The Costs and Consequences of Sovereign Borrowing*

Mark Aguiar
Princeton University and NBER

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1 Introduction

It is a great honor to give the Mundell-Fleming Lecture at the IMF's 24th Jacques Polak Annual Research Conference. It it is a particularly special privilege to do so at a conference in honor of Ken Rogoff. Ken's brilliance, creativity, and intellectual fearlessness has always been a guiding inspiration in my career. As will be clear throughout my lecture, I will build on many of Ken's seminal insights. This is a testament to how Ken's research has been hugely influential on my own approach to economics.

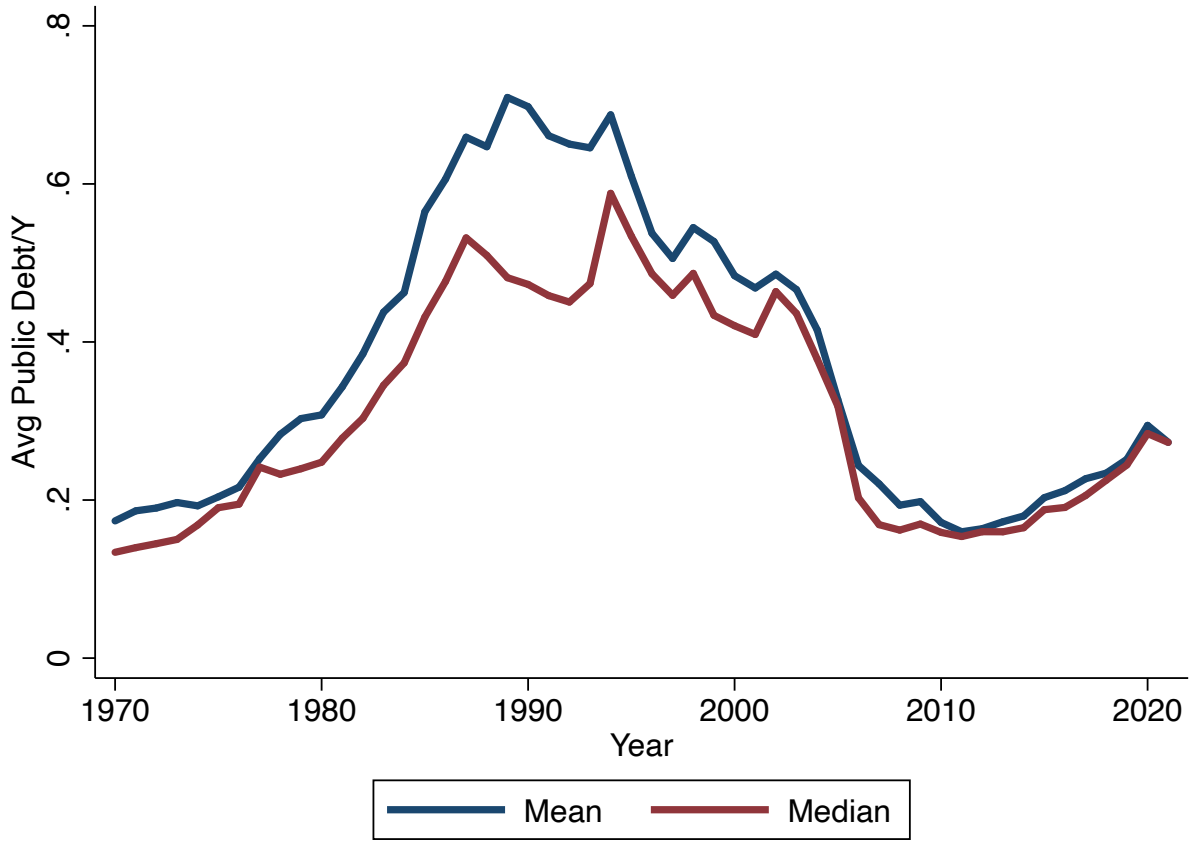
It has been roughly fifty years since the (latest) explosion of lending to emerging and developing economies. In Figure 1 I plot the average external sovereign debt to GDP in emerging and developing economies from 1970 to 2021. The data is from the World Bank's World Development Indicators (WDI). The sample consists of countries with 1970 GDP per capita, expressed in 2015 U.S. dollars, of less than $10,000. As a reference, the threshold places Argentina in the sample and Greece out. The figure consists of a balanced sample of 52 countries, and plots both the mean and median debt to income ratio. It should be stressed that debt is external public and publicly gauranteed debt, and does not include debt issued in domestic bond markets. This omission is particularly relevant for recent years, as discussed below.

The figure depicts the large increase in debt from 1970 of less than 20% to a peak around the turn of the millenium of 50-60% on average, and then a decline back to 1970s levels, before a small uptick in the 2010s. I will initially focus on the first part of this sample, through 2004, before considering the decline in the latter part.

I want to take the opportunity of this lecture to reflect on how I view this broader development. In particular, I will draw some insights and lessons from data and theory to explore what

*maguiar@princeton.edu. The author wishes to thank Manuel Amador and Cristina Arellano for extremely helpful comments.

Figure 1: Trends in External Debt



sovereign borrowing does and does not do. I will contrast the data, and my own thinking, with a simple benchmark, that I shall call the "neoclassical conventional wisdom." I will use the data and theoretical framework to ask a simple question: does access to sovereing debt markets make the private citizens of emerging and developing economies better off. And, would improving the efficiency of these markets increase or decrease private welfare. I will make a case that, arguably, correcting inefficiencies may be welfare reducing. This may sound provocative, but I do not aim to be provocative for its own sake. The goal will be to take a simple framework, informed by the data, and take it to its logical conclusion. The goal will not be a set of actionable policy items, but rather to flip the perspective or paradigm in which policy is made. That is, to challenge the premise that marginal improvements in debt markets are steps in the right direction for the average inhabitant of emerging markets. We shall see to what extent this case can be made convincingly. The discussion will go to extreme counterfactuals as a pedagogical tool. I will then conclude with more practical policy conclusions that can be drawn from the reversed paradigm.

2 The Empirical Consequences of Sovereign Debt

2.1 The Neoclassical Paradigm meets the Allocation Puzzle

What I shall call the neoclassical conventional wisdom posits two main benefits from access to external bond markets. The first is to relax the saving=investment constraint of a closed economy. In particular, sovereign debt markets allow a developing economy to tap into global savings to fund investment, speeding the transition to the steady state of the neoclassical growth model. The second benefit is insurance. In particular, to the extent a country's income fluctuates independently of the rest of the world, there is scope for risk sharing. Sovereign debt markets can then be used to "smooth" consumption or government expenditure relative to a volatile aggregate income process.

The neoclassical paragidm does not rely on frictionless markets. In particular, it is well known that international debt markets are subject to a host of frictions, including (i) limited commitment; (ii) limited state contingency; (iii) rollover risk; and (iv) deadweight costs of default, which may include loss of reputation, declines in trade or output, and increases in inequality. A large literature, of which I have been part of, argues that mitigating these frictions are steps in delivering on the promise outlined in the preceding paragraph. This premise will be one I will examine skeptically in what follows.

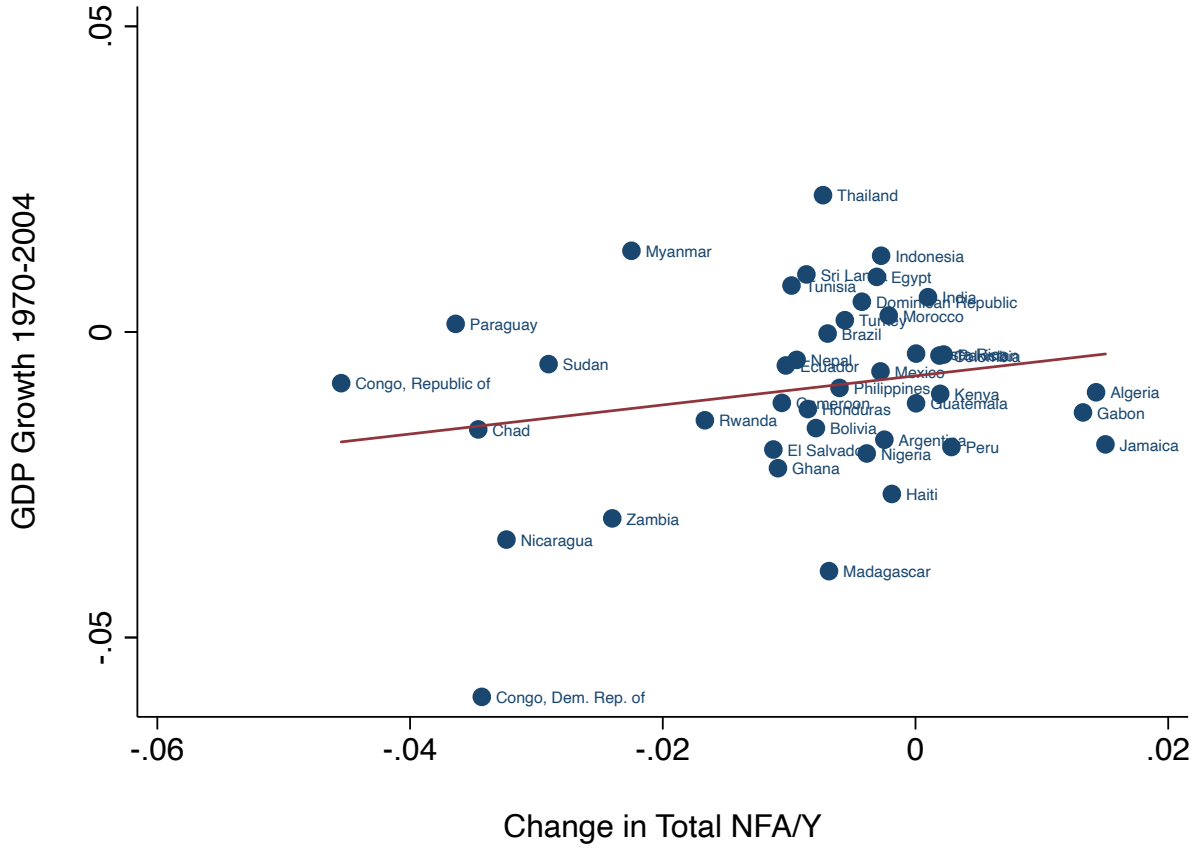
One implication of the neoclassical paradigm is that debt and capital are complements. This reflects that sovereign borrowing is a means to increase physical capital beyond private saving. As a motivating example, consider the models of Cohen and Sachs (1986) and Barro, Mankiw, and Sala-I-Martin (1995), which involve a constraint of the from $B_t \leq \nu K_t$.[1] The interpretation is that debt is collateralized by physical capital, and $\nu > 0$ is the allowable leverage ratio. A country increases B in order to increase its capital stock. The process is not instantaneous due to adjustment costs in the model of Cohen and Sachs (1986) and due to the need to accumulate complementary human capital in the model of Barro, Mankiw, and Sala-I-Martin (1995). But the key prediction is that both debt and capital increase along a transition path, with the speed of transition dictated by technological constraints and bounded below by the (counter-factually fast) transition rate of the closed economy neoclassical growth model. I also highlight that the neoclassical paradigm makes no distinction between public and private debt, as the allocation maximizes the welfare of the (Ricardian) representative private agent.

The hypothesis that international capital markets speed growth was laid to rest by an influential paper of Gourinchas and Jeanne (2013). They documented that emerging and developing economies that grew relatively fast *exported* savings on net, while countries that lagged behind

[1] Cohen and Sachs (1986) consider a linear and non-linear production technology. This constraint is the one derived under linearity.

imported capital. They dubbed this phenomenon the "Allocation Puzzle."

Figure 2: The Allocation Puzzle of Gourinchas-Jeanne



I replicate this fact in my dataset in Figure 2. Each point is a country over the period 1970-2004. The horizontal axis is the difference in net foreign assets as a ratio to GDP over this sample period, expressed in annualized changes. Net foreign assets are computed using the External Wealth of Nations dataset of Lane and Milesi-Ferretti (2018). As we move to the right, countries are accumulating claims on the rest of the world; that is, by saving relatively more compared to their domestic investment. Coveresely, movements to the left represent incresing net promises issued by the country to the rest of the world; that is, by saving relatively less compared to domestic investment. The vertical axis is the growth in GDP per capita over this period, also in annualized changes and relative to the growth rate of the US during this time frame. The figure also includes the linear regression line. The figure depicts an upward sloping relationship on average, indicating that countries that grew the fastest were net exporters of savings. This pattern is difficult to square with the standard neoclassical logic, but is reconciable with an alternative view that I present next.

2.2 Growth in the Shadow of Expropriation

In this section, I discuss an alternative paradigm that predicts debt and capital move in the *opposite* direction along the transition path. Moreover, this approach makes a stark distinction between public (governemnt) borrowing and saving and private capital flows.

This approach replaces the $B \leq \nu K$ inequality with $W^G(B) \geq W^D(B)$, where W^G is the value of the political incumbent as a function of the stock of external debt B, while W^D is the value of "deviating" or defaulting on debt promises, as a function of the physical capital stock K. Such a constraint is present in Thomas and Worrall (1994) as well as my work with Gita Gopinath and Manuel Amador (Aguiar, Amador, and Gopinath, 2009; Aguiar and Amador, 2011).[2]

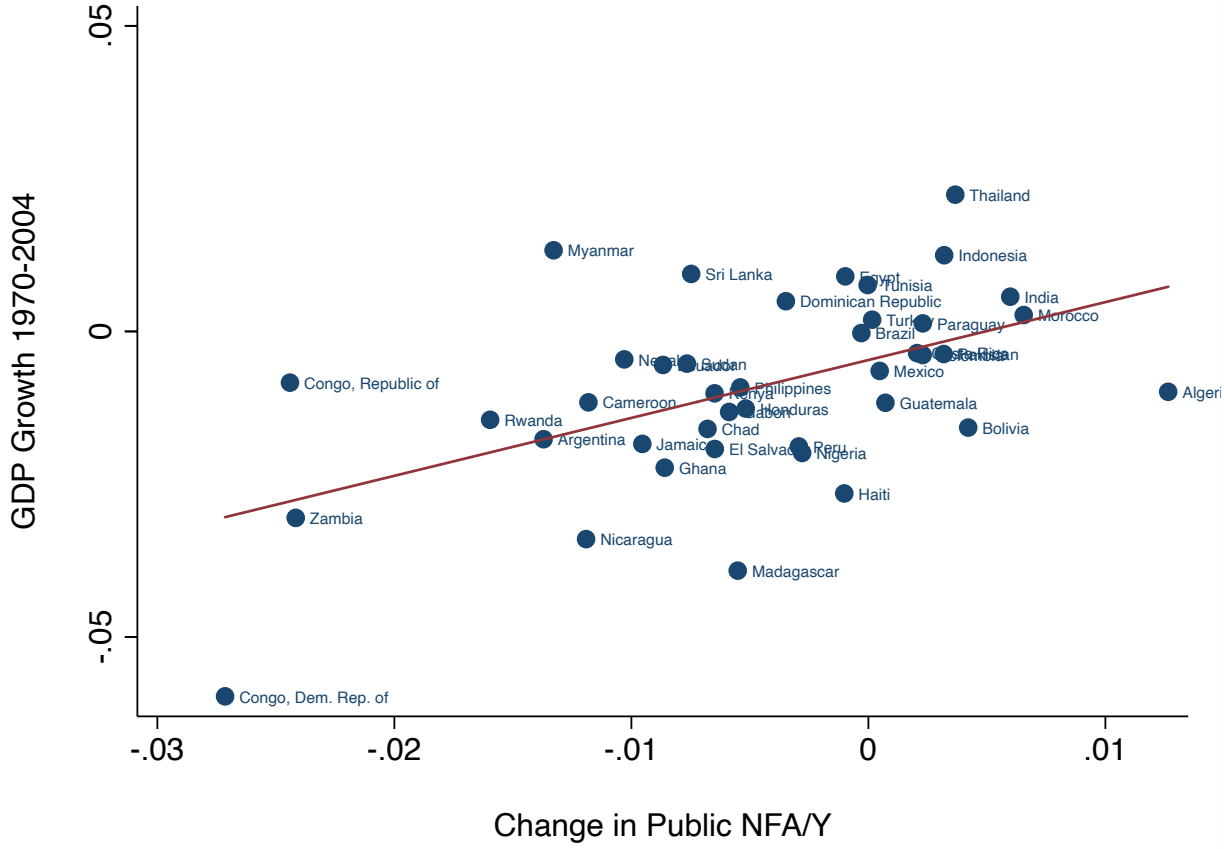
There are two useful ways to view this fundamental inequality. One is the traditional "trigger strategy" viewpoint, in which W^D is the consequence of defaulting on debt, perhaps financial autarky or autarky plus some loss of productive efficiency. Repayment of B is credible as long as the value obtained by servicing deb (W^G) is greater than the value of deviation. The approach posits that W^G is decreasing in B, as more debt reduces the resources available for consumption by political incumbents. We also have W^D increasing in K, as the inability to borrow again (or whatever is the consequence of defaulting) is less punishing the greater the amount of capital located in the economy. Hence, a larger K means lenders are less willing to extend B, generating a negative relationship between the two variables. An alternative interpretation is one of taxation. More debt tempts the government to tax capital (or "expropriate" in the terminology of Aguiar and Amador, 2011), and hence private agents are less willing to invest in the economy if the government has a large amount of debt outstanding. This phenomenon is what Manuel Amador and I termed "growth in the shadow of expropriation."

The expropriation interpretation highlights another core distinction with the neoclassical conventional wisdom. Namely, that the political incumbents may be working at cross purposes to the private agents. Aguiar and Amador (2011) model the government as a sequence of political incumbents that rotate in and out of power stochastically. All else equal, parties prefer spending that occurs while in power, which combined with the possibility of losing office, makes them biased towards consuming in the present. Moreover, political incumbents do not fully weight the welfare of the owners of capital, either because they are foreign residents or because they are not political "insiders."

With these ingredients in hand, the prediction is that sovereign borrowing "crowds out" private investment, despite the presence of a deep pool of global savings in which the domestic economy is small. Evidence in support of this alternative is presented in Figure 3. The figure is

[2]Cohen and Sachs (1986) derives the inequality discussed in the previous section from such a constraint, as well. As noted, their linear benchmark case collapses to $B \leq \nu K$, but the case with non-linear production is a precursor to the dynamics discussed in this section.

Figure 3: Growth in the Shadow of Expropriation

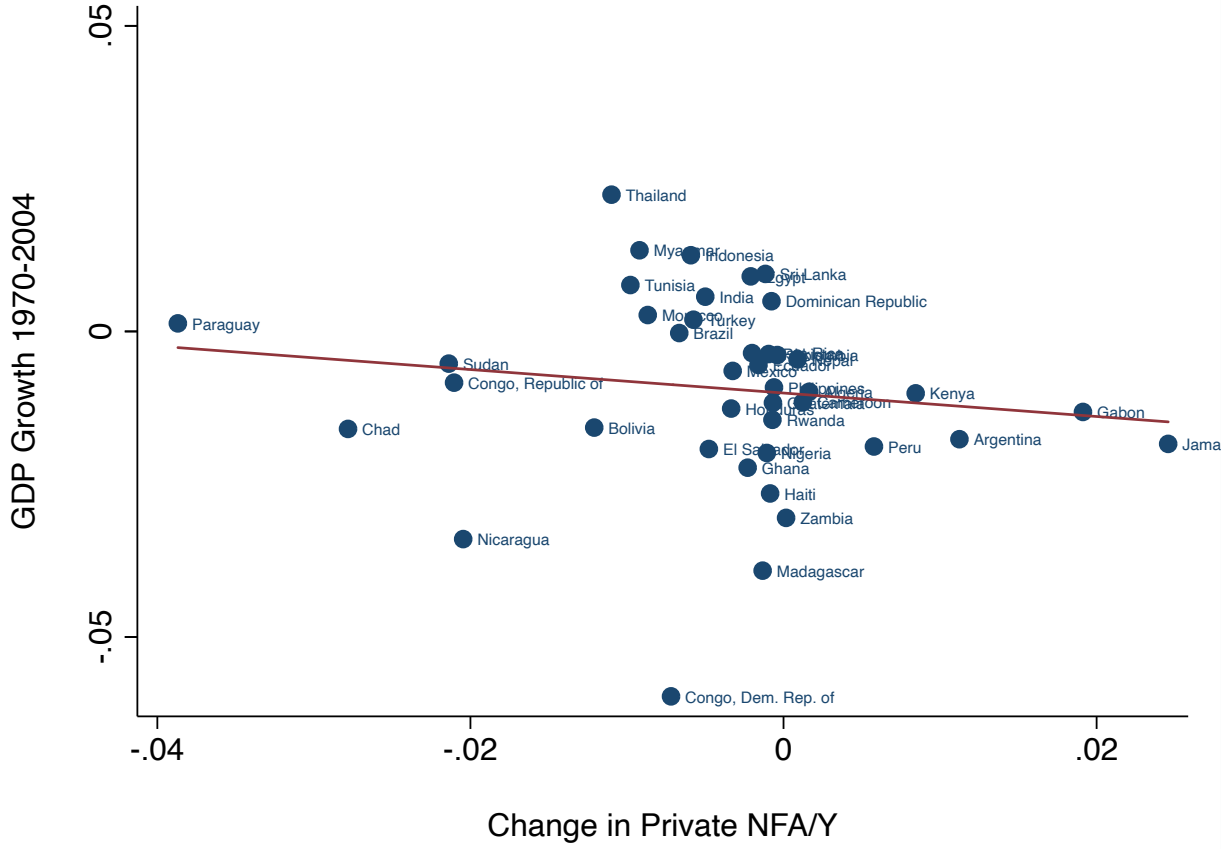


similar to Figure 2, but on the horizontal axis is the net asset position of the government, rather than the economy as a whole. In particular, public net foreign assets are computed as foreign reserves minus external public debt. The positive relationship depicted for the economy as a whole in Figure 2 is even stronger when restricted to public savings in Figure 3. Each country in the scatter plot is interpreted by Aguiar and Amador (2011) to be a particular parameterization of political economy frictions, with countries that borrow more suffering from more severe present bias. We show that the speed of transition is not driven by technology, as in the neoclassical paradigm, but by the severity of political economy frictions.

Conversely, and consistent with the altenrative theory, *private* capital flows (computed as the net of total flows minus public) behave in a manner consistent with the neoclassical intuition. In particular, Figure 4 plots growth against the change in private net foreign assets. The average relationship is negative, indicating that faster growth attracts private capital flows on net.

Finally, Figure 5 depicts average investment rates (as a ratio to GDP) against the change in external public debt over the 1970-2004 sample period. Consistent with Figure 3, we see that countries that rely more on external debt markets have lower investment rates. The preponder-

Figure 4: Private Capital Flows

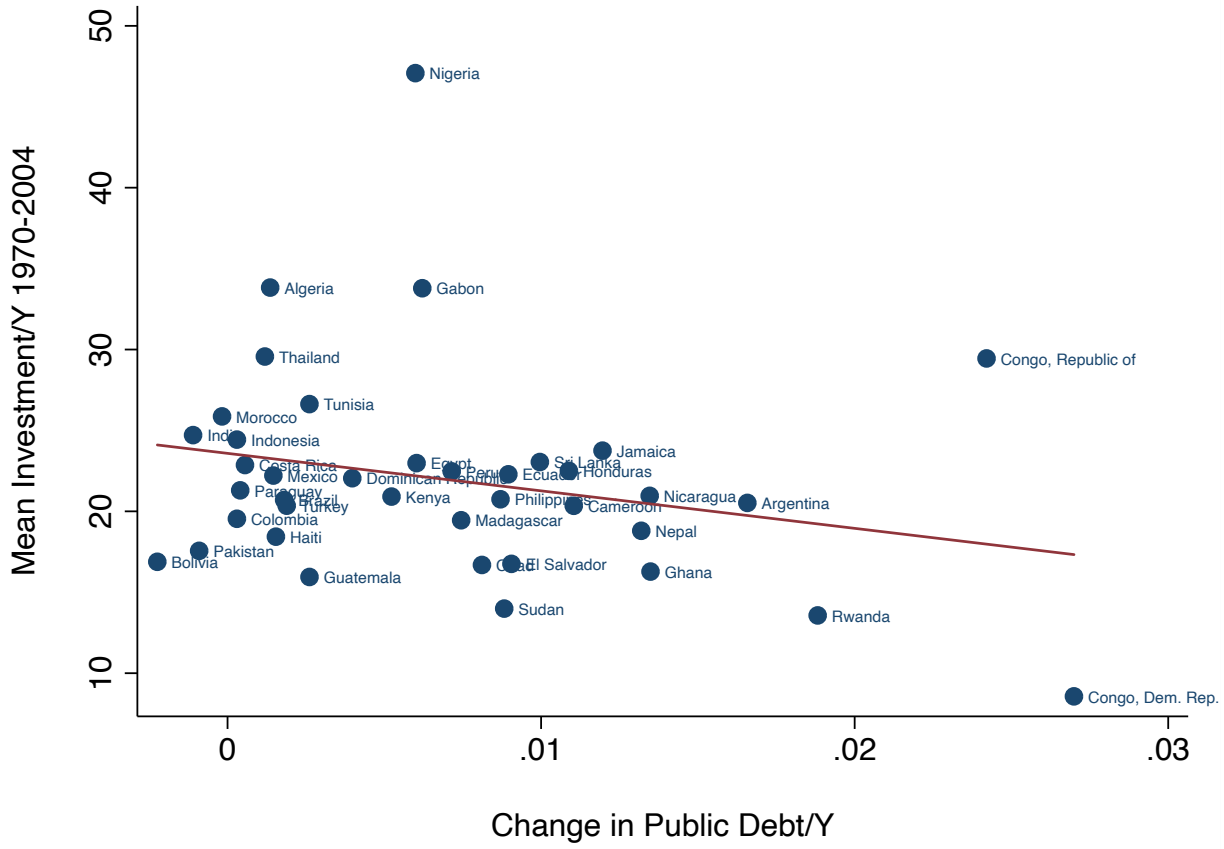


ance of evidence presented above argues against the belief that sovereign debt markets are used in practice to increase investment above a limited pool of domestic savings. Rather, the data is consistent with the opposite perspective in which debt reduces the level of investment.

It should be stressed that the patterns are over a relatively long time frame. We know from other work that governemnt borrowing is often positively correlated with investment, consumption, and output at business cycle frequencies in emerging markets. The above patterns show that the correlation of debt with income and investment have the reverse sign over the longer run.

It would be ideal to have an instrument that exogenously shifts the stock of external debt so we can see how this plays out in investment. Absent such a source of exogenous variation, the best we can do is combine theory and observed patterns to distinguish cause and effect. Doing so leads to a plausible argument that sovereign borrowing depresses investment and growth. The reverse prediction, that debt markets enable growth, has a steeper uphill climb to square with the data.

Figure 5: External Debt and Investment Rates



2.3 A Caveat: Extending the Sample

The patterns in Figures 2 to 5 cover the sample 1970-2004, which contains the large run up in debt observed in emerging and developing economies. What about the decline observed in the final two decades?

Figure 6 replicates Figure 3 using the full sample. We see that the positive relationship in the earlier sample is not as strong in the full sample. Figure 7 depicts the latter sample 2004-2021 isolated from the earlier sample, and we see that the relationship has switched sign over time, which attenuates the relationship in the full sample relative to the benchmark sample.

Figure 8 sheds some light on what is driving this attentuation. The blue circles represent country data drawn from the benchmark 1970-2004 sample, while the red diamonds are from the full sample 1970-2021. We see that many of the large debtors in the benchmark sample have shifted towards the less indebted over the full sample. This represents a combination of debt forgiveness (e.g. the Democratic Republic of Congo), default and restructuring (e.g. Argentina), and the commodity boom and associated growth in GDP in the 2000s (e.g. Argentina again).

Figure 6: Public Flows 1970-2021

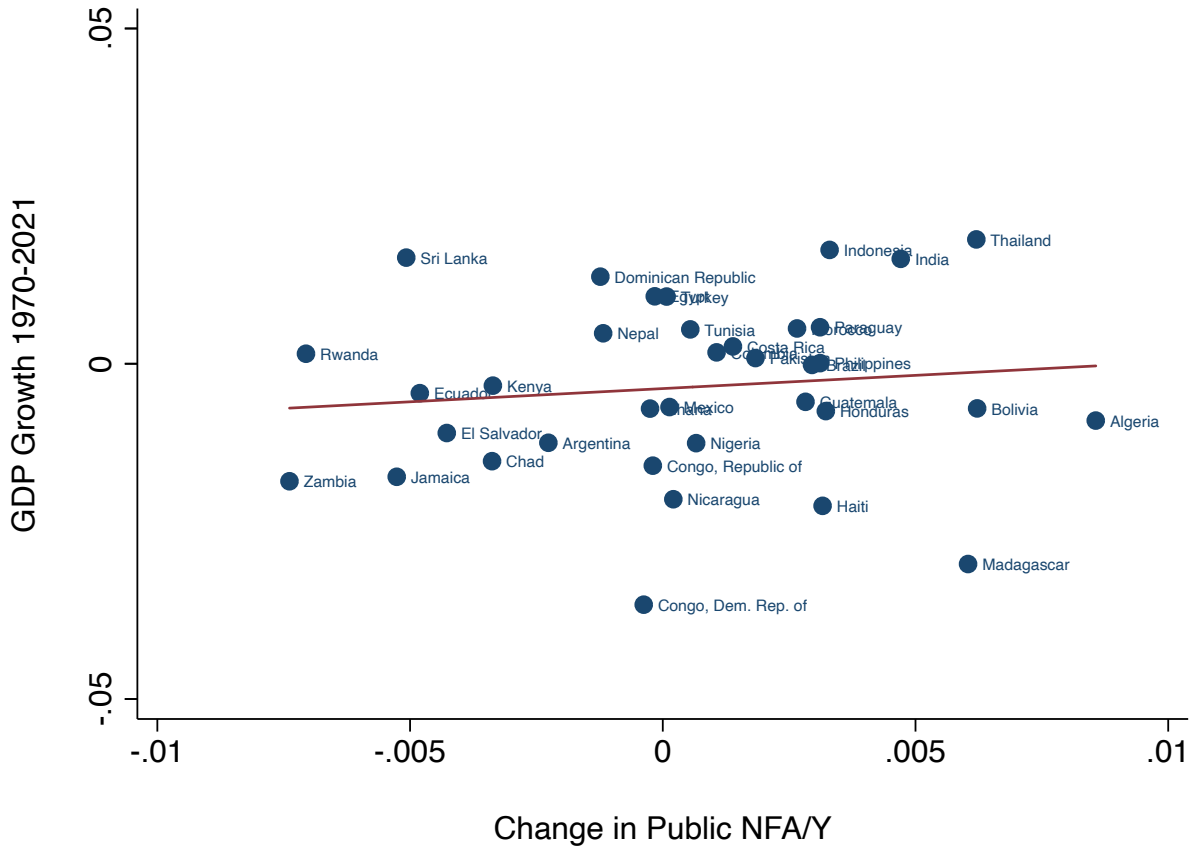


Figure 7: Public Flows 2004-2021

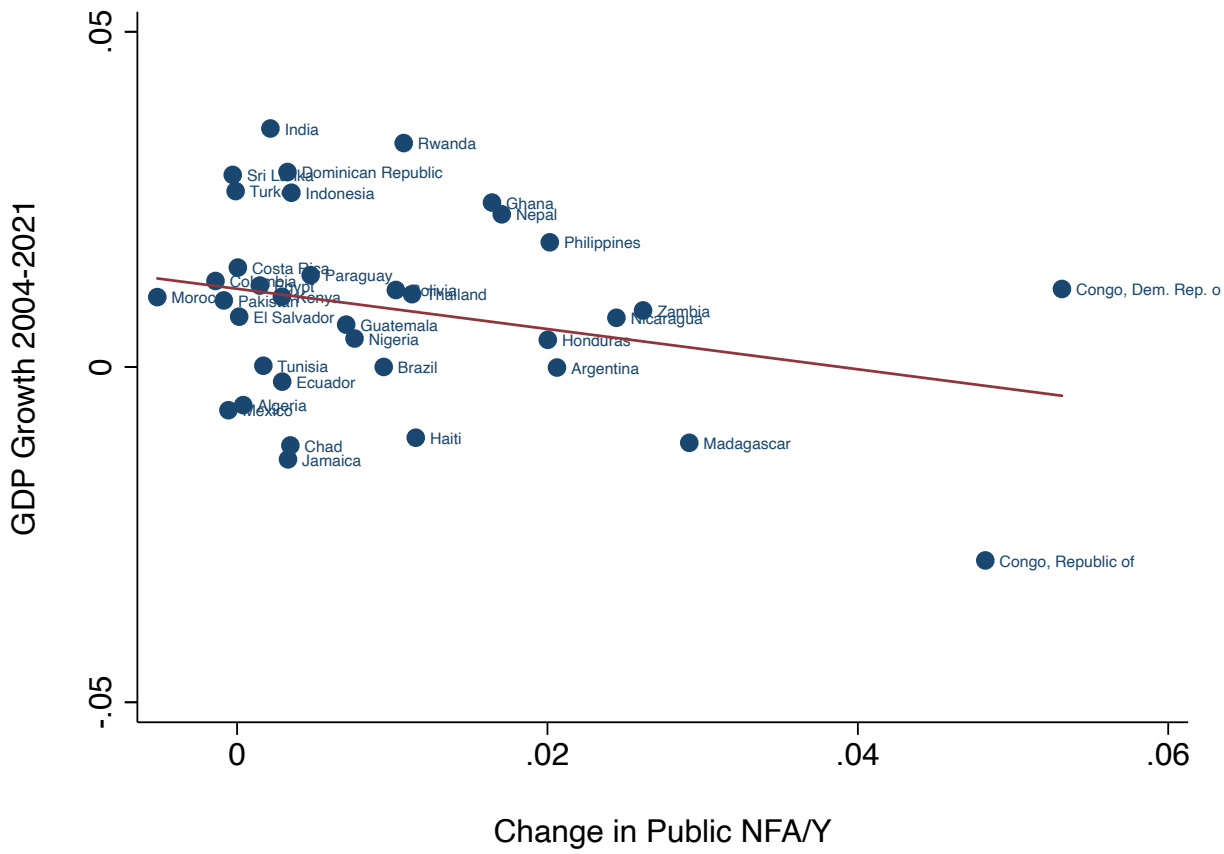


Figure 8: Public Flows: Early and Full Sample Period

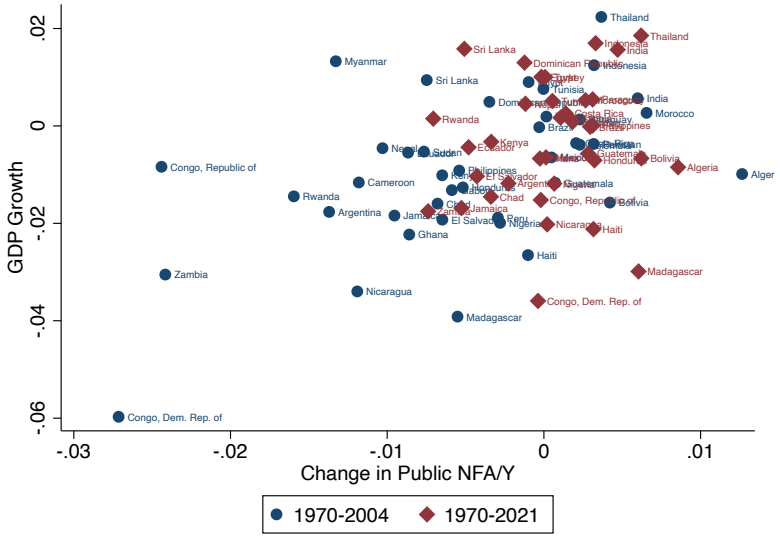
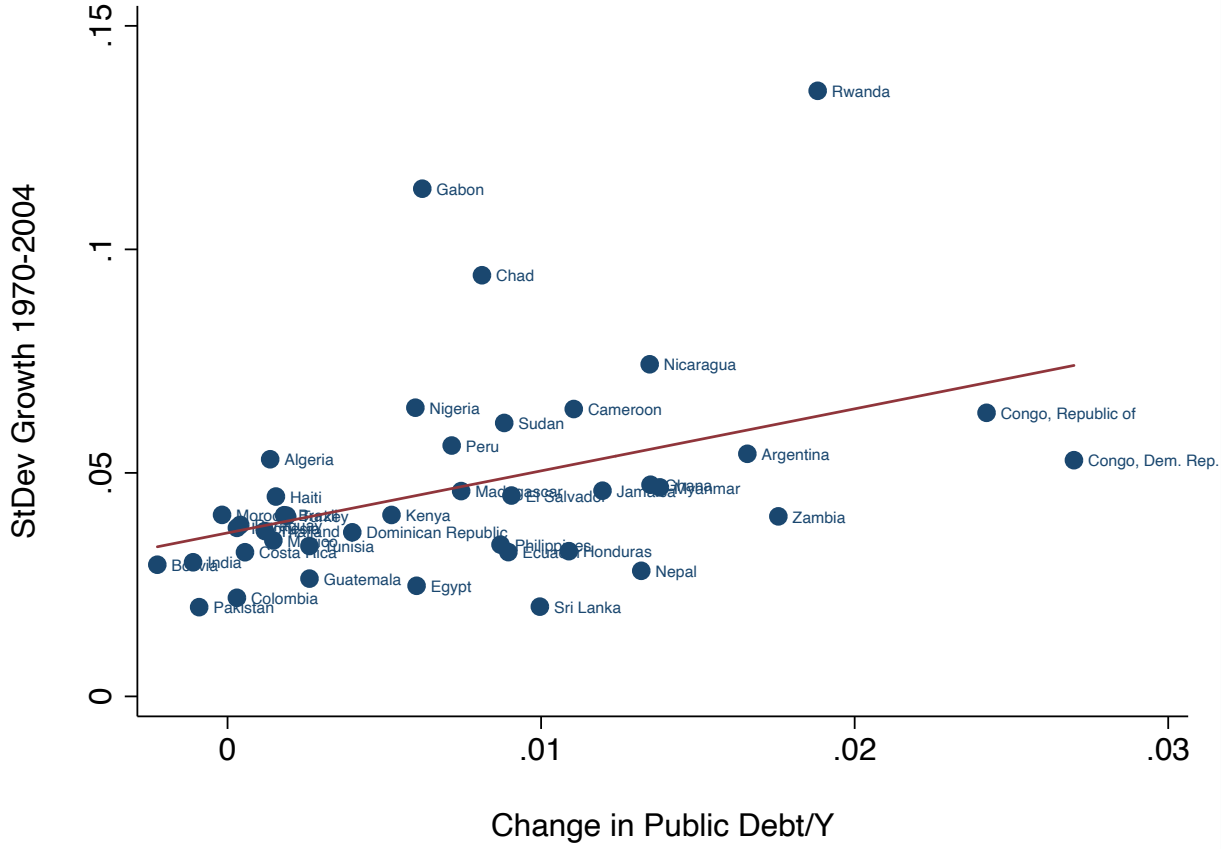


Figure 9: Volatility of Growth



Moreover, the latter pattern has seen the development of domestic debt markets, with increased foreign participation, that is not captured by the external debt measures obtained from the WDI.

The updated sample suggests the simple $B \uparrow \Longrightarrow K \downarrow$ mechanism that pops out so clearly in the benchmark sample needs some care. In particular, the level of external debt may not be a sufficient state variable for the risk of expropriation. For example, it may be the case that histories matter, in the sense that a low debt level due to a sequence of borrowing, default, and restructuring is not the same as low debt due to never having borrowed in the first place. For a recent model of such reputational dynamics, see Fourakis (2023).

2.4 Sovereign Debt as a Volatility Generator

If sovereign debt does not generate investment and growth, what about the ability of debt markets to smooth income fluctuations? To explore this, I compute the standard deviations of the annual growth in GDP, government expenditure, and private consumption over the 1970-2004 sample. I then correlate these measures of volatility to the change in external public debt over this period.

Figure 10: Volatility of Government Expenditure

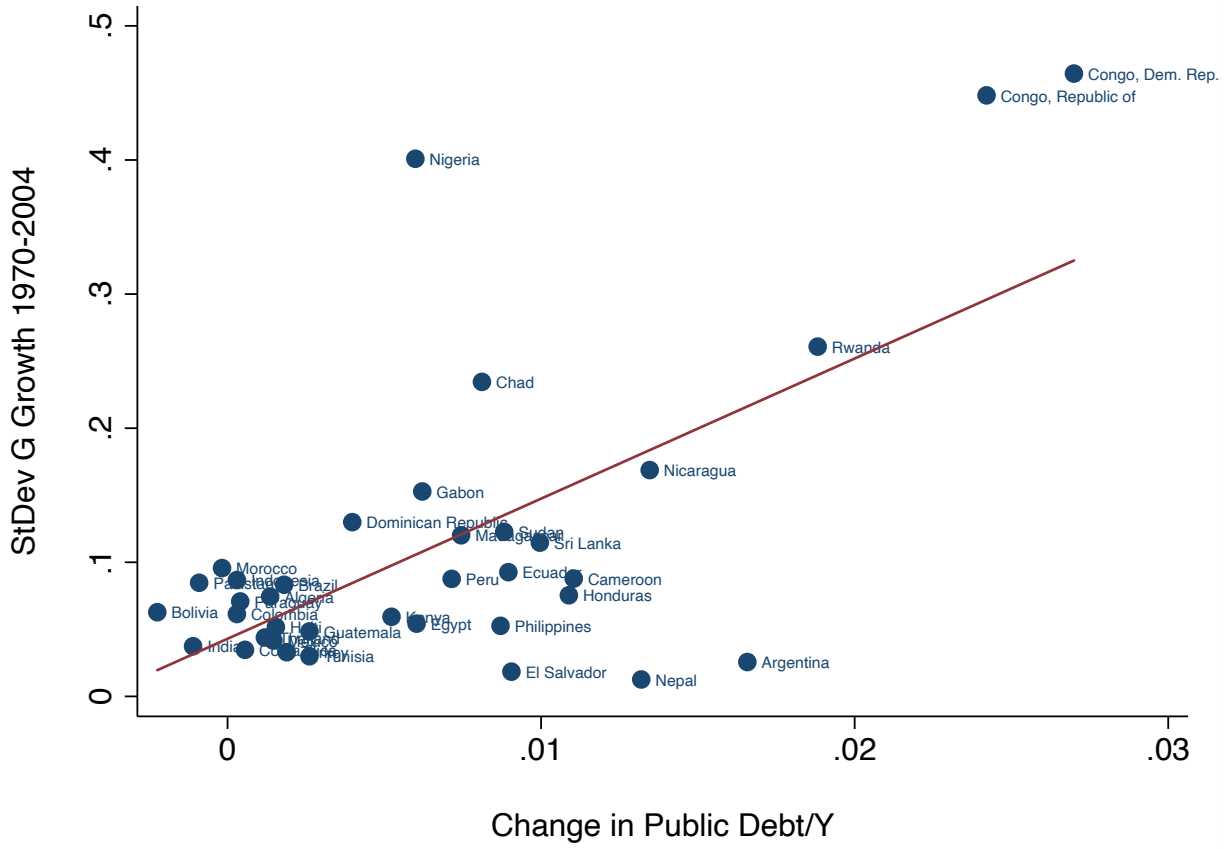


Figure 9, plots the standard deviation of annual growth in GDP per capita against the change in external debt as a ratio of GDP. The figure depicts a strong positive relationship between volatility and debt. Figure 10 plots volatility in government expenditure against the change in external debt, and we see an even stronger positive relationship. Figure 11 depicts the ratio of volatility in government expenditure over the standard deviation of income growth. We see that more borrowing is associated with an increase in government expenditure volatility above and beyond that of income volatility. Figure 12 depicts the relative volatility of consumption to income. The relationship is not nearly as strong as in the case of government consumption, but there is also no indication that debt is used to reduce the relative volatility of private consumption.

The data indicate that sovereign borrowing is associated with higher volatility of income and higher *relative* volatility of public and private consumption. This is unfortuante news for the hypothesis that sovereign debt markets help smooth expenditure relative to fluctuations in income. What about the case for reverse causation? That is, what if volatility drives borrowing? Say, a sequence of bad shocks, like natural disasters or wars, induce the government to borrow in order to smooth taxation. This is hard to rule out completely, but one argument against this is

Figure 11: Relative Volatility of Government Expenditure

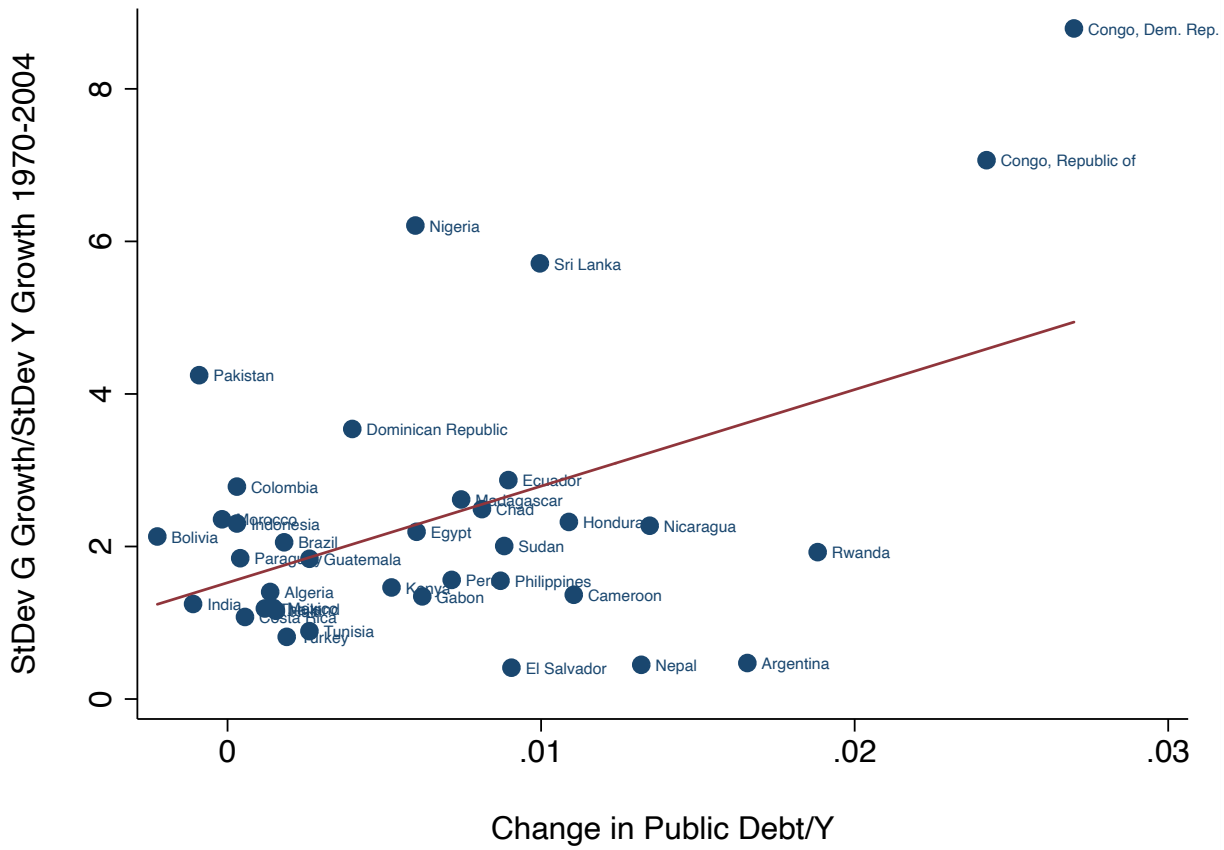
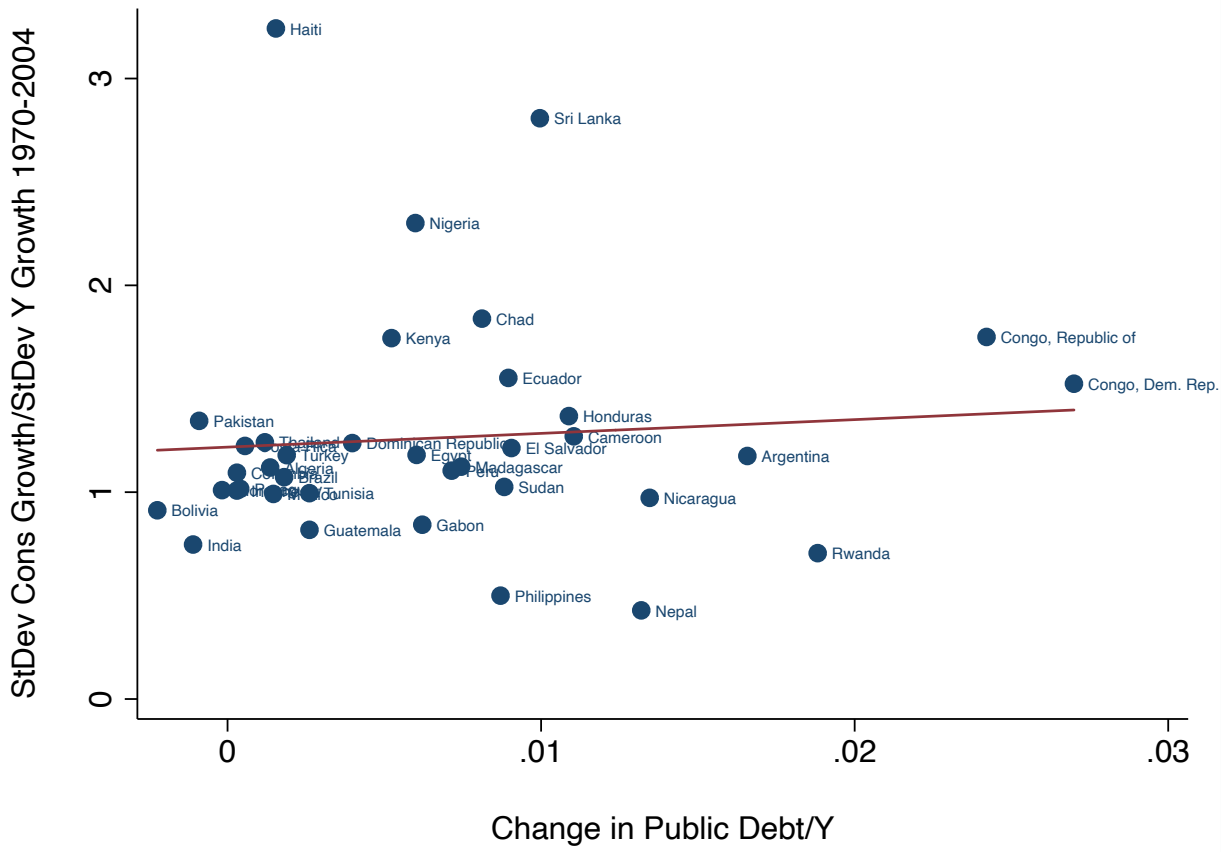


Figure 12: Relative Volatility of Private Consumption



the long time frame. At some point, the repeated arrival of large shocks should be seen as part of the underlying stochastic process rather than simply a bad sequence of draws from a relatively stable process. If the underlying process is volatile, theory predicts that governments should accumulate a buffer stock of saving (as in the canonical model of Aiyagari et al., 2002). To the extent that governments fail to do this, the resulting expenditure volatility becomes a choice or consequence of fiscal decisions, and not solely due to bad luck.

2.5 Taking Stock

Sovereign debt generates (or, at best, is associated with) slower growth and more volatility. This is the opposite of the neoclassical conventinal wisdom, but consistent with a model of debt overhang excerbated by political economy frictions. One potential response to the empirical patterns is to "double down" on the promise of the neoclassical paradigm. That is, correct inefficiencies in debt markets and provide debt/fiscal guidelines to governments in the hope of recovering the original promise of sovereign debt markets. An alternative is to view inefficiencies as a second best positive outcome. That is, poorly working debt markets help correct or constraint political economy frictions. In this view, the more limits on government borrowing the better, even if these limits are the result of correctable frictions in sovereign debt markets. This latter premise may be worth further inquiry, which I will undertake using a canonical sovereign debt model in the next section.

3 The Value/Costs of Sovereign Borrowing in Theory

3.1 A View from the Standard Quantitative Model

In this section, I will explore the value of sovereign debt markets in a standard quantitative sovereign debt model. Specifically, I build on the model of Chatterjee and Eyigungor (2012).[3] The main ingredients are an stochastic endowment, no investment, default that is costly but strategic, and an impatient decision maker relative to an international risk-free interest rate $R^\star$.

Before proceeding, it is important to discuss whether these ingredients are realistic and capture the first order forces in real life sovereign debt markets. The absence of investment is obviously unrealistic, but given the Allocation Puzzle and how debt crowds out investment discussed above, if anything this biases the results in favor of sovereign borrowing. The default costs play a crucial role in the model. It is hard to measure the counterfactual paths of output absent default, so it is hard to quantify these costs. Hébert and Schreger (2017) have a clever identification scheme

[3]The precise calibration and model is that of the "EG-LT" model presented in Aguiar, Amador, and Monteiro (2023).

Table 1: Predicted Moments

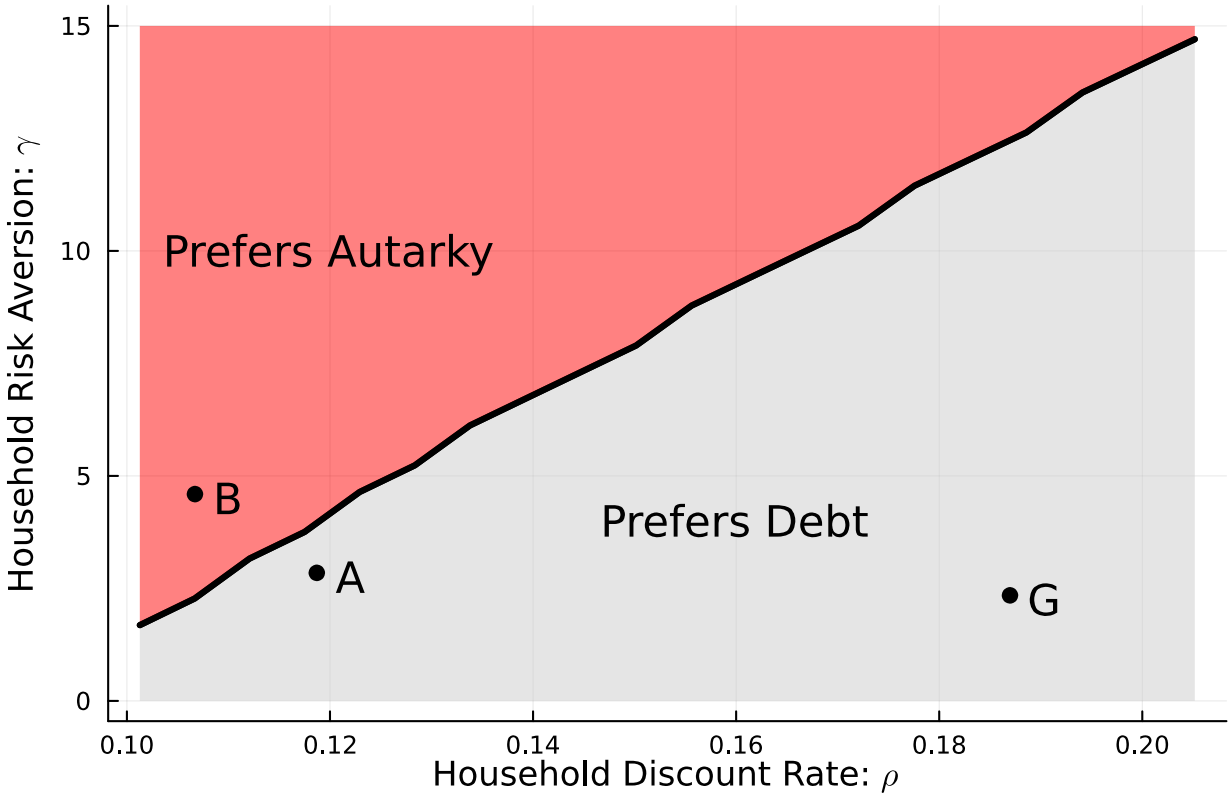
Outcome	Ergodic Mean
$\frac{B}{Y}$	17.5%
Default Frequency	7% per annum
Mean $r - r^\star$	8.4 %
StDev $r - r^\star$	4.6%
$\frac{\sigma(\ln c)}{\sigma(\ln y)}$	1.11
$\rho(TB/Y, Y)$	-0.66

using asset price behavior around court decisions in the case of NML Capital, Ltd. v. the Republic of Argentina. Farah-Yacoub et al. (2022) use synthetic controls to construct counterfactuals. Both papers suggest large deadweight costs of default, and Farah-Yacoub et al. (2022) argue these costs fall disproportionately on poorer households. The large costs turn the canonical question of why countries repay on its head. Now, the question becomes why countries borrow in the first place. The model answers this with impatience on the part of the governemnt, a proxy for the political economy distortions mentioned above. The assumption of strategic default is an open question, and I will turn below to an alternative model in which default is forced by a self-fulling run by creditors.

This combination generates the excess consumption volatility we see in the data. In particular, bond prices are procyclical due to persistent endowment shocks and, due to government impatience, the government avails itself of these better terms in booms. Thus, borrowing is procyclical, consistent with the data. Table 1 contains key moments from the ergodic distribution. The model's predictions are broadly in line with those observed in many emerging markets, and particularly extreme cases such as Argentina, which is the target of the calibration. For these reasons, the model is a plausible laboratory to do counterfactual analysis.

With the model in hand, I build on and extend Aguiar, Amador, and Fourakis (2020) and ask the following question: Do private agents prefer a world with no access to sovereign debt markets to an equilibrium in which the government is able to borrow and lend internationally. Specifically, we solve the model for a fixed parameterizaton of government preferences and compute the resulting equilibrium allocation of consumption expenditures starting from zero debt. We can then value this allocation under alternative preferences reflecting variation in the subjective rate of time preference and the coefficient of relative risk aversion. For each set of preferences, we compare the value under the equilibrium allocation with debt to that of financial autarky.

Figure 13: The Value of Sovereign Debt Markets



The two dimensions of preference heterogeneity are motivated by political economy considerations. The fact that private households may be more patient than incumbent politicians was discussed above and is a standard prediction of many models of political turnover. Disagreement on how to value risk is less obvious. One interpretation is that the political class does not bear the full downside risk of default. In particular, if some private agents are pushed close to subsistence, they may be relatively risk averse compared to the political incumbent. Another interpretation is that a political incumbent may borrow to increase the odds of re-election, trading off a risk of default with large social costs in order to increase the private gain of re-election. This force also makes the incumbent more willing to risk negative outcomes than the private agent.

Figure 13 contains the quantitative punchline. Along the horizontal axis are alternative values for the private agents' discount rate. Movements to the right imply more impatience. The vertical axis are potential values for the private agents' coefficient of relative risk aversion. Moving up the axis, private agents become more risk averse. The point G corresponds to the government's preferences that drive the borrowing and default decisions generating the equilibrium allocation. The world risk free interest rate is 4% in annual terms, while the government's discount rate is 19%. The government's coefficient of risk aversion is set at 2.

The solid diagonal line separates two regions of the parameter space. The northwest region contains those combinations of impatience and risk aversion for which the private agents prefer financial autarky, while the southeast region are those that prefer access to debt markets. Note that the more risk averse the private agent is, the more it dislikes access to debt markets. This reflects that the government uses debt markets to *increase* consumption volatility, both due to procyclical borrowing while in good credit standing and due to the lost output when in default.

Points A and B are useful examples of alternative preference parameterizations. At point A, the private agent's preferences are close enought to G that the agent prefers the government has access to debt markets. Point B, relative to A, has increased risk aversion and reduced discounting, to the point that B prefers financial autarky.

Note that for modest levels of risk aversion and discount rates normally used in closed economy macro (say, risk aversion of 2-5 and discount rates of 5-10%), the private agents would prefer autarky. Quantitatively, viewed through the lens of a standard model, it is not difficult to argue that access to debt markets on the part of an impatient sovereign is welfare reducing.

3.2 The Value of a Lender of Last Resort

The preceding analysis compared the extreme of permanent autarky against the equilibrium with access to debt. Within the confines of the calibrated model, a plausible case can be made for autarky. In this subsection, we explore whether improving the efficiency of debt markets is welfare enhancing. Specifically, we consider a model of self-fulfilling runs in the spirit of Cole and Kehoe (2000). We then ask whether having a lender of last resort improves the welfare of private agents for altenrative preference parameterizations.

The logic of self-fulfilling rollover crises builds on the canoncial bankrun logic. In particular, given enough maturing debt, a government can face two potential outcomes.[4] If lenders are willing to buy new bonds, the government can use the proceeds from the debt auction to pay off maturing bonds. This is the "good" equilibrium, and the one typically studied in the quantitative literature. The "bad" equilibrium arises if the crditors do not participate in the bond auction. In this case, the government cannot roll over its debt and is forced to default on maturing bonds. The default rationalizes the creditors' non-participation, generating the possibility of a self-fulfilling failed auction. This is a pure coordination failure that can occur without any change in fundamentals.

A lender of last resort (LoLR) can eliminate the bad equilibrium. By promising to buy bonds in the event of a failed auction, creditors understand that a run is not supportable in equilibrium. The

[4]There are other equilibrium outcomes beyond the two extremes considered here and in Cole and Kehoe (2000). See, for instance, Aguiar, Chatterjee, et al. (2022).

LoLR then never actually has to step in along the equilibrium path, as the implicit (and assumed credible) promise to intervene is sufficient to coordinate expectations on the good equililbrium.

The difficulty in practice for a LoLR is to distinguish self-fulfilling runs from fundamental defaults due to shocks to income that make the country fundamentally insolvent or unwilling to service the debt even at the good equilibrium prices. This may result in the LoLR "bailing out" a debtor in equilibrium that is not triggered by a self-fulfilling panic.

We abstract from this difficulty, and endow our model LoLR with full information, so it can make this distinction. The result is an equilibrium in which runs never occur, and the LoLR never needs to expend resources along the equilibrium path. This "stacks the deck" in favor of a LoLR.

We compute two versions of a short-term bond model, one with self-fulfilling runs and one wihtout.[5] I flag two extreme assumptions. The first is that debt has a maturity of one period, which is the shortest possible in the discrete time model. This maximizes the risk of a rollover crisis. The second is that the government's discount rate is relative extreme; specifically, the quarterly discount factor is set to 0.85, which is an annual discount rate of 65%. This extreme value is necessary in order for the government to borrow into a region for which a run is possible. If one believes self-fulfilling runs are a feature of real-world debt markets, some combination of lumpy repayment schedules and willingness to risk a run seem to be a reality, as well.

The predicted moments of the model with and without runs are reported in Table 2. A few things are worth noting. The model without a LoLR has lower average debt levels. This reflects that prices in the associated equilibrium incorporate the risk of a run, detering the accumulation of debt. Second, all the defaults in the rollover model are due to self-fulfilling panics. Nevertheless, the LoLR model has a fair number of defaults, as the government borrows more in this equilibrium and increases the risk of fundamental default. This has the semblance of moral hazard in the presence of insurance, but recall the LoLR never pays out in equilibrium. The presence of the LoLR results in an efficient allocation from the perspective of the government and its creditors. It is not a vehicle for bailouts along the equilibrium path.

Figure 14 is similar in construction to that of Figure 13. In particular, the equilibrium is computed for a fixed preference parameterization of the government, both with and without a LoLR. The two equilbria's allocations are then evaluated at different private agent preference parameterizations. The parameter space is divided into a region of relative patient and risk averse agents that would prefer a world *wihtout* a LoLR, and those in the southeast region that value the LoLR. Again, we see that for plausible levels of risk aversion and patience, the presence of a LoLR is welfare reducing.

The fact that private agents would prefer the world with higher rates of default and self-fulfilling runs may seem surprising. However, absent runs, the equilbrium is constrained efficient.

[5] See the short-term debt models in Aguiar, Amador, and Monteiro (2023) for details of the calibratoin.

Table 2: Moments of Short-Term Debt Model: With and Without LoLR

	Rollover Model	LoLR Model
$\frac{B}{Y}$	7%	16%
Default Frequency	1.9%	1.4% per annum
Mean $r - r^\star$	2.0 %	1.5%
StDev $r - r^\star$	1.2%	1.0%
$\frac{\sigma(\ln c)}{\sigma(\ln y)}$	1.07	1.20
$\rho(TB/Y, Y)$	-0.19	-0.16
Share Defaults from Runs	100%	0%

In particular, Aguiar and Amador (2019) show that the equilibrium solves a planning problem that maximizes the joint surplus of the government and the lender, subject to limited commitment and the restriction of asset markets to one-period bonds. The borrowing decisions of the government ensure the allocation is on the constrained Pareto frontier. However, this does not imply the allocation is efficient from the perspective of a private agent that has different views on discounting or risk aversion than the government. In fact, efficiency implies the allocation is fine tuned to the preferences of the government, maximizing the welfare consequences of any disgreement over discounting or risk aversion. On the other hand, the model with runs is far from efficient, constraining the government from achieving its desired allocation, which in turn mitigates the consequence of disagreements.

4 Summing Up: Practical Policy Implications

From the perspective of the data as well as simple models, it is hard to identify the value of sovereign debt markets to the borrowing countries. With modest disagreements about time discounting and risk-reward valuations, it is plausible that access to debt markets are welfare reducing for the private citizens. Even an intervention as seemingly beneficial and costless as a LoLR with perect information may not be welfare improving.

That said, it is not within the realm of a standard policy toolkit of a multi-national organization to prohibit all sovereign borrowing. Even the role of LoLR is difficult to assess, as the above analysis was from an ex ante perspective. From an ex post perspective, in the midst of a run, it is clearly beneficial to intervene. It is hard to see the commitment device that would prevent such ex post interventions that would be necessary to achieve the ex ante welfare gains. That

Figure 14: The Value of a LoLR

said, in practice the creation of a LoLR facility must balance the value of preventing runs against the possibility of moral hazards and wasteful bailouts. The analysis above suggests raising the threshold for interventions may be called for.

Moreover, the discussion was not designed to advocate for or against particular policy proposals. Rather, the analysis took extreme stances to most clearly elucidate the empirical and theoretical arguments about the costs and consequences of sovereign borrowing. This begs the question of implications for practical policy making. One answer to this question is that the arguments presented in this lecture are useful for the *context* in which policy analysis is undertaken. It should be essential that any cost-benefit calculus of a potential intervention include a discussion of whether the resulting equilibrium will be more aligned with the welfare of the citizens, or will any increase in efficiency result in taking the equilibrium further away from that desired by the private agents.

One useful analogy is to macro-prudential policy (MacroPru), which has gained in prominence since the Great Financial Crisis of 2008. The argument for MacroPru holds that private efficient borrowing is not efficient from a social or aggregate perspective. A policy response that makes debt markets less private efficiencly (say, from a tax on borrowing or debt limits) may be socially optimal. There is no comparable toolkit in the sovereing debt market, but the logic may still be relevant. Policies that improve the private efficiency of debt markets viewed from the perspective of the creditor and borrower (goverment), may not be efficient from a broader welfare perspective. The counterpart of MacrPru may then be to err on the side of under correction of certain sovereign debt market inefficiencies.

Another practical implication is in post default restructurings. Defaults are usually associated with a sharp disruption of economic activity, a pontentially drawn out restructuring process, and then re-entry to global debt markets. There are possible roles for multi-lateral institutions at each step. Clearly, ameliorating the initial disruption of economic activity is beneficial. The lesson from this lecture is that the final steps (re-entry and perhaps even restructuring) may be moved lower down the priority list, or, perhaps, off the priority list altogether.

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