REM WORKING PAPER SERIES

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REM Working Paper 0244-2022

September 2022

REM – Research in Economics and Mathematics
Rua Miguel Lúpi 20,
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ISSN 2184-108X

REM – Research in Economics and Mathematics

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Economic Growth after Debt Surges*

João Tovar Jalles+ **Paulo Medas**#

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Abstract

Debt levels, both private and public, were already at record highs before the Covid-19 pandemic, and surged further in 2020. The high indebteness raises concerns whether it will undermine future growth prospects. This paper contributes to the ongoing debate by examining what happens to economic growth after debt surges. We apply a local projection method to a new dataset of debt surges in 190 countries between 1970 and 2020. How results show that the relationship between debt surges and economic growth are complex. Debt surges tend to be followed by weaker economic growth and persistently lower output. However, this negative relationship does not always hold. Surges in public debt tend to have the most negative impact on future growth prospects. This is particularly the case if the economy is already operating with a large positive output gap. Debt surges also tend to be followed by weaker economic growth if the initial debt levels are high, especially for private debt surges. Our results also show how debt surges impact future growth. Public debt surges are associated with especially weaker private and public investment, although both private and public consumption are also negatively affected. Surges in corporate debt are followed by lower private and public investment.

JEL Classification Numbers: C33, H63, E20, F44

Keywords: [Type Here] Public debt; private debt; economic growth; potential GDP; investment; panel data; local projection; nonlinearities

* This work was supported by the FCT (Fundação para a Ciência e a Tecnologia) [grant number UIDB/05069/2020]. The opinions expressed herein are those of the authors and do not necessarily reflect those of the authors' employers. Any remaining errors are the authors' sole responsibility. An IMF WP version is also available here: https://www.imf.org/en/Publications/WP/Issues/2022/07/29/Economic-Growth-After-Debt-Surges-521357

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1. Introduction

Debt levels, both private and public, were already at record highs before the Covid-19 pandemic and surged further in 2020. According to IMF (2021) global public debt is projected to have risen by about 19 percentage points of GDP in 2020 among advanced economies. The increase reflects both the rise in deficits due to the automatic stabilizers as economic growth collapsed and the discretionary policy measures undertaken by governments to respond to the health crisis. Corporate debt has also risen significantly, partly thanks to governments support, as corporates tried to manage the large economic shock and lockdowns.

The large increase in debt raises the question of its impact in the economy and medium-term growth prospects. The additional debt helped fund policy actions that may reduce the negative effects of the crisis, including on potential growth, and allow for a faster economic recovery. In addition, the case for increasing debt to promote economic growth is greater now given low interest rates (Blanchard, 2019, and Furman and Summers 2020). However, given the already high pre-pandemic debt levels, the additional debt surge may have adverse effects on economic activity over the next years. This could be because the large debt levels lead to fiscal, debt, or financial crises and eventually take a toll on growth (Medas et al. 2018, Asonuma et al. 2019, Kose et al. 2021). Even if governments and private sector avoid bankruptcies, the effects of a private and public debt overhang could undermine economic prospects.

This paper contributes to the ongoing debate and existing empirical literature by examining what happens to economic growth prospects after debt surges. We study how real and potential economic growth tends to perform following a surge in different types of debt by applying a local projection method to a new dataset of debt surges in advanced and developing economies spanning between 1970 and 2019 for a sample of 190 countries. Our analysis shows that surges in total (public plus private) debt are usually followed by lower output over the medium term. However, the negative relationship does not always hold. The effect depends on different factors and type of debt surge. In particular, economic performance tends to be particularly worse over the medium term following a surge in public debt, less so for surges in private (household or nonfinancial corporates). Debt surges are never associated with an increase in potential output and may even decrease it. We also examine if the current interest rates have an impact. In the short-term we find that the impact of debt surges does not vary with the cost of borrowing. However, GDP may be persistently lower following a debt surge when contemporaneous interest rates are low contrary to what would have been expected.

Another contribution of the paper it to explore how the different types of debt surges have different impact on future growth depending on the initial level of total debt and the state of the economy (output gap). The argument is that the total level of leverage of the economy matters to assess whether further accumulation of debt may be excessive and have a negative impact on growth (Lim, 2019). At low levels of debt, the benefits from rising debt may be higher—for example, finance productive investment and help manage economic cycles—while at high debt levels, further increases in debt may have more negative effects. For example, if the economy is already highly leveraged, increasing debt may raise concerns from external creditors or push domestic borrowing costs higher discouraging some productive investments. We find that in economies with initial higher leverage levels, debt surges are followed by worse growth

outcomes. If leverage is low, debt surges may be associated with higher output in the years ahead. The effects of private debt surges, in particular, seem to depend on the initial levels of leverage. Our findings also suggest that the initial economic conditions matter, but again growth prospects depend on the type of debt surge.

Third, we investigate possible channels of transmission between debt surges and economic activity by studying the behavior of the different components of aggregate demand. Public debt surges are associated with the worse impact on the different components. Private and public investment are particularly weaker—public investment is 15 percent lower than in the baseline (no debt surge)—although both private and public consumption are also negatively affected. Surges in corporate debt are followed by lower private and public investment. One possibility is that governments cut public investment to create fiscal space to help firms. Household debt surges tends to have less impact on economic activity in general. However, the results vary significantly depending on the initial debt levels.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 presents the data and some stylized facts and outlines the empirical methodology. The following section discusses the empirical results, including a battery of sensitivity and robustness checks. The last section concludes.

2. Literature Review

Governments use fiscal policy to promote strong and sustainable growth and reduce poverty and economic and social inequalities. Since Keynes (1936) seminal work, there is a broad consensus that fiscal stimulus should be used to fight recessions. The case is even stronger when faced with a health and economic crisis as the Covid-19 pandemic. At the same time, the unprecedent rise in both public and private debt during the pandemic raises concerns that it may undermine future economic growth. While earlier literature had a benign view of debt, seen to be contributing positively to growth (Modigliani, 1961; Solberg 1988), later research raised concerns with debt overhangs.[1] These were heightened by the debt crises of developing countries in the 1980s-90s (Moreno-Badia et al. 2020).

The literature on debt overhang has received a renewed impulse after the global financial crisis (IMF 2016). For example, Reinhart and Rogoff (2010) and Baum, Checherita-Westphal, and Rother (2013) presented evidence that above some levels, debt is associated with lower economic growth. Kumar and Woo (2010) find an inverse relationship between initial debt and subsequent growth. At the same time, while the evidence for a negative correlation between public debt and economic growth appears to be robust, the literature is still debating on whether high debt causes low economic growth (Panizza and Presbitero 2013) and the channels. For example, Lof and Malinen (2014) found no evidence for a robust effect of public debt on growth

[1] Krugman (1988) defines a debt overhang situation as one in which the expected repayment on foreign debt falls short of the contractual value of debt. Borensztein (1990) raises the concern of the effect due to debt overhang of past accumulated foreign debts on investment. Schclarek (2004) found that for developing countries there was always a negative and significant relation between debt and growth. For advanced countries, he did not find any robust evidence.

even for higher debt levels using a panel VAR analysis. While Pattillo et al. (2011) argue that the majority of the effect of public debt on output growth occurs via TFP rather than capital accumulation. Relatedly, Afonso and Jalles (2016) find a negative effect of government size on output.

While the literature usually studies the (long-term) impact of high debt, our analysis will focus mainly on the impact of a surge in debt. Our analysis is closer to Gomez-Puig and Sosvilla-Rivero (2015) that argue for a "diabolic" loop between high debt and low economic growth and find evidence for a causal relationship between changes in public debt and economic growth for European countries in recent years. We also investigate if the impact of debt depends on the initial level of debt.

Given the context of both private and public debt being at record levels, we take a broader perspective when studying the impact of debt surges on growth. We compare what happens to growth dynamics when different types of debt surge (household, nonfinancial corporate, public) and how it depends on the total size of debt in the economy. The literature on how the different levels of debt matter and possible interaction among them is limited.[2] However, in theory, the effects of rising debt should also depend on the total amount of leverage of the economy. For example, Bornhorst and Ruiz Arranz (2013) find evidence for the Eurozone that high private sector debt, paired with high public debt, hampers growth. The argument is that the simultaneous deleveraging of the private and public sectors can weigh on growth. In particular, economy-wide, self-enforcing negative feedback loops between highly-indebted private sectors, a weak financial sector, and a sovereign under stress constrain demand and credit conditions. Lim (2019) also finds that, for an unbalanced panel of up to 41 advanced and emerging economies, increases in the share of total debt to GDP leads to a contraction in the GDP growth rate.[3,4]

[2] In general, the impact of high household and corporate debt has been studied separately. For example, Mian and Sufi (2014) did an extensive analysis of contribution of household debt to recessions, while Jordà et al. (2020) looks at the effects of corporate overhang on economic growth.

[3] Lim (2019) uses quarterly data and focuses mainly on the very short term dynamics, while we use yearly data that allows to include larger number of countries and abstract from high frequency volatility (noise) in the data.

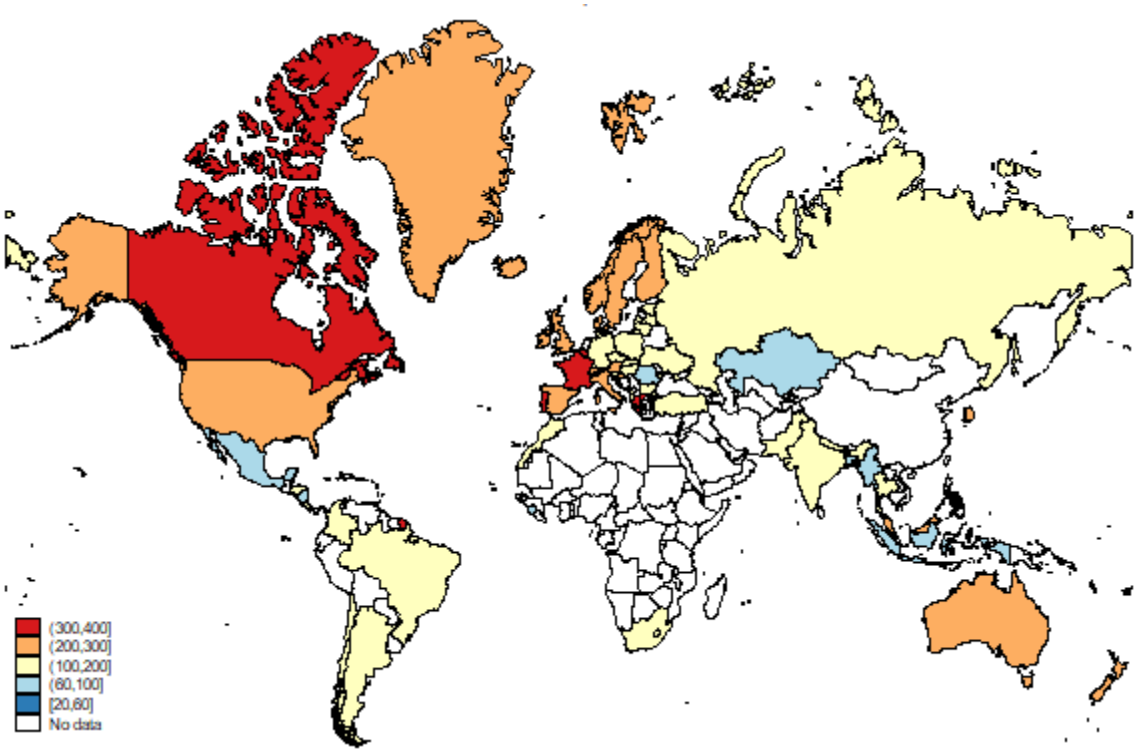
[4] Another example of the link between private sector distress and governments is Bernardini and Forni (2020). When looking at a sample of recession episodes, they find that those preceded by larger buildups in private debt tend to be followed by larger accumulations of public debt. Similarly, to recessions preceded by a rapid run-up in public debt, these ex-post public debt buildups are associated with a more muted growth in government expenditures and a sharper rise in fiscal stress.

3. Data Issues and Methodology

3.1 Data

Our analysis builds on several measures of private and public debt. We focus on three categories, namely: household debt (loans and debt securities), nonfinancial corporate debt (loans and debt securities), and public debt (all expressed in percent of GDP). For public debt, we use general government definition (central and subnational levels) if available or central government debt otherwise. We also focus on loans and debt securities, which usually represent the vast majority of liabilities and are the data is available for a large set of countries. Our main source of data comes from IMF´s Global Debt Database (Mbaye and others, 2018) which covers an unbalanced panel of 190 advanced economies, emerging market economies and low-income countries, dating back to 1950. The database comprises total gross debt of the public and private nonfinancial sector. Figure 1 shows a world map of total debt in percent of GDP in the latest available year of the database. Other fiscal and macroeconomic variables are retrieved from the IMF´s World Economic Outlook (WEO) Database.

Figure 1: Total Debt Across the World, 2020 (% GDP)



Source: IMF FAD Global Debt Database

Given the difficulty in estimating potential economic growth across a large set of countries, the analysis will be based on two different estimates. We use data estimated by IMF's desk economists, which is more limited in number of countries, and also build an alternative measure

to maximize the total number of observations available. Despite substantial progress in the estimation methodologies to calculate potential output, there is no widely accepted approach in the profession. Researchers typically adopt two alternative methods to estimate potential GDP (Borio, 2013): (i) univariate statistical approaches, which usually consist of filtering out the trend component from the cyclical one; and (ii) structural approaches, which derive the estimates directly from the theoretical structure of a model. While aware of their limitations and shortcomings[5], we apply the recent filter proposed by Hamilton (2018) which tries to address some of the criticism surrounding the use of the Hodrick-Prescott (HP, 1981) filter (such as the identification of spurious cycles, inter alia) in the context of a large heterogeneous sample (see Harvey and Jaeger, 1993; Cogley and Nason, 1995). Hamilton's (2018) approach to extract the cyclical and trend component of a generic variable x_t (denoted ${x^c}_t$ and ${x^\tau}_t$, respectively), consists of estimating the following regression:

$$x_{t+h} = \gamma_0 + \sum_{j=0}^{k} \gamma_j + x_{t-j} + u_{t+h} \quad (1)$$

where ${x^\tau}_t + {x^c}_t$. The non-stationary part of the regression provides the cyclical component:

$$x_t^c = \widehat{u_t} \quad (2)$$

while the trend is given by

$$x_t^\tau = \widehat{\gamma_0} + \sum_{j=0}^{k} \widehat{\gamma_j} + x_{t-h-j} \quad (3)$$

Hamilton (2018) suggests that h and k should be chosen such that the residuals from equation (1) are stationary and points out that, for a broad array of processes, the fourth differences of a series are indeed stationary. We choose h = 2 and k = 3, which is line with the dynamics seen in real GDP.

Debt surges: definition and descriptive statistics

Debt surges are defined as taking the value 1 in a given year if the corresponding change between two consecutive years is larger than the country´s average change plus one standard deviation of the annual change and the change is at least 1 percent of GDP; otherwise, it takes the value zero. This should allow to identify country-specific debt surges. Note that for different surges a different underlying debt stock variable in percent of GDP is used (HH, NFC, GOV). Other, but similar, criteria to identify debt surges have been used in the previous literature (Abbas and others, 2011; Weber, 2012; Jaramillo and others, 2016, 2017).[6]

[5] Statistical methods suffer from the end-point problem, that is, they are sensitive to the addition of new data and to real-time data revisions. Structural models, on the other hand, may be difficult to implement consistently in cross-sectional environments and rely on the imposition of pre-determined assumptions.

[6] These authors used ad-hoc criteria to identify years where debt increased by more than 1 percent of GDP and then looked at the multi-year trend in the debt increase. If the overall change in debt over consecutive years was equal to or beyond 10 percent of GDP, they defined it as a debt surge episode. The focus was only on government debt.

The sample contains a large number of both private and government debt surges. In the period 1970-2020 there were more than 200 household and corporate debt surges (Table 1). The median size of corporate debt surges is close to 7.5 percent of GDP, almost double the one observed for households' debt. The number and median size of surges in public debt are significantly larger. The median public surge amounts to 12.4 percent. There are also a number of debt surges that overlap.

Table 1. Debt Surges by income groups (1970-2020)

	AEs	EMEs	LICs	Total
Number of surges				
HH	122	65	15	202
NFC	124	73	22	219
GOV	142	284	183	609
Size (median)				
HH	4.8	2.8	3.1	4.1
NFC	9.0	5.7	2.9	7.5
GOV	8.6	12.3	16.4	12.4

Note: Consider overlapping surges if they happen in the same year or neighboring years. HH = households; NFC = non-financial corporates, GOV = public debt (general government when available; otherwise, central government).

The size of debt surges varies significantly across income groups (Table 1 and Figure 2). Advanced economies have the largest private debt surges for both households and corporates. While corporate debt surges tend to be lower among LICs. On the other hand, surges in public debt are especially large among LICs (debt can rise by more than 20 percentage points) and tend to be considerably larger than surges in private debt. Among advanced economies, surges in public debt tend to be smaller.

3.2 Methodology

In order to assess the dynamic response of real and potential GDP to debt surge episodes, we follow the local projection method proposed by Jordà (2005) to estimate impulse-response functions (IRFs). This approach was advocated by Auerbach and Gorodnichenko (2013) and Romer and Romer (2017) as a flexible alternative to vector autoregression (autoregressive distributed lag) specifications since it does not impose dynamic restrictions.[7] It is also better suited to estimating nonlinearities in the dynamic response—such as, in our case, interactions between debt surge episodes and the degree of initial indebtedness.

The baseline specification takes the following form:

$$y_{t+k,i} - y_{t-1,i} = \alpha_i + \beta_k DS_{i,t} + \theta X_{i,t} + \varepsilon_{i,t} \qquad (4)$$

[7] This method has been used to study the dynamic impact of macroeconomic shocks such as financial crises (Romer and Romer, 2017) or fiscal shocks (Jordà and Taylor, 2016).

in which y is the dependent variable of interest; β_k denotes the (cumulative) response of the variable of interest in each k year after the debt surge episode; α_i are country fixed effects, included to take account of differences in countries' average level of economic activity; $DS_{i,t}$ denotes the debt surge shock. The focus is on the first year of a given episode to improve the identification and minimize reverse causality problems (for a similar approach, see Ball and others, 2013).8 $X_{i,t}$ is a set of control variables including two lags of the debt surge shock and two lags of the dependent variable.

Equation (4) is estimated using Ordinary Least Squares (OLS). IRFs are then obtained by plotting the estimated β_k for k= 0,1,..,5 with 90 (68) percent confidence bands computed using the standard deviations associated with the estimated coefficients β_k—based on robust standard errors clustered at the country level.9 According to Sims and Zha (1999) "the conventional pointwise bands common in the literature should be supplemented with measures of shape uncertainty". Hence, for characterizing likelihood shape, bands that correspond to 68 percent posterior probability, or one standard deviation shock, provide a more precise estimate of the true coverage probability.10

To explore the role of prevailing fiscal and macroeconomic conditions for the effect of debt surges on economic activity, the dynamic response is now allowed to vary with the initial level of debt level and whether the economy is facing a recession or large output gap (proxy for macroeconomic conditions), as follows:

$$y_{i,t+k} - y_{i,t-1} = \alpha_i + \beta_k^L F(z_{i,t}) DS_{i,t} + \beta_k^H (1 - F(z_{i,t})) DS_{i,t} + \theta X_{i,t} + \varepsilon_{i,t} \quad (5)$$

with

$$F(z_{it}) = \frac{\exp(-\gamma z_{it})}{1+\exp(-\gamma z_{it})}, \quad \gamma > 0$$

in which z_{it} is an indicator of initial economic or fiscal conditions (either real GDP growth or total debt in percent of GDP) normalized to have zero mean and unit variance. The weights assigned to each regime vary between 0 and 1 according to the weighting function $F(.)$, so that $F(z_{it})$ can be interpreted as the probability of being in a given fiscal space state (high vs. low). The coefficients β_L^k and β_H^k capture the macroeconomic impact of debt surge shocks at each horizon k in cases of low fiscal space or high indebtedness ($F(z_{it}) \approx 1$ when z goes to minus infinity) and high fiscal space or low indebtedness ($1 - F(z_{it}) \approx 1$ when z goes to plus infinity), respectively.

As discussed in Auerbach and Gorodnichenko (2012, 2013), the local projection approach to estimating non-linear effects is equivalent to the smooth transition autoregressive (STAR) model developed by Granger and Teräsvirta (1993). Here, δ = 1 is used to assess the role of the initial

[8] All debt surge shocks featured in our analysis are country-wide shocks.
[9] Another advantage of the local projection method compared to vector autoregression (autoregressive distributed lag) specifications is that the computation of confidence bands does not require Monte Carlo simulations or asymptotic approximations. One limitation, however, is that confidence bands at longer horizons tend to be wider than those estimated in vector autoregression specifications.
[10] Other papers that have employed one standard deviation bands include Giordano et al. (2007), Romer and Romer (2010), and Bachmann and Sims (2012).

fiscal conditions.11 Using such a STAR function in the context of fiscal policy is not new. Auerbach and Gorodnichenko (2012, 2013) and Abiad and others (2016) employed a similar approach but they looked at the nature of the prevailing fiscal stance by using shocks defined in terms of government consumption forecast errors. The advantage of this approach is twofold. First, compared with a model in which each dependent variable would be interacted with a measure of the fiscal conditions, it permits a direct test of whether the effect of the debt surge shock varies across different regimes. Second, compared with estimating structural vector autoregressions for each regime, it allows the effect of debt surge shocks to change smoothly between degrees of indebtedness by considering a continuum of states to compute the impulse response functions, thus making the response more stable and precise.

4. Results

4.1 Baseline (unconditional)

Results, from estimating equation (4) for real GDP growth or potential GDP growth, suggest debt surges are followed by periods of lower real growth. After a total debt surge[12], real GDP growth tends to be persistently lower (Figure 3a), with GDP on average 2 percent of GDP lower after 5 years (relative to the case of no debt surge). The results also show that increases in debt are not related to increases in potential GDP, on the contrary potential GDP also tends to be lower by about 1.5 percent. This suggests that higher debt may not have been used to fund productive capital, a frequent argument for why more borrowing can be desirable. The results are similar if we analyzing the largest debt surges (Figure 3b).[13]

The results vary when looking at different types of debt surges separately (Figure 4). After a household debt surge, real GDP growth does not seem to be initially affected, although it tends to be somewhat lower in the medium term, but the effect is not statistically robust with the 90 percent confidence interval. The evidence is similar for nonfinancial corporate debt with only weak evidence that GDP is lower over time. However, the results show that surges in public debt are followed by lower real GDP growth. Real GDP tends to be lower by 3-4 percent following a spike in public debt after in the medium term. The results are broadly similar in relation to potential GDP. The negative relationship between public debt and potential growth—potential output is lower by 1.5 percent after 5 years—is stronger compared to the case for private debt. The results for private debt surges are surrounded with a higher degree of uncertainty, with some evidence that potential GDP may be lower after a debt surge. Using the alternative Hamilton-based potential GDP estimates yields broadly similar IRFs, with the evidence somewhat stronger that potential GDP tends to be lower after debt surges.[14]

The results are influenced by the experience of the 2008-09 global financial crisis (GFC). If we exclude the post-2008 period from the analysis, the main thrust of the results remain; but the impact is smaller and appears to be less persistent. However, including the GFC seems

[11] The results do not qualitatively change for different values of $\delta > 0$.
[12] Total debt is the sum of household, nonfinancial corporate and government debt. Surges are constructed the same way as for individual categories.
[13] We define large surges increases larger than the mean plus 2 standard deviations and imposing a minimum size of at least 1.5 percentage points of GDP.
[14] Results are available from the authors upon request. Note that this is not combined with WEO output gap estimates for consistency purposes.

important as it can provide valuable information to understand episodes of large debt surge, as during the pandemic, starting from relatively high debt levels.

We also analyze whether the results differ by income group.[15] In general, the results are similar, but there are a few differences. First, a somewhat surprising result, debt surges are associated with worse growth outcomes in advanced economies (Figure 5). This is particularly the case for real GDP dynamics following government debt surges. It is relatively larger in the case of advanced economies, where output tends to be 4 percent lower. In developing economies not only is the magnitude of the effect on real GDP smaller, but is also less persistent. One possible explanation for this difference is if government debt surges in advanced economies are more associated with counter-cyclical fiscal responses. That is, negative shocks hurt growth, which has large and persistent effects on future growth (scarring effects) that are not related to debt surges. However, if the fiscal response in advanced economies is larger (which tends to be) it should prevent or limit scarring effects and as such we should observe less persistent effects in advanced economies, which is the opposite of our results—suggesting debt surges have a negative impact (we discuss further below). Second, surges in household debt seem to be followed by worse GDP outcomes over the medium term in developing economies, while for corporate debt it is the opposite result—tend to be linked to worse growth outcomes in advanced economies.

4.2 Robustness and Sensitivity

To assess the robustness of the effects of debt surges on economic activity, it is also important to control for previous trends in dynamics of real GDP. The baseline specification attempts to do this by controlling for up to two lags in the dependent variable.[16] To further mitigate this concern, we re-estimate equation (4) by including country-specific time trends as additional control variables. Results remain overall qualitatively unchanged (Figure A1).

The previous analysis considers the impact of debt surges one at a time, raising potential concerns about omitted variables—surges could happen across segments at the same time. We re-estimate our main regression equation (4) by including debt surges in all segments simultaneously, that is household, non-financial corporate and central government.[17] Figure A2 shows the effects on real GDP growth and potential GDP growth. The results are in line with those presented earlier.

A possible concern regarding the analysis is that the debt surges are influenced by expectations of future economic and fiscal developments. For example, governments that expect growth to be low in the next year, may decide to expand the fiscal and borrow more today to try stabilizing the economy or to invest and raise potential growth. Controlling for expectations of current and future real GDP growth and the budget balance-to-GDP ratio (to address potential reverse

[15] Results for emerging markets and low-income countries separately are displayed in Figure [5b]. The results are similar, although there is somewhat stronger evidence that economic growth is lower in low income countries that emerging markets in the outer years.
[16] Similar results are obtained when using alternative lag parametrizations. Results for zero, one and three lags (not shown) confirm that previous findings are not sensitive to the choice of the number of lags.
[17] The vector $X_{i,t}$ in equation (4) was augmented to include up to two lags of all debt surge shocks.

causality)—retrieved from the WEO from the October vintage, 1-year ahead—the basic thrust of the previous results remains (Figure A3).

Finally, to mitigate cross-sectional dependency concerns, we re-estimated equation (1) with a Driscoll-Kraay (1998) robust standard errors. This non-parametric technique assumes the error structure to be heteroskedastic, autocorrelated up to some lag and possibly correlated between the groups. Results displayed in Figure A4 are qualitatively similar suggesting cross-sectional dependence is not a major issue in our setting.

Other additional sensitivity exercises—available upon request—included: i) the exclusion of the post-Global Financial Crisis period; ii) controlling for Sovereign Rating Agencies scores[18]; iii) only consider central government debt surges associated with Rating Agencies downgrades; iv) the exclusion of currency devaluation years (based on negative changes in the real effective exchange rate from the IMF WEO). Obtained IRFs kept the main thrust of baseline findings.

4.3 Conditional on initial economic conditions

We now explore if the impact of debt surges on future economic growth depends on initial conditions. In particular, we examine if debt surges have a different impact if they happen at the time the economy is operating with a large output gap (above potential) or low (negative) output gap.[19] One hypothesis is that if the debt surged is associated with efforts to contain the size of a recession it could minimize scarring in the economy and promote stronger growth. We use equation (5) to estimate the results conditional on the initial level of the output gap. In particular, we compare the results of unconditional (baseline) analysis versus cases when the initial output gap is low ("recessions") or large ("expansions").

The results vary significantly whether the debt surge is associated with private or public debt (Figure 6). Household debt surges when the economy is facing a recession tend to have similar behavior as the unconditional case. In cases where the economy has been expanding, household debt surges may lead to further rise in the output gap initially, but the effects tends to disappear over time. For private firms, the results are also similar to the unconditional case over time, although a debt surge may initially contribute to accelerate economic growth for economies with already positive output gap—but the effect reverses over time.

The evidence shows that public debt surges appear to have initially different effects depending on initial level of output gap. If the initial output gap is small (recession), economic growth following a debt surge tends to be higher than compared with a debt surge in the unconditional case, but growth is not different from case without a debt surge. These results suggest that when government debt surges are associated with counter-cyclical fiscal responses, future economic growth will be higher (fiscal policy prevents economic scarring). If the initial output

[18] This exercise was based on credit ratings´ data availability and includes information from the three main rating agencies, Standard & Poors (S&P), Moody´s and Fitch Ratings on December 31st. Similarly to Afonso et al. (2011), we group ratings in 21 categories by putting together the few observations below C, which are given the value one, while AAA observations receive the value 21. The final score is a simple average of the scores given by each of the rating agencies.

[19] The output gap used is computed via the HP filter to maximize the number of observations. Note that this is not combined with WEO output gap estimates for consistency purposes. The high vs low output gap split is based on the non-linear $F(z_{it})$ function.

gap is large, economic growth tends to be lower after a debt surge similarly to the unconditional case.[20] Overall, the results suggest that the initial macroeconomic conditions may affect somewhat the impact of debt surges on growth, with the negative impact being less pronounced when the economy starts from a weaker position.

4.4 Conditional on level of total debt and interest rates

The behavior of economic activity following a debt surge may also depend on the initial levels of debt. The argument is that it is the total leverage that matters (Lim 2019, Reinhart, Reinhart, and Rogoff 2012). At low levels of debt, there may be more beneficial effects from increasing debt—for example, raise productive capacity—while at high debt levels, further increases in debt may increase risks, lead to debt overhang, and hamper growth. We use equation (5) to compare the results of unconditional (baseline) analysis versus cases when the initial debt levels are low or high.

The analysis confirms that the response of output varies significantly with the initial total leverage levels. In cases where total debt levels are high, debt surges are associated with worse outcomes (Figure 7a). GDP tends to growth slower and is on average 4 percent lower after 5 years relative to if there was no debt surge—in the unconditional case, GDP tend to be lower by around 2 percent. However, if leverage is low, debt surges may be associated with higher real growth for a few years, although the impact tends to die down over time—GDP tends to be persistently higher than the unconditional case.

The results, once again, tend to vary when looking at different types of debt surges (Figure 7b). Surprisingly, the effect of public debt surges does not seem to depend on initial levels of leverage. Debt surges tend to have a negative effect whether the initial debt levels are low or high. There is some evidence that when initial debt levels are low, the negative impact of debt surges will be more in the medium term (possible as debt levels rise above certain levels).

For private debt, however, debt surges can be associated with higher growth for some years if the initial debt of leverage is low. However, the effect dies down, especially for corporate debt. While if initial leverage is high, growth will tend to be lower initially and similar to the unconditional case. The effects of the initial leverage levels are particularly significant (although temporary) for household debt. These results support the hypothesis that increasing debt—especially private debt—is particularly undesirable when the levels of leverage are already high. This is confirmed if we look at the growth dynamics following debt surges which are accompanied by S&P downgrades. Output dynamics are worse and more persistent in those cases.[21]

We also examine if the current interest rates have an impact. One argument is that low interest rates observed in recent years imply that potential risks from rising debt are lower and the

[20] The results when using the WEO output gap instead are broadly similar but the number of observations drops considerably (available upon request).

[21] Following Auerbach and Gorodnichenko (2017), we also re-estimated equation (4) for the total debt case by measuring the conditioning variable (debt ratio), with respect to lagged GDP. Lagging the denominator by one period is done to ensure that the contemporaneous reaction of the ratio to a debt surge shock is driven by changes in debt rather than output. Results displayed in Figure A6 show that our previous conclusions remain unchanged.

benefits may be higher (e.g. higher fiscal multipliers). We do not find evidence supporting that hypothesis as in most cases the short-term impact is similar in both cases (Figure 8). However, the results provide some evidence that GDP will be persistently lower when interest rates at present are low. This surprising result could reflect that interest rates may rise after the debt surge and undermine future economic growth. These empirical findings echo those of Al-Amine and Willems (2021). They link their findings to investor sentiment—showing that an overly bullish outlook on a country (pushing the sovereign's cost of borrowing below than those implied by fundamentals) often leads to an over-accumulation of debt, which is then followed by a slowdown in growth.

4.5 Channels

Why are debt surges associated with lower economic output in the years ahead? To answer this question we examine the behavior of the different components of aggregate demand, namely private consumption, private investment, public consumption, and net exports.[22] Table 2 summarizes the main results and Figure 9 show them in detail. As expected, public debt surges are the ones associated with worse impact on economic activity. It is noteworthy, that private and public investment are particularly weaker—public investment is 15 percent lower than in the baseline (no debt surge)—although both private and public consumption are also negative affected. Not surprisingly, imports also are significantly lower.

Surges in corporate debt are followed by lower private and significantly lower public investment (lower by 10% than baseline) over the medium term. One possible reason is that when corporates are under financial distress, governments will provide financial support while cutting other expenditures to create fiscal space. However, exports tend to be higher in the medium term. Household debt surges have much less impact on economic activity. There appears to be a temporary increase in private consumption, while private investment is lower in the medium term. The surges are associated with somewhat lower public consumption over the medium term. Exports tend to be temporarily lower, while imports are lower in the medium term.

[22] Data on the components of GDP, namely we study private consumption, private investment, public consumption, and net exports, are from the IMF's World Economic Outlook database and are converted to real terms using the GDP deflator

Table 2. Debt Surges and Components of GDP (unconditional)

	Impact on:					
Type of debt spike:	Private consumption	Public Consumption	Private Investment	Public Investment	Exports	Imports
Household	Positive effect ST	Lower MT (2%)	Lower MT (5%)	No significant impact	Lower ST	Lower MT
Corporate	No significant impact	Lower MT (3%)	Lower (6%)	Lower (10%)	Higher MT (4%)	Higher ST
Government	Lower (5%)	Lower (2%) in first years	Lower (8%)	Lower (15%)	Lower ST; higher MT	Lower (4%)

Note: ST= short term; MT = medium term.

Do these responses vary depending on the initial level of total debt? As before, we analyze the behavior for cases when countries have initial high or low debt levels–in comparison with the unconstrained case (Figure 10). In the case of private consumption, surges in private debt (especially household debt) have a more positive impact on private consumption if initial debt levels are low. For public debt, private consumption is temporarily higher if initial debt is low, but the effect dies down over time and private consumption falls similarly as in the unconditional case. Public consumption behavior after debt surges does not vary significantly depending on the initial levels of debt. The possible exception of household debt surges, where public consumption is higher if the initial debt is low.

The response of private investment can vary significantly depending on the initial debt levels in some cases. There are very large differences in response to household and corporate debt surges depending on initial debt levels. Investment is significantly larger among countries with low initial debt levels and tends to be somewhat lower when initial debt levels are high. Among public debt surges, the response tends to always be negative independently of the initial debt levels.

The response of public investment also shows very different behavior depending on the initial debt levels, but the differences do not always persist. Following a debt surge, public investment is higher in the first years if the initial debt levels are low, but the effect dies down and reverses itself in the medium term for corporate and public debt surges. The pattern tends to be the opposite when initial debt is high, public investment declines initially, but rises in the medium term, especially for public debt surges.

In the external accounts, there is a wide variance of outcomes, suggesting in general initial debt levels may not make a significant difference (10e-10f). For exports, there is some evidence that corporate debt surges is associated with worse outcomes when initial debt levels are high, which may reflect that the high leverage in the economy undermines ability of exporters to finance their activities. For imports, these tend to be higher when private debt surges and initial debt levels are low, but the difference disappears over time.

5. Conclusion

The large surge in corporate and public debt during the pandemic raises concerns that it will damage growth prospects in the years ahead. However, it is not clear the impact will be necessarily negative. The rise in debt as a response to the economic crisis, allowed to fund programs to save lives and businesses and could reduce scarring allowing for a stronger economic recovery. However, the high pre-pandemic debt levels could imply that the additional debt surge will constrain economic activity over the next years. This paper investigates what was the behavior of economic activity, real GDP and potential GDP, following debt surges applying a local projection method to a new dataset of debt surges in advanced and developing economies spanning between 1970 and 2020.

Our analysis suggest the relation between debt surges and future economic prospects are complex, but there are important lessons for policy makers. The results suggest that output is persistently lower after a total debt surge, however the growth pattern depends on different factors including type of debt surge and initial macro-fiscal conditions. The worse growth performance is especially pronounced among public debt surges. Although, private debt surges also tend to be associated with lower potential GDP.

The effects of debt surges depend to some degree on the initial economic conditions, but not always on the expected way. The negative impact of public debt surges on future growth is more pronounced when the economy starts from a stronger cyclical position (large positive output gap). Such result suggests that procyclical fiscal policy can be disruptive.. Private debt surges, on the other hand, are associated with temporarily higher GDP if the economy is experiencing a large positive output gap.

The impact of debt surges also varies depending on the initial total debt levels in the economy. If total leverage is high, GDP growth is on average 4 percent lower relative to the case of no debt surge. However, if leverage is low, debt surges may be associated with higher real growth for a few years. Somewhat surprisingly, these effects are mainly driven by private sector debt surges. The initial level of total leverage is not as relevant for public debt. This suggests that excess private sector leveraging is more detrimental for future growth prospects than size of public debt.

Our analysis also provides some clues for why debt surges can be detrimental for economic growth. Both corporate and public debt surges are followed by significantly lower public and private investment. It suggests that firms and governments cut investment when under financial distress. Surges in public debt also have a negative impact in private and public consumption. It could be because governments undertake spending cuts and increases in taxes after the debt surge or because households constrain their spending concerned with future tax increases.

Overall, the results further strengthen the call for prudent policies and building buffers to manage large shocks, like the Covid-19 pandemic. Countries with initial lower debt levels are in better shape to increase borrowing in a crisis without jeopardizing future growth. The results also strengthen the case for governments to monitor and prevent excessive debt surges and leveraging by the private sector.

We see this analysis as providing important clues, but more work is needed to better understand the impact of the large debt surges, including in response to large crises. The set of debt surges considered have often been accompanied by other fiscal and monetary measures that cannot be fully controlled for in the analysis. Moreover, the empirical estimates capture the average historical impact of major debt surges on output. As such, they do not explicitly account for inherent uncertainty and cross-country heterogeneity regarding key variables (for example, fiscal multipliers, government funding costs) and possible unique effects associated with pandemics.

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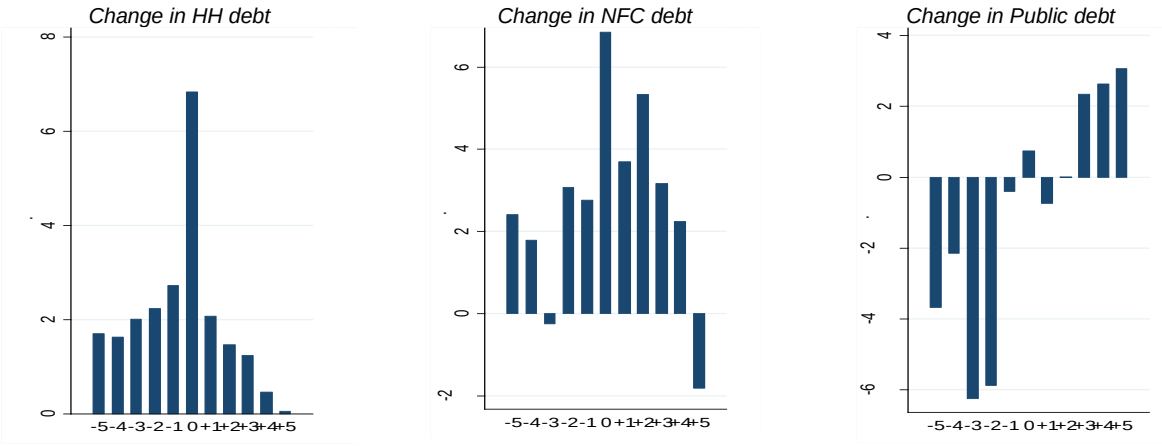
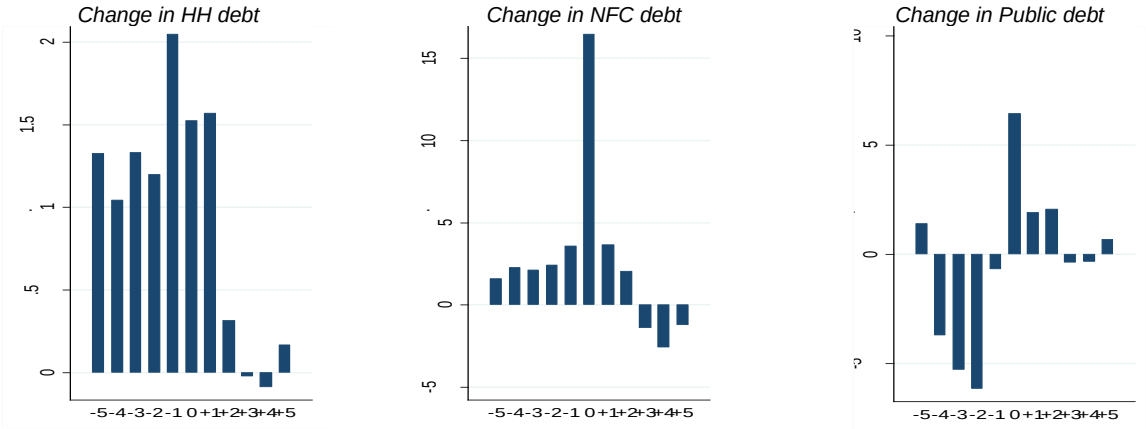
Figure 2. Changes in Debt around Surges (average, all countries, percent of GDP)

(5 years before and after a given debt surge, with t=0 being the first year of the surge)

Household Debt Surge



Non-Financial Corporate Debt Surge



Government Debt Surge

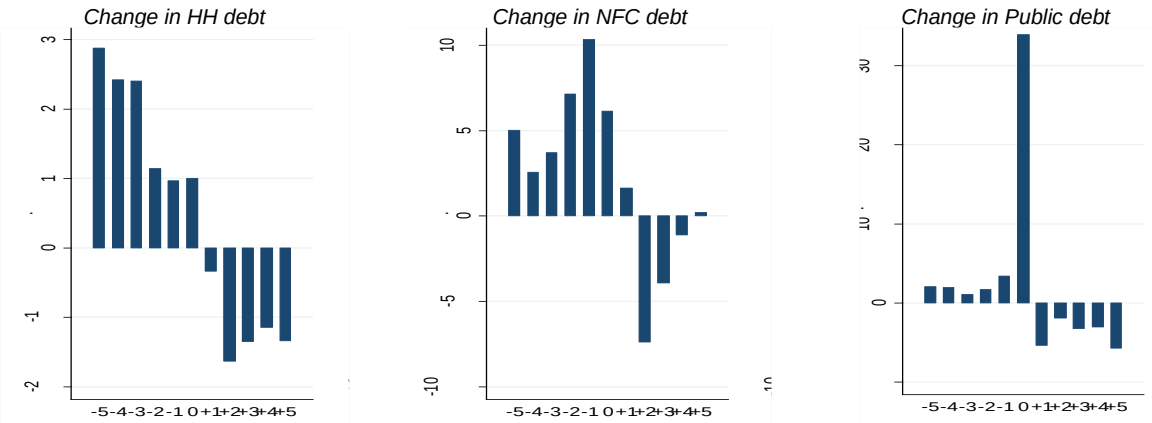
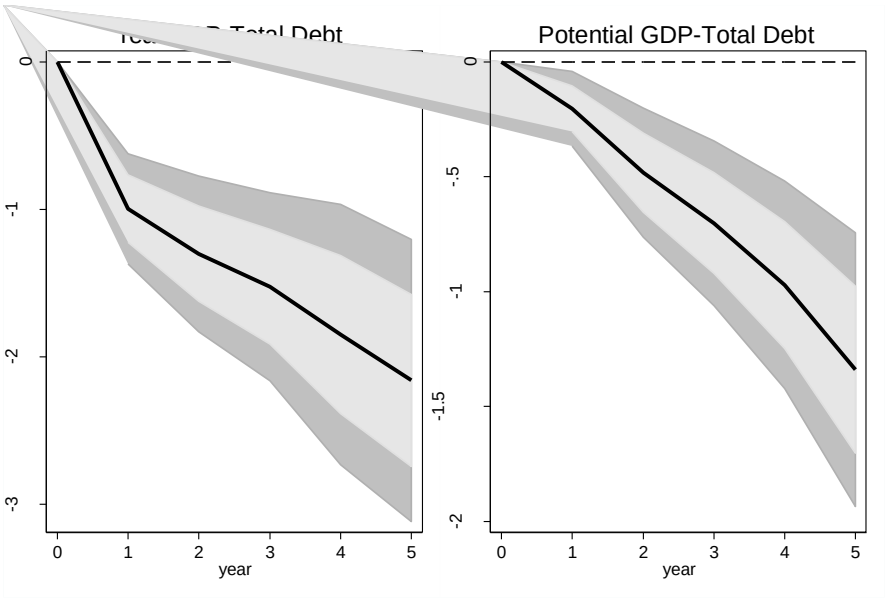
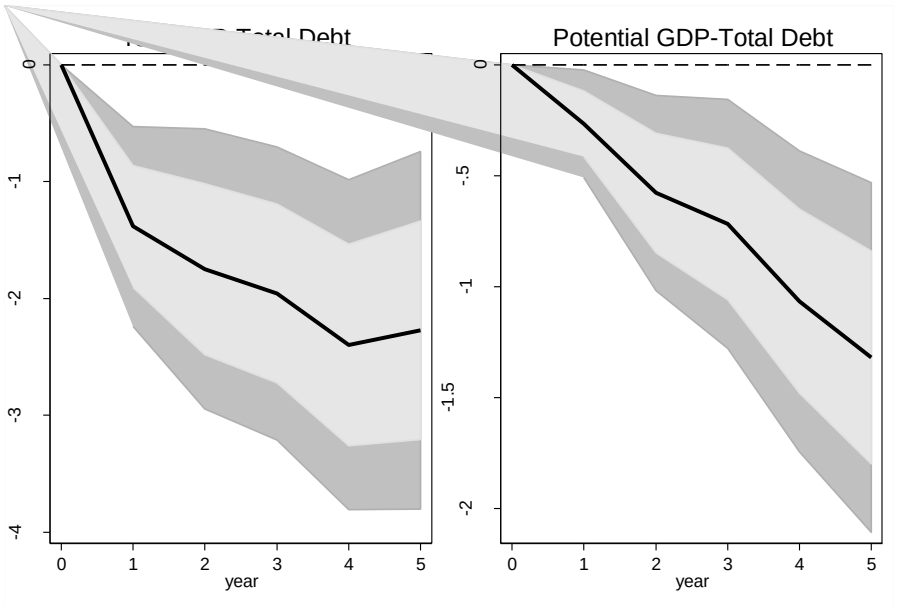


Figure 3.a Real GDP and Potential Output following Total Debt Surges (percent)



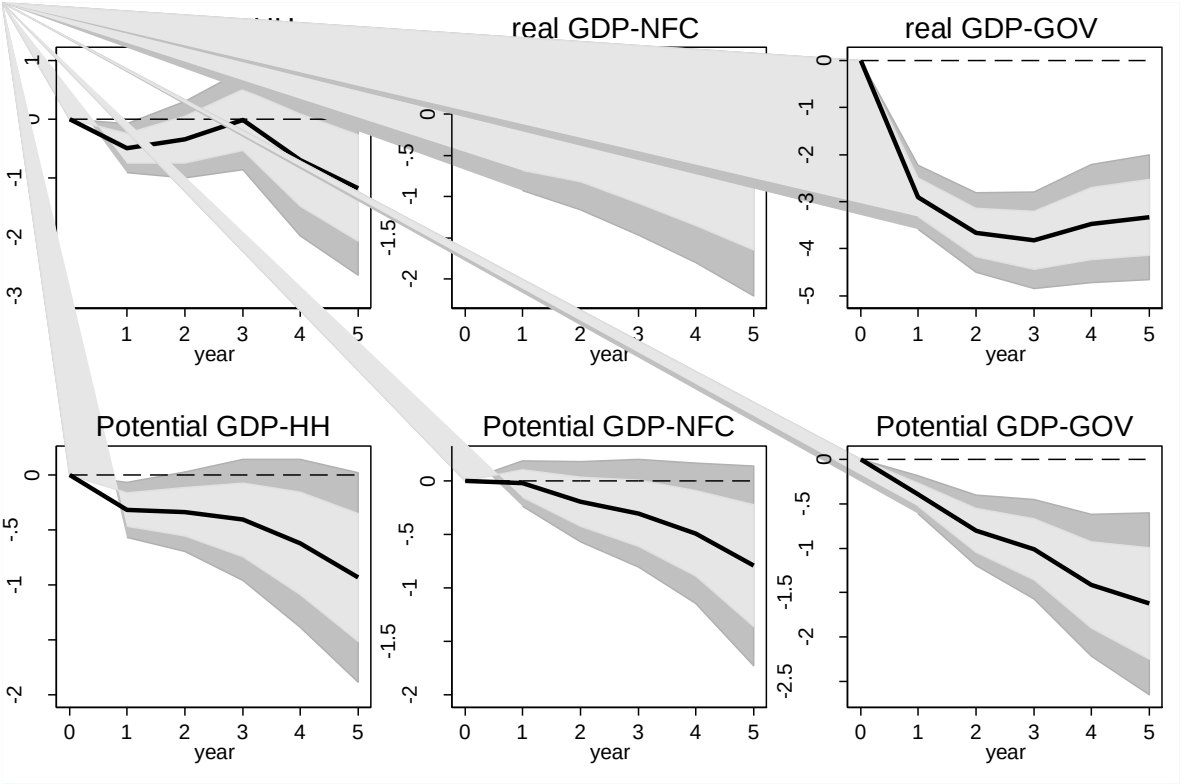
Note: x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level.

Figure 3.b Real GDP and Potential Output following Extreme Total Debt Surges (percent)



Note: x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to an extreme debt surge shock defined as those for which the country-specific change between consecutive years is larger than the mean plus 2 standard deviations and the change is equal or larger than 1.5 percent of GDP. Dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level.

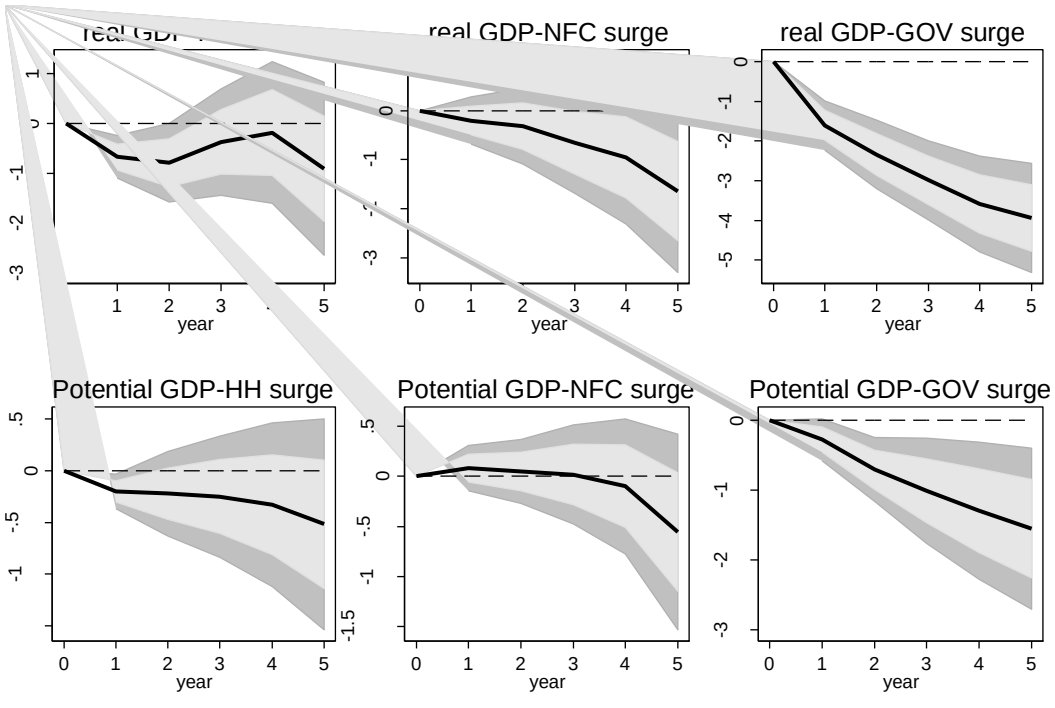
Figure 4. Real GDP and Potential Output following Debt Surges (percent)



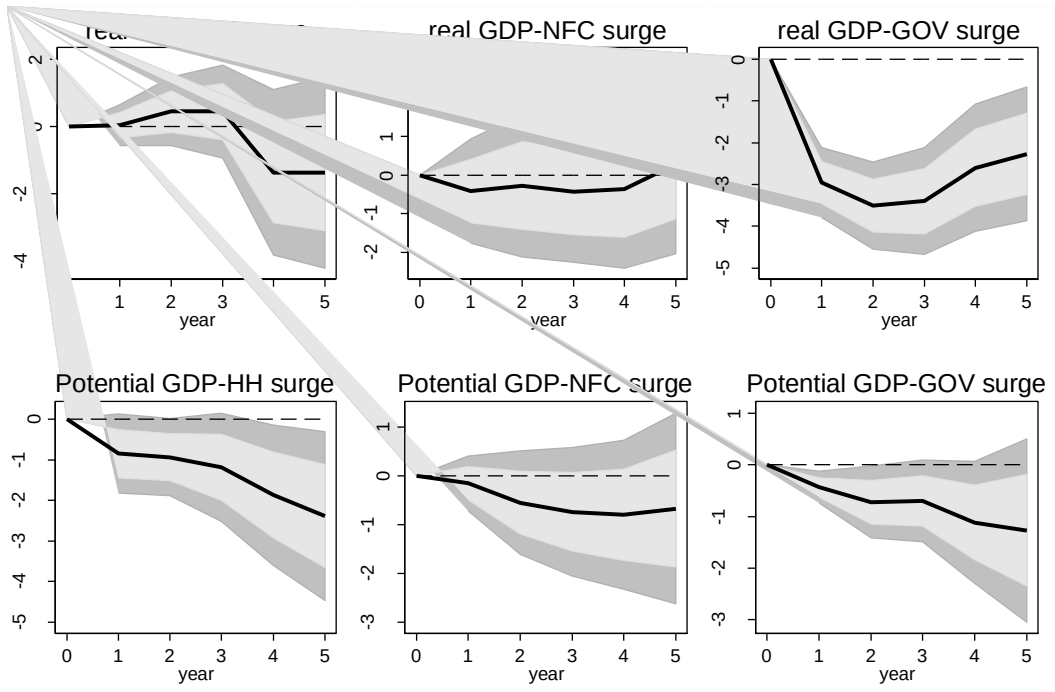
Note: x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level.

Figure 5. Real GDP and Potential Output following Debt Surges by income group (percent)

Advanced Economies

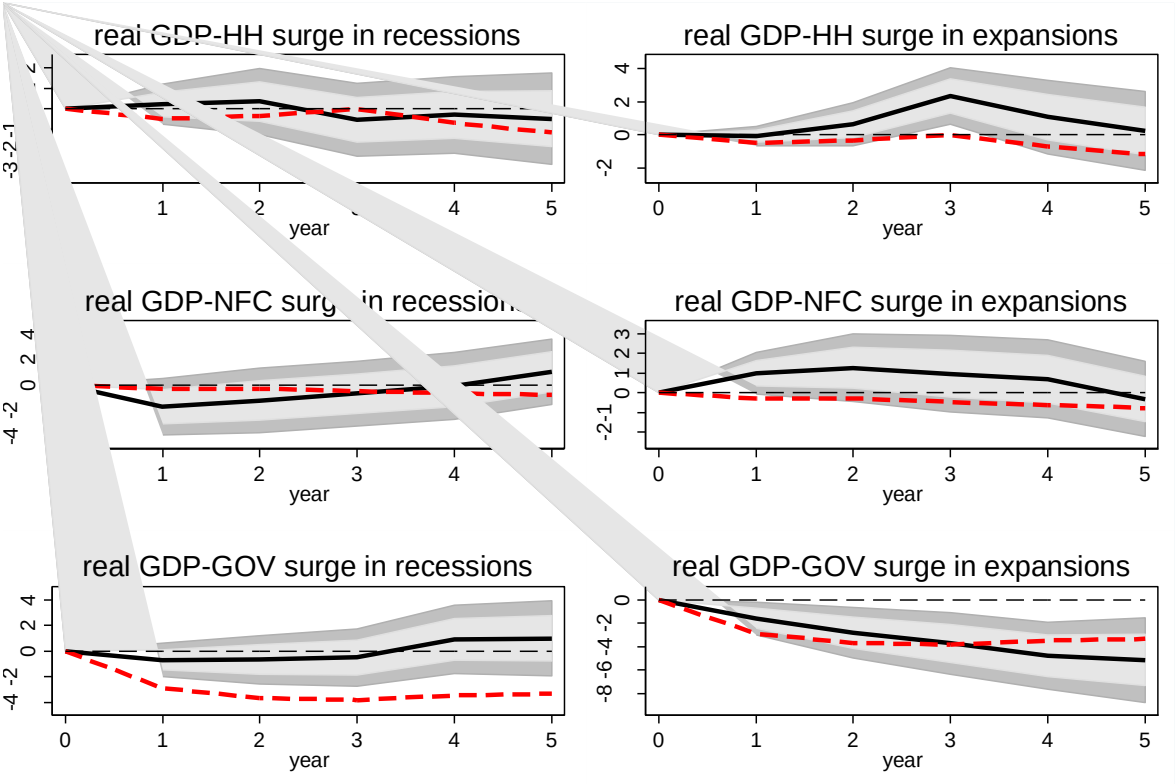


Developing Economies



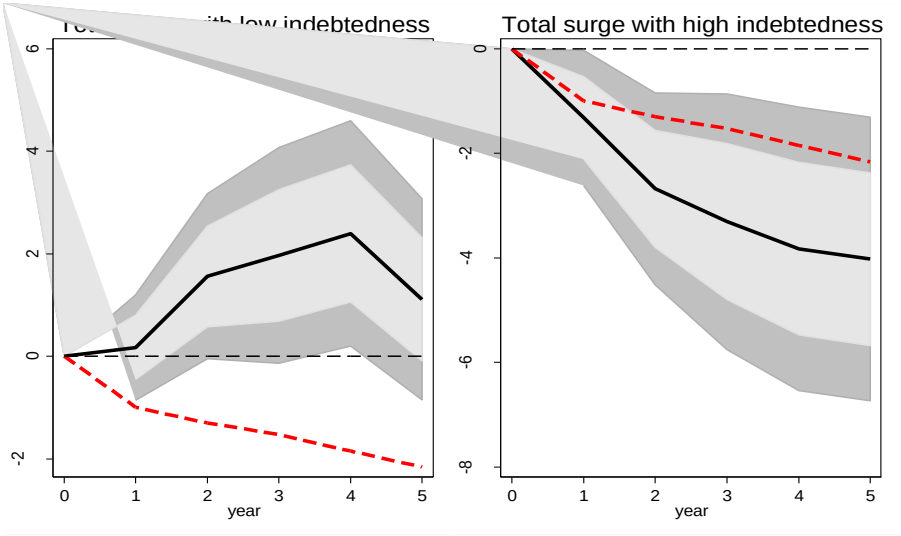
Note: x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level.

Figure 6. Real GDP following Debt Surges: the role of the business cycle (percent)



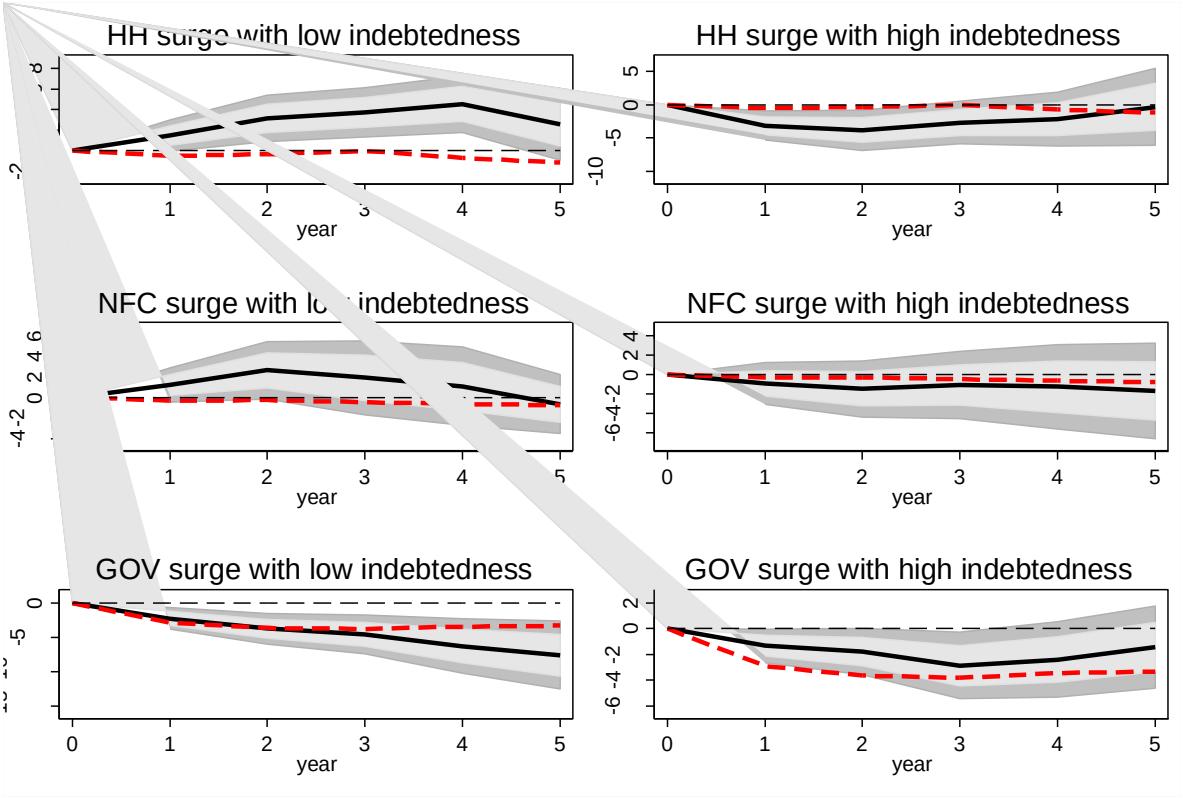
Note: estimation of equation 5 using real GDP growth as z in F(z). x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level. The red line denotes the unconditional baseline result from estimating equation (4). Uses estimates of output gap by applying HP filter. The case when the initial output gap is low is denominated “recessions”, while when output is positive and large it called “expansions”.

Figure 7a. Real GDP following Debt Surges: the role of total indebtedness levels (percent)



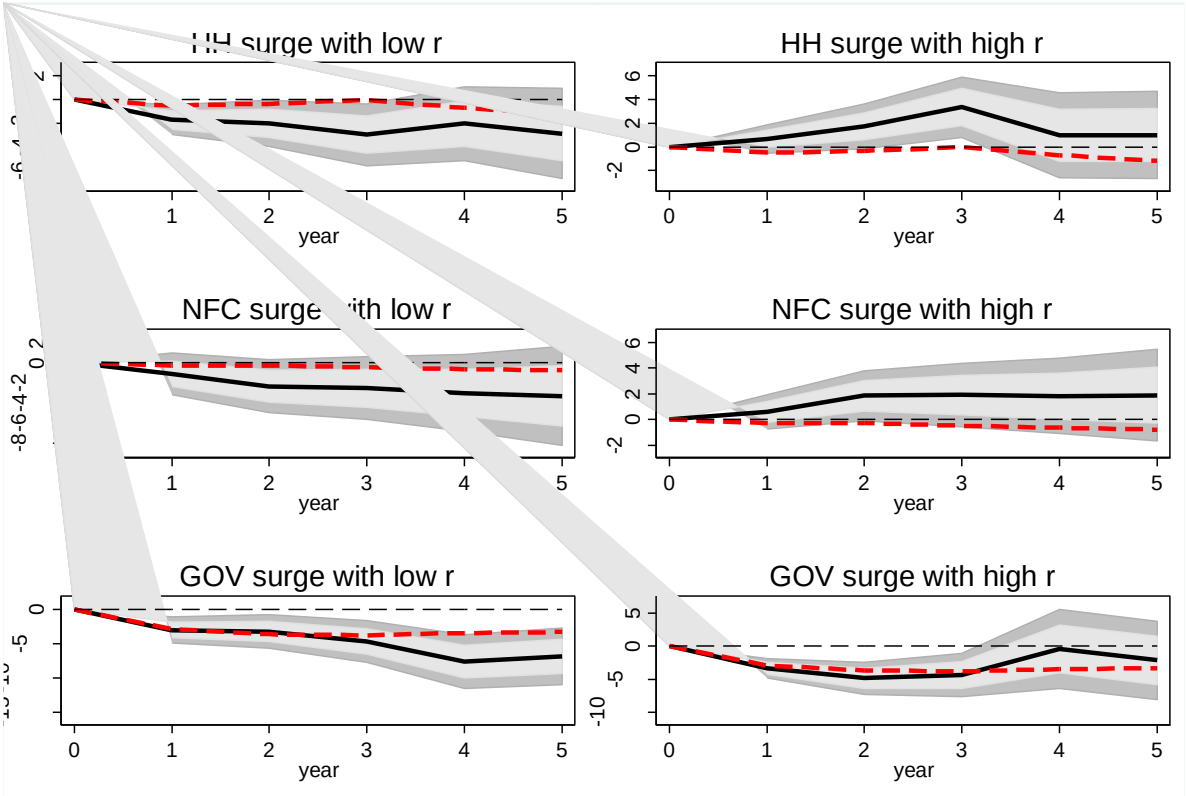
Note: estimation of equation 5 using total debt in percent of GDP as z in F(z). x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level. The red line denotes the unconditional baseline result from estimating equation (1).

Figure 7b. Real GDP following Debt Surges per type of debt (percent)



Note: estimation of equation 5 using total debt in percent of GDP as z in F(z). x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level. The red line denotes the unconditional baseline result from estimating equation (1).

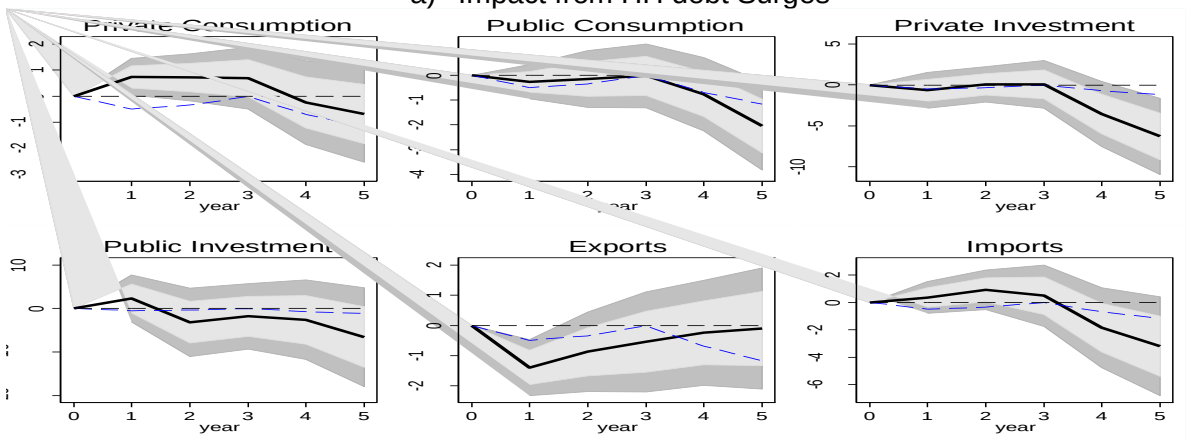
Figure 8. Real GDP following Debt Surges: the role of interest rate conditions (percent)



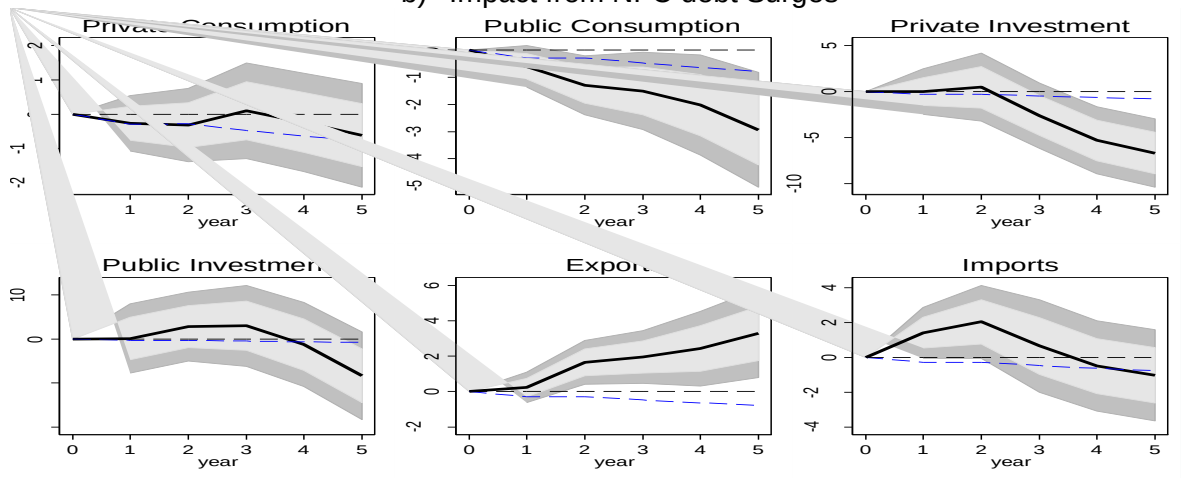
Note: x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level. The red line denotes the unconditional baseline result from estimating equation (1).

Figure 9. Channels: Effect of Debt Surges on Aggregate Demand Components (percent)

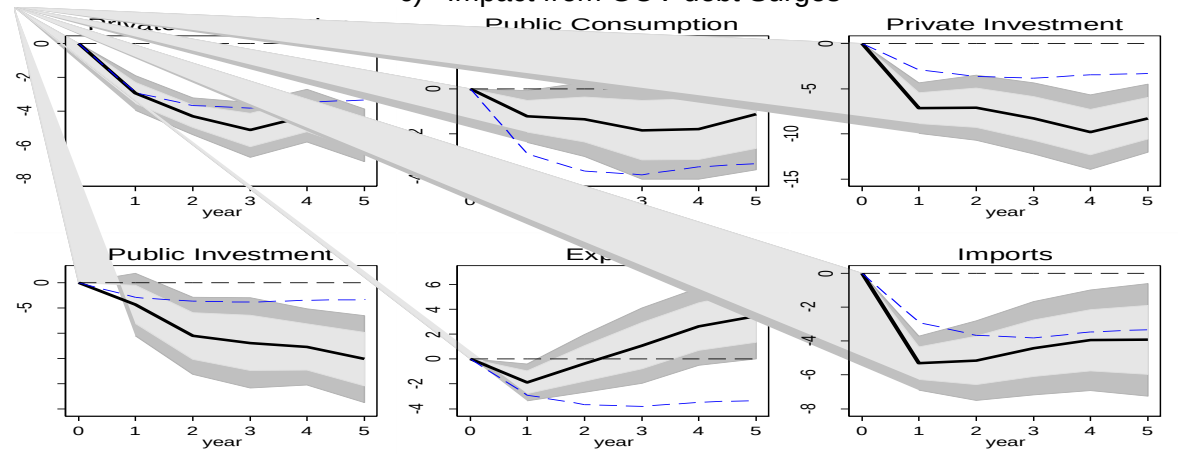
a) Impact from HH debt Surges



b) Impact from NFC debt Surges

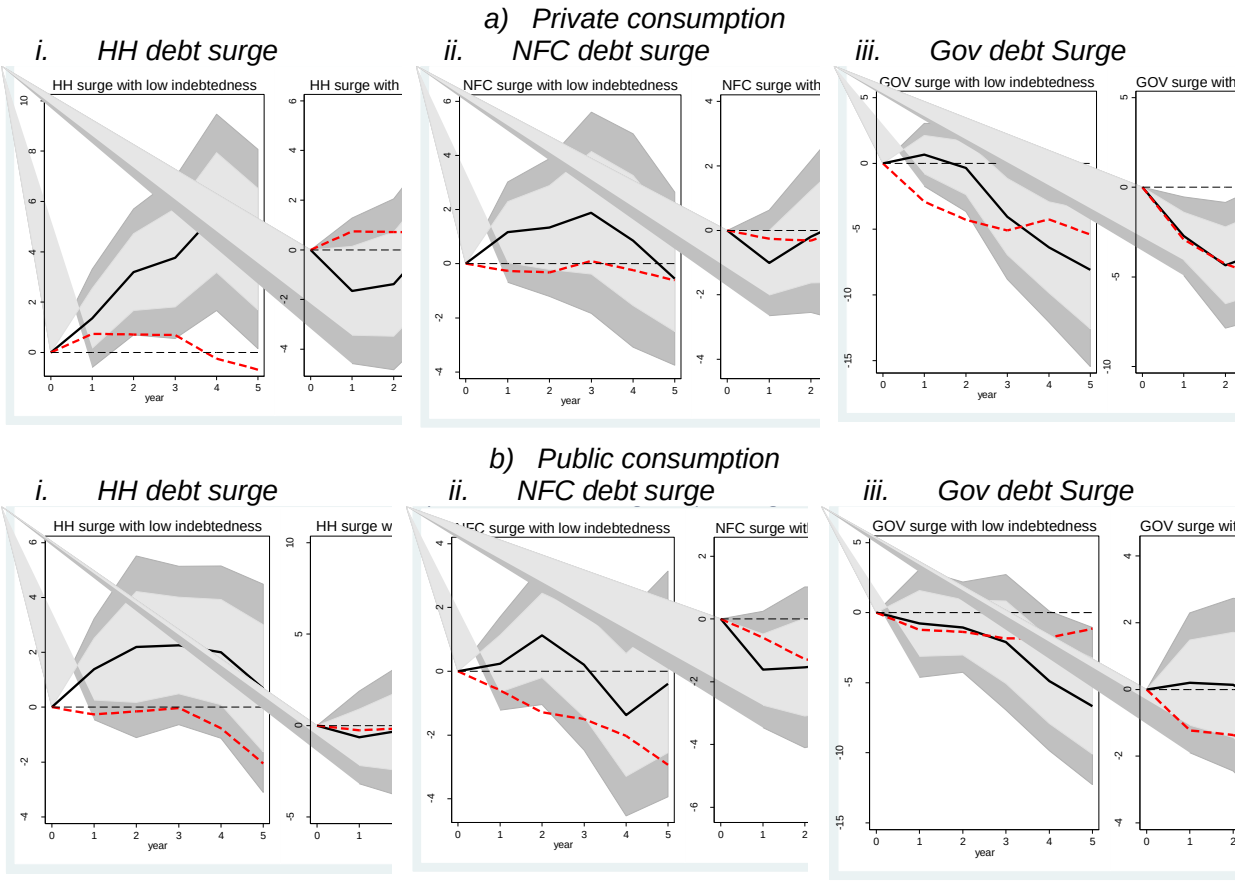


c) Impact from GOV debt Surges



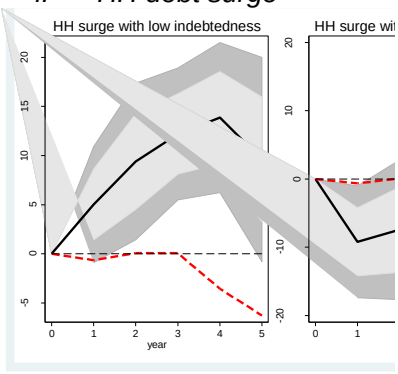
Note: x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level. Aggregate demand components expressed in real terms using the GDP deflator. The blue line denotes the real GDP unconditional result for comparison purposes.

Figure 10. Channels: Effect of Debt Surges on Aggregate Demand Components, conditional on initial debt level

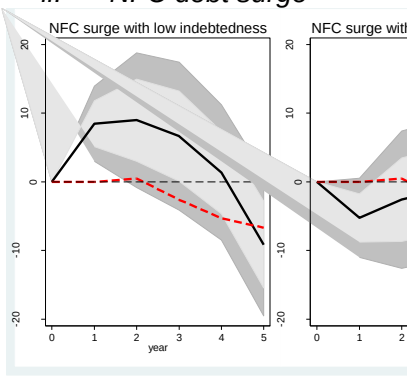


c) Private Investment

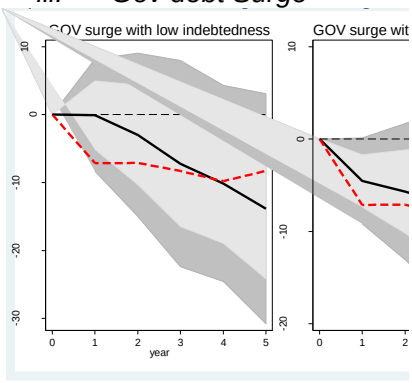
i. HH debt surge



ii. NFC debt surge

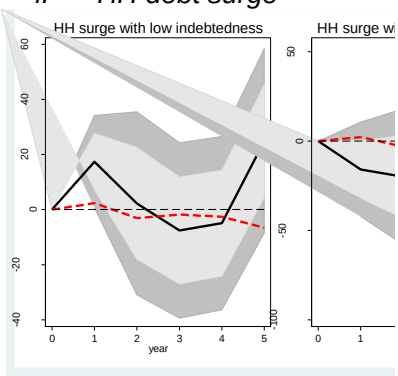


iii. Gov debt Surge

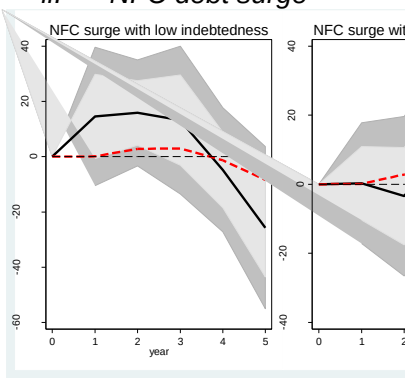


d) Public Investment

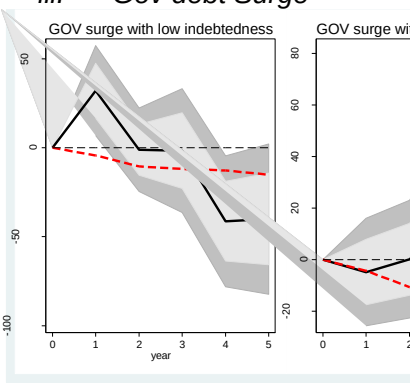
i. HH debt surge



ii. NFC debt surge

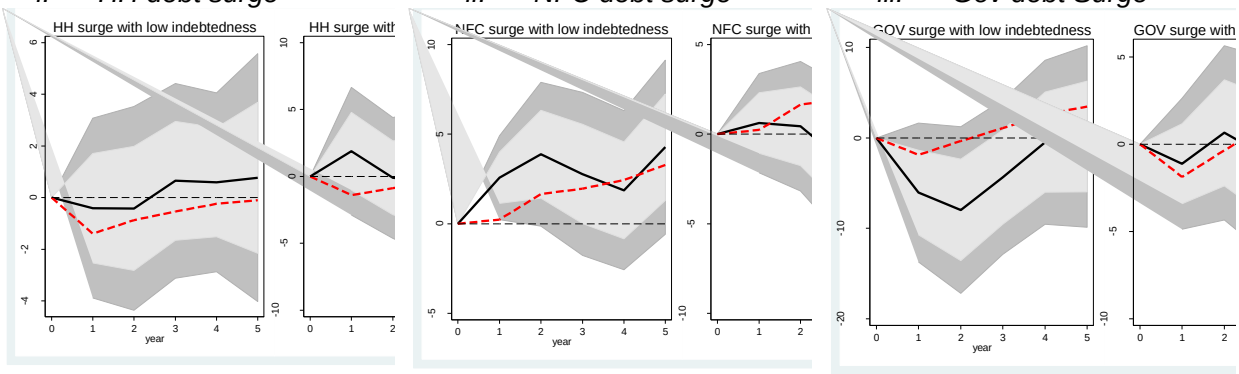


iii. Gov debt Surge



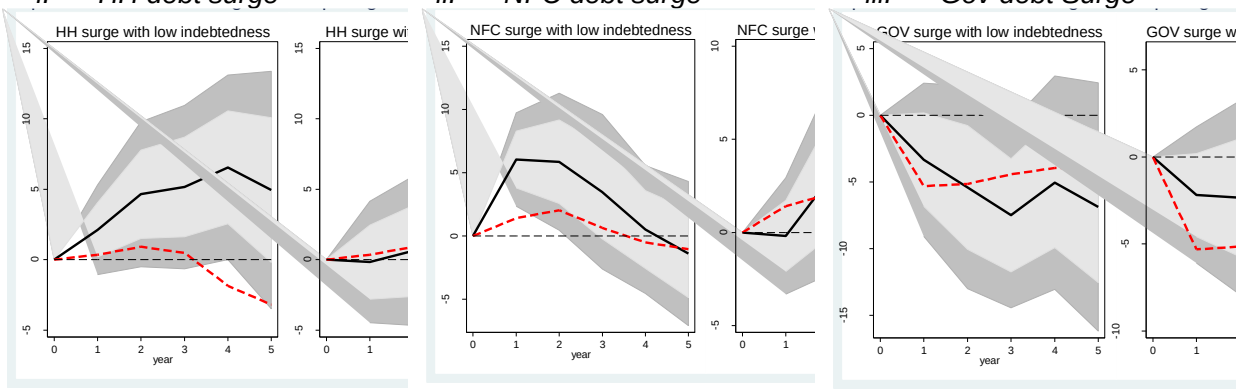
e) Exports

i. HH debt surge *ii. NFC debt surge* *iii. Gov debt Surge*



f) Imports

i. HH debt surge *ii. NFC debt surge* *iii. Gov debt Surge*



Note: x-axis in years; t=0 is the year of the debt surge shock; t=1 is the first year of impact. Solid black lines denote the response to a debt surge shock, dark grey area denotes 90 percent confidence bands while light gray area denotes 68 percent confidence bands, based on standard errors clustered at country level. Aggregate demand components expressed in real terms using the GDP deflator. The red line denotes the real GDP unconditional result for comparison purposes.