (Gelpern, 2013), eventually forcing Argentina to settle with its holdouts. Schumacher et al. (2021) document that creditor lawsuits have become an increasingly common in sovereign debt markets and that these lawsuits disrupt government

access to international capital markets, as foreign courts are able to impose financial embargos on sovereigns.

Direct sanctions and trade costs

Governments have on occasions intervened actively in support of their constituents who are holders of defaulted debt issued by other. These interventions have taken the form of diplomatic dissuasion, withholding of official credit, threat of trade sanctions, and in exceptional cases, armed interventions. Mitchener and Weidenmier (2005) document about a dozen cases of sanctions of this type during the period 1870-1914.

There is also substantial evidence that sovereign defaults disrupt international trade (Rose, 2005; Asonuma et al, 2016; Serfaty, 2020). Why this happens remains unclear, however. 20th and 21st century defaults no longer lead to trade sanctions, and the evidence does seem to back a link via the reduction in trade finance (Borensztein and Panizza, 2009).

Default as a negative signal about the government or the state of the economy

Several studies argue that a sovereign default is costly because of the information it signals. For example, a default decision could be seen as revealing information about policy preferences, such as that the government is willing to ignore property rights. A default could also be viewed as signaling the government's private information about the weak state of the economy.

Besides increasing the cost of future government borrowing, these signals could have negative consequences for the broader economy. Cole and Kehoe (1998) argue that a sovereign default may imply that the government is considered untrustworthy in other areas besides the credit relationship with lenders. One consequence may be capital flight. In Sandleris (2008), the negative information about the state of the economy revealed by the default decision depresses the net worth of firms, with negative implications for investment. Consistent with these arguments, Hébert and Schreger (2017) find that legal rulings that increase the probability of default caused a depreciation of the exchange rate and a decline in the value of Argentine equity, disproportionally hurting foreign-owned firms, exporters, and large firms.

Domestic financial and political costs

To the extent that governments default on debt held by domestic residents (who are generally voters), it is not surprising that a sovereign default may have political costs. Broner et al (2010)

present a theory of sovereign debt in which default is deterred by the combination of domestic political default costs (assumed to prevent governments from opportunistically default on their own citizens) and the presence of well-functioning secondary markets (which make it impossible to selectively default on foreigners). Reinhart and Rogoff (2011) document that a significant share of sovereign debt is issued under domestic jurisdiction and held mainly by residents (see also IMF, 2021, and Erce et al., 2022). Gennaioli et al. (2018) document the significant exposure of banks to their own sovereigns. When banks hold sovereign bonds, a sovereign default may hurt their balance sheets, causing a decrease in lending, a banking crisis, and a decline in economic activity (Gennaioli et al., 2014).[9] In addition, banks could be hurt indirectly, including through the signaling channels discussed above. Bocola (2016) finds that sovereign risk is recessionary because it tightens the funding constraints of banks. Asonuma et al (2021) show that reduction in bank credit to the private sector is an important channel through which debt restructurings hurt the economy. Borensztein and Panizza (2009) and Malone (2011) find that sovereign defaults are associated with an increased probability of job loss by political leaders.

The desire to avoid the political and/or domestic financial costs of default may be one reason why sovereign debt restructurings are often "too little too late" (IMF 2014, Guzman and Stiglitz, 2016). Levy Yeyati and Panizza (2011) find that the default quarter typically coincides with the trough of output contraction, followed by a recovery. They interpret this as suggesting that defaults may be inefficiently delayed—either because policy makers attempt to signal to markets that they are not defaulting strategically, or because they gamble for resurrection in the face of political output costs. IMF (2014) documents that debt was often high for a long period of time before restructurings, suggesting that these restructurings were delayed, and that 86 percent of the sovereigns that restructured their debt between 1980 and 2012 did so more than once, suggesting that initial restructurings did not provide enough relief to solve debt problems.

Quantifying the output cost of sovereign defaults

Most default costs described above—rises in borrowing costs, financial embargos, trade reductions, reputational spillovers, losses imposed on domestic financial intermediaries—would be expected to have an impact on output. Measuring these output costs is intrinsically difficult, however. While it is easy to find a negative correlation between default and growth, it is difficult

[9] Reinhart (2002) finds that sovereign defaults not only cause banking crises but also lead to currency crises.

to determine whether this negative correlation is driven by the default or by other factors that explain both the default and low growth. Furthermore, while the default could trigger low growth, low growth (and the expectation of low growth in the future) may trigger the default. Consistent with this "reverse causality", Levy Yeyati and Panizza (2011) find that output contractions typically precede defaults.

Despite these difficulties, a few recent papers have tried to identify the causal incremental impact of default on output. Kuvshinov and Zimmermann (2019) use an inverse propensity score weighting (IPSW) approach (Jordá and Taylor, 2016) which first estimates a government's propensity to default using a logit model and then uses the predicted default probability to give more surprising (exogenous) default events a greater weight in the estimation (this approach works if the decision to default is only influenced by the variables used to estimate the propensity score). Their main finding is that default have a large but temporary output cost, which peaks at an average of almost 4 percent of GDP after five years, followed by a recovery in the long run.

Marchesi and Masi (2021) used a synthetic controls approach in which a group of 15 countries that defaulted on official debts and 7 countries that defaulted on private debts are compared with a control group constructed to mimic the pre-default behavior of the defaulting countries. Unlike Kuvshinov and Zimmermann (2019), they find a *permanent* effect of default on private creditors on debtor output: a default depresses *growth* in the debtor country by about 1 to 1.8 percentage points per year which the country is in default, but not in the long run. In contrast a default on the official sector has not impact on growth during the default years and appears to raise growth in the long run.

This literature also points to some factors that modify the costs of default. Defaults appear to have higher costs in countries with large banking sectors (Asonuma et al 2021) and if they are followed by banking crises (Kuvshinov and Zimmermann 2017). Debt restructurings that preempt (and hence avoid) default appear to have much lower output costs than post-default restructurings (Asonuma et al 2016, 2021). "Hard" defaults (defined either using an index that captures the "coerciveness" of the government's negotiating tactics or based on the losses inflicted on investors) lead to larger output losses than "soft" defaults (Trebesch and Zabel 2017).

7. When do governments default?[10]

Closely related to the costs of default are the circumstances in which governments default—namely, settings in which the costs of defaulting are smaller than the costs of servicing the debt. This could be due to the state of the economy, the costs of rolling over debt coming due (or the inability to do so), or political factors.

Affordability of debt payments ("ability to pay")

When government resources are low relative to scheduled debt service, paying debt obligations may require large adjustments to expenditures or revenues. Such adjustments can be economically or politically costly. Circumstances that may depress the affordability of debt payments include:

- *Economic downturns*. Governments tend to default in periods of low growth (Manasse and Roubini, 2009), when fiscal revenues are typically lower, and expenditures are sometimes higher. Tomz and Wright (2007) report that 62 percent of default episodes occurred in years when the output level in the defaulting country was below its trend. Consistent with this, sovereign credit ratings respond to macroeconomic factors, such as the GDP growth rate and per capita income (Cantor and Packer 1996). The countercyclicality of the interest rate paid by governments in developing countries (Section 8) suggests that markets expect more defaults when economic conditions are worse. Wars or civil conflicts can trigger a collapse of economic activity and thus increase default risk (Rivoli and Brewer, 1997).
- *Terms of trade shocks*. Many emerging economies strongly rely on commodity exports as a source of tax revenue and foreign exchange (Mendoza, 1995). Many studies show that terms of trade fluctuations are a significant predictor of sovereign default and interest rate spreads in emerging economies.[11] For example, in Ecuador, falling commodity prices led to a sovereign default in 1999.[12] The sharp declines in oil prices during the second half of the 1990s contributed to the worsening of the macroeconomic and fiscal situation that led to the Russian default of 1998 (Sturzenegger and Zettelmeyer, 2007).

[10] This section draws on Hatchondo et al (2007).

[11] See for instance Catao and Sutton (2002), Catao and Kapur (2006), Min (1998), Caballero (2003), Caballero and Panageas (2003), Calvo, Izquierdo and Mejia (2004), Cuadra and Sapriza (2006), Sturzenegger and Zettelmeyer (2007), and Hilscher and Nosbusch (2010).

[12] Oil and bananas together accounted for 59 percent of Ecuadorian exports in 2001. Ecuador was the first country to default on Brady bonds (Brady bonds arose from an effort in the late 1980s to reduce the debt held by less-developed countries that were frequently defaulting on loans).

- *A devaluation of the local currency.* The level of public debt obligations is an important determinant of affordability. Moreno Badia et al. (2020) find that the levels of public debt and public debt service are important predictors of fiscal crises. When sovereign's debt is denominated in foreign currency (Section 10) and revenues rely mainly on non-tradable goods production and taxation, a depreciation of the local currency damages the government's ability to afford debt payments. Currency mismatches in the banking, corporate and household sectors can magnify the effects of the depreciation, by leading to bankruptcies, a drop in investment, and a fall in government revenue. Manasse and Roubini (2009) find that exchange rate overvaluation and exchange rate volatility predict sovereign debt crisis. Ghulam and Derber (2018), Moreno Badia et al. (2020), and Moreno Badia et al. (2021), find a significant role of exchange rate fluctuations as a predictor of crises. Moreno Badia et al. (2020) document that fiscal crises often overlap with currency crises.
- *Contingent liabilities.* The materialization of contingent liabilities, including from the banking sector, may damage the government capacity to pay and thus increase sovereign risk (Moreno Badia et al., 2021). Balteanu and Erce (2018) and Ghulam and Derber (2018) discuss how bank and sovereign distress feed into each other.

High borrowing costs ("ability to pay")

A high cost of borrowing could trigger a default if it leads debt to grow faster than revenues and the economy, and thus causes a loss of access to the external debt market (at which point the cost of any action to mobilize the resources to repay may be prohibitive, unless the country can access official financing from crisis lenders such as the IMF).

Apart from the adverse events discussed in the last subsection, higher borrowing costs could have two triggers.

First, a sharp rise in advanced country interest rates. For example, sharply higher interest rates in the United States in the early 1980s (a result of Federal Reserve Board chairman Paul Volcker's efforts to bring down inflation in the U.S.) were one of the main triggers of the developing country debt crisis of the 1980s (Cline, 1995). Many studies have documented that the borrowing cost of developing countries are influenced by U.S. interest rates (Lambertini, 2001; Arora and Cerisola, 2001; Uribe and Yue, 2006; Ghulam and Derber, 2018).

Second, a collapse in confidence or increase in risk aversion, also referred to as a "debt run", or a "sudden stop" (Calvo, 1998). Unlike a rise in borrowing cost triggered by foreign interest rates, this type of crisis can be self-fulfilling, as the expectation of default triggers a jump in borrowing cost which raises the cost of repaying and induces default, validating the original expectation (Sachs, 1984; Calvo, 1988; Cole and Kehoe, 1996, 2000; Lorenzoni and Werning, 2019). Sudden stops of this kind contributed to the Mexican (1995) debt crisis, the Asian (1997) crisis, the international propagation of the global financial crisis after the collapse of Lehman brothers in September of 2008, the sharp but thankfully brief tightening of emerging market borrowing conditions in March 2020, and many other international financial crisis episodes. Longstaff et al. (2011) find that global factors account for 64 percent of the variation in sovereign spreads and that on average, the risk premium represents about a third of sovereign spreads.

Political factors ("willingness to pay")

Manasse and Roubini (2009) and Ghulam and Derber (2018) find that political factors influence sovereign default risk. This occurs because government turnover may trigger significant changes in the sovereign's willingness to pay (Van Rijckeghem and Weder, 2004; Hatchondo et al. 2010). In a survey of default episodes, Sturzenegger and Zettelmeyer (2007) conclude that "a solvency crisis could be triggered by a shift in the parameters that govern the country's willingness to make sacrifices in order to repay, due to changes in the domestic political economy (a revolution, a coup, an election etc.)." Goretti (2005) describes how concerns about the elected candidate explain the increase of the sovereign spread in Brazil around the 2002 presidential election. Alfaro and Kanczuk (2005), Cole et al. (1995), and Hatchondo et al. (2009) present models in which both default and difficulties in market access after a default may be triggered by political turnover.

8. The costs of sovereign default risk

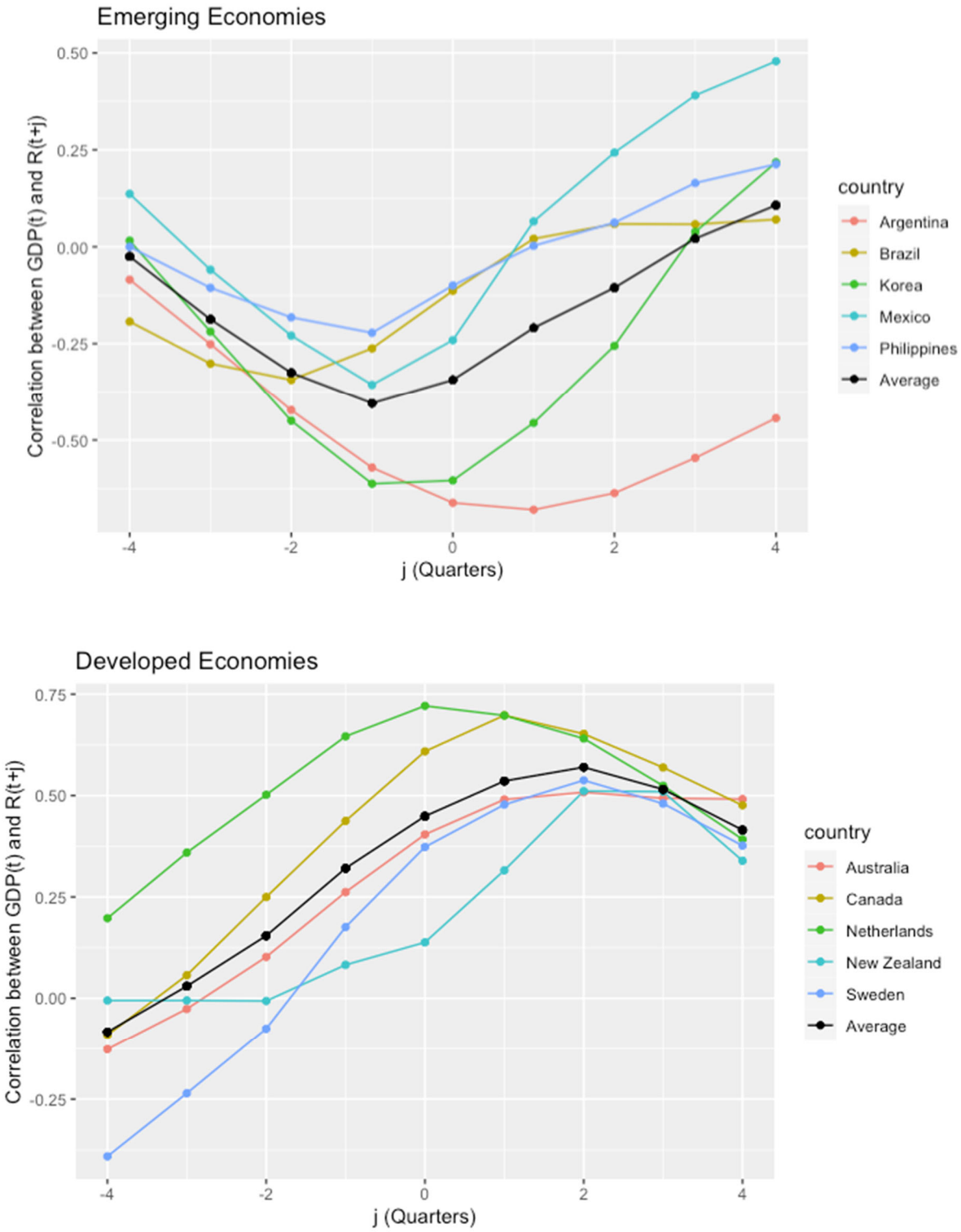
Starting with Neumeyer and Perri (2005), several studies have documented that business cycles in small emerging economies differ from those in small advanced economies, and suggested that these differences relate to the presence of default risk in the former but not the latter.[13] Default risk influences interest rates which in turn influences economic activity.

[13] See Neumeyer and Perri (2005), Uribe and Yue (2006) Aguiar and Gopinath (2007) and Garcia-Cicco et al (2010), among others.

Figure 2 and Appendix Table 1 present the empirical regularities documented by Neumeyer and Perri (2005), updated with more recent data. Compared with developed economies, emerging economies feature:

- Higher volatility of output, real interest rates, and net exports;
- Higher volatility of consumption relative to income (in emerging economies, consumption is typically more volatile than income, while the opposite is true in advanced economies);
- Countercyclical real interest rates, with higher interest in recessions (in contrast, interest rates in advanced economies are procyclical); and more countercyclical net exports.

Figure 2. Cross-correlations between GDP and real interest rates at different lags.



Source: Authors' calculations based on official data.

Additional distinctive features of emerging economies include procyclical government expenditure (while government expenditure is acyclical or slightly countercyclical in advanced countries) and a countercyclical inflation tax (while that latter is procyclical in advanced economies).[14]

Macroeconomic models incorporating sovereign risk can account for the business cycle regularities of emerging economies.[15] High interest rates paid by developing countries reflect a compensation for the probability of a sovereign default, while the countercyclicality of spreads is consistent with the fact that sovereigns are more likely to default when economic conditions are bad (see Section 7). Hence, borrowing conditions are more expensive in bad times, and thus borrowing levels may be lower. This lead to countercyclical net exports (lower imports in bad times) and higher volatility of consumption relative to income compared to advanced economies. Furthermore, if borrowing is more expensive in bad times, it may be optimal to tax more and decrease government expenditures in such times, which would help to explain the procyclicality of public expenditures and the countercyclicality of tax rates in emerging countries (Cuadra, Sanchez and Sapriza, 2010).

However, emerging markets needs not be stuck with these adverse business cycle properties forever. Frenkel et al. (2013) show that a large number of emerging economies have "graduated" from fiscal procylicality, shifting from procyclical to countercyclical fiscal policy. They also suggest that improving institutional quality is the key to the ability to conduct a more countercyclical fiscal policy. Similarly, Vegh and Vuletin (2014) show that many Latin American countries have been able to switch from procyclical to countercyclical fiscal policy responses to crises, and that this graduation proved effective in reducing the severity of the crises. Amador and Phelan (2021) investigate the possibility of "graduation" in the context of a model of sovereign default and reputation.

A recent branch of the literature inspired by the Eurozone crisis focuses on direct costs that sovereign risk creates for the economy at large. A literature pioneered by Farhi and Tirole (2018) studies the nexus between a sovereign and the banking system. Because of feedback created by a combination of exposure of domestic banks to sovereign bonds and the possibility and anticipation

[14] See Gavin and Perotti (1997), Talvi and Vegh (2005), Kaminsky et al (2004), and Alesina et al (2008).
[15] See Aguiar and Gopinath (2006), Arellano (2008), Cuadra and Sapriza (2008), Hatchondo and Martinez (2009), Hatchondo Martinez and Sapriza (2010), Lizarazo (2010) and Yue (2010) among others.

of bailouts, so-called "doom loops" can arise.[16] In these events, negative shocks for one of the actors can spell trouble for the other, amplifying the recession caused by the original shock.

At the same time, also inspired by the Eurozone crisis, Bocola (2016) provides a model of the correlation between the interest rates paid by sovereigns and those available for investment by the private sector of the same countries, which Neumeyer and Perri (2005) assume. Because of the pass-through of sovereign risk, investment becomes more costly when sovereign default seems likely, which hurts growth prospects for the economy (see also Arellano, Bai, and Bocola, 2017, and Arellano, Bai, and Mihalache, 2018). Balke (2017) pursues a related effect in job postings instead of real investment. Bianchi, Ottonello, and Presno (2021) studies feedback between sovereign risk and domestic fundamentals with nominal rigidities, and Roldán (2020) investigates costs of sovereign risk stemming from an aggregate-demand doom loop.

9. Why do governments choose high and volatile sovereign risk?

The quantitative-theoretic literature on sovereign default has shown that a rational and benevolent government only chooses to live with high and volatile sovereign risk because of its inability to commit future repayment and borrowing policies.[17][18] Furthermore, even without commitment to future repayment policies, if governments could commit to future borrowing policies, this would eliminate the majority of sovereign risk (Hatchondo and Martinez, 2009; Chatterjee and Eyigungor, 2012; Hatchondo et al., 2021a).[19]

Governments' inability to commit to future borrowing policies generates the so-called debt dilution problem. Debt dilution refers to the reduction in the value of existing debt triggered by the issuance of new debt. Issuing new debt reduces the value of existing debt because it increases the probability of default. Three factors generate the sovereign debt dilution problem: (i) governments issue long-term debt, (ii) the current government cannot control debt issuances by future governments, and (iii) bonds are priced by rational investors. Rational investors anticipate

[16] For instance, Burnside et al (2001) argue that the Asian crisis in 1997 was originated due to the expectation that future deficits associated with implicit bailout guarantees to the banking system would be financed through an inflation tax on outstanding nominal debt.

[17] Following Aguiar and Gopinath (2006) and Arellano (2008), this literature has extended the Eaton and Gersovitz (1981) framework for quantitative studies of fiscal policy and sovereign debt crises.

[18] Dovis (2019) shows that ex post inefficiencies (defaults and temporary financial exclusion) are necessary along the equilibrium path to support the optimal risk-sharing arrangement between the government and foreign lenders when the government lacks commitment and has private information.

[19] Hatchondo et al. (2021a) argue that it would be easier to commit to future borrowing policies than to commit to future repayment policies.

that additional borrowing by future governments will increase the risk of default on long-term bonds issued by the current government and, thus, offer a lower price for these bonds. The current government could benefit from constraining future borrowing because this could increase the price of the bonds it issues. However, governments are typically unable to constrain borrowing by future governments. While issuing one-period debt eliminates this time inconsistency in borrowing decisions, it magnifies the exposure to shifts in borrowing opportunities. When the government issues only one-period bonds, it has to roll over its debt every period, and thus it is more vulnerable to adverse income shocks that contract its borrowing set. On the other hand, as emphasized by Aguiar et al. (2019), actively managing the debt maturity profile can affect debt prices in a self-defeating way. This creates tradeoffs about the choice of maturity.[20]

This literature also assumes that the government can only issue noncontingent bonds (i.e., financial markets are incomplete). In the standard model, debt and income are the only determinants of default. With complete markets, the government could make a different payment promise for each level of next-period income, eliminating uncertainty about repayment. Then, lenders would never pay for a payment promise on which they know the government would default and a bond making such a promise is not traded. In contrast, with non-contingent bonds, when the government borrows it promises the same payment regardless the level of income. In this case, the government tends to default if the income realization is sufficiently low.

10. What can be done to mitigate sovereign risk?

Fiscal frameworks

In order to improve commitment to future government borrowing, an increasing number of countries are adopting fiscal rules—restrictions imposed upon future governments' ability to conduct fiscal policy—that can help anchor expectations about future policy, reducing excessive future deficits, and hence relaxing current borrowing constraints.

Hatchondo et al. (2022a, 2022b) use a model of sovereign default with long-term debt to show how substantial gains could be achieved by introducing simple fiscal rules that implement fiscal

[20] Bocola and Dovis (2019) exploit these tradeoffs to identify rollover and fundamental risk from observed changes in maturity choice. Sanchez et al. (2018) and Dvorkin et al. (2020) show how endogenous maturity helps to understand the timing of sovereign debt crisis.

anchors.[21] While debt levels play a predominant role in discussions of fiscal rules, Hatchondo et al. (2022a, 2022b) show that the sovereign spread is better suited to be the fiscal anchor. They find that a common spread-limit generates significant welfare gains for sets of economies with different levels of debt intolerance (i.e., with different mappings from sovereign debt levels to sovereign spreads). In contrast, a common debt-limit may fail to generate welfare gains for many economies in the set and may even generate welfare losses in some of these economies. Since the sovereign spread incorporates information about the degree of debt intolerance in each economy, the common spread limit forces economies with more debt intolerance to borrow less while allowing economies with less debt intolerance to borrow more.

The performance of a common rule limit for sets of economies with different levels of debt intolerance is important for two reasons. First, fiscal rules often impose common limits to several economies. In 2014, 48 of the 85 countries with fiscal rules had supranational rules. Second, robust policy recommendations should acknowledge uncertainty about a single economy's characteristics. The exercises presented by Hatchondo et al. (2022a, 2022b) can be interpreted as searching for policy recommendations that are robust to this uncertainty. Blanchard et al (2021) point out that debt-limit fiscal rules are bound to lead to mistakes due to this "Knightian uncertainty", and instead propose replacing numerical debt targets with fiscal standards (i.e., qualitative prescriptions that leave room for judgment together with a process to decide whether the standards are met).

Of course, the possibility of constraining future governments' borrowing with a fiscal rule depends on the governments' ability to commit to respect the fiscal rule in the future.[22] Countries have strengthened compliance with their fiscal rules by introducing independent fiscal councils that provide public assessments of fiscal plans and performance, and evaluation or provision of macroeconomic and budgetary forecasts. In addition, an increasing number of countries has implemented fiscal responsibility laws that set out procedural and transparency requirements. Fiscal rules are also being complemented with automatic sanctioning and enforcement procedures. Schaechter et al. (2012), Debrun and Kinda (2014), and Debrun et al. (2013) discuss country

[21] Hatchondo et al. (2021) compute the borrowing path that a government with commitment to future borrowing would choose and find that a simple debt brake rule can achieve 60 percent of the welfare gains obtained with the optimal borrowing path.

[22] IMF (2021b) argue that fiscal frameworks provide the set of rules and institutions that allow countries to signal such commitments and to comply with them.

experiences with fiscal rules, transparency laws, and fiscal councils. Hatchondo et al. (2022a) argue that committing to follow good fiscal rules may not be too costly. Chatterjee and Eyigungor (2015) and Hatchondo et al. (2016) propose modifying sovereign debt contracts to constrain future borrowing.

State-contingent debt

As discussed in Section 7, one of the inefficiencies in sovereign debt models stems from the assumption of incomplete markets, which reflects the lack of state-contingent debt instruments in practice. The recent European sovereign debt crises and the increase in public debt levels after the COVID-19 shock have brought proposals for state-contingent debt instruments to the forefront of policy debates as a strategy to avoid costly defaults (United Nations, 2006; Blanchard et al., 2016; IMF, 2017; IMF, 2020).

Several studies highlight possible benefits from tying sovereign debt obligations to domestic GDP (Shiller, 1993; Borensztein and Mauro, 2004; Hatchondo and Martinez, 2012). One benefit from GDP-indexation is that issuing debt that promises lower payments when GDP takes low values may facilitate the financing of automatic stabilizers (such as an increase in unemployment benefits during economic downturns) and countercyclical fiscal policy. Another benefit is that GDP indexation could diminish the likelihood of fiscal crises for governments that face a countercyclical borrowing cost (in part because of a countercyclical default risk). Kamstra and Shiller (2010) argue that GDP indexation would help investors who want exposure to income growth (for instance, to protect relative standards of living in retirement) and protection against inflation. Bolton and Jeanne (2009) argue that it is somewhat of a puzzle that the overwhelming majority of sovereign debts are not GDP indexed. Hatchondo et al. (2022) study a model of equilibrium sovereign default in which the government issues cocos (contingent convertible bonds) that stipulate a suspension of debt payments when the government faces liquidity shocks. In spite of reducing the frequency of defaults triggered by liquidity shocks, cocos increases the overall default frequency. In contrast, cocos that stipulate a debt write-off when the government faces the shock, achieve larger welfare gains by reducing default risk.

Despite these well-understood advantages, the use of state-contingent debt instruments is scarce in practice and countries have not been able to issue such financial instruments at a reasonable premium—as in the recent cases of Argentina (2005), Greece (2012) and Ukraine (2015).

Surprisingly, while some practical implementation challenges have been discussed among policy makers, there is little theoretical analysis investigating them and the lack of indexation in sovereign debt markets remains a puzzle. IMF (2017) and Benford et al. (2018) point to myopia on the part of issuers, who might be out of office before the gains fully materialize. Krugman (1988) argues that GDP-indexed bonds could create moral hazard problems by disincentivizing the government to conduct growth-friendly policies or leading governments to misreport GDP statistics. However, these arguments do not seem to be empirically relevant.[23] Others argue that markets for these instruments tend to be shallow and, thus, these bonds would carry a large liquidity premium. Moretti (2020) investigates this liquidity channel and finds that state-contingent debt is still welfare-improving.

Costa et al. (2008) compute a large residual spread for GDP warrants, on top of the compensation for default risk. They interpret this residual as a premium for the "novelty" of this relatively exotic asset. Igan et al. (2021) find that this premium remains significant. Roch and Roldan (2021) argue that the premium may reflect concerns about model misspecification (à la Hansen and Sargent, 2001) on the part of lenders. They show that for the commonly used threshold state-contingent bond structure (e.g., in the GDP-linked bond issued by Argentina in 2005), the model with robustness generates ambiguity premia in bond spreads that can explain most of what the literature has labeled as novelty premium. While the government would be better off with this bond when facing rational expectations lenders, this additional source of premia leads to welfare losses when facing robust lenders. Furthermore, the optimal bond design crucially depends on the degree of the lenders' preference for robustness. At the calibrated level of robustness, the optimal state-contingent bond provides insurance to the home country but also avoids jumps in the repayments offered to lenders as a function of domestic income. In contrast to the commonly used threshold bond, the optimal design generates substantial welfare gains, which are decreasing in the level of robustness.

Monetary policy credibility

Eichengreen and Hausmann (1999) were the first to highlight that emerging economies' sovereign debt was mainly denominated in foreign currency during the 90s and introduced the term "original sin" to describe the inability of these countries to borrow abroad in local currency. Since then,

[23] This argument should also apply to inflation-linked bonds, but many countries have issued this type of securities.

there has been an extensive literature examining both the consequences and causes of original sin. In particular, Hausmann (2003) shows that original sin lowers the creditworthiness of a country because it makes the real exchange rate a relevant price in determining the capacity to pay, which is more volatile and tends to depreciate in bad times. Thus, countries with original sin are charged an additional risk premium when they borrow.

A strand of the literature has related the original sin to the lack of a credible and independent monetary policy. Jeanne (2003) develops a simple conceptual model in which borrowers are induced to borrow in foreign currency because unpredictable monetary policy makes them uncertain about the future real value of their local currency liabilities. Rajan and Tokatlidis (2005) also argue that liability dollarization is a response to lack of monetary policy credibility.

More recently, Du et al (2020) consider a two-period framework with risk averse lenders and varying degrees of inflation commitment. As governments with lower commitment resort more often to inflation in the second period, debt denominated in local currency is riskier and lenders demand a higher compensation for holding it. These risk premia make local-currency debt less desirable and induce the government to borrow in foreign currency. Ottonello and Perez (2019) and Engel and Park (forthcoming) build quantitative models of sovereign default and currency composition to rationalize debt issuing in foreign currency as a commitment to not partially default the debt with future inflation when monetary policy is discretionary.

Aguiar et al. (2013) show that while low commitment to inflation renders an economy with domestic currency bonds more vulnerable to a rollover crisis, extreme commitment is not desirable either as it eliminates the possibility of inflating during a crisis. They argue that there is a range of moderate inflation credibility that makes domestic currency bonds strictly preferable for intermediate levels of debt, where the reduction in rollover crisis vulnerability is at work. In the context of a monetary union, Bianchi and Mondragon (2022) use a quantitative model of sovereign default with nominal rigidities and self-fulfilling crises to show that the lack of monetary policy independence increases sovereign default risk by making countries more vulnerable to rollover crises. Without monetary policy autonomy, a self-fulfilling crisis can generate a recession in the presence of nominal rigidities under a fixed exchange rate regime but not with a flexible exchange rate.

A final channel through which central bank credibility can make debt safer is does not operate through default risk but rather the cyclical insurance properties of sovereign debt. By lowering interest rates in recessions, the central bank generates a capital gain for domestic holders of sovereign debt at the time when they need it most. This turns government debt into a "negative beta" asset that helps investors hedge (Brunnermeier et al 2021, Cochrane 2021). Only central banks that do not have to worry that expansionary monetary policy may lead to a de-anchoring of inflation expectations can do this.

Overall, this line of research suggest that a credible and independent monetary policy can function like a fiscal asset (Willems and Zettelmeyer 2022). It is an essential condition for the development of local-currency debt markets which would reduce the premium associated with the original sin and, at the same time, reduce the premium related to rollover crises. It contributes to market liquidity, and boost the insurance value of holding sovereign debt. Seen through these lens, giving central banks more independence and adopting inflation-targeting frameworks are essential steps in de-risking debt and establishing it as a safe asset.

11. Conclusion

In conclusion, we summarize what we view as the four main takeaways of this survey.

First, sovereign debt is a unique asset class because of the unique powers of the sovereign. From the perspective of a private creditor, however, these can cut both ways. In countries in which political accountability of governments and constitutionally anchored property rights make defaults on domestic creditors extremely unlikely, and from which foreign investors can freely enter and exist through liquid secondary bond markets, the main power that matters is the power to tax in the future. This acts like a form of collateral, making sovereign debt safe. In contrast, in countries with lower political accountability and/or greater ability to discriminate between foreign and domestic creditors, the main trait that sets sovereign debt aside is the limited ability of foreign investors to enforce their claims against the sovereign in the event of default. This makes sovereign debt risky, particularly when economic institutions are weak. Advanced countries are predominantly in the first group, while emerging market and developing economies predominantly in the second.

Second, countries issuing risky sovereign debt can do so because of the associated costs of default. These include temporary exclusion from external capital markets, higher future borrowing costs, negative reputational effects that can hurt the domestic economy, and the financial and political costs that arise from defaulting on one's own citizens. Defaults have two main causes: economic or political shocks that raise the costs of fiscal and/or external adjustment that would be needed to generate the resource to repay above the costs of default, and sharp rises in borrowing costs. The latter could be triggered by an increase in foreign (world) borrowing rates, but also by a shift in expectations, leading to a sudden change in market appetite for risky debt, a rollover crisis, and a depreciation of the currency. As a result, debt crises can be self-fulfilling.

Third, countries issuing risky sovereign debt suffer from a severe disadvantage relative to countries that issue safe debt. Their real interest rates, output, consumption and external balances are more volatile. While in advanced economies, consumption is smoother than output, the opposite is true in economies with risky debt. In such economies, government fiscal policies tend to be procyclical, exacerbating recessions and booms. The reason is that recessions increase sovereign risk and borrowing cost, forcing governments to borrow less, making recessions worse. This can further increase sovereign risk.

Finally, risky-debt economies can morph into safe-debt economies and vice versa. In the last two decades, many emerging market countries have "graduated" from procyclical to countercyclical fiscal policies; leading to less severe crises and reduced sovereign risk. Conversely, during the euro area crisis, the debt of several European countries that was previously thought of as safe became risky, and one country (Greece) had to restructure its debts.

The causes for graduation or relegation mostly relate to slow-moving institutional change (and with regard to relegation, to large shocks that overwhelm the capacity of institutions to deal with them). However, they can also be influenced by policies that are to some extent under the control of governments. These include commitment devices against overborrowing and debt dilution, such as fiscal rules; adoption of state-contingent debt instruments that reduce the set of economic states that could lead to default, and credible and independent monetary policy. The latter enables the government to issue bonds in local currency, makes bond markets more liquid, and enables central banks to intervene in a panic, reducing the risk of rollover crises.

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Appendix Table 1. Business cycles in emerging and developed economies

(a) Standard deviations

	% Standard deviation			% Standard deviation				
				% Standard deviation of GDP				
	GDP	R	NX	PC	TC	INV	EMP	HRS
Emerging economies								
Argentina	3.95	10.13	1.52	1.15	0.99	3.41	-	-
Brazil	1.66	1.93	0.91	1.13	1.98	3.22	0.73	1.43
Korea	3.29	1.3	2.6	1.57	1.7	2.53	0.62	0.4
Mexico	2.22	1.68	1.21	1.1	0.88	3.59	0.4	0.53
Philippines	1.1	1.11	1.51	0.68	1.1	5.83	0.42	-
Average	2.45	3.23	1.55	1.11	1.31	3.72	0.54	0.78
Developed economies								
Australia	0.91	1.4	0.86	0.97	0.84	4.68	1.08	1.43
Canada	1.22	1.15	0.67	0.66	0.47	2.97	1.57	0.62
Netherlands	1.17	0.8	1.62	0.84	0.68	6.34	-	-
New Zealand	1.62	1.74	1.12	0.98	0.78	3.52	0.83	0.19
Sweden	1.54	1.16	0.54	0.79	0.5	3.13	1.31	2.21
Average	1.29	1.25	0.96	0.85	0.65	4.13	1.20	1.11

(b) Correlations with GDP

	R	NX	PC	TC	INV	EMP	HRS
Emerging economies							
Argentina	-0.26	-2.35	0.86	0.98	0.28	-	-
	(0.03)	(0.13)	(0.02)	(0.03)	(0.01)		
Brazil	-0.1	-1.24	0.7	0.23	0.28	0.58	0.28
	(0.09)	(0.14)	(0.05)	(0.05)	(0.01)	(0.01)	(0.03)
Korea	-1.53	-1.15	0.62	0.55	0.38	1.44	0.94
	(0.37)	(0.09)	(0.03)	(0.04)	(0.02)	(0.07)	(0.01)
Mexico	-0.32	-1.14	0.93	1.04	0.25	1.89	-0.56
	(0.13)	(0.14)	(0.04)	(0.05)	(0.01)	(0.03)	(0.01)
Philippines	-0.1	0.12	0.32	0.23	0.11	0.31	-
	(0.09)	(0.07)	(0.14)	(0.09)	(0.01)	(0.01)	
Average	-0.46	-1.15	0.69	0.61	0.26	1.06	0.22
Developed economies							
Australia	0.27	-0.47	0.48	0.5	0.16	0.44	0.11
	(0.05)	(0.08)	(0.08)	(0.09)	(0.01)	(0.01)	(0.05)
Canada	0.64	0.01	1.07	1.25	0.25	0.2	0.47
	(0.07)	(0.15)	(0.09)	(0.15)	(0.02)	(0.06)	(0.08)
Netherlands	1.05	-0.04	0.89	0.98	0.06	-	-
	(0.09)	(0.06)	(0.07)	(0.09)	(0.01)		

New Zealand	0.13 (0.08)	-0.15 (0.12)	0.71 (0.06)	0.86 (0.08)	0.18 (0.02)	0.46 (0.01)	1.60 (0.08)
Sweden	0.49 (0.1)	-0.29 (0.23)	0.82 (0.08)	1.11 (0.14)	0.26 (0.02)	0.38 (0.08)	0.33 (0.01)
Average	0.52	-0.21	0.79	0.94	0.18	0.37	0.63

(c) Correlations with interest rate

	NX	PC	TC	INV	EMP	HRS
Emerging economies						
Argentina	4.33 (0.58)	-1.57 (0.18)	-1.71 (0.22)	-0.49 (0.06)	-	-
Brazil	0.51 (0.21)	-0.14 (0.1)	-0.07 (0.06)	-0.03 (0.04)	-0.77 (0.02)	-0.26 (0.03)
Korea	0.34 (0.06)	-0.17 (0.03)	-0.16 (0.03)	-0.09 (0.02)	-0.36 (0.1)	-0.27 (0.17)
Mexico	0.53 (0.13)	-0.16 (0.07)	-0.19 (0.08)	-0.09 (0.02)	-1.27 (0.03)	0.31 (0.02)
Philippines	0.22 (0.07)	0.31 (0.15)	0.12 (0.1)	-0.04 (0.02)	-0.31 (0.08)	-
Average	1.19	-0.35	-0.4	-0.15	-0.68	-0.07
Developed economies						
Australia	-0.76 (0.12)	0.86 (0.11)	0.92 (0.13)	0.13 (0.03)	0.97 (0.07)	0.12 (0.01)
Canada	0.01 (0.14)	0.66 (0.11)	0.89 (0.15)	0.13 (0.02)	0.20 (0.08)	-0.41 (0.02)
Netherlands	0.001 (0.04)	0.43 (0.06)	0.41 (0.08)	0.03 (0.01)	-	-
New Zealand	-0.46 (0.12)	0.15 (0.09)	0.25 (0.11)	0.14 (0.02)	0.87 (0.03)	1.28 (0.07)
Sweden	-0.54 (0.17)	-0.01 (0.08)	0.06 (0.13)	0.11 (0.02)	0.36 (0.07)	0.08 (0.02)
Average	-0.35	0.42	0.5	0.11	0.6	0.27

Sources: Authors' calculations based on quarterly official data.

Note: Net exports (NX) are exports minus imports over GDP. Real interest rates (R) are in percentage points. Total consumption (TC) includes private (PC) and government consumption, changes in inventories, and statistical discrepancy. Investment (INV) is gross fixed capital formation. Employment (EMP) is number of workers, and total hours (HRS) is number of workers times weekly hours of work per worker. All series except net exports and real interest rates are in logs. All series have been Hodrick–Prescott filtered.

PUBLICATIONS

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