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SOVEREIGN DEBT AND GRACE PERIODS

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Abstract

We document that grace periods are widespread, characterizing 83% of the external sovereign debt stock. This prevalence is largely driven by concessional (official) loans, which account for 73% of the stock and universally feature grace periods. To examine their macroeconomic role, we develop a quantitative model showing that grace periods enhance household welfare by reducing default risk and improving market completeness, yet also increase long-run dependence on non-contingent debt and raise sovereign spreads. We empirically validate these mechanisms using local projection estimates and conduct policy counterfactuals on shortened grace periods, voluntary debt exchanges, and the stigma premium associated with concessional finance.

Keywords: Sovereign debt, default, concessional loans, grace period, stigma premium
JEL Codes: E44, F34

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1 Introduction

Grace periods refer to intervals during which the borrower is not required to repay *principal*. They are a standard feature of sovereign borrowing: in our data, 83% of sovereign debt carries a grace period, with an average length of about five years.¹ Concessional loans—whether bilateral or multilateral—are pervasive in low- and lower-middle-income countries, where they account for a large share of external sovereign lending, often exceeding 80%. In high-income countries, by contrast, concessional finance represents only a small fraction of sovereign borrowing (Figure 1). These loans typically feature long grace periods (up to ten years), below-market interest rates, and de facto seniority relative to private claims (Table 1).

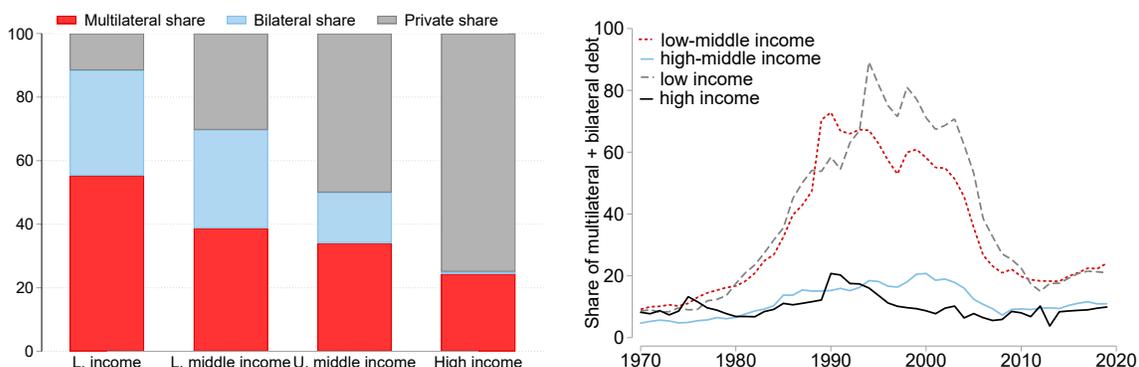


Figure 1: Share of multilateral, bilateral and private debt. Source: World Bank.

Taking stock of these facts, this paper contributes to the existing literature on sovereign debt in three main dimensions. First, we document in detail the nature of grace periods in sovereign borrowing and the prevalence of concessional loans. Second, we develop a quantitative sovereign default framework that explicitly incorporates grace periods and concessional loans alongside standard non-contingent government debt. Third, we empirically estimate the effects of grace periods and concessional loans using local projections and use these estimates to validate the predictions of our theoretical model.

Our documentation on grace periods and concessional loans highlight four key features that a quantitative model should possess to enhance our understanding of sovereign debt. First, the model must allow for default as an equilibrium outcome. Second, it should incorporate at least two types of assets in the governments budget: long-term

¹The IMF–World Bank *International Debt Statistics* define the grace period as the time from signature (or issuance) to the first *principal* repayment; interest is typically due and paid during this interval. This differs from a debt moratorium, which suspends *debt service* (often including interest).

non-contingent debt and long-term concessional loans. Third, the model needs to reflect the common use of grace periods in sovereign borrowing. Fourth, it should replicate the primary patterns observed in the data following the introduction of a new asset class, specifically concessional loans with grace periods.

To this end, we build a model of a small open economy that receives a stochastic income stream of a single tradable good. The government's objective is to maximize the expected utility of private agents. We follow the timing of [Eaton and Gersovitz \(1981\)](#). Decisions are made sequentially. In each period, the government first determines whether to default on its non-contingent private bond and then decides how much to borrow. A government in default incurs an income cost, is temporarily excluded from issuing non-contingent bonds, and loses access to concessional loans. Concessional loans are available only during financial distress episodes when the government faces a shock that increases its gross financing needs. These concessional loans include grace periods, during which payments are suspended for some periods, including the cases of default and exclusion. In later sections, we relax some of these assumptions to further explore the model's mechanisms.

A fundamental trade-off arises when grace periods are embedded in sovereign debt contracts. On the one hand, grace periods provide temporary repayment relief during adverse income shocks, enhancing market completeness and alleviating liquidity constraints in periods of protracted economic weakness. On the other hand, in settings where sovereign borrowing is predominantly long-term, the use of grace periods can exacerbate the problem of debt dilution, as the postponement of payments allows newly issued debt to erode the value of existing claims, potentially increasing overall borrowing costs. By shifting repayment obligations into the future, grace periods may inadvertently encourage greater borrowing, thereby increasing the likelihood of subsequent dilution. As such, the desirability of grace periods from a welfare perspective becomes a quantitative question: do the liquidity benefits during crises outweigh the potential costs associated with increased debt dilution? We seek to answer this question in our theoretical framework.

To validate the predictions of our theoretical model, we empirically compare the interest rate and CDS responses following the establishment of Flexible Credit Lines (FCLs) and swap lines across a panel of countries. Both facilities are extended to financially sound economies facing liquidity stress, making them comparable in purpose and recipient profile. Their contractual terms, however, differ systematically. Swap lines are short-term arrangements with no grace periods, while FCLs carry longer maturities and grace periods up to 5 years. Empirically, announcements capture these full contractual packages: longer maturities with grace periods for FCLs versus short-term swap lines

with no grace periods. Hence, our estimates do not isolate a “pure” grace-period effect. Rather, they offer the closest observable benchmark within actual sovereign borrowing practices, as no otherwise identical credit lines for sovereigns exist that differ solely in the inclusion of a grace period. With this caveat in mind, we find that within the first year of access, swap lines generate a larger and more persistent reduction in sovereign spreads than FCLs. A complementary difference-in-differences analysis using Mexico’s first-time announcements at daily frequency corroborates this pattern and suggests that anticipation effects may attenuate pooled local-projection responses.

For model validation, we examine the transition dynamics following an unanticipated policy announcement granting the government access to concessional loans with varying lengths of grace periods. The simulated responses closely replicate our empirical findings. Introducing concessional lending attenuates both default risk and sovereign spreads, consistent with observed declines in CDS and EMBI measures. Moreover, the reduction in borrowing costs is even more pronounced when grace periods are removed altogether, reinforcing the mechanism at the core of our model in which grace-free, short-term concessional loans increase market completeness without exacerbating debt dilution problem.

Our quantitative results on the long-run also confirm this finding. Concessional loans, when structured to remain available exclusively during risk-on periods, can lower sovereign spreads over the long run. This effect arises from avoiding grace periods and preserving short-term maturities, thereby preventing additional debt dilution while still enhancing market completeness.

We focus on Portugal for our policy exercise for two main reasons. First, to isolate the effects of concessional lending and associated grace periods, we select a country with historically limited exposure to concessional debt. This allows us to introduce an additional instrument featuring grace periods and thus cleanly identify the incremental contribution of each ingredient embedded in the model. Second, this choice ensures consistency with our empirical strategy, which leverages the introduction of Flexible Credit Lines, Precautionary Credit Lines, and central bank swap arrangements that are granted exclusively to economies with strong macrofinancial fundamentals yet exposed to external vulnerabilities. In line with these considerations, concessional loans are calibrated to a ceiling of 10 percent of annual GDP, which is approximately equal to Portugal’s average gross financing needs in recent years. Our quantitative results indicate that, in response to country-specific income shocks, the introduction of concessional loans of this magnitude, combined with a 10-year grace period, reduces the widening of sovereign spreads by roughly 120 basis points and lowers the probability of default by half upon adoption.

These findings lead to a natural question regarding the use of concessional loans. If these loans are so beneficial, why haven't they been widely utilized despite being available for some time in the euro area? We attribute this to a political *stigma premium* (see [Reinhart and Trebesch \(2016\)](#)). Our calculations suggest that the stigma premium can be as high as 25%. In other words, the perceived cost of using concessional loans would need to reach 25% to explain their lack of use. This high premium is primarily due to the long grace periods associated with concessional loans. Without grace periods, we find that a stigma premium of just 5% would suffice to discourage their use entirely.

We then conduct a set of counterfactual policy exercises. We first show that prohibiting the suspension of debt payments during default episodes acts as a *disciplining device* for the sovereign, generating stronger quantitative effects. The underlying mechanism is that if the government is required to meet its obligations from concessional loans even after default, the cost of defaulting becomes more pronounced. This, in turn, enables the government to sustain a higher level of non-contingent debt at lower spreads in equilibrium.

However, the capacity to sustain higher debt levels under the presence of concessional loans may run counter to policymakers preferences -an issue that has been explicitly raised in public debates. The sharp increase in public indebtedness across the euro area following extensive fiscal stimulus has renewed attention on the design of fiscal frameworks, particularly as they relate to debt sustainability. To address this issue and align with existing proposals, concessional loans could be repurposed as a deleveraging instrument, i.e. a financing tool to help sovereigns deleverage their debt to achieve the 60 percent debt-to-GDP ratio, a common policy goal aligned with the Maastricht rule.²

To examine the implications of such an approach, we analyze a scenario in which the sovereign exchanges its defaultable debt with existing bondholders and uses concessional loan proceeds to finance this exchange using a net present value preserving (voluntary) debt exchange framework as in [Hatchondo et al. \(2014\)](#). Our results indicate that this exchange mechanism nearly eliminates default risk and sovereign spreads. Nevertheless, it introduces greater consumption volatility, as the presence of debt brakes restricts the governments ability to smooth adverse income fluctuations. Taken together, these findings suggest that, amid elevated debt burdens and the renewed policy emphasis on reducing public indebtedness, a combined strategy of encompassing concessional lending, volun-

²Debt brakes are institutional fiscal rules designed to limit government borrowing and ensure fiscal discipline. These rules, implemented in several countries-most notably Switzerland and Germany-are intended to constrain public debt levels and promote sustainable public finances.

tary debt exchanges, and binding debt brake rules can play a critical role in safeguarding sovereign solvency and preserving financial stability.

We also would like to note that we distinguish grace periods from contractual debt moratorium. A grace period is an unconditional, predetermined repayment holiday embedded in the loans initial amortization schedule -typically involving interest-only payments for a fixed number of periods, followed by the commencement of principal amortization. A contractual moratorium (a state-contingent standstill) is an explicit clause that suspends scheduled payments when a specified trigger is met (e.g., crisis indicators) and defines the treatment of the deferred amounts such as capitalization, maturity extension, or forgiveness. Both grace periods and moratoria are priced *ex ante*, but the key distinction lies in conditioning. Grace periods shift cash flows with certainty according to a predetermined timetable and, in practice, are accessed through concessional facilities typically activated during crises. Moratoria, by contrast, alter cash flows only when the trigger state materialises and can be issued at any time, so their pricing reflects the probability and severity of suspension.³ In this paper, we focus on the quantitative assessment of grace periods in sovereign debt framework.

Related Literature. This paper contributes to the vast literature on quantitative sovereign debt including the works of [Eaton and Gersovitz \(1981\)](#), [Aguiar and Gopinath \(2006\)](#), and [Arellano \(2008\)](#). An important feature of our framework is the inclusion of long-term debt for both non-contingent debt and concessional loans. Previous research emphasizes the significance of long-term debt as a modeling choice for non-contingent contracts, as highlighted by [Hatchondo and Martinez \(2009\)](#), [Chatterjee and Eyigungor \(2012\)](#), and [Arellano and Ramanarayanan \(2012\)](#). Notably, [Hatchondo et al. \(2016\)](#) show that debt dilution under long-term debt can materially reduce welfare, and that eliminating it can generate sizable welfare improvements. Additionally, [Aguiar et al. \(2019\)](#) argue that, in the absence of income risk fluctuations, sovereigns should actively manage short-term debt while remaining passive with long-term debt. Our study departs from this literature by incorporating grace periods into this framework. Unlike [Aguiar et al. \(2019\)](#), we show that when income risk fluctuations are considered, sovereigns actively manage long-term debt as well in terms of engaging in activities such as buybacks or new issuance, highlighting the nuanced interaction between income risk and debt management strategies.

[Boz \(2011\)](#), [Fink and Scholl \(2016\)](#), [Hatchondo et al. \(2017\)](#), and [Önder \(2022\)](#) examine short-term concessional loan-like instruments within a quantitative default framework while our paper investigates long-term maturity structure of concessional loans with grace periods. In addition, unlike [Liu et al. \(2024\)](#), who develop a repeated-game model

³see [Hatchondo et al. \(2025a\)](#), [Önder et al. \(2023\)](#), [Hatchondo et al. \(2025b\)](#), [Guler et al. \(2024\)](#)

of official lending under limited enforcement and moral hazard (yielding imperfect insurance via countercyclical official loans) but do not include grace periods, or [Hatchondo et al. \(2025a\)](#), who examine debt standstills (payment suspensions) without write-offs, or [Arellano and Barreto \(2025\)](#), who model official debt with longer maturities but likewise omit grace periods, our framework explicitly incorporates grace period clauses in a sovereign default model. This leads to distinct analytical and quantitative insights. In our model, grace periods provide liquidity relief and greater market completeness (much as official lending in [Liu et al. \(2024\)](#) serves as crisis insurance), but they simultaneously exacerbate debt dilution, since postponing payments lets new borrowing erode the value of existing claims. Consequently, in contrast to [Arellano and Barreto \(2025\)](#)'s finding that longer-duration official debt increases debt capacity by constraining future borrowing, we find that grace periods ultimately raise long-run sovereign spreads and borrowing costs. Similarly, while [Hatchondo et al. \(2025a\)](#) show that a temporary standstill with private creditors triggers a surge in spreads once payments resume due to accumulated obligations, our grace-period framework internalizes this trade-off. Grace periods lower immediate default risk and improve welfare in the short run, but at the expense of higher future spreads and greater reliance on non-contingent debt. In sum, by incorporating grace periods, our paper uncovers a novel tension between short-term crisis relief and long-term debt sustainability that is missed in grace-period-free models, offering different quantitative conclusions on default incentives and sovereign debt dynamics. Moreover, [Hatchondo et al. \(2025b\)](#) study a sovereign-issued, state-contingent security that suspends payments in bad states, is continuously available (not only in crises), and is competitively priced by markets (i.e. laissez-faire with respect to default risk). By contrast, we analyze concessional credit lines with grace periods that are accessed only during crises and whose terms reflect official-sector pricing rather than market default premia. In our setting, once disbursed, the grace-period cash-flow shift is unconditional, which is typically interest-only-even after the shock subsides. The object of interest is therefore repayment-profile design under official support, not the market pricing of state-contingent standstill clauses.

[Bahaj and Reis \(2022\)](#) document the stabilizing role of central bank swap lines as lender-of-last-resort instruments, a mechanism that parallels our empirical comparison between swapbased liquidity backstops and concessional arrangements featuring grace periods. Moreover, [Alfaro et al. \(2014\)](#) explores sovereign-to-sovereign capital flows (public debt flows) and their role in upstream capital movements, further motivating attention to the structure of official debt in empirical sovereign finance literature. Our framework highlights concessional loans' broader implications for consumption, debt dynamics, and

overall welfare. Our findings propose that concessional loans could yield long-run welfare gains if designed to be accessible only during risk-on episodes and structured as short-term instruments. While grace periods enhance market completeness, they exacerbate the debt dilution problem, leading to higher sovereign spreads in the long run.

The literature on optimal sovereign debt contracts is extensive, encompassing works such as [Atkeson \(1991\)](#), [Thomas and Worrall \(1994\)](#), [Kehoe and Perri \(2003\)](#), [Dovis \(2018\)](#), and [Callegari et al. \(2023\)](#). Our study departs from this literature by explicitly incorporating strategic default risk into the analysis. Nonetheless, we argue that a contract design characterized by the absence of grace periods, short-term maturity, and availability limited to risk-on episodes can lower long-term borrowing costs by improving market completeness.

The remainder of the paper is structured as follows. Section 2 presents the stylized facts. Section 3 outlines the model environment, and Section 4 reports the models implications along with a set of counterfactual exercises. In Section 5, we provide suggestive empirical evidence that relates to the models predictions. Section 6 concludes.

2 Stylized facts: Grace periods, Concessional and Private External Debt 1970-2019

Table 1 presents a comparative summary of external sovereign debt characteristics - both concessional and private- for a panel of 108 countries spanning a range of income groups.⁴ The analysis covers two periods: 1970-1999 and 2000-2019. For each country, we use data from the World Banks *International Debt Statistics* on total external debt stocks and average loan terms for new external debt issuances.

For the purposes of our descriptive analysis, we define external debt stocks as the total stock of Public and Publicly Guaranteed (PPG) debt owed to both official and private creditors, measured in current U.S. dollars.

Official external debt consists primarily of concessional loans extended by multilateral institutions-such as the International Monetary Fund (IMF), World Bank, and regional development banks (e.g., AfDB, IDB, ADB)-as well as bilateral loans from sovereign governments and their agencies, including Paris Club members and countries such as China. These loans are typically issued on concessional terms and frequently include grace periods of three to five years prior to the commencement of principal repayment. For example, Ecuador's oil-backed bilateral loans from China during 2010s included a four-year grace

⁴Table A1 (Appendix Appendix A) shows a similar analysis across the entire 1970-2019 period

period, while IMF facilities such as the Extended Fund Facility commonly incorporate repayment deferrals of similar duration. Grace periods are a standard feature of multinational lending agreements (see [International Monetary Fund \(2024a\)](#), [International Monetary Fund \(2024b\)](#)).

In contrast, private external debt comprises public and publicly guaranteed (PPG) loans from commercial banks (e.g., JPMorgan, HSBC, BNP Paribas), other private creditors (including manufacturers, exporters, and export credit agencies), and both publicly issued and privately placed bonds. Among these, syndicated bank loans are notable for often including grace periods designed to delay repayment during periods of macroeconomic adjustment. For example, euro-area crisis programmes financed by the European Stability Mechanism (ESM) provide official loans with long maturities and explicit grace periods on principal: beneficiaries begin repaying principal only after an initial grace period, while interest accrues from disbursement and is paid during the life of the loan.⁵

To further distinguish debt across repayment structures, we classify external debt with grace periods as the sum of concessional debt and debt from commercial banks -two categories that incorporate repayment deferrals. External debt without grace periods includes bonds, which are typically issued absent such provisions. This classification reflects standard lending practices and provides a useful framework for analyzing variation in the terms of sovereign borrowing. The data includes an item entitled "loans from other private creditors", which we could not precisely identify. Although sizable, we categorized them under the no-grace-period category. Thus, the overall grace period numbers we report can be considered as a lower bound.

Panel A documents changes in the composition of external sovereign debt across time for different creditor types, and grace period features. The table reports average shares of external debt for two periods: 1970-1999 (pre-2000) and 2000-2019 (post-2000), which are disaggregated by official and private creditor sources. Columns (1)-(3) present the shares of debt owed to official creditors, classified as multilateral institutions, bilateral creditors excluding China, and bilateral creditors including China. Columns (4)-(6) report the shares of debt owed to private creditors, including commercial banks, bonds, and other private lenders excluding those based in China. Column (7) shows the share of private external debt originating from Chinese creditors. Finally, columns (8) and (9) distinguish between debt instruments with grace periods, comprising concessional loans and loans from commercial banks, and those without grace periods, which include bonds and loans from other private creditors.

⁵The ESM notes that beneficiaries start repaying principal only after a grace period, while loan interest accrues immediately after disbursement and is paid during the loans life.

Panel B documents changes in the structure and pricing of new sovereign external borrowing across time and creditor type. The analysis focuses on three key loan characteristics reported separately for the pre-2000 and post-2000 periods: (i) grace period length (in years), (ii) loan maturity (in years), and (iii) interest rates (in %). Columns (1)-(6) present summary statistics for new concessional loans while columns (7)-(9) report corresponding values for new borrowing from private creditors. Within the concessional category, columns (1)-(3) capture loans from official creditors globally, and columns (4)-(6) isolate concessional lending from Chinese official creditors. This disaggregation facilitates a detailed comparison of how loan terms have evolved over time and how they vary by source of financing.

Several salient patterns emerge from Panel A. First, the composition of creditors has undergone meaningful shifts over time. Most notably, the share of external debt owed to multilateral institutions declined substantially across all country groups, falling from 44% in the pre-2000 period to less than 30% post-2000. This decline is particularly pronounced among low-income and lower-middle-income countries, where the share of multilateral debt dropped from 62% to 39% and from 44% to 29%, respectively. One potential explanation for this pattern is the stigma associated with borrowing from multilateral institutions, especially facilities such as the IMF's Extended Credit Facility and Extended Fund Facility which may signal financial distress or require strict conditionality.

A comparable reduction has been observed in bond-financed external debt as well. The average share of bonds in total external debt declined sharply among high-income countries, from 63% pre-2000 to just 18% post-2000. Similarly, for upper-middle-income countries and emerging market economies, bond reliance decreased from 30% to 8% over the same period.

Conversely, bilateral and commercial bank lending became increasingly prominent. Across all countries, the share of bilateral debt rose from 25% to 39%, while commercial bank lending increased from 6% to 13% between the pre- and post-2000 periods. This upward trend was most evident among upper-middle-income, high-income, and emerging market economies. For low- and lower-middle-income countries, the shift was concentrated primarily in bilateral lending, which appears to have partially offset the decline in multilateral financing.

Table 1: External Debt Composition and Loan Terms by Creditor Type and Period (1970-1999 and 2000-2019)

Panel A: External Debt Composition (% External Debt)																		
Country group	Official Creditors				Private Creditors				With Grace Periods?									
	Multilateral		Bilateral		China		Commercial Banks		Bonds		Other Creditors		China		Yes		No	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)									
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
<i>Low Income</i>	62.0	39.1	27.9	43.7	6.0	4.7	2.0	2.8	0.7	0.2	1.5	9.4	0.3	0.0	97.9	90.4	2.1	9.6
<i>Low Mid. Income</i>	44.4	29.3	29.2	46.1	7.9	1.5	5.7	9.9	10.1	2.8	2.6	10.4	0.6	0.0	87.2	86.8	12.8	13.2
<i>Upper Mid. Income</i>	33.2	24.6	20.4	31.8	2.5	1.3	9.9	21.7	30.9	8.4	3.0	12.2	0.2	0.0	66.1	79.4	33.9	20.6
<i>High Income</i>	21.0	17.3	6.2	20.9	0.1	0.0	9.2	37.6	63.3	17.8	0.3	6.4	0.0	0.0	36.4	75.8	63.6	24.2
<i>Emerging Market</i>	32.1	24.0	21.3	33.7	2.4	0.9	9.8	21.5	31.5	8.4	2.8	11.4	0.2	0.0	65.7	80.2	34.3	19.8
<i>All</i>	44.4	29.9	25.0	39.5	5.2	2.3	6.3	13.2	16.8	4.7	2.4	10.4	0.3	0.0	80.9	84.8	19.1	15.2

Panel B: Loan Characteristics of New External Debt Issuances																		
Country group	All Creditors					China					New Loans							
	Grace periods (years)		Maturity (years)		Interest Rate (%)		Grace periods (years)		Maturity (years)		Interest Rate (%)		Grace periods (years)		Maturity (years)		Interest Rate (%)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)									
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
<i>Low Income</i>	7.6	8.4	31.0	33.1	1.3	2.1	7.6	9.3	19.5	19.0	1.4	0.4	4.4	2.2	2.9	7.1	12.7	8.7
<i>Low Mid. Income</i>	6.6	7.5	25.1	26.7	2.1	3.9	5.9	9.6	17.5	19.8	2.3	1.5	6.2	3.0	4.3	7.8	12.0	9.7
<i>Upper Mid. Income</i>	5.4	5.4	18.9	19.7	2.8	5.9	4.7	6.1	15.0	16.5	3.0	2.7	8.3	3.3	5.2	8.4	12.5	9.5
<i>High Income</i>	4.8	5.0	16.2	17.1	3.6	7.0	7.0	7.0	30.0	30.0	3.0	3.0	12.3	4.2	5.1	8.6	13.4	8.6
<i>Emerging Market</i>	5.5	5.6	19.3	20.5	2.8	5.8	4.6	6.5	14.9	16.8	3.0	3.1	8.6	3.5	5.1	8.3	12.4	9.6
<i>All</i>	6.4	6.9	24.1	25.7	2.2	4.2	6.0	8.7	17.4	18.8	2.3	1.4	7.4	3.0	4.6	7.9	12.4	9.4

Authors' calculations. The table shows several statistics on external debt averaged within countries of different income groups, Emerging Market countries, and across all countries. We employ annual aggregate data from the International Debt Statistics (World Bank) for 108 countries during 1970-2019. External debt stocks is the sum of Public and Publicly Guaranteed (PPG) loans from official and private creditors. We define external debt from official creditors as concessional debt. External debt from official creditors includes PPG loans from international organizations (multilateral) and loans from governments and their agencies (bilateral). Private creditors external debt captures PPG loans from private commercial banks, loans from other private financial institutions (other creditors), and bonds publicly issued or privately placed. We define grace loans as the sum of concessional external debt plus external debt from commercial banks. All data on external debt stocks is expressed in current U.S. dollars. Panel A reports average external debt composition for 1970/1999 (Pre-2000) and 2000/2019 (Post-2000). Columns (1)(3) show shares from official sources (multilateral, bilateral ex. China, bilateral with China). Columns (4)(7) show shares from private sources (banks, bonds, other creditors ex. China, China). Columns (8)(9) report shares of debt with and without grace periods. Panel B documents three key loan characteristics: (i) grace period length (in years), (ii) loan maturity (in years), and (iii) interest rates (in %). Columns (1)(6) present the statistics for new concessional loans, columns (7)(9) are new borrowing from private creditors. Within the concessional category, columns (1)(3) capture loans from official creditors globally, and columns (4)(6) isolate concessional lending from Chinese official creditors.

In our dataset, the high-income group, comprising Chile, Hungary, Panama, Poland, Trinidad and Tobago, and Uruguay, continues to exhibit the lowest official creditor share (both multilateral and bilateral) across all groups in both periods (Panel A, Table 1). The modest post-2000 increase observed for this group is driven entirely by the bilateral component and is largely attributable to developments in Poland. By contrast, Chile, Trinidad and Tobago, and Panama experience declines in their bilateral shares, falling from double- to single-digit levels. Their multilateral shares also decrease on average. Consequently, the overall uptick reflects changes in group composition rather than a broad-based increase, and high-income economies remain those with the lowest official creditor exposure.

A key implication of the growing importance of bilateral and commercial lending has been the expansion of external debt instruments that incorporate grace periods - arrangements in which repayments are temporarily deferred. This category, which includes both concessional and commercial loans featuring such repayment structures, has remained the predominant form of sovereign external financing. On average, debt with grace periods accounted for 81% of total external debt before 2000, rising modestly to 85% thereafter. Although this broad pattern is observed across income groups, the underlying dynamics differ considerably. Among low- and lower-middle-income countries, the share of debt with grace periods declined only slightly, maintaining its central role in their financing mix. By contrast, high-income countries experienced a substantial shift: the prevalence of debt with grace periods more than doubled, increasing from 36% in the pre-2000 period to nearly 76% in the post-2000 period. Taken together, these trends underscore the increasingly pivotal role of grace-period debt in shaping sovereign financing structures across the income spectrum.

Lending from China -both official bilateral and private- remains modest in aggregate terms, and its relative importance has declined over time. The share of bilateral external debt owed to Chinese creditors across all countries fell from 5% in the pre-2000 period to 2% in the post-2000 period, with the steepest reduction observed among lower-middle-income economies, where the share dropped from 8% to 1.5%. Private lending from Chinese creditors, already limited in scale, effectively disappeared after 2000, declining from 0.3% of total external debt to zero. Together, these trends indicate a diminishing role for China as a sovereign creditor in both official and private segments.

Panel B documents additional stylized facts on grace periods, maturities, and interest rates associated with new external debt issuance from both official and private creditors. A clear divergence in lending terms emerges between these two creditor types in the post-2000 period. Private creditors have extended loans with substantially shorter

grace periods and maturities, alongside markedly higher interest rates. On average, private loans feature grace periods of roughly three years and interest rates close to 8%, in contrast to concessional loans, which typically offer seven-year grace periods and interest rates around 4%. These disparities are especially pronounced among lower-income and emerging market economies. For example, among lower-middle-income countries, the average interest rate on private loans after 2000 reached 9.7% - more than twice the 3.9% observed on concessional lending.

Chinese concessional lending displays systematically different financial terms compared with other official creditors. In the post-2000 period, these loans were characterized by notably shorter grace periods (approximately three years) and significantly shorter maturities of around eight years. At the same time, they carried higher interest rates, averaging 4.6%, which exceeds the typical terms offered by multilateral and traditional bilateral concessional lenders.

Turning to the evolution of borrowing costs over time, clear divergences emerge across creditor classes. Interest rates on newly issued private loans declined moderately across most income groups between the pre- and post-2000 periods, a pattern plausibly linked to more favorable global credit conditions. By contrast, concessional lending became noticeably more expensive, particularly for upper-middle-income, high-income, and emerging market economies. For example, the average interest rate on concessional loans to upper-middle-income countries rose from 2.8% to 5.9%, while for high-income countries, it increased from 3.6% to 7.0%. Taken together, these developments indicate that official financing has grown relatively costlier for higher-income sovereign borrowers.

Grace periods on newly issued concessional loans have remained remarkably stable over time, rising only marginally from an average of 6.4 years in the pre-2000 period to 6.9 years thereafter. By contrast, private lending experienced a pronounced contraction in grace periods across all income groups: the average grace period on private external debt fell sharply from 7.4 years before 2000 to just 3 years in the post-2000 era.

Finally, the data indicate a modest lengthening of maturities across both categories of external lending. For the full country sample, the average maturity of new concessional loans increased from 24.1 to 25.7 years, while the corresponding maturity on private loans rose from 17.4 to 18.8 years.

3 The Quantitative Model

Our empirical findings suggest that the following are desirable properties of a quantitative model designed to improve our understanding of sovereign debt. First, the model

should generate default in equilibrium. Second, the model should at least accommodate two assets in its budget balances: long-term non-contingent debt and long-term concessional loans. Third, the model should account for the prevalence of grace periods in sovereign debt issuance. Fourth, it should capture the main dynamics observed in the data following the inception of a new asset class, namely concessional loans. With this in mind, we provide a framework in which the government has the ability to issue non-contingent private bonds that do not entail grace periods (as in the data) and access concessional loans with grace periods. In what follows, we provide the details of such a model.

3.1 Environment

The model assumes that the government lacks commitment to future decisions regarding default and borrowing. The analysis focuses primarily on achieving a Markov-perfect equilibrium. In simple terms, this means that in each period, the government's default and borrowing strategies are determined only by payoff-relevant state variables.

In each period, the sequence of events unfolds as follows. First, the economy is hit by an endowment shock and a local expenditure shock, and then the government decides whether to repay. Subsequently, after observing these shocks, the government makes decisions about debt default and borrowing, subject to constraints influenced by its default choice.

The economy's endowment of the single tradable good is represented by $y \in Y \subset \mathbb{R}_{++}$. The endowment process is as follows

$$\log(y_t) = (1 - \rho) \mu + \rho \log(y_{t-1}) + \varepsilon_t,$$

with $|\rho| < 1$, and $\varepsilon_t \sim N(0, \sigma_\varepsilon^2)$.

Following [Hatchondo et al. \(2025b\)](#), government expenditures denoted by e_t may take a low or a high value: $e_t \in \{e_L, e_H\}$, and it evolves according to a Markov process. During normal times, e_t equals e_L , while e_t becomes e_H during a local shock, with $e_H > e_L$. Specifically, a local shock ℓ initiates with probability $\pi_{LH}(y) \in [0, 1]$ and concludes with probability $\pi_{HL} \in [0, 1]$. To account for the correlation between negative conditions in international capital markets and low domestic aggregate income ([Calvo et al., 2006a](#); [Calvo et al., 2006b](#)), we model π_{LH} as a decreasing function of y , expressed as $\pi_{LH}(y) = \min \left\{ \pi_0 \exp^{-\pi_1 \log(y) - 0.5 \pi_1^2 \sigma_\varepsilon^2}, 1 \right\}$.

Access to concessional loans granted automatically during a local shock and it expires when the shock is over.

Episodes of the grace period, denoted as $g \in \{g_S, g_N\}$, where g_S indicates being in a grace period and g_N indicates not being in one, follow a Markov process. In this process, a grace period begins with probability $\pi_{NS}(g) \in [0, 1]$ and ends with probability $\pi_{SN} \in [0, 1]$. Thus the grace regime has expected duration $E[T_g] = 1/\pi_{SN}$; we set $\pi_{SN} = 0.1$ so that the model matches an *average* grace period of 10 years, using a geometric duration as a tractable approximation to fixed-horizon contractual grace periods. If the government gains access to concessional loans in the current period, then the probability of transitioning to a grace period in the following period is $\pi_{NS}(g' = g_S \mid e = e_H) = 1$. This is consistent with the stylized fact presented earlier. During suspended payment periods, creditors earn a rate of return r_C .

Preferences of the government over private consumption are given by

$$\mathbb{E}_t \sum_{j=t}^{\infty} \beta^{j-t} u(c_j),$$

where \mathbb{E} denotes the expectation operator, β denotes the subjective discount factor, and c_t represents consumption of private agents. The utility function is strictly increasing and concave.

Asset spaces: Two asset classes exist in the model. The first one is the standard long-term debt. As [Hatchondo and Martinez \(2009\)](#), we assume that a non-contingent bond issued in period t promises an infinite stream of coupons that decrease at a constant rate δ . In particular, a bond issued in period t promises to pay $\delta(1 - \delta)^{j-1}$ units of the tradable good in period $t + j$, for all $j \geq 1$. Hence, non-contingent debt dynamics can be represented as follows:

$$b_{t+1} = (1 - \delta)b_t + i_t,$$

where δb_t are the payments due in period t , and i_t is the number of non-contingent bonds issued in period t . As presented in our data section, bonds under private creditors do not entail grace periods.

To discipline the model with long-term concessional (official) loans, we represent concessional claims using the long-term (perpetuity) structure of [Hatchondo and Martinez \(2009\)](#), as above. Access to concessional lines is triggered by a local shock ℓ ; once the shock ends, new access expires.

A key contractual feature of these loans is a grace period, which delays the onset of *principal* repayment after disbursement (and may extend beyond the crisis episode). In the model, a draw on concessional credit moves the economy into a “grace” regime starting in the next period; the regime then lasts for a stochastic number of periods. We capture grace-

period relief as a temporary reduction in *cash* debt service by scaling the coupon payments by $\varphi \in [0, 1]$. Thus, while in grace the sovereign pays $\varphi \delta_C b_C$ in cash each period. We interpret φ as the degree of net cash-flow deferral: $\varphi = 1$ implies no cash-flow relief (the full coupon is paid as in normal times), whereas $\varphi = 0$ implies full deferral of coupon payments. Consistent with the fact that concessional claims are not restructured in our setting, deferred payments are carried forward (no haircut) by accruing at the contractual rate and adding to the outstanding balance.⁶

If the sovereign has not defaulted and the payments of concessional loans are suspended while the government has access to them, then the budget constraint reads

$$c = y - e_H - \delta b + q(b', b'_C, y, p, g) [b' - b(1 - \delta)] + q_C \left(b'_C - \frac{b_C}{1 + r_C} \right),$$

where q and q_C denote the price of non-contingent bonds and concessional loan, respectively. Following the literature, we assumed concessional loans to be non-defaultable and set it to equal to the risk free rate, $q_C = \frac{1}{1+r_C}$. Later on, we relax this assumption and introduce a premium. Note that the government expenditures e become e_H as the government can only access to these concessional loans when they are hit by local shocks. If payments accrued due to concessional loans are in a grace period while the sovereign cannot access to concessional loans, consumption is given by

$$c = y - e_L - \delta b + q(b', b'_C, y, p, g) [b' - b(1 - \delta)].$$

If the access to the concessional loans is not triggered and the payments are not suspended, then the consumption is given by

$$c = y - e_L - \delta b - \delta_C b_C + q(b', b'_C, y, p, g) [b' - b(1 - \delta)].$$

Lastly, if the access to the concessional loans is triggered and the payments that are due from its previous concessional loan balances are not in a grace period, then the consumption reads

$$c = y - e_H - \delta b - \delta_C b_C + q(b', b'_C, y, p, g) [b' - b(1 - \delta)] + q_C (b'_C - (1 - \delta)b_C).$$

⁶The IMF–World Bank *International Debt Statistics* define grace periods as delays to the first *principal* repayment; interest charges typically accrue throughout. Because our long-term bond representation does not separate principal and interest payments period by period, we summarize grace as reduced *cash* debt service via φ .

Default: Government default encompasses both current and future debt obligations. This aligns with the observed behavior of defaulting governments and is a conventional assumption in the literature.⁷ When a sovereign defaults, it is excluded from private debt markets for a stochastic period of time and faces an income cost of defaulting during its exclusion. Upon the government's re-entry, the government pays a fraction of its defaulted debt.

It is customary that the sovereign does not default on concessional loans as they have a seniority over private debt and keep their coupon payments as scheduled. In our setting, concessional claims are *not restructured*: if a default/exclusion overlaps with a grace period, scheduled cash payments are *deferred* (no haircut) and the outstanding balance accrues interest at the contractual rate until repayment resumes after the grace period ends.

The budget constraint during defaults and exclusions is given by $c = y - e - \phi(y)$ if payments are suspended, and $c = y - e - \phi(y) - \delta_C b_C$ if concessional loan payments are not suspended. The government does not have to make payments during exclusion if it overlaps with a grace period on the concessional loan contract.

3.2 Recursive Formulation

Let $s \equiv (y, \ell, g)$ denote the vector of exogenous states. Let V denote the value function of a government that is not currently in default. The function V satisfies the following functional equation:

$$V(b, b_C, s) = \max \left\{ V^R(b, b_C, s), V^D(b, b_C, s) \right\}, \quad (1)$$

⁷A notable aspect in sovereign debt contracts is the inclusion of an acceleration clause and a cross-default clause. The acceleration clause empowers creditors to demand immediate repayment if the government defaults on a debt payment. Simultaneously, the cross-default clause stipulates that any default in a government obligation triggers a default in the contract containing that clause. These clauses imply that following a default event, future debt obligations transition into the category of current obligations.

where the government's value of repaying is given by

$$V^R(b, b_C, s) = \max_{b' \geq 0, b'_C \geq 0, c \geq 0} \left\{ u(c) + \beta \mathbb{E}_{(y'|y, \ell', (y', \ell), g'|(\ell, g))} \left[V(b', b'_C, s') \right] \right\}, \quad (2)$$

subject to

$$\begin{aligned} c &= y - e - \delta b - [\mathcal{I}(g)\varphi + (1 - \mathcal{I}(g))] \delta_C b_C + q(b', b'_C, s)i + \mathcal{I}(\ell)q_C i_C, \\ i &= b' - b(1 - \delta), \\ i_C &= b'_C - [1 - \mathcal{I}(g)] b_C(1 - \delta_C) - \mathcal{I}(g)b_C[\varphi(1 - \delta_C) + (1 - \varphi)(1 + r_C)], \\ b'_C &= (1 - \mathcal{I}(g)) b_C(1 - \delta_C) + \mathcal{I}(g)b_C[\varphi(1 - \delta_C) + (1 - \varphi)(1 + r_C)] \text{ if } \mathcal{I}(\ell) = 0, \\ q(b', b'_C, s) &\geq \underline{q} \forall b' > b(1 - \delta), \end{aligned} \quad (3)$$

where $\mathcal{I}(\ell)$ and $\mathcal{I}(g)$ are both indicator functions. $\mathcal{I}(\ell)$ becomes unity when the government is hit by a local shock and thus is allowed to borrow from multilateral institutions and equals 0 otherwise. Namely,

$$\mathcal{I}(\ell) = \begin{cases} 1 & \text{if } e = e_H, \\ 0 & \text{otherwise.} \end{cases}$$

$\mathcal{I}(g)$ activates during a grace period, φ indicates the fraction of scheduled concessional debt service payments that are paid during a grace period. For instance, when $\varphi = 0$, the sovereign pays nothing. When $\mathcal{I}(g) = 1$, we interpret φ as the share of contractual debt service that is paid in cash; the unpaid share is capitalized. In particular, if $\varphi = 0$, then no cash payment is made and the outstanding balance evolves as $b'_C = (1 + r_C)b_C$. During non-grace periods $\mathcal{I}(g)$ becomes 0. Equation (3) is the law of motion of concessional loans when the sovereign cannot access to them. Expectations, depicted in the right hand-side of equation (2), are computed such that whenever the government accesses to concessional loans, payments are suspended in the next period. That is, $\mathcal{I}(g') = 1$ if $\mathcal{I}(\ell) = 1$. When payments are suspended, it accrues interest rate at a rate r_C and the price of a concessional loan is given by a risk free rate $q_C = \frac{1}{1+r_C}$. The value of defaulting is given by:

$$\begin{aligned} V^D(b, b_C, s) &= u(y - e - \phi(y) - [1 - \mathcal{I}(g)] \delta_C b_C) \\ &+ \beta \mathbb{E}_{s'|s} \left[(1 - \psi) V^D(b, (1 + r_C) \left((1 - \mathcal{I}(g'))(1 - \delta_C) b_C + \mathcal{I}(g') b_C \right), s') \right. \\ &\left. + \psi V(\alpha b, (1 + r_C) \left((1 - \mathcal{I}(g'))(1 - \delta_C) b_C + \mathcal{I}(g') b_C \right), s') \right], \end{aligned} \quad (4)$$

The solution to the government's problem yields decision rules for default $\hat{d}(b, b_C, s)$, non-contingent debt $\hat{b}(b, b_C, s)$, concessional loans $\hat{b}_C(b, b_C, s)$, and consumption when not in default $\hat{c}(b, b_C, s)$. The default rule \hat{d} is equal to 1 if the government defaults, and is equal to 0 otherwise. In a rational expectations equilibrium (defined below), investors use the borrowing and default decision rules to price debt contracts. Thus, the bond-price function solves the following functional equation:

$$(1+r)q(b', b'_C, s) = \mathbb{E}_{s'|s} \left[\left[\hat{d}(b', b'_C, s') q^D(b', b'_C, s') + \left[1 - \hat{d}(b', b'_C, s') \right] [\delta + (1-\delta)q(b'', b''_C, s')] \right] \right] \quad (5)$$

where

$$(1+r)q^D(b', b'_C, s) = \mathbb{E}_{s'|s} \left\{ \left[\alpha \psi \left((1-d') \left[\delta + (1-\delta)q(\hat{b}(\alpha b', l'_C, s'), \hat{b}_C(\alpha b', l'_C, s'), s') \right] + d' q_d(\alpha b', l'_C, s') \right) + (1-\psi)q^D(b', l'_C, s') \right] \right\}, \quad (6)$$

where $l'_C = (1 - \mathcal{I}(g))(1 - \delta_C)b'_C + \mathcal{I}(g)b'_C$, $d' = \hat{d}(\alpha b', l'_C, s')$ denotes the next-period equilibrium default decision, $b'' = \hat{b}(b', b'_C, s')$ denotes the next-period equilibrium non-contingent debt decision and $b''_C = \hat{b}_C(b', b'_C, s')$ denotes the next-period equilibrium concessional loan decision.

3.3 Recursive Equilibrium

A *Markov Perfect Equilibrium* is characterized by

1. rules for default \hat{d} , non-contingent borrowing \hat{b} , and concessional loan borrowing \hat{b}_C
2. and bond price functions q and q_C for non-contingent and concessional loans, respectively,

such that:

- i. given the bond price functions q and q_C , the policy functions \hat{d} , \hat{b} , and \hat{b}_C solve the Bellman equations (1), (2), and (4).
- ii. given policy rules $\{\hat{d}, \hat{b}, \hat{b}_C\}$, the bond price function q satisfy condition (5).

3.4 Computation

Solving the model relies on iterating the value functions V^R and V^D , and price function q . To avoid the potential multiplicity problem outlined in [Krusell and Smith \(2003\)](#), we first solve the equilibrium of the finite-horizon economy. We start with an initial guess for the terminal value and iterate backward until the differences in value and price functions for two subsequent periods are less than 10^{-5} . We then use the obtained values as the equilibrium of the infinite horizon economy. We use 40 grid points for non-contingent debt, 40 grid points for concessional loans, and 30 grid points for income. Expectations are computed using 300 Gauss-Legendre quadrature points.⁸

3.5 Calibration for the economy without concessional loans

Table 2: Parameter values

	Parameter	Value	Target
Risk aversion	γ	2	Standard RBC value
Risk-free rate	r	4%	Standard RBC value
Discount factor	β	0.92	
Probability of reentry after default	ψ	1/3	Hatchondo et al. (2025b)
Recovery rate	α	0.63	Cruces and Trebesch (2013)
Standard debt duration	δ	0.1	Average duration 6.7 years
Concessional loan duration	δ_C	0.1	Average duration of 10 years
Minimum bond price	q	0.60	
Government consumption	$e = e_L$	0.12	data
Concessional loan cap	b_C	0.10	European Stability Mechanism (2024)
Calibrated			
Income autocorrelation coefficient	ρ_ϵ	0.78	Estimated
Standard deviation of innovations	σ_ϵ	2.54%	Estimated
Mean log endowment	μ	$(-1/2)\sigma_\epsilon^2$	Normalization
Income cost of defaulting	d_0	-1.13	Spread and debt-to-GDP ratio
Income cost of defaulting	d_1	1.288	Spread and debt-to-GDP ratio
Level parameter in entry probability	π_0	0.38	3 high-financing needs episodes every twenty years
Slope parameter in entry probability	π_1	38	4% lower average income
Probability of entering high risk premium	π_{HL}	0.8	Each episode lasts 1.25 years
Probability of grace period ending	π_{SN}	0.1	10 yrs of grace period
Local income shock	e_H	0.22	10% annual income loss

We first calibrate the benchmark model without concessional loans ($i_C = 0$) to reflect key characteristics of the Portuguese economy. This economy is characterized by real debt that cannot be inflated away, underpinned by strong fundamentals, yet stands to benefit from concessional loans during periods of heightened gross financing needs.

The utility function assumes a constant coefficient of relative risk aversion, given by:

$$u(c) = \frac{c^{1-\gamma} - 1}{1-\gamma}, \text{ with } \gamma \neq 1.$$

⁸We use tools developed in [Önder \(2023\)](#) for the portfolio problem. In particular, we use bi-dimensional optimizers which are shown to be superior over taste shocks for portfolio problems.

The income cost of defaulting is defined as $\phi(y) = d_0y + d_1y^2$. This quadratic income cost structure allows us to match the average levels of debt and sovereign spreads observed in the data.

Table 2 presents the benchmark values assigned to all model parameters. Each period in the model represents one year. The risk-free interest rate is set at 4 percent, and the discount factor β is set at 0.92, both standard values in quantitative studies on sovereign defaults and business cycles in small open economies. We set the minimum bond price, \underline{q} as 0.60, which prevents consumption booms prior to defaults and is never binding in the simulations.

Except for the spread data, we use data from 1995 to 2019. The spread data becomes available after 1999, following Portugal’s accession to the Euro area. The parameters governing the endowment process are chosen to replicate the behavior of logged and linearly detrended GDP in Portugal during this period.

Public expenditure, e_L , is set at 12 percent of average income, which is within the range of public consumption to GDP in Portugal. We set $\delta = 0.1$, which, alongside the targeted sovereign spread, yields an average debt duration of 6.7 years in the simulations—consistent with the average duration of public debt in Portugal.⁹

We model the local shock as one that increases the government’s gross financing needs, such as in the case of a natural disaster. This type of shock is primarily domestic, similar to the framework used in Hatchondo et al. (2025b).

Formally, we assume that government expenditure shock, e , follows a Markov process with probabilities set as $\pi_0 = 0.38$, $\pi_1 = 38$, and $\pi_{HL} = 0.8$. The low expenditure level, $e_L = 0.12$, is consistent with the baseline calibration, while the high expenditure level, $e_H = 0.22$, represents a 10 percent increase in public spending relative to average income—comparable to the shocks reported by Bova et al. (2016).

We set the cap on concessional loan limits, \overline{b}_C , at 10%, with an average grace period of 10 years ($\pi_{SN} = 0.1$), following the lending practices of the European Financial Stability Facility (EFSF) (see European Stability Mechanism (2024)). The EFSF provided financial assistance to Portugal as part of the EU and IMF bailout program after the 2011 sovereign debt crisis. Loan terms, including grace periods, were determined by the specific agreements made during the bailout negotiations. In Portugal’s case, the total loan received from the EFSF amounted to more than 10% of its GDP, with a grace period of approxi-

⁹We use data from the Public Debt Management Office of Portugal (<https://www.igcp.pt/en/>) for the average debt duration and apply the Macaulay definition of duration, which, given the coupon structure in this paper, is given by $D = \frac{1+r^*}{\delta+r^*}$, where r^* denotes the constant per-period yield delivered by the bond.

mately 10 years. To align with recent concessional loan proposals, we revisit our analysis using a 4% cap on concessional loans and a 3-year grace period.

To calibrate the model, we adjust two parameters for the cost of default, two parameters for the likelihood of entering a high-financing-need period, and the risk premium (d_0 , d_1 , π_0 , π_1 , and π_{HL}). These are calibrated to match five key moments: an average spread of 1.8 percent, a public debt-to-GDP ratio of 88.1 percent, three high-financing needs episodes per 20 years, a 4 percent trend-income reduction during these episodes (Calvo et al., 2006b) with a 1.5 percentage point increase in spreads during a local shock. The targets for debt and spread levels are again based on data from Portugal.

In our model, the duration of concessional loan repayments are set to be 10 years, $\delta_C = 0.1$, in line with existing proposals. Consistent with previous proposals, we assume that deferred payments accrue interest at the risk-free rate ($r_C = r$), meaning there is no nominal debt forgiveness associated with concessional loans.

Table 3 reports moments in the data and in the simulations of the benchmark economy with non-contingent debt. The simulations match the moments targeted in the calibration well. For the $\rho(b, b_C)$ moment, which computes the cross-correlation between new debt issuances of non-contingent debt and concessional debt, we resort to the cross-country panel moments provided in Table B2. The model also does a good job of matching this negative correlation, which suggests that these debt instruments are rather weak substitutes. The table shows that the model generates less than one-third of the observed spread. This is a known limitation of Eaton-Gersovitz models.

4 Results

We evaluate the effects of introducing concessional loans by comparing model simulations for a baseline economy without such instruments to those for an economy in which the government can issue both noncontingent bonds and concessional loans. Our findings suggest that, in the long run, the introduction of concessional loans leads to an increase in total sovereign indebtedness, as well as a modest rise in default risk and interest rate spreads.

To analyze model dynamics, Figure 2 illustrates the impact of concessional loans on bond prices. The upper panels show the government bonds' equilibrium pricing schedule in economies with and without concessional loans during normal times, while concessional loan utilization is zero ($b_C = 0$). The solid blue line represents the baseline economy while the dashed red line represents the economy with concessional loans. The upper-left chart plots the equilibrium price functions as a function of income when debt

Table 3: Main Results

	(1)	(2)	(3)
	Data	Baseline	With concess loans
Mean public debt to GDP (%)	88.1	88.8	92.1
Mean concessional loans to GDP (%)	<i>n.a.</i>	<i>n.a.</i>	8.3
Mean sovereign spread (r_s) (%)	1.8	1.8	1.9
Spread volatility ($\sigma(r_s)$)	2.9	0.8	0.8
$\sigma(c)/\sigma(y)$	1.1	1.5	1.5
$\rho(r_s, y)$	-0.5	-0.8	-0.8
Defaults per 100 years	<i>n.a.</i>	4.0	4.4
Average duration of debt (in yrs)	6.6	6.7	6.6
Average grace period of concessional loans (in yrs)	<i>n.a.</i>	<i>n.a.</i>	10
Spread rise during local shocks	1.5	1.6	1.8
$\rho(b, b_C)$	-0.1*	<i>n.a.</i>	-0.2

The first column reports Portugal's data moments, the second column reports the results of the baseline model without concessional loans and the third column presents the results with concessional loans. The Standard deviation of a variable is denoted by σ , and the coefficient correlation between variables is denoted by ρ . Consumption and income are reported by natural logs. For $\rho(b, b_C)$ moment, we use the panel average provided in Table B2.

is fixed at the ergodic level of the benchmark economy, specifically $b = 88.8\%$ for both the baseline and for the economy with concessional loans. The upper-right chart displays pricing schedules with income set at 2.5 standard deviations below trend and plots it as a function of non-contingent debt. In the upper-left panel, asset prices are higher in the economy featuring concessional loans. This reflects the lower probability of default for any given income-debt position, which compresses interest rates (given the inverse relationship between bond prices and interest rates). Similarly, in the upper-right panel, prices remain elevated in the concessional-loan economy even under long-term debt, as the anticipated probability of future default is persistently lower.

The lower panel of Figure 2 provides further insights into the dynamics of bond prices. The top-left chart depicts equilibrium prices as a function of income, with non-contingent debt and credit line levels fixed at their respective long-run values (88.8% for the baseline and 92.1% non-contingent debt) and zero credit line utilization. In contrast, the top-right chart illustrates equilibrium prices as a function of non-contingent debt, assuming income is 2.5 standard deviations below its long-run trend and credit line utilization remains at zero. These charts reveal that asset prices improve when credit lines are accessed but unused. The bottom charts replicate these analyses, this time setting credit line utilization to its ergodic value ($b_C = 8.3\%$). They show that asset prices are slightly lower in an economy with credit lines, though this difference is subtle due to scaling. This finding aligns with the mean sovereign spread (r_s) reported in Table 3.

Our findings suggest that, in the long run, the introduction of concessional loans leads to an increase in total sovereign indebtedness, as well as a modest rise in default risk and interest rate spreads. This coexistence reflects a portfolio effect: concessional access reduces *state-contingent* default risk for a given (y, b) , but it also induces higher equilibrium leverage, which can raise *unconditional* default frequency in the stationary distribution.

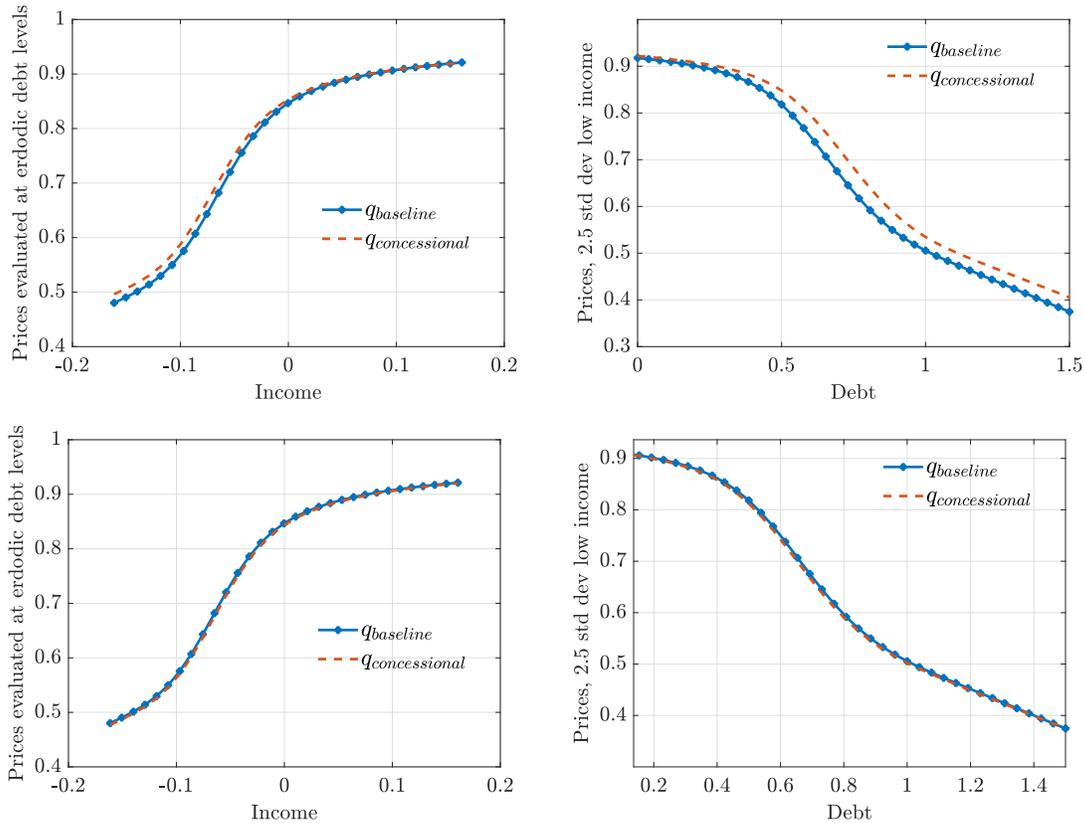


Figure 2: Equilibrium prices. The upper panels display the equilibrium price functions during normal times, when concessional loan utilization is zero ($b_C = 0$). The upper left panel shows equilibrium prices as a function of income, while the upper right panel shows them as a function of debt. The bottom left panel illustrates the economies at their ergodic levels, with 88.8% non-contingent debt for the baseline case and 92.1% non-contingent debt for the economy with a 10% concessional loan. The bottom right panel replicates the upper right panel, but now b_C is set to 10 percent of mean income, which is normalized to unity.

4.1 Transition Dynamics - Model Validation

In this section, we study the effects of an unanticipated announcement in which the government gains access to concessional loans starting immediately during a local shock. We use this analysis to validate the model by comparing its predictions with the local

projection estimates presented in the empirical section 5. In that section, estimates are obtained using FCL and swap line arrangements, and we also report results for their initial introduction into an economy.

Specifically, when the economy is hit by a local shock ($\ell = e_H$), the borrowing cap on concessional loans relaxes from zero to 0.10. Figure 3 reports the impulse response functions (IRFs) following a 2.5 standard deviation income shock. The topleft panel displays the exogenous income process fed into the model. Red dashed lines correspond to the benchmark economy without access to concessional loans, while yellow dashed lines depict the economy following their unanticipated introduction of concessional loans.

The figure shows that in response to the income shock, the benchmark economy increases its indebtedness only modestly. Absent default risk, the government would prefer to borrow more in order to smooth consumption. However, as default probabilities rise, borrowing costs, measured by spreads, increase sharply, constraining the governments ability to rely on debt issuance for consumption smoothing. By contrast, the introduction of concessional loans lowers default risk, substantially reduces consumption volatility, and enables cheaper borrowing relative to the benchmark economy. These effects are consistent with the equilibrium price dynamics shown in Figure 2. Access to an additional funding source during periods of stress is therefore critical in mitigating sharp increases in borrowing costs and default risk. As a result, the government is incentivised to borrow more, leading to a higher longrun stock of non-contingent debt, accompanied by slightly higher spreads and default risk. This pattern closely mirrors our empirical findings, which show that EMBI spreads and CDS premia decline markedly following the introduction of FCLs and swap lines.

Upon gaining access to concessional loans, the government makes immediate use of this funding, generating a short-run increase in consumption. Over the longer horizon, however, higher borrowing costs and interest payments weigh on consumption, which eventually falls below its baseline level. This raises the question of whether concessional loans ultimately improve welfare -a question we address in the next section.

4.2 Welfare analysis

In this section, we examine whether switching to an economy with concessional loans is welfare enhancing. We measure the welfare gain from the introduction of concessional loans as the constant proportional change in consumption that would make a consumer indifferent between living in the economy without concessional loans and living in the

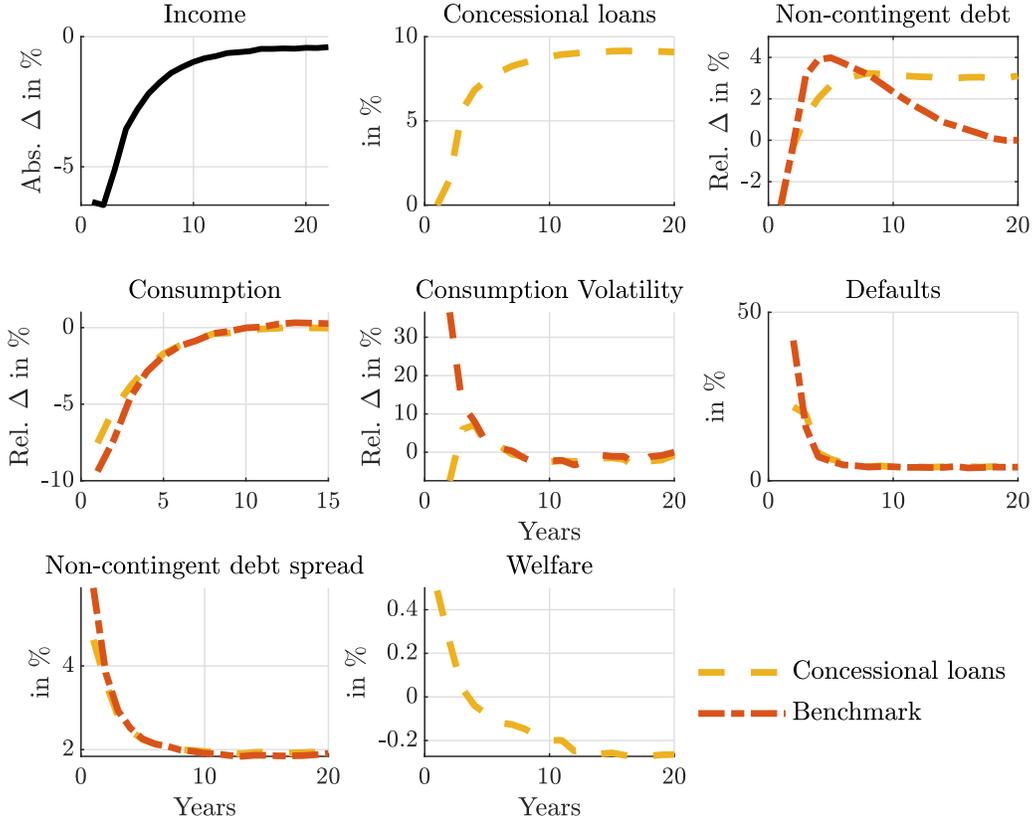


Figure 3: Impulse Response Functions. The figure illustrates the behavior of key variables following a simultaneous shock to each economy, which starts with an initial average debt level (as in the baseline economy) and is jointly affected by a local shock and a negative income shock of two-and-a-half standard deviations. The local shock lasts for one year, while the income shock follows its recovery path, as depicted in the upper left chart. Concessional loans, defaults, spreads, and welfare are shown in levels, while other variables are expressed as percentage deviations from the baseline. The dashed yellow line represents the economy with concessional loans and the red dashed-dotted line corresponds to the benchmark.

economy with concessional loans. These welfare gains are given by

$$\left[\frac{\hat{V}^{\text{NC}}(b, y, s)}{\hat{V}^{\text{concession}}(b, 0, s)} \right]^{\left(\frac{1}{1-\gamma}\right)} - 1,$$

where the super-index “NC” refers to the value function in the benchmark economy and the super-index “concession” refers to the economy with concessional loans. Thus, a positive welfare gain means that agents prefer the economy with concessional loans.

The left panel of Figure 4 reports welfare gains as a function of the calibration target for public debt-to-GDP ratio in the baseline economy (set at 88.8 percent) and for alternative income levels, following a switch to an economy with concessional loans. Two cases are considered: the dashed red line corresponds to an economy subject to a local shock, while the solid blue line represents normal times. The figure indicates that the associated welfare gains can be sizable. The consumption panel of Figure 3 further shows that the introduction of concessional loans induces the government to rely on this source of financing, resulting in a front-loading of consumption. Over the longer run, however, the accumulation of additional borrowing exerts a drag on the economy, so that welfare closely tracks the path of consumption and ultimately turns negative in the economy with concessional loans.

Revisiting Figure 4, we observe that welfare gains decline with higher income levels. This pattern reflects a lower probability of default, which compresses the price differentials between concessional loans and the baseline economy. These price differentials are also evident in the panels of Figure 2. The discontinuity in welfare gains arises because, for a given portfolio allocation and state, the government defaults below a critical income threshold.

The right panel of the figure isolates the source of welfare gains at mean output as a function of the ratio of net debt issuance, $(b' - b(1 - \delta) + b'_C)$, to mean income (normalized to one) at the time concessional loans are introduced. Thick dots denote equilibrium outcomes. These patterns are consistent with those shown in Figure 2. In particular, the equilibrium points (thick dots) indicate that the economy with concessional loans issues larger quantities of debt at lower prices, which boosts consumption and, in turn, generates higher welfare gains.

4.3 Role of grace periods

In this section, we examine the role of grace periods, a central feature of virtually all proposed concessional loan frameworks. In the baseline concessional-loan economy, once access is granted, the loan contract features an *expected* ten-year grace period ($\pi_{SN} = 0.1$). Access to concessional loans is state contingent and closely linked to adverse income realizations. In column 2 of Table 4, we shorten the grace period to three years, a horizon over which the severity of income shocks typically dissipates. In the final column, we eliminate grace periods altogether.

Several important patterns emerge from these counterfactuals. First, shorter grace periods are associated with higher ratios of non-contingent debt to GDP and a reduced

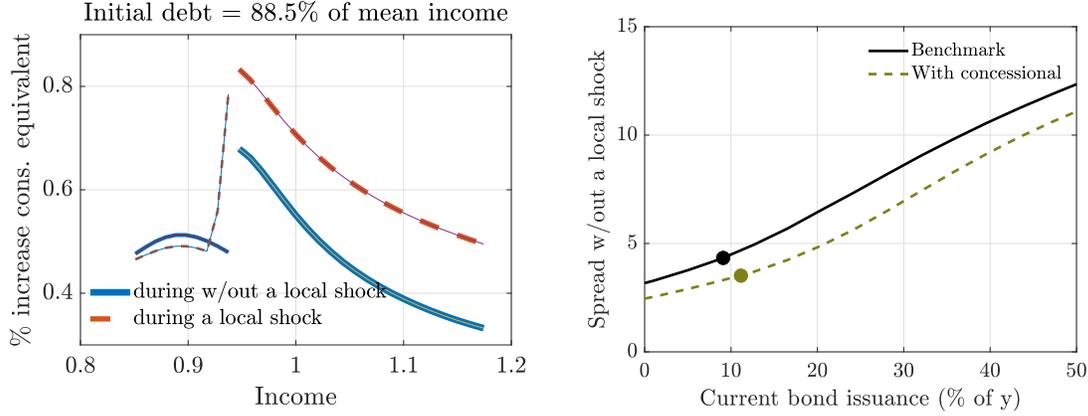


Figure 4: Welfare gains from switching to the economy with concessional loans. The left panel illustrates the welfare gains, expressed in consumption equivalent terms, resulting from transitioning from the baseline economy to the economy with concessional loans. At the time of the switch, the initial debt portfolio includes no concessional loans ($b_C = 0$) and a stock of non-contingent debt that represents long-term indebtedness in the baseline economy. The right panel compares the impact of this switch on the debt pricing schedule, depicting the relationship between the ratio of net debt issuance ($b' - b(1 - \delta) + b'_C$) and mean income (normalized to one) at the time of the switch. Thick dots indicate equilibrium realizations.

Table 4: Role of grace periods

	(1) Baseline concess loans	(2) 3 years grace period	(3) No grace period	(4) No grace one period
Mean public debt to GDP (%)	92.1	94.8	93.9	88.6
Mean concessional loans to GDP (%)	8.3	5.5	5.4	1.2
Mean sovereign spread (r_s) (%)	1.9	1.9	1.7	1.3
Spread volatility ($\sigma(r_s)$)	0.8	0.8	0.7	0.5
$\sigma(c)/\sigma(y)$	1.5	1.5	1.5	1.5
$\rho(r_s, y)$	-0.8	-0.8	-0.9	-0.9
Defaults per 100 years	4.4	4.4	4.1	4.8
Avrg duration of debt (in yrs)	6.6	6.6	6.7	6.8
Avrg grace period of concessional loans	10	3	0	0
Spread rise during local shocks	1.8	1.6	1.3	1.0

The first column presents the results of the baseline model with concessional loans, the second column reports the results for the economy with a three-year grace period for concessional loans, and the third column shows the outcomes when grace periods are removed from the model while the last columns shows the results with grace periods are removed and the concessional loans are set to be one-period ($\delta_C = 1$). The standard deviation of a variable is denoted by σ , and the correlation coefficient between variables is denoted by ρ . Both consumption and income are reported in natural logarithms.

reliance on concessional borrowing. The underlying mechanism is improved market completion: shorter grace periods allow sovereigns to smooth shocks more effectively through market debt rather than relying on concessional instruments. A three-year grace period

is particularly effective, as it aligns well with the typical recovery time following adverse shocks. By contrast, a ten-year grace period is likely to overlap with a subsequent business cycle, increasing the probability that the economy experiences another downturn before the grace period expires. In such cases, if the government faces a new fiscal shock within the ten-year window, it may have already exhausted its concessional borrowing capacity.

A second mechanism operates through anticipated changes in default costs. As shown in equation (4), sovereign payments are suspended during default episodes. For example, if a concessional loan is accessed in period 1 with a ten-year grace period and the sovereign defaults in period 2, the remaining eight years of the grace period continue to apply. Given that sovereigns are typically excluded from credit markets for an average of three years following default, this implies that no payments may be required during the exclusion period. Consequently, shortening the grace period also acts as a *disciplining device* by reducing the scope for payment suspension in default. The results in column 3 indicate that this disciplining effect dominates the gains from improved market completion. We further explore this channel in Section 4.6.2. In column 4, we eliminate grace periods as in column 3, but additionally assume that concessional loans are one-period contracts. Under this specification, concessional loans are short-term instruments that become available only when the governments gross financing needs spike, closely resembling the structure of swap lines. The results offer important insights into the design of concessional lending. When concessional loans are long-term and non-defaultable, they exacerbate the debt dilution problem inherent in models with long-term debt. The mean concessional loans-to-GDP ratio is lower in column 4 because concessional loans are one-period and accessed only during periods of elevated financing needs. By contrast, in the other specifications, concessional loans are long term and amortize gradually at rate δ_C .

Figure 5 displays the impulse response functions associated with the introduction of concessional loans without a grace period (labeled 'No grace period' in the figure). In the very short run, the two concessional-loan economies exhibit broadly similar dynamics. In both cases, the government immediately draws on concessional financing to avert default and relies heavily on this source of funding at impact. This initial reliance generates a front-loading of consumption and a decline in borrowing costs when a local shock triggers the introduction of concessional loans. These dynamics are consistent with our empirical findings. In particular, we show that swap line arrangements, which differ primarily in their grace-period structure, are associated with a sharper compression of EMBI spreads and CDS premia, reinforcing the interpretation that the absence of grace periods strengthens the immediate stabilizing effects of concessional financing.

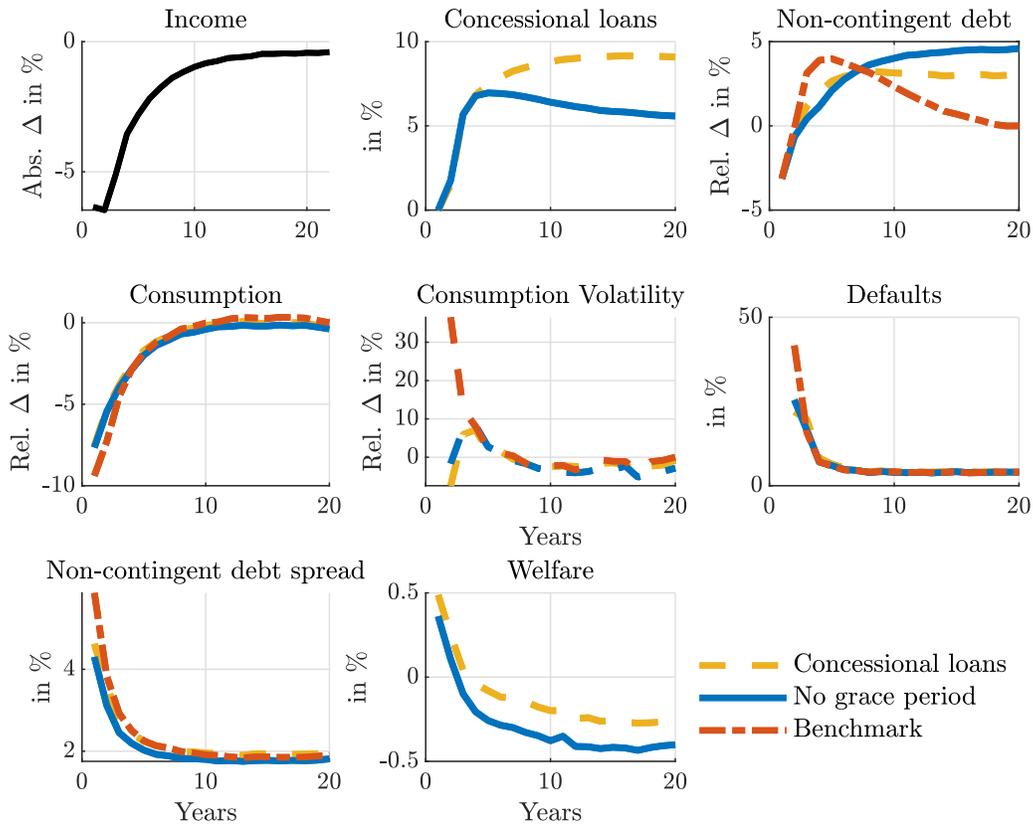


Figure 5: Impulse Response Functions. The figure illustrates the behavior of key variables following a simultaneous shock to each economy, which starts with an initial average debt level (as in the baseline economy) and is jointly affected by a local shock and a negative income shock of two-and-a-half standard deviations. The local shock lasts for one year, while the income shock follows its recovery path, as depicted in the upper left chart. Concessional loans, defaults, spreads, and welfare are shown in levels, while other variables are expressed as percentage deviations from the baseline. The blue solid line represents the case where the grace period is absent, while the dashed yellow line represents the economy with concessional loans and a 10-year grace period. The red dashed-dotted line corresponds to the benchmark.

The key differences across specifications emerge in the long run. The economy without a grace period opts for lower utilization of concessional loans. Notably, this strengthens the sovereigns precautionary motive to conserve concessional borrowing capacity for more severe adverse shocks. At the same time, the implied increase in effective default costs enables the sovereign to sustain higher levels of non-contingent debt in equilibrium. This higher debt accumulation raises interest payment obligations over time and ultimately results in slightly lower consumption. Because welfare closely mirrors con-

sumption dynamics, long-run welfare in the no-grace-period economy is lower than in the concessional-loan economy with a ten-year grace period.

Figure 6 reports consumption-equivalent (CE) welfare gains relative to an economy without concessional loans as we vary π_{SN} , which governs the expected duration of the suspension regime, $E[T] = 1/\pi_{SN}$. CE gains rise with the expected suspension length. For short-to-medium durations, the gains reflect insurance: longer suspensions are more likely to cover the post-crisis “hangover,” delaying debt service until spreads and fiscal conditions normalize, which improves consumption smoothing and lowers near-term default incentives. For longer durations, an additional channel becomes important. Because the sovereign discounts the future, extending the suspension window effectively shifts resources from the future toward the present by postponing repayment obligations, allowing greater consumption front-loading. Moreover, when the expected time to the next local shock is on the order of a decade, longer suspensions also reduce the likelihood that sizable repayments resume shortly before (or during) the next adverse episode, further increasing their insurance value.

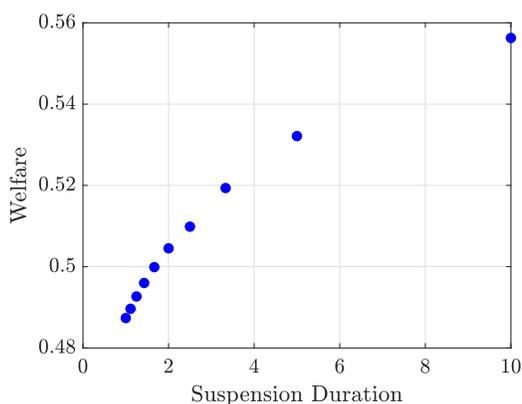


Figure 6: Duration of Debt Suspensions

4.4 Net present value preserving (voluntary) debt exchange

In this section, we analyze the effects of introducing concessional loans through a debt exchange in which the government negotiates concessions with bondholders, as in Hatchondo et al. (2014). Bondholders are not made worse off by this exchange, as they benefit from capital gains arising from both the reduction in non-contingent debt and the introduction of concessional financing. Following Hatchondo et al. (2017), we characterize such a debt exchange as “voluntary”, in the sense that it does not impose direct

losses on bondholders. Importantly, this notion of voluntary exchange should not be interpreted as implying that each individual creditors participation is entirely voluntary. Even when an exchange is collectively beneficial for creditors, individual bondholders may have incentives to free-ride on the participation of others and opt out of the exchange. Such collective action problems are well recognized in the context of sovereign debt, where restructuring typically involves a large and heterogeneous set of creditors, including bondholders, private lenders, and international institutions. In the absence of a central coordinating authority, individual creditors may hold out in the hope of securing more favorable terms, potentially delaying or complicating the restructuring process. In practice, it is often difficult to assess the extent to which governments exert pressure on bondholders to participate in these exchanges. By focusing on voluntary debt exchanges, we abstract from these complications and study an ideal scenario in which the government fully captures the capital gains accruing to bondholders from the introduction of concessional loans. As emphasized in [Hatchondo et al. \(2017\)](#), voluntary debt exchanges feature prominently in policy discussions (see, for example, [Claessens and Dell’Ariccia \(2011\)](#)) and are frequently observed in practice ([Hatchondo et al. \(2014\)](#)).

We assume that, at the beginning of the period in which concessional loans are introduced, the government makes a take-it-or-leave-it offer to bondholders. For each non-contingent coupon payment due during this period, bondholders are offered a deferred payment equal to $\frac{\bar{b}_C}{b}$, payable in the subsequent period, together with a share of non-contingent bonds of value b_V/b that begin servicing coupons immediately. If bondholders reject this offer, concessional loans are not introduced.

The government determines the level of non-contingent debt, denoted by b_V , such that bondholders, as a group, are indifferent between accepting or rejecting the offer. This allows the government to capture all the benefits of introducing concessional loans. The post-exchange quantity of non-contingent bonds, b_V , satisfies the following condition:

$$\begin{aligned} \frac{\bar{b}_C}{b(1+r)} + \frac{b_V(b, \bar{b}_C, s)[\delta + (1-\delta)q((1-\delta)b_V(b, \bar{b}_C, s), \bar{b}_C, s)]}{b} \\ = \delta + (1-\delta)q_N(\hat{b}_N(b, s), s), \end{aligned} \quad (7)$$

where q_N and \hat{b}_N represent the bond price and the government’s borrowing function, respectively, in an economy without concessional loans (i.e., where $\bar{b}_C = 0$, so \bar{b}_C is not needed as a state variable).

The right-hand side of the equation captures the value accruing to a bondholder who rejects the exchange, incorporating both contemporaneous coupon payments and future contractual obligations. The left-hand side, in contrast, represents the value to a bond-

holder who accepts the exchange, taking into account deferred payments as well as the newly issued non-contingent bonds.

Figure 7 illustrates the gains from arranging concessional loans through a voluntary debt exchange as a function of income, evaluated at the average noncontingent debt level of 88.8 percent observed in the benchmark economy. The upperleft panel shows the amount of noncontingent debt that can be exchanged with bondholders solely due to the price effect induced by the announcement of concessional loans, even when the government does not draw on these loans (i.e., setting $\bar{b}_C = 0$ in equation (7)). The scope for debt exchange is substantial at low income levels, where default risk is elevated. By reducing these risks, concessional loans generate sizable price differentials between economies with and without access to concessional financing. The lower-left panel reports the associated welfare gains, measured in consumption-equivalent terms, from transitioning to an economy with concessional loans through a voluntary debt exchange.

The right-hand panels of Figure 7 display the amount of non-contingent debt that can be exchanged when concessional borrowing is capped at 10 percent, together with the corresponding welfare gains. A key implication of this analysis is that, even under a relatively tight concessional loan limit, the government can exchange significant amounts of non-contingent debt by appropriating capital gains arising from improvements in asset prices. At the same time, voluntary debt exchanges do not affect long-run outcomes. Concessional loans can therefore be interpreted as a financial instrument for reducing long-term sovereign indebtedness. This perspective suggests that concessional lending arrangements may be designed subject to additional conditions, a possibility we explore in the next subsection.

4.5 Voluntary debt exchanges with a debt break for non-contingent debt

Fiscal rules, such as debt brakes, are institutional constraints on government fiscal policy designed to ensure the sustainability of public finances over time. Among these, debt brakes are a prominent class of rules that explicitly limit government borrowing in order to keep public debt at manageable levels (see [Kopits and Symansky \(1998\)](#) for an overview of fiscal rules). Originally pioneered by Switzerland and subsequently adopted or adapted by other countries, including Germany, debt brakes aim to regulate government borrowing and enforce fiscal discipline (see [Hofmann \(2022\)](#)).

Switzerland's debt brake, introduced in 2003, requires that federal expenditures do not exceed revenues over the business cycle. Enshrined in the Swiss constitution, the rule

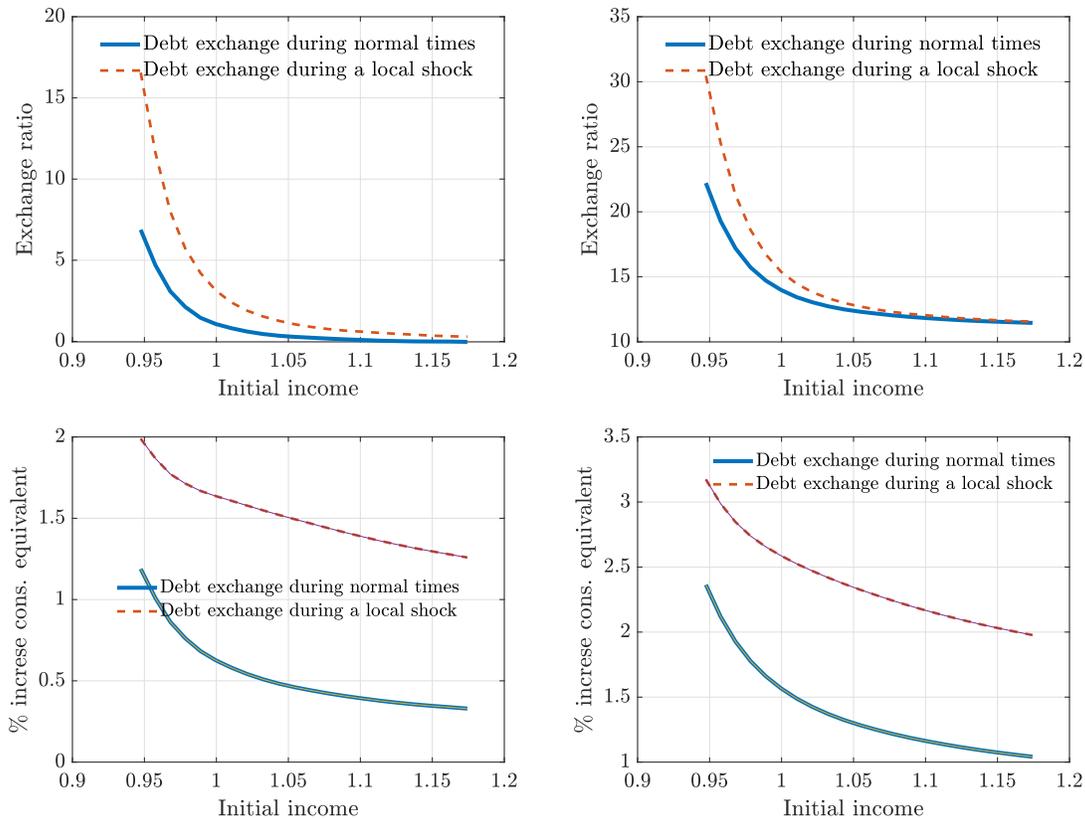


Figure 7: Voluntary Debt Exchanges

is widely credited with fostering balanced budgets and maintaining low debttoGDP ratios. Germany's "Schuldenbremse" (debt brake), introduced in 2009, similarly constrains government borrowing, albeit with institutional features tailored to the German fiscal framework.

When appropriately designed and credibly enforced, debt brakes can play an important role in promoting sustainable public finances by limiting excessive borrowing, reducing the likelihood of fiscal crises, and supporting macroeconomic stability. From this perspective, concessional loans can be viewed as a complementary financing instrument that facilitates the attainment of more sustainable debt levels.

As discussed earlier, while the introduction of concessional loans may generate only transitory effects in isolation, such instruments can be pivotal in easing the transition toward compliance with fiscal targets mandated by debt brakes, thereby yielding more persistent benefits. The complementarities between concessional lending arrangements and fiscal rules have long been recognized in both the academic and policy literature (see [Hatchondo et al. \(2022\)](#), [Hatchondo et al. \(2017\)](#), and [Önder \(2022\)](#)).

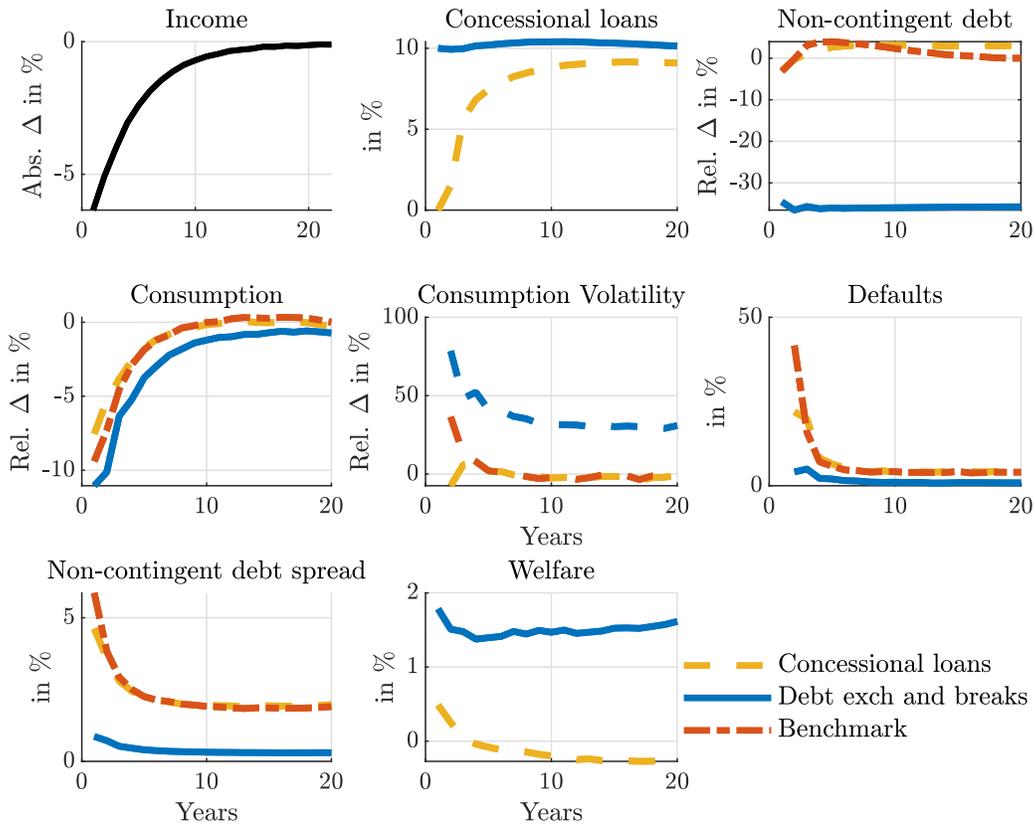


Figure 8: Impulse Response Functions. The figure illustrates the behavior of key variables following a simultaneous shock to each economy, which starts with an initial average debt level (as in the baseline economy) and is jointly affected by a local shock and a negative income shock of two-and-a-half standard deviations. The local shock lasts for one year, while the income shock follows its recovery path, as depicted in the upper left chart. Concessional loans, non-contingent debt, defaults, spreads, and welfare are shown in levels, while other variables are expressed as percentage deviations from the baseline. The blue solid line represents the economy where voluntary debt exchanges occur, with the sovereign adhering to a 60% debt brake rule. In contrast, the dashed yellow line represents the economy with concessional loans and a 10-year grace period. The red dashed-dotted line corresponds to the benchmark.

In this section, we examine the effects of introducing concessional loans in conjunction with a debt brake that imposes limits on non-contingent debt. Specifically, we assume that non-defaultable bonds equivalent to 10 percent of mean income (normalized to one) are issued to facilitate a voluntary debt restructuring. Simultaneously, an immediate cap is imposed on defaultable debt at 60 percent of mean income. This threshold is chosen for two reasons. First, the concessional loans provide sufficient financing to support the debt

reduction required to comply with the cap. Second, the cap substantially reduces default risk by limiting the accumulation of vulnerable debt.

Figure 8 presents impulse response functions following the introduction of concessional loans, conditional on the voluntary debt exchange undertaken with bondholders. The paths of concessional loans and non-contingent debt reflect the outcome of this exchange. All concessional borrowing is used to finance the debt exchange, thereby reducing non-contingent debt to comply with the 60 percent debt ceiling. Immediately after the exchange, default risk and sovereign spreads decline sharply. Relative to the scenario without a debt exchange, depicted by the yellow dashed line, the economy featuring voluntary exchanges and a debt brake exhibits higher welfare both on impact and in the long run, as well as higher contemporaneous consumption. At the same time, an important drawback of debt brakes, frequently emphasized in policy debates, is their limited flexibility. By constraining borrowing, strict debt brake rules can restrict the government's ability to smooth consumption in response to adverse economic shocks. This trade-off is evident in the consumption volatility panel, which shows that consumption volatility remains elevated relative to the baseline economy.

Overall, our findings highlight a fundamental trade-off. When combined with concessional loans and voluntary debt exchanges, debt brakes enhance fiscal discipline and reduce the likelihood of sovereign default crises. However, while effective at anchoring fiscal responsibility, their rigidity may hinder countercyclical fiscal policy, which might be necessary during economic downturns.

4.6 Investigating Model Mechanism

4.6.1 Permanent concessional loans

This section presents the quantitative analysis of an economy in which concessional loans are permanently available, rather than only during local shocks. The model is solved using one-period concessional loans, which distinguishes the contribution of this paper from the existing literature. In particular, we introduce concessional loans to be available permanently, as in [Hatchondo et al. \(2017\)](#), including periods of default, and emphasize the importance of a trigger mechanism in the contract. Specifically, we set $\mathcal{I}(\ell) = 1$ at all times, with $\delta_C = 1$. The results of this analysis are presented in the second column of the [Table 5](#), with the first column showing the baseline economy for reference.

Our results indicate that, consistent with Hatchondo et al. (2017), concessional loans have negligible long-run effects.¹⁰

Next, we eliminate the grace period feature of the concessional loans while maintaining their long-term debt characteristics. As a result, we re-conduct the analysis from Hatchondo et al. (2017), but now with long-term concessional loans. The results are presented in the third column of Table 5. The use of long-term concessional loans, when available all the time, does not change long-run moments meaningfully compared to its one-period correspondent. With long-term concessional loans, the government only has to roll over its coupon payments, with one-period concessional loans, it has to roll over the full amount b_C . As the sovereign can roll over them indefinitely, we do not observe meaningful differences.

Table 5: Model mechanism

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline	Perm. lines one-period	Perm. lines long-term	Pay all if default	Stigma ($p=0.25$)	Stigma no grace ($p=0.05$)
Mean public debt to GDP (%)	88.8	87.6	88.0	102.9	89.6	89.6
Mean concessional loans to GDP (%)	<i>n.a.</i>	8.6	8.1	8.6	1.4	0.5
Mean sovereign spread (r_s) (%)	1.8	1.8	1.8	1.5	1.8	1.7
Spread volatility ($\sigma(r_s)$)	0.8	0.8	0.8	0.7	0.8	0.8
$\sigma(c)/\sigma(y)$	1.5	1.6	1.5	1.5	1.5	1.5
$\rho(r_s, y)$	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8
Defaults per 100 years	4.0	4.0	4.1	3.7	4.0	4.0
Avg duration of debt (in yrs)	6.7	6.7	6.7	6.8	6.7	6.7
Avg grace period of concessional loans	<i>n.a.</i>	0	0	10	10	0
Spread rise during local shocks	1.6	1.4	1.4	1.3	1.6	1.5

The first column presents the results of the baseline model. The second column reports the results for an economy with no grace periods, where concessional loans are available at all times, including during defaults, with a duration of one period, i.e., $\delta_c = 1$. The third column shows the results from the second column but with long-term concessional loans, where $\delta_c = 0.1$. The fourth column displays the results when the sovereign is required to fully repay its concessional loan obligations upon default. The fifth column presents the results under a stigma premium of $p = 0.25$, while the final column shows the outcomes with a stigma premium of $p = 0.05$ and no grace periods. The standard deviation of a variable is denoted by σ , and the correlation coefficient between variables is denoted by ρ . Both consumption and income are reported in natural logarithms.

4.6.2 Pay all concessional loans if defaulted

In this subsection, we examine a counterfactual scenario where the sovereign repays the full concessional loan obligations upon defaulting on its debt. Specifically, the budget constraint during default becomes $y - e - \phi(y) - b_C$, and, upon reentry into the credit markets, the sovereign starts with no outstanding concessional loans.

The results are presented in the fourth column of Table 5. Notably, while the long-run government debt-to-GDP ratio increases by 14 percentage points, interest rate spreads

¹⁰We omit IRFs for brevity, as they closely mirror those in Hatchondo et al. (2017). In essence, the government utilizes these funds to avert default upon introduction, but subsequently continues to roll over the debt indefinitely, rendering the concessional loans akin to a free lunch.

decrease by nearly one-fifth, and default rates fall. This is because the seniority of concessional loans and the requirement to repay them in full serve as a *disciplining device*, increasing the cost of default for the sovereign.

4.6.3 Stigma premium

An obvious question is why concessional loans, despite their clear benefits and long-standing availability, have not been widely adopted. We attribute this to a political *stigma premium*. The stigma premium on loans from financial institutions refers to the additional costs or challenges that countries may encounter when seeking financial assistance from such entities due to associated reputational, political risks and negative perceptions. It has been long established that for many countries, IMF loans are seen as a measure of last resort, and borrowing from the IMF can carry a significant social and economic stigma. This perception can result in elevated costs for the borrowing country, both directly and indirectly, beyond the standard interest rate or repayment terms (see [Reinhart and Trebesch \(2016\)](#)).

Next, in the spirit of [Moretti \(2020\)](#) and [Hatchondo et al. \(2025b\)](#), we measure the effects of assuming that concessional loans carry a stigma premium over the advertised rate, given by $q_c = \frac{1}{1+r+p}$. Column (5) of [Table 5](#) reports the relevant moments when the assumed stigma premium is set to 2,500 basis points, $p = 0.25$. This analysis underscores critical dynamics. For the government to refrain from using these concessional loans, the effective rate would need to increase by nearly 2,500 basis points.

Apart from the stigma premium, this analysis also highlights the important role of grace periods. Notably, the sovereign continues to tap concessional loans despite their significant costs. For example, when $p = 0.05$, the share of concessional loans in budget balances disappears. However, if we remove the grace period from the model, the uptake of these concessional loans declines, especially when an extra premium is involved. This outcome reflects the sovereign's impatience. Although concessional loans accrue interest, maintaining a constant net present value during the grace period, an impatient government prefers them as it avoids coupon payments for the next 10 years after its access.

4.6.4 Lower concessional loan limit

In this exercise, we explore the models dynamics under a tighter constraint on concessional borrowing by lowering the cap on available concessional loans to 4 percent of GDP, i.e., $\bar{b}_C = 0.04$, compared with the 10 percent cap used in the baseline analysis. The corresponding impulse response functions are reported in [Figure 9](#).

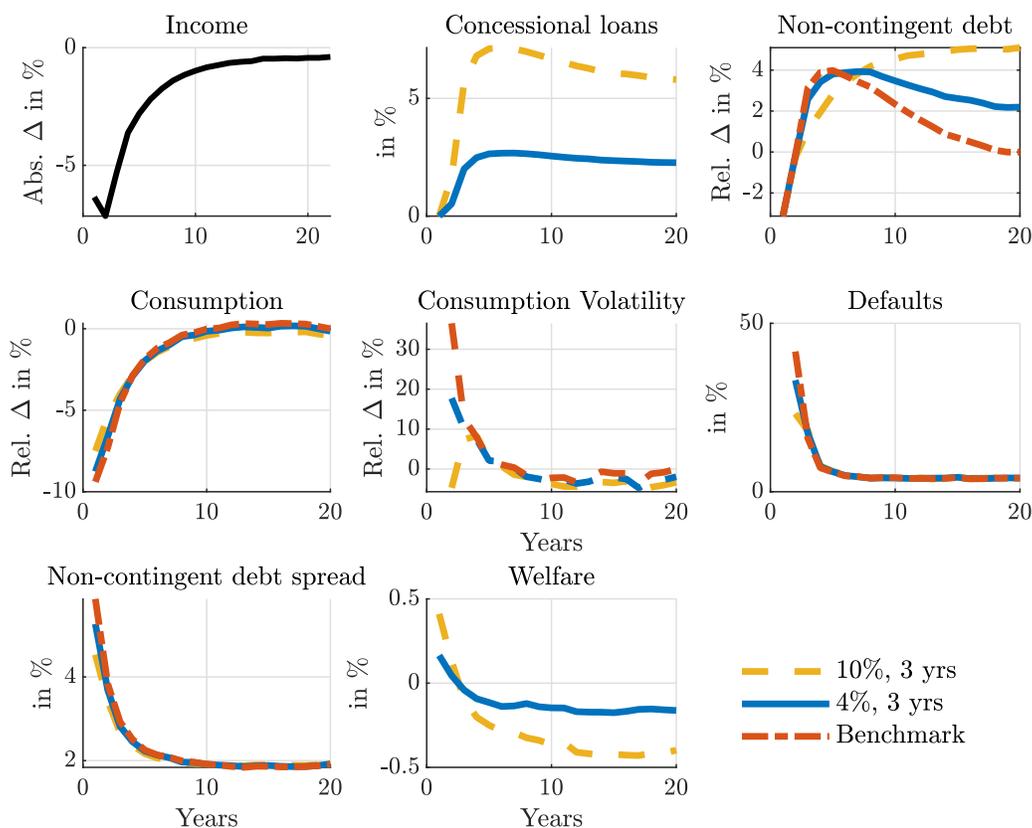


Figure 9: Impulse Response Functions. The figure illustrates the behavior of key variables following a simultaneous shock to each economy, which starts with an initial average debt level (as in the baseline economy) and is jointly affected by a local shock and a negative income shock of two-and-a-half standard deviations. The local shock lasts for one year, while the income shock follows its recovery path, as depicted in the upper left chart. Concessional loans, defaults, spreads, and welfare are shown in levels, while other variables are expressed as percentage deviations from the baseline. The blue solid line represents the case where the grace period is set to 3 years with a concessional loan cap of 4%, while the dashed yellow line represents the economy with concessional loans and a 3-year grace period with a concessional loan cap of 10%. The red dashed-dotted line corresponds to the benchmark.

Several trade-offs emerge under this lower cap. Upon introduction, the reductions in default probabilities and sovereign spreads are more muted than in the higher-cap scenario. However, long-run consumption and welfare are higher, and the steady state level of debt is lower. This reflects the fact that, during a local shock, the governments gross financing needs rise by 10 percent of GDP, while the reduced availability of concessional loans allows only partial financing of this increase.

A potential drawback of the 4 percent cap is that it may constrain the sovereigns ability to reach its longrun debt target of 60 percent of GDP through the voluntary debtexchange mechanism discussed in Section 4.5.

4.7 Fraction of coupon payments during grace

This section studies how the generosity of the grace period—measured by the fraction of concessional coupons serviced while the economy is in grace—affects welfare. In the model, grace operates through a temporary reduction in *cash* debt service on concessional loans, governed by $\varphi \in [0, 1]$. When $\varphi = 1$, the sovereign pays the full coupon and the contract provides no cash-flow relief; when $\varphi = 0$, coupon payments are fully suspended. Intermediate values capture partial coupon servicing, a common feature of official lending arrangements.

Figure 10 reports welfare, measured in consumption-equivalent terms relative to the economy without concessional loans, for alternative values of φ , holding all other contractual features fixed. Welfare displays a non-linear relationship with the fraction of coupons paid during grace.

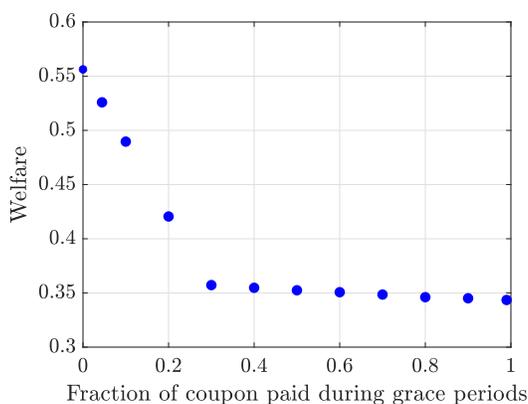


Figure 10: Welfare under different proportions of coupon payments during grace periods

When φ is high, grace delivers little liquidity relief and concessional loans closely resemble standard long-term debt. Cash-flow relief is limited, so the sovereign has little scope to front-load resources into bad times; consumption smoothing improves only modestly and welfare gains are small. As φ declines, partial deferral of coupon payments relaxes the government’s cash-flow constraint in adverse states, strengthens consumption smoothing, lowers short-run default incentives, and compresses equilibrium spreads. In this region, the insurance value of grace dominates, raising welfare.

5 Empirical Evidence: Market Reactions to IMF Credit Lines and Central Bank Swap Facilities

Private creditors typically lend on less favorable terms than official creditors, offering shorter maturities, limited or no grace periods, and higher interest rates. This contrast raises an important question: does access to concessional official financing affect how private markets assess sovereign risk? To address this issue, we examine whether announcements of concessional lending arrangements influence private creditors' perceptions of default risk, as reflected in sovereign interest rate spreads. Our empirical strategy compares the dynamic market responses to two forms of official support: IMF Flexible Credit Lines (FCLs), which combine long maturities with substantial grace periods, and U.S. Federal Reserve central bank swap agreements, which provide short-term liquidity without a grace component. While this comparison does not isolate the effect of grace periods *per se*, it allows us to interpret market reactions as responses to a broader *concessional-terms package*, which offers longer maturities and grace periods at lower cost relative to non-concessional liquidity support.

We estimate the dynamic effects of FCL and swap line announcements on sovereign risk premia using a local projection approach, following [Jordà \(2005\)](#). Sovereign spreads are measured using both the Credit Default Swap (CDS) premium and the EMBI+ index. Both series are expressed in basis points (bps), so the impulse responses below are interpreted as level changes in bps at horizon h relative to the pre-announcement baseline. We begin by presenting results for a panel of upper-middle- and high-income emerging market economies that had access to either facility between 2008 and 2015.¹¹ We then provide a detailed case study of Mexico, an important emerging market that benefited from both FCL arrangements and Federal Reserve swap lines.

For country i in month t , let $Y_{i,t}$ denote the monthly average value of either the CDS premium or EMBI+ spread. We then estimate the following equation:

$$Y_{i,t+h} = \alpha + \lambda_i + \lambda_t + \beta_h \text{FCL}_{i,t} + \delta_h \text{SWAP}_{i,t} + \sum_{j=1}^6 \rho_{j,h} Y_{i,t-j} + \sum_{j=1}^k \omega_{j,h} \Delta X_{t-j} + \varepsilon_{i,t+h}. \quad (8)$$

$\text{FCL}_{i,t}$ and $\text{SWAP}_{i,t}$ are indicator variables equal to one in the month of an FCL or swap announcement, respectively. Specification (8) includes up to six lags of the depen-

¹¹We exclude high-income advanced economies with access to swap lines, such as the United Kingdom and Australia, as their sovereign risk dynamics may differ systematically from those of the emerging markets that constitute the majority of our sample.

dent variable, as well as country and year fixed effects (λ_i, λ_t). In addition, we control for global financial conditions, including six lags for the VIX monthly change (in CDS regressions) and two lags in the composite EMBI+ index monthly change (in EMBI+ regressions).

Our identification strategy exploits the shared and distinct characteristics of FCLs and swap lines. On the one hand, both arrangements are considerably less costly than borrowing from private external markets and are available exclusively to countries with sound macroeconomic fundamentals. On the other hand, the two instruments differ along a key contractual dimension: repayment structure. FCLs are medium-term arrangements (initially one to two years, renewable) that include grace periods ranging from 3.25 to 5 years, while swap lines are short-term facilities, typically maturing in 90 days, and do not feature grace periods. As maturity and grace provisions vary jointly across the two instruments, our reduced-form estimates should be interpreted as reflecting the effects of the *overall contractual package*, rather than the causal impact of grace periods per se. Accordingly, we present the impulse responses to FCL and swap announcements separately (the sequences $\{\beta_h\}$ and $\{\delta_h\}$) and compare their profiles across horizons. The shared eligibility criteria help mitigate concerns about selection bias, allowing us to interpret differences in market reactions as primarily driven by variation in contractual design rather than unobserved fundamentals. Moreover, the comparison between FCLs and swap lines offers a natural setting to assess how concessional lending terms affect private borrowing costs.

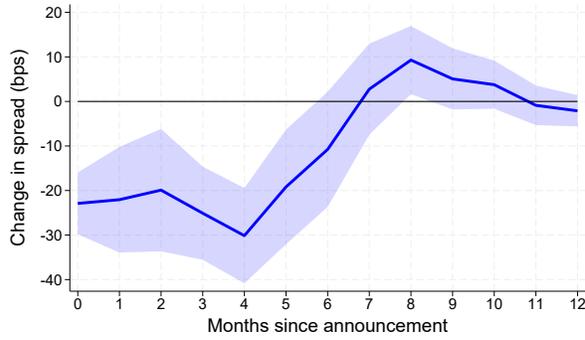
5.0.0.1 Interpretation and caveats. Several features differ between FCLs and swap lines beyond maturity and grace provisions. Swap lines may convey immediate dollar-liquidity backstops and central-bank cooperation; FCLs may differ in conditionality, stigma, and the information content of IMF approval; and the two instruments can coincide with distinct global or country-specific news. Accordingly, our local-projection and DID estimates should not be read as identifying the causal effect of grace periods in isolation. Instead, we use these instruments to benchmark market reactions to two empirically salient *contract-design packages*: medium-term concessional arrangements with grace (FCLs) versus short-term liquidity support without grace (swap lines). This is precisely the margin highlighted by our model—shorter-maturity official support improves market completeness while limiting debt dilution—so the empirical comparison provides a transparent reduced-form target for the models transition dynamics rather than a stand-alone causal estimate of grace.

Table 6: Contract Size and Tenor by Instrument (2009–2023)

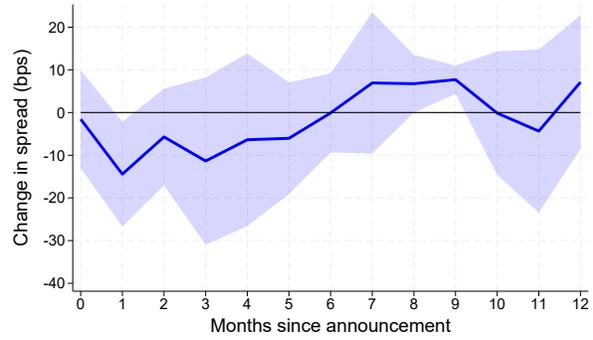
	N	Size/GDP (in %)	Maturity (months)	Grace (years)
FCL	15	1.86 [0.84–2.51]	18.0 [11.8–23.8]	3.25–5
SWAP	78	0.85 [0.28–2.14]	2.8 [0.9– 2.8]	0

Authors calculations. The table shows medians for each FCLs and SWAPs in our sample; bracketed values are interquartile ranges [p25-p75]. N counts announcement-month events. Size/GDP (in %) is the agreed loan amount in USD at the announcement date divided by nominal USD GDP in year $t-1$ of the announcement month. Maturity is reported in months. Grace is the stated contractual grace period in years; swap lines have no grace by design (0).

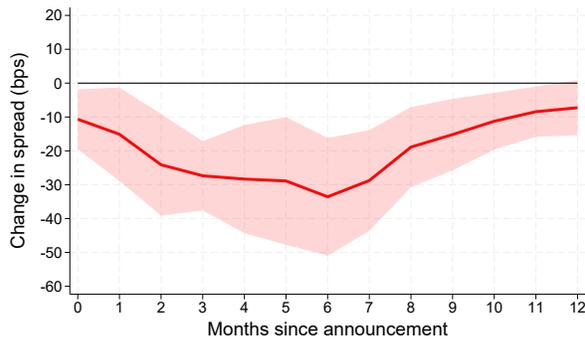
Within our estimation sample, Table 6 reports the median Size-to-GDP ratio, maturity (with interquartile ranges in brackets), and grace periods associated with the FCL and swap announcements used in the local projection analysis. FCLs are typically larger relative to GDP and include grace periods, whereas swap arrangements are shortterm and do not feature grace periods. Importantly, the interquartile ranges of Size-to-GDP overlap across the two instruments, indicating that although FCLs are larger at the median, the distributions are not separated by orders of magnitude. This supports our interpretation of the reduced-form responses as reflecting reactions to a broader contractual package rather than to scale alone. By contrast, maturities differ sharply across instruments, consistent with our identification narrative.



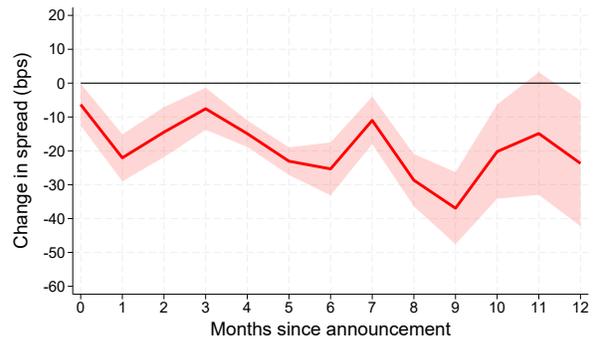
(a) CDS - FCL Announcement



(b) EMBI+ - FCL Announcement



(c) CDS - SWAP Announcement



(d) EMBI+ - SWAP Announcement

Figure 11: FCL and SWAP Announcements: The figure shows the impact of FCL and SWAP announcements for panel countries during 2008m1-2015m12. We plot the sequences $\{\beta_h\}$ and $\{\delta_h\}$ from equation (8) with 90% confidence bands. Y-axis in basis points (bps). X-axis in months since announcement; month 0 is the announcement month. A zero reference line is included in each panel.

Figure 11 presents the estimated impulse responses up to 12 months following announcements of an FCL or a swap arrangement. At the time of introduction (month 0), the point estimates indicate a sizable decline in sovereign spreads. In particular, the CDS premium falls by approximately 22.9 bps following an FCL announcement and by about 10.7 bps following a swap announcement. For the EMBI+ index, the corresponding estimates, although smaller and not statistically significant, are also negative, at roughly 1.5 and 6.3 bps, respectively. Overall, these results suggest that, on impact, FCL announcements elicit a somewhat stronger immediate decline in private sovereign spreads than swap announcements.

However, the persistence of these effects differs markedly across instruments. For CDS spreads, the impact of FCL announcements becomes statistically insignificant by month 6, whereas the effect of swap announcements remains significant through month

12. The contrast is even more pronounced for EMBI+ spreads. Swap announcements generate persistent declines in private sovereign spreads that gradually increase in magnitude and remain statistically significant up to one year after the announcement, while the effect of FCL announcements is statistically significant only at one month after introduction and is otherwise close to zero, with a temporary uptick around month 9.

Conditional on statistical significance, the postintroduction effects are generally stronger and more persistent for swaps than for FCLs. For CDS spreads, FCL announcements are associated with declines of up to roughly 35 bps, peaking around month 4, whereas swap announcements produce reductions ranging between about 10 and 35 bps with greater persistence. For EMBI+ spreads, the maximum decline following FCL announcements is approximately 15 bps at month 1, while swap announcements generate reductions of roughly 20 to 40 bps over subsequent months. Overall, we interpret these results as evidence on market responses to a concessional-terms package, combining longer maturities and grace period compared to short-term liquidity support without grace periods, while recognizing that differences in maturity are intrinsically bundled with grace in this empirical comparison.

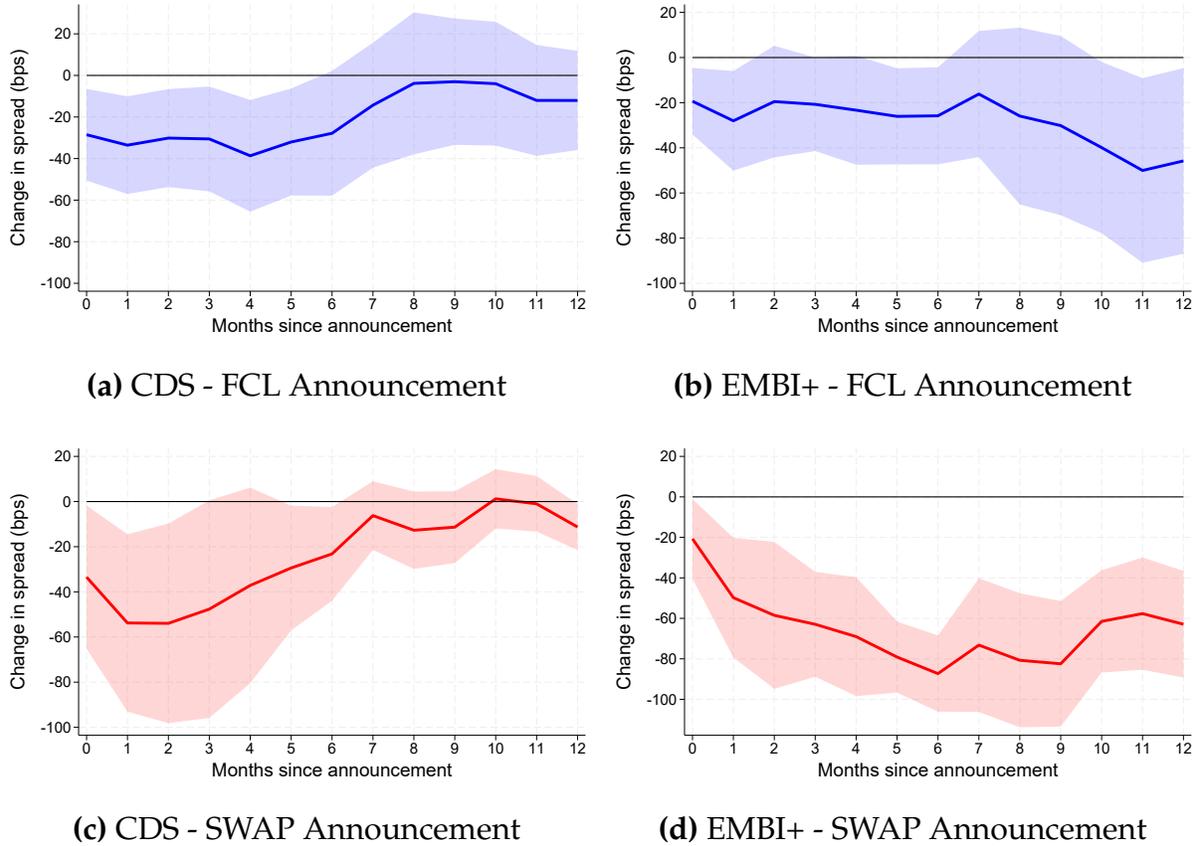


Figure 12: FCL and SWAP Announcements: Mexico

As a robustness check, we re-estimate the local projections for Mexico, the only country in the panel to receive both an FCL and a swap line:

$$Y_{t+h} = \alpha + \beta_h \text{FCL}_t + \delta_h \text{SWAP}_t + \sum_{j=1}^q \rho_{j,h} Y_{t-j} + \varepsilon_{t+h}. \quad (9)$$

Equation (9) includes one lag ($q = 1$) in the CDS regressions and two lags ($q = 2$) in the EMBI+ regressions.

The local projection estimates for Mexico are presented in Figure 12. The results echo those from our panel estimation. The effects of swap announcements are stronger and more persistent than those of FCLs. CDS spreads decline by 2060 bps following swaps, compared to 2040 bps for FCLs. EMBI+ spreads drop by up to 90 bps after swaps, exceeding the 2050 bps range for FCLs.

Overall, within the first year following announcement, swap lines, despite their short maturities and absence of grace periods, generate larger and more persistent reductions

in sovereign spreads than FCLs. Taken together, the evidence indicates that access to concessional official financing improves borrowing conditions in private markets. However, the gains appear to be more pronounced for facilities characterized by shorter maturities and no grace periods, which is consistent with the implications of our quantitative model of sovereign default with concessional lending.

Table 7: DID estimates CDS and EMBI+: Mexico

	CDS			EMBI+		
	(1)	(2)	(3)	(4)	(5)	(6)
δ_{FCL}	-63.47*** (14.22)	-200.79*** (20.77)		-37.16*** (11.54)	-193.34*** (10.05)	
δ_{SWAP}	-133.17*** (14.15)		-194.46*** (13.61)	-159.23*** (14.52)		-195.16*** (9.80)
year	✓	✓	✓	✓	✓	✓
month	✓	✓	✓	✓	✓	✓
N_{obs}	687	343	687	687	687	687
\bar{R}^2	0.63	0.67	0.63	0.61	0.61	0.61

Notes: Authors calculations. Dependent variable is Mexico's daily CDS or EMBI+ spread. In parentheses we report heteroskedasticity-consistent standard errors. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. All specifications include year and month fixed effects, two lags of ΔY_t , and contemporaneous plus lagged changes in the VIX and EMBI Global indices.

One limitation of the local projection estimates is that they pool all FCL and swap announcements across countries and over time. While this approach exploits rich variation, it may attenuate the estimated effects of initial program announcements if subsequent arrangements are partially or fully anticipated by markets (e.g., in the case of renewal of prior agreements). To address this concern, we shift attention to firsttime FCL and swap announcements, which are arguably more informative and less subject to anticipation effects.

We focus on Mexico and estimate the impact of first-time announcements on private sovereign borrowing costs using a difference-in-differences (DID) framework. Mexico offers a unique identification opportunity, as the FCL and swap line announcements occurred in close succession, on 17 April and 22 April 2009, respectively, allowing us to separately identify their effects using daily data.¹²

¹²A staggered DID design using a panel of countries is not feasible due to limited cross-sectional treatment variation. In the CDS sample, only Mexico received an FCL, while variation across other countries pertains solely to swap announcements. Conversely, in the EMBI+ sample, only FCL announcements are observed. As a result, panel-based DID estimates would primarily capture countryspecific shocks for Mexico rather than average treatment effects across multiple treated units.

The estimation results are reported in Table 7. In the joint specification, the FCL announcement is associated with a reduction of 63 bps in CDS spreads and 37 bps in EMBI+ spreads, while the swap line announcement yields an additional decline of 133 and 159 bps, respectively; all estimates are statistically significant at the 1 percent level. Columns (2),(3),(5), and (6) report specifications that estimate each intervention in isolation. When included alone, the FCL announcement is associated with a decline of roughly 200 bps in both CDS and EMBI+ spreads. Swap-only regressions deliver nearly identical estimates, with reductions of about 194195 bps. These results suggest that, taken separately, each intervention could account for almost the full adjustment in spreads. Comparing these estimates with those from the joint specification yields two key conclusions.

First, the nearadditive structure of the estimated coefficients indicates that markets treated the FCL and the swap line as distinct shocks, rather than attributing the entire decline in spreads to a single intervention. Had this not been the case, the combined estimate would not align closely with the sum of the individual effects. Second, while spreads began adjusting following the FCL announcement, the swap line accounted for the majority of the overall compression. This pattern mirrors the local projection results, but with larger magnitudes. First-time announcements generate sharper market responses than the pooled LP estimates, consistent with anticipation dampening the effects of subsequent arrangements. At the same time, the short pre-swap window implies that the FCL estimate is based on limited variation and may be more sensitive to omitted shocks than the swap coefficient.

Overall, the daily DID evidence reinforces our main finding that concessional arrangements improve market access, but swap lines, despite their short maturities and absence of grace periods, deliver a stronger and more immediate compression of sovereign spreads upon introduction.

6 Conclusion

This paper contributes to the understanding of grace periods and concessional lending in sovereign debt markets by combining empirical evidence with a quantitative theoretical framework. On the empirical side, we document the widespread use of grace periods in sovereign borrowing, particularly in concessional lending, and estimate their effects using local projections. Our results show that access to concessional loans with grace periods lowers sovereign default risk and reduces private borrowing spreads. On the theoretical side, we develop a sovereign default model that incorporates concessional loans and grace periods alongside standard non-contingent debt. Our results confirms the em-

pirical findings that concessional lending with grace periods enhances debt sustainability by mitigating default risk. At the same time, restrictions on payment suspensions during default act as a disciplining device, raising the cost of default and reinforcing fiscal discipline.

Our policy analysis illustrates how concessional loans can facilitate sovereign deleveraging. Using a debt exchange framework calibrated to Portugal, we show that voluntary exchanges financed through concessional loans can substantially reduce default risk and sovereign spreads. These gains, however, come at the cost of higher consumption volatility, driven by debtbrake mechanisms. The design of concessional facilities therefore matters. Limiting their use to periods of elevated risk and shortening grace periods can improve long-run debt sustainability while containing concerns about debt dilution.

Finally, our findings shed light on political and economic constraints that limit the broader adoption of concessional lending. Despite their potential benefits, the use of such instruments is discouraged by a stigma premium. Our estimates suggest that a stigma cost of up to 25 percent can rationalize governments reluctance to rely on concessional loans, particularly those with long grace periods. This highlights a central trade-off in the design of official support. While concessional lending can provide valuable shortterm relief, it may also entail longer-term risks related to debt dilution and future borrowing costs.

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Appendix A External Debt Composition and Loan Characteristics, Full Sample

Table A1: External Debt Composition and Loan Terms by Creditor Type (1970-2019)

Country group	Panel (A): External Debt Composition								
	Official Creditors			Private Creditors			With Grace Periods?		
	Multilateral (1)	Bilateral (2)	China (3)	Commercial Banks (4)	Bonds (5)	Other Creditors (6)	China (7)	Yes (8)	No (9)
<i>Low Income</i>	49.0	36.9	5.3	2.4	0.4	6.0	0.1	93.6	6.4
<i>Low Mid. Income</i>	35.9	38.7	4.3	8.0	6.0	7.0	0.3	87.0	13.0
<i>Upper Mid. Income</i>	28.7	26.4	1.9	16.1	19.1	7.9	0.1	73.1	26.9
<i>High Income</i>	18.4	16.3	0.0	28.8	31.9	4.5	0.0	63.6	36.4
<i>Emerging Market</i>	27.7	28.1	1.6	16.2	18.8	7.5	0.1	73.6	26.4
<i>All</i>	36.3	33.0	3.6	10.2	10.1	6.9	0.2	83.1	16.9

Country group	Panel (B): Loan Characteristics of New External Debt Issuances								
	New Concessional Loans			China			Private Creditors		
	Grace periods (years) (1)	Maturity (years) (2)	Interest Rate (%) (3)	Grace periods (years) (4)	Maturity (years) (5)	Interest Rate (%) (6)	Grace periods (years) (7)	Maturity (years) (8)	Interest Rate (%) (9)
<i>Low Income</i>	8.1	32.3	1.7	8.5	19.2	0.9	2.7	6.2	9.6
<i>Low Mid. Income</i>	7.1	25.9	3.1	7.2	18.3	2.0	4.2	6.5	10.5
<i>Upper Mid. Income</i>	5.4	19.3	4.5	5.3	15.6	2.9	5.5	7.0	10.8
<i>High Income</i>	4.9	16.8	5.9	7.0	30.0	3.0	6.6	7.6	10.1
<i>Emerging Market</i>	5.5	20.0	4.5	5.3	15.6	3.0	5.6	7.0	10.8
<i>All</i>	6.7	25.0	3.3	7.1	18.0	1.9	4.6	6.7	10.5

Authors' calculations. The table shows several statistics on external debt averaged within countries of different income groups, Emerging Market countries, and across all countries. We employ annual aggregate data from the International Debt Statistics (World Bank) for 108 countries during 1970-2019. External debt stocks is the sum of Public and Publicly Guaranteed (PPG) loans from official and private creditors. We define external debt from official creditors as concessional debt. External debt from official creditors includes PPG loans from international organizations (multilateral) and loans from governments and their agencies (bilateral). Private creditors external debt captures PPG loans from private commercial banks, loans from other private financial institutions (other creditors), and bonds publicly issued or privately placed. We define grace loans as the sum of concessional external debt plus external debt from commercial banks. All data on external debt stocks is expressed in current U.S. dollars. Panel A reports average external debt composition. Columns (1)(3) show shares from official sources (multilateral, bilateral ex. China, bilateral with China). Columns (4)(7) show shares from private sources (banks, bonds, other creditors ex. China, China). Columns (8)(9) report shares of debt with and without grace periods. Panel B documents three key loan characteristics: (i) grace period length (in years), (ii) loan maturity (in years), and (iii) interest rates (in %). Columns (1)(6) present the statistics for new concessional loans, columns (7)(9) are new borrowing from private creditors. Within the concessional category, columns (1)(3) capture loans from official creditors globally, and columns (4)(6) isolate concessional lending from Chinese official creditors.

Appendix B Correlations External Debt Issuances

Table B2: Correlations External Debt Issuances (Disbursements)

	Concessional	Multilateral	Bilateral	Private	Banks	Bonds	Other Priv.
Panel A: All Years							
Concessional	1.00						
Multilateral	0.74	1.00					
Bilateral	0.84	0.27	1.00				
Private	0.12	-0.04	0.20	1.00			
Banks	0.05	-0.05	0.12	0.74	1.00		
Bonds	-0.12	-0.10	-0.09	0.46	0.01	1.00	
Other Priv.	0.28	0.08	0.34	0.69	0.35	-0.07	1.00
Panel B: 2000-2019							
Concessional	1.00						
Multilateral	0.75	1.00					
Bilateral	0.71	0.07	1.00				
Private	-0.05	-0.10	0.04	1.00			
Banks	0.05	-0.08	0.16	0.44	1.00		
Bonds	-0.08	-0.08	-0.04	0.90	0.05	1.00	
Other Priv.	0.04	-0.02	0.08	0.21	0.11	-0.03	1.00
Panel C: 1970-1999							
Concessional	1.00						
Multilateral	0.73	1.00					
Bilateral	0.85	0.27	1.00				
Private	0.11	-0.06	0.20	1.00			
Banks	-0.01	-0.10	0.06	0.81	1.00		
Bonds	-0.12	-0.10	-0.09	0.26	0.08	1.00	
Other Priv.	0.25	0.04	0.32	0.78	0.34	-0.05	1.00

Authors' calculations. The table shows the correlation for debt issuances of different types of external debt. We employ annual aggregate data from the International Debt Statistics (World Bank) for 108 countries during 1970-2019. External debt stocks is the sum of Public and Publicly Guaranteed (PPG) loans from official and private creditors. We define external debt from official creditors as concessional debt. External debt from official creditors includes PPG loans from international organizations (multilateral) and loans from governments and their agencies (bilateral). Private creditors external debt captures PPG loans from private commercial banks, loans from other private financial institutions (other private), and bonds publicly issued or privately placed. We calculate debt issuances as disbursements on external debt relative to trend GDP. Trend GDP is obtained by taking the exponential of the logged nominal GDP trend, which is estimated using the HP filter. Disbursements refer to the amounts drawn by the borrower from loan commitments during the specified year. We present the correlations for the entire period (Panel A), post-2000 (Panel B), and pre-2000 (Panel C).