Does Foreign Debt Contribute to Economic Growth?[*]

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Abstract

We study the relationship between foreign debt and GDP growth using a panel dataset of 122 countries from 1980 to 2015. We find that economic growth correlates positively with foreign debt and that the relationship is causal in nature by using the sovereign credit default swap spread as an instrumental variable. Furthermore, we find that foreign debt increases investment and then GDP growth in subsequent years. Our findings suggest that sovereign default risks are responsible for "upstream" capital flows that contribute to GDP growth in OECD countries.

Keywords: foreign debt; upstream capital flows; GDP growth; investment; sovereign credit default swap
JEL Classification: F21; F34; O16

1 Introduction

Since financial globalization started accelerating in 1980's, global imbalances have emerged (see Mendoza et al., 2009). Between 1980 and 2020 the sum of current account balances of the US amounts to –$12514 billion, which is the largest cumulative deficit among all countries, while that of China amounts to $3725 billion.[1] This means that the US has imported while China has exported capital over the past 40 years. The law of diminishing returns implies that capital—ceteris paribus—would flow from rich countries where the marginal product of capital is low to poor countries where it is high. Therefore, in the neoclassical model poor countries are supposed to import and rich countries are supposed to export capital. However, Lucas (1990) observed that capital does not flow from rich to poor countries just as the example of the US and China shows.

Since Lucas' seminal work, the literature has decomposed capital flows in the financial account to examine the effects of each flow. It is well-established that foreign direct investment (FDI) contributes to economic growth in developing countries with a high level of human capital in Borensztein et al. (1998) or developed financial markets in Alfaro et al. (2004). The finding seems to be consistent with the neoclassical model. On the other hand, several studies find that upstream capital flows are caused by emerging economies that accumulate foreign reserves (e.g., Gourinchas and Rey, 2007; Mendoza et al., 2009; Gourinchas and Jeanne, 2013; Alfaro et al., 2014). However, the relationship between portfolio investment and economic growth remains elusive.[2]

This paper investigates the relation between foreign debt—the debt instrument in portfolio investment—and GDP growth using a panel dataset covering 122 countries from 1980 to 2015. Figure 1 shows that net foreign debt of OECD countries largely mirrors foreign reserve holdings of non-OECD countries.[3] It is surprising to see

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[1]Data of China's current account balances are missing for 1980 and 1981.

[2]In theoretical models with no FDI, financial frictions may limit domestic investment and lead to upstream (portfolio investment) flows from "poor" countries to "rich countries" and sustain the cross-country inequality when financial markets are integrated globally (e.g. Matsuyama, 2004; Kikuchi and Stachurski, 2009; Kikuchi et al., 2018). If FDI is allowed, investors in rich countries could circumvent host-country financial frictions and invest in poor countries.

[3]The sum of net foreign debt across all countries in the world must be zero except for the
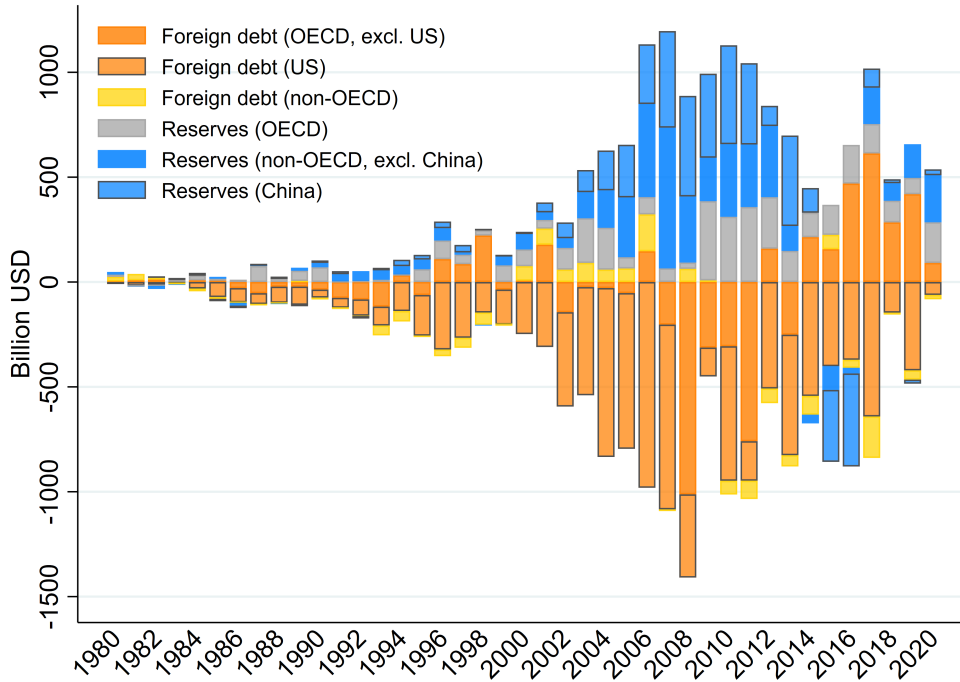
Figure 1: The Sum of Net Foreign Debt and Foreign Reserves for about 200 Countries from 1980 to 2020.

Note: Foreign debt represents the debt instrument of portfolio investment. This figure plots aggregated series of all the reporting countries of the balance of payment statistics provided by IMF. Data of China's foreign debt are missing for 2016-2020.

that the US occupies 97 percent of net foreign debt of OECD countries while China occupies 77 percent of foreign reserve holdings of non-OECD countries. We capture the effects of foreign reserve holdings on GDP growth in the country that issue the reserve currency by utilizing data on foreign debt by country (how much foreign debt each country holds).

We find that foreign debt increases GDP growth in our panel analysis that excludes major offshore financial centers and oil exporters. We justify this exclusion on the ground that those countries, although recording a very high volume of international

discrepancies that foreign reserves create; there is no net concept for foreign reserves and every foreign reserve holding must have its counterpart recorded in foreign debt as its transactions typically involve buying or selling debt securities.

financial transactions, might distort our analysis because they channel a very small portion of capital inflows into domestic investment - the channel we would like to explore in this paper. In fact, we find that foreign debt increases investment and then GDP growth in subsequent years by employing the local projection analysis developed by Jordà (2005). This indicates that foreign debt contributes to GDP growth through capital accumulation.

Using the sovereign credit default swap (CDS) spread as an instrumental variable (IV) we find the relationship between foreign debt and GDP growth to be causal in nature. (We refer to the *sovereign* credit default swap as the CDS throughout the paper.) The CDS spread is the cost that investors pay to hedge against sovereign default risks. Thus, the predicted values in the first stage of panel IV regression can be interpreted as changes in foreign debt caused by exogenous supply-side shocks. To the best of our knowledge we are the first to identify how sovereign CDS spreads affect investment and GDP growth via foreign debt in a large panel dataset.

Lastly, we divide our sample into OECD and non-OECD countries to relate our results to upstream capital flows and global imbalances as observed in Figure 1. We find that the CDS spread is lower and foreign debt is higher in OECD than non-OECD countries on average.[4] Our model excluding foreign debt but including common control variables used in the growth regression literature underestimates GDP growth of OECD countries. The inclusion of foreign debt increases the explanatory power of our model for GDP growth in OECD countries by 2.2 percent. Hence, the novel channel between foreign debt and growth we identify via the CDS spread points to the "real" effects of the "exorbitant privilege" the US and other OECD countries have (c.f., Gourinchas and Rey, 2007). We conclude that sovereign default risks are responsible for upstream capital flows that contribute to GDP growth through capital accumulation in OECD countries.

The positive relationship between foreign debt and GDP growth we find is the opposite of what many others find for developing countries. For example, Pattillo et al. (2002) finds that the effect of foreign debt on per capita growth is negative among average developing countries. Similarly, Clements et al. (2003) finds that high levels of debt can depress economic growth in low-income countries. Those findings

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[4]Demirgüç-Kunt et al. (2013) finds that securities markets become more important than banks as the economy develops.

are in line with debt overhang problems in low-income economies where a country's debt service burden to foreign lenders is so heavy that it creates disincentives to invest in the country (see Krugman, 1988). We differ from this line of literature in that 1) our sample covers a wide range of countries from low-income to high-income countries; 2) our IV approach controls for the incentives to invest in a country; and 3) our battery of controls such as regulatory quality and the government debt to GDP ratio accounts for the credibility of debtors. In other words, we control for unfavorable conditions in countries that suffer from debt overhang problems and analyze the effect of foreign debt on growth in a more general setup.

Our work may also be contrasted with the literature that finds a negative relationship between public debt and growth (see Reinhart and Rogoff, 2010). Examining different samples of countries and periods, most works in the literature confirm a negative relationship between debt and growth (see Reinhart et al., 2012, for a survey). Our work differs from them as our main independent variable is foreign debt, i.e., debt that a country owes to foreigners (both public and private entities). Given home bias as in Feldstein and Horioka (1979) foreigners are more responsive to shocks in international capital markets than domestic residents are. In other words, investors are more selective when investing internationally than domestically, and therefore issuing debt domestically is fundamentally different from issuing debt internationally. Those differences, which we capture implicitly through our controls and IV approach, must be responsible for the positive relationship between foreign debt and growth.

The rest of the paper is organized as follows. Section 2 describes the panel data and reports the results of the baseline model. Section 3 investigates the investment channel and Section 4 the dynamic effects of foreign debt. Section 5 relates our findings to upstream capital flows and global imbalances. Section 6 concludes.

2 GDP Growth and Foreign Debt

2.1 Panel Data

We construct a country-level unbalanced panel dataset covering 122 countries from 1980 to 2015.[5] The panel data used in the baseline analysis cover 95 percent of world GDP on average throughout the sample period. In addition to the full sample, we use two sub-samples. The first sub-sample, as discussed later, excludes outlier countries from the full sample. This sub-sample covers 96 countries from 1980 to 2015 representing 81 percent of world GDP on average. The second sub-sample used for instrumental variable regressions has a more limited sample size due to data availability of the instrument and controls. The sample covers 50 countries from 1997 to 2015 representing 48 percent of world GDP on average. The robustness of results using different samples shows the generality of our estimation results.

The baseline model uses real GDP growth as the key dependent variable. GDP is measured in a constant local currency unit and provided in the World Development Indicator (WDI) database by the World Bank. We also use investment growth as a dependent variable in our additional analysis. Total investment is measured in a constant local currency unit and provided in the WDI database. Total investment can be decomposed into private and public investment, each measured in a constant US dollar unit rather than a local currency unit due to data availability. The series are provided by the IMF. [6]

The key right-hand-side variable is foreign debt normalized by GDP. Throughout this paper foreign debt denotes the debt instrument of portfolio investment, which captures international transactions of corporate and government debt provided in the International Financial Statistics by the IMF. The series measure net capital inflows (gross inflows minus gross outflow). The balance of payments statistics also reports the debt instrument in a sub-category of other investment flows. We do not include the series in foreign debt as it mainly captures cross-border banking

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[5]See Table 8 for the list of countries.

[6]We confirmed that main results hold when we use real GDP or investment growth measured in a constant US dollar unit. However, we mainly use the series measured in a local currency unit to eliminate the valuation effects caused by changes in exchange rates as much as possible.

activities such as bank lending and deposit transactions, which is not directly related to investment.

Notation	Description	Source
GDP and Investment		
ΔGDP	Growth of gross domestic product, constant local currency unit	WDI
ΔInvestment	Gross fixed capital formation, constant local currency unit	WDI
ΔInvestment^{Priv}	Growth of general government investment (gross fixed capital formation), constant USD	IMF
ΔInvestment^{Pub}	Growth of private investment (gross fixed capital formation), constant USD	IMF
Portfolio Investment Inflow		
Foreign debt	Portfolio investment flow, debt instrument (net capital inflow, % of GDP)	IMF
Instrument		
CDS spread	5-year sovereign CDS spread (basis point, divided by 100)	Kose et al. (2017), World Bank
Control Variable		
Initial Real GDP per capita	Initial level of GDP per capita (constant USD, logged)	WDI
Human Capital Index	Human capital index, based on years of schooling and returns to education	Penn World Table 9.1
Government Consumption	General government final consumption expenditure (% of GDP, logged)	WDI
Trade Openness	Import plus export (% of GDP, logged)	WEO, WDI
Inflation	Inflation as measured by GDP deflator (annual %). We drop all observations for which inflation is less than -10% and then set to zero all the observations for which inflation takes negative value and apply the inverse hyperbolic sine transformation.	WDI
ΔCredit/GDP	Domestic credit to private sector to GDP ratio (%). Domestic credit refers financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.	Global Financial Development Database, WDI
Regulatory quality	Regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).	Kaufmann et al. (2011), Worldwide Governance Indicators
Government Gross Debt	General government gross debt (% of GDP, logged)	WEO
Crisis dummy	Banking Crisis Dummy (1=Banking Crisis, 0=None).	Laeven and Valencia (2013, 2020), World Bank

Table 1: Definition and Notation of Variables.

We include standard controls in the growth regression literature such as the initial level of real GDP per capita, the human capital index, government consumption,

trade openness, and the inflation rate (e.g. Arcand et al., 2015; Durlauf et al., 2005).
The details are summarized in Table 1.

2.2   The Baseline Model

The baseline model investigates the relationship between foreign debt and GDP
growth. There are two groups of countries that require a special treatment. The
first group contains offshore financial centers that record large transactions in inter-
national financial markets but typically re-invest capital inflows in third countries.
The second group contains oil exporters that invest their oil revenues in foreign
equity or debt and record large current account surplus (i.e., net capital outflow).
For both groups, capital inflows are not a source for domestic investment, which is
the channel we would like to explore. We identify 14 countries as offshore financial
centers following Lane and Milesi-Ferretti (2018) and 13 countries as major oil ex-
porters, whose time-series average of the oil rents to GDP ratio exceeds 8 percent.
The identified countries are listed in Tables 8 and 9.

The summary statistics shows that the offshore financial centers and oil exporters
are indeed outliers in our sample. Table 2 reports the cross-sectional summary
statistics of FDI and portfolio investment. In the full sample reported in panel A,
the standard deviation, minimum and maximum of portfolio investment are much
larger than those of FDI. For example, the standard deviation of portfolio investment
is 18.444, which is over three times larger than that of FDI (=5.471). Panels B and
C show that the large values of portfolio investment are attributable to the offshore
financial centers and oil exporters, who can work as noisy observations and lead
to inaccurate results. Moreover, panel C shows that total portfolio investment and
foreign debt have similar mean, standard deviation, minimum and maximum that
are different from those of equity instrument. This corroborates our strategy to
focus on foreign debt as the key driver of portfolio investment.

The baseline model is

$$\Delta GDP_{i,t} = \beta_1 Foreign\_debt_{i,t} + \beta_2 Foreign\_debt_{i,t} \times Dum^{Normal}$$
$$+ \Gamma X_{i,t-1} + \delta_i + \gamma_t + \varepsilon_{i,t} \quad (1)$$

	obs.	mean	stdev.	min	max
Panel A: Full Sample (122 countries)					
Foreign Direct Investment					
Total (equity + debt)	119	2.549	5.471	-5.198	39.939
Portfolio Investment					
Total (equity + debt)	119	1.287	18.444	-42.391	194.364
Equity instrument	122	1.754	22.615	-29.552	244.941
Debt instrument (foreign debt)	122	-0.561	5.400	-50.577	7.814
Panel B: Financial Centers and Oil Exporters (27 countries)					
Foreign Direct Investment					
Total (equity + debt)	26	2.783	7.910	-5.198	37.129
Portfolio Investment					
Total (equity + debt)	26	4.632	39.818	-42.391	194.364
Equity instrument	27	8.358	48.172	-29.552	244.941
Debt instrument (foreign debt)	27	-4.306	10.611	-50.577	2.003
Panel C: Non-outlier Countries (95 countries)					
Foreign Direct Investment					
Total (equity + debt)	93	2.483	4.623	-2.036	39.939
Portfolio Investment					
Total (equity + debt)	93	0.352	1.202	-4.850	6.561
Equity instrument	95	-0.123	0.618	-3.356	1.041
Debt instrument (foreign debt)	95	0.504	1.104	-1.380	7.814

Table 2: Summary Statistics of Outlier and Other Countries.

Note: This table reports the summary statistics of cross-sectional data constructed by averaging values of each country included in the panel data from 1980 to 2015.

where $\Delta GDP_{i,t}$ is the growth rate of real GDP in county i in year t; $Foreign\_debt_{i,t}$ is the debt instrument of portfolio investment in country i in year t; Dum^{Normal} is a dummy variable that equals 1 if country i is a non-outlier and 0 otherwise; $X_{i,t-1}$ is a vector of one year lagged controls; δ_i captures country-fixed effects; and γ_t captures time-fixed effects. Hence, β_2 (or $\beta_1 + \beta_2$) is the coefficient of our interest, which captures the correlation between foreign debt and GDP growth in non-outlier countries.

Table 3 summarizes the results of our baseline model. Column 1 shows that the coefficient of the interaction term of foreign debt and the dummy for non-outlier country is positive and significant, although that of foreign debt itself is negative. The F-test for joint significance on the coefficient $\beta_1 + \beta_2$ shows a statistically

significant sign. This indicates that an increase in foreign debt is associated with an increase in GDP growth for non-outlier countries. The result remains unchanged when we exclude the outlier countries from the sample (column 2) or when we include control variables (columns 3-4). Notably, the size of coefficients for non-outlier countries is similar in columns 1 and 3 and in columns 2 and 4 suggesting robustness of the results.

	ΔGDP			
	(1)	(2)	(3)	(4)
Capital inflow				
Foreign debt	-0.008*	0.027***	-0.011*	0.030***
	(0.004)	(0.009)	(0.006)	(0.010)
Foreign debt × Dum(=1 if not an outlier)	0.035***		0.041***	
	(0.010)		(0.012)	
F-test for joint significance	9.23***	-	8.22***	-
Sample	Full	Excl. outlier	Full	Excl. outlier
Country-fixed Effect	✓	✓	✓	✓
Time-fixed Effect	✓	✓	✓	✓
Controls			✓	✓
# Country	122	95	121	94
# Observation	3142	2477	3013	2371
Within R^2	0.116	0.132	0.187	0.201

Table 3: Baseline Result Controlling Outlier Countries.

Note: The dependent variable is real GDP growth. The independent variable is foreign debt (the debt instrument of portfolio investment divided by GDP) and its interaction term with the non-outlier country dummy. Control variables are the lag of human capital index, government consumption to GDP ratio (logged), trade openness (logged), the inflation rate, and initial level of GDP per capita (logged). The sample used in columns 2 and 4 excludes 27 outlier countries. Standard errors in parenthesis are clustered on country. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

2.3 The Panel Instrumental Variable Approach

The baseline model in the previous section shows that higher foreign debt is associated with higher GDP growth in non-outlier countries. This section employs an instrumental variable (IV) approach to reduce concerns on endogeneity such as the reverse causality between foreign debt and GDP growth. For example, higher GDP

growth may attract foreign capital because of higher demand for capital, which would support a positive relation between GDP growth and foreign debt. This concern arises as the baseline model may capture the effects of miscellaneous valuations of foreign debt, instead of identifying exogenous shocks of foreign debt.

The panel IV analysis using an external instrument will help identify exogenous shocks and reduce the endogeneity concerns. To this end, we require an instrument that 1) correlates with foreign debt, but 2) is orthogonal to the error term. We choose the sovereign credit default swap (CDS) spread as an instrument for foreign debt. The data for the CDS spread are available from 1997 to 2015 provided by Kose et al. (2017) and the World Bank. The CDS spread measures the cost for investors to hedge against the sovereign default risk of a country. Hence, the CDS spread naturally correlates with foreign debt. For example, an increase in the CDS spread would lead to an decrease in foreign debt in a country because investors would reduce demand for securities that are considered more risky. Regarding orthogonality to the error term, we might be concerned about a positive correlation between fundamentals and the CDS spread. For example, an increase of current GDP may reduce concerns on debt sustainability of a country decreasing the CDS spread. If this were true, the CDS spread would correlate with the error term and be an invalid instrument.

We present two arguments why we think that the CDS spread is orthogonal to the error term. First, the CDS spread is a forward-looking variable, and therefore the current economic variables including GDP growth must be irrelevant to the CDS spread. For example, consider a case where GDP growth is caused by a positive productivity shock. In this case GDP growth might increase or decrease the CDS spread depending on how long the effects of the shock are expected to last. Second, it is not GDP growth itself but the underlying causes for GDP growth that are relevant to the CDS spread. For example, if GDP growth is caused by an increase in government expenditure, investors might worry about the sustainability of debt and the CDS spread might increase. This might be more likely for a country with a high level of government debt. On the other hand, consider a country that is hit by a permanent positive productivity shock. This may improve sustainability of debt and decrease the CDS spread in the country. Hence, GDP growth, depending on its underlying causes, can either increase or decrease the CDS spread. Therefore, we

assume that the CDS spread is randomly assigned to GDP growth across countries and years guaranteeing orthogonality of the instrument to the error term.

With our IV estimation strategy we can identify supply-push effects of foreign debt unrelated to demand factors in capital recipient countries. We employ two-stage least squares (2SLS). In the first stage we regress foreign debt on the CDS spread and controls to obtain the fitted values of foreign debt. The CDS spread is the cost for investors to hedge against the sovereign risk, and thus contains supply-side information such as willingness of investors to invest in a country. Therefore, the fitted values estimated in the first stage can be interpreted as changes in foreign debt that are caused by exogenous supply-side shocks. In the second stage, we regress GDP growth on the fitted values. Hence, our panel IV regression identifies the supply-push effects of foreign debt on GDP growth providing structural interpretation of estimation results.

Figure 2 shows partial correlation between the CDS spread and foreign debt sketching the first stage regression. Both variables are residualized by the controls used in Table 3 as well as country- and time-fixed effects. The scatter plots suggest that the CDS spread predicts dynamics of foreign debt well: higher sovereign default risks, which are not explained by observable factors and fixed effects, are associated with smaller foreign debt. From the viewpoint of portfolio analysis investors are inclined to reduce demand for securities that are considered more risky. We confirm this negative relation in the formal analysis reported in Table 4.

Table 4 summarizes the results of the panel IV analysis. Here, we use the sub-sample excluding the outlier countries because we can not set the instrument (the CDS spread) for both foreign debt and the interaction term of foreign debt and a dummy for non-outlier countries. Column 1 shows the results without control variables. In the first stage, the coefficient of the CDS spread on foreign debt is negative and significant suggesting that a lower sovereign default risk is associated with higher foreign debt as expected. More importantly, the coefficient of foreign debt on GDP growth is positive and significant in the second stage. One percentage point increase in foreign debt leads to a 0.212 percentage point increase in real GDP. The coefficient is over two times larger than the one estimated by the standard fixed-effect estimation with the same sub-sample shown in column 2. The larger estimate suggests that there is a downward bias in the baseline analysis possibly caused by
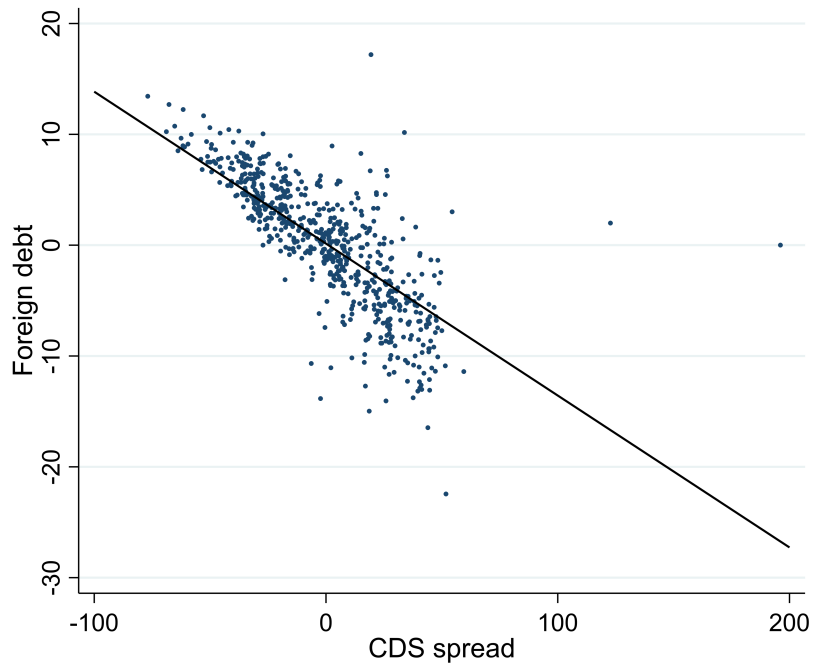
Figure 2: Partial Correlation between CDS Spread and Foreign Debt.

Note: Plotted data in each axis are residuals from OLS regressions of the CDS spread and foreign debt on standard controls, country-fixed effects, and time-fixed effects. The figure does not show one observation (Greece 2012) where the residual of the CDS spread and the foreign debt is 508.4 and -54.6. The fitted line is based on all the available observations.

endogeneity.

The panel IV analysis shows similar results when we include control variables (columns 3-4). In column 3, the coefficient of foreign debt shows a positive and significant sign, and the size of the coefficient is similar to the one in column 1. The coefficient is again much larger than that of the fixed-effect estimation shown in column 4, and the result of the first stage is almost the same as the one in column 1. Moreover, in the panel IV analysis, the first stage F-statistics is sufficiently large, corroborating the relevance of the CDS spread as an instrument.

To summarize, the panel IV analysis in this section reduces endonegeity concerns in our baseline model and indicates that higher foreign debt, in response to a lower sovereign CDS spread, leads to higher GDP growth.

	ΔGDP			
	(1)	(2)	(3)	(4)
Second stage/single equation				
Foreign debt	0.212**	0.093**	0.229**	0.103**
	(0.092)	(0.043)	(0.099)	(0.045)
First stage				
CDS spread	-0.088***	-	-0.088***	-
	(0.022)	-	(0.020)	-
First stage F-statistic	15.052	-	18.121	-
Estimator	2SLS	FE	2SLS	FE
Sample	Excl. outlier	Excl. outlier	Excl. outlier	Excl. outlier
Period	1997-2015	1997-2015	1997-2015	1997-2015
Country-fixed Effect	✓	✓	✓	✓
Time-fixed Effect	✓	✓	✓	✓
Controls			✓	✓
# Country	50	50	50	50
# Observation	643	643	643	643

Table 4: Panel Instrumental Variable Approach (2SLS).

Note: The dependent variable is real GDP growth. The endogenous or independent variable is foreign debt (the debt instrument of portfolio investment divided by GDP), instrumented with the sovereign CDS spread in columns 1 and 3. Control variables are the lag of human capital index, government consumption to GDP ratio (logged), trade openness (logged), inflation rate, and initial level of GDP per capita (logged). Standard errors in parenthesis are clustered on country. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

2.4 Robustness

In the panel IV regression in Section 2.3 we might be concerned that the sovereign CDS spread affects GDP growth through a channel other than foreign debt. In that case, we must include the additional variable capturing the channel in our specification. Financial crises might present such a channel. When a financial crisis occurs, the sovereign default risk increases as GDP is expected to decrease, which in turn decreases foreign debt. In such a case, the CDS spread is systematically related to GDP growth. Therefore, we follow Laeven and Valencia (2013, 2020) to include a banking crisis dummy in the following analysis. Similarly, the government debt to GDP ratio might present another channel. Countries with higher government debt tend to have a higher sovereign CDS spread and lower GDP growth due to a debt overhang problem (e.g., Reinhart and Rogoff, 2010). Thus, we also include

the government gross debt to GDP ratio as an additional control. Furthermore, to reduce concerns about omitted variable bias, we include the regulatory quality index estimated by Kaufmann et al. (2011) and the growth of the private credit to GDP ratio, both of which correlate with foreign debt and GDP growth as additional controls.

	ΔGDP				
	(1)	(2)	(3)	(4)	(5)
Second stage					
Foreign debt	0.185**	0.165**	0.182**	0.168**	0.222**
	(0.0915)	(0.0813)	(0.0913)	(0.0838)	(0.103)
First stage					
CDS spread	-0.087***	-0.085***	-0.086***	-0.085***	-0.075***
	(0.021)	(0.021)	(0.020)	(0.021)	(0.020)
Sovereign rating					0.637***
					(0.194)
Hansen J test					2.266
[p-value]					[0.133]
First stage F-statistic	17.34	16.196	17.447	16.289	8.740
Sample	Excl. outlier	Excl. outlier	Excl. outlier	Excl. outlier	Excl. outlier
Period	1997-2015	1997-2015	1997-2015	1997-2015	1997-2015
Time-fixed Effect	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓
Crisis Dummy	✓	✓	✓	✓	✓
Government Debt/GDP	✓	✓	✓	✓	✓
Regulatory Quality		✓		✓	✓
ΔCredit/GDP			✓	✓	✓
# Country	50	50	50	50	49
# Observation	621	593	602	575	565

Table 5: Robustness (2SLS).

Note: The dependent variable is real GDP growth. The endogenous variable is foreign debt (the debt instrument of portfolio investment divided by GDP) instrumented with the sovereign CDS spread (columns 1–4) or the sovereign rating (column 5). Control variables are the lag of human capital index, government consumption to GDP ratio (logged), trade openness (logged), inflation rate, initial level of GDP per capita (logged), banking crisis dummy, general government gross debt to GDP ratio (logged), regulatory quality, and growth of private credit to GDP ratio. Standard errors in parenthesis are clustered on country. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 5 summarizes the results of including the additional controls. The specification in column 1 includes the banking crisis dummy and the government debt to GDP

ratio showing that our main results hold. The CDS spread is negatively correlated with foreign debt in the first stage, and its coefficient is positive and significant in the second stage. The results remain unchanged if we add the regulatory quality index (column 2), the growth of the credit to GDP ratio (column 3), or both (column 4). The size of the coefficients is fairly stable across the specifications ranging from 0.165 to 0.185.

Similar to the CDS spread, the sovereign debt rating may be another valid instrument for foreign debt. This is because the rating also captures the sovereign default risk of a country and correlates with foreign debt of the country. We perform a panel IV analysis using both the CDS spread and the sovereign rating as instruments, which enables us to conduct an over-identification test. As shown in column 5 of Table 5, the main results hold. More importantly, the over-identification test confirms that we can not reject the null hypothesis that the excluded instruments are exogenous, although the first stage F-statistics becomes much smaller. This result corroborates the validity of using the CDS spread as an instrument.

Next we perform the panel IV analysis including the outlier countries. Columns 1 and 2 of Table 10 present the results. The main findings hold. The coefficients of foreign debt are positively significant in the second stage, and the CDS spread is negatively associated with foreign debt in the first stage. However, the first stage F-statistics is smaller compared to those in Tables 4 and 5. Specifically, in column 1, the F-statistics is below 10 indicating that the outlier countries may be noisy observations even when foreign debt is instrumented with the CDS spread. Thus, we regard the sub-sample excluding the outlier countries as the main data set as before.

The US is by far the largest debtor (see Figure 1). To show that our results are not driven by the US, columns 3 and 4 of Table 10 present results of a sample that excludes the US confirming that our main results hold: The size of coefficients is almost the same as those in column 3 of Table 4 or column 4 of Table 5. Exclusion of the US does not change our main results even when we perform a fixed-effect estimation using the sample used in Table 3. The additional analysis indicates that we capture an empirical regularity across a wide range of countries. Furthermore, we confirm robustness of our model by a dynamic panel GMM analysis developed by Arellano and Bond (1991) (available on request).

3   The Investment Channel

This section explores the channel through which foreign debt contributes to GDP growth. We focus on the investment channel, in which an increase in foreign debt expands the production capacity of a country through accumulation of fixed capital. Without data that decompose foreign debt into public and private debt, we consider the following possible channels: 1) private debt owed to foreigners increases private investment, 2) public debt owed to foreigners increases public investment, and 3) public debt owed to foreigners increases private investment.[7,8] Channels 1) and 2) are straightforward. Channel 3) considers that public debt might crowd in private investment. For example, private firms may be contracted to carry out a public infrastructure project for which the government raises fund by issuing bonds. Therefore, there might be a positive relation between public debt and private investment.

To investigate the investment channel, we perform a panel IV analysis that sets real investment growth as the dependent variable. The specification is described as follows:

$$\Delta Investment_{i,t}^{k} = \beta_1 Foreign\_debt_{i,t} + \Gamma X_{i,t-1} + \delta_i + \gamma_t + \varepsilon_{i,t} \qquad (2)$$

where $\Delta Investment_{i,t}^{k}$ is the growth of gross fixed capital formation in country i in year t with superscript k representing total, private, or public investment, and $Foreign\_debt_{i,t}$ indicates the debt instrument of portfolio investment as before. Total investment is measured in a constant local currency unit and provided by the WDI database. Private and public investments are provided by the IMF Investment and Capital Stock Database and measured in a constant US dollar unit instead of a local currency unit due to data availability. Following the panel IV analysis presented in the previous section, foreign debt is instrumented with the CDS spread and the sample period is from 1997 to 2015.

Table 6 summarizes the results. Column 1 shows that the coefficient of foreign debt on total investment is positive and significant. One percentage point increase in

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[7]We think that it is unlikely that private debt increases public investment, and therefore exclude the possibility.

[8]Alfaro et al. (2014) provides data that distinguish private and public debt but focus on emerging economies that are a subset of our sample.

	ΔInvestment		ΔInvestment$^{\text{Priv}}$		ΔInvestment$^{\text{Pub}}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Second stage						
Foreign debt	0.779***	0.572***	0.863***	0.682***	0.290	0.057
	(0.269)	(0.206)	(0.290)	(0.235)	(0.259)	(0.190)
First stage						
CDS spread	-0.087***	-0.085***	-0.088***	-0.085***	-0.088***	-0.085***
	(0.020)	(0.021)	(0.020)	(0.021)	(0.020)	(0.021)
First stage F-statistic	18.259	16.294	18.301	16.213	18.301	16.213
Sample	Excl. outlier	Excl. outlier	Excl. outlier	Excl. outlier	Excl. outlier	Excl. outlier
Period	1997-2015	1997-2015	1997-2015	1997-2015	1997-2015	1997-2015
Country-fixed Effect	✓	✓	✓	✓	✓	✓
Time-fixed Effect	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Crisis Dummy		✓		✓		✓
Government Debt/GDP		✓		✓		✓
Regulatory Quality		✓		✓		✓
ΔCredit/GDP		✓		✓		✓
# Country	49	49	48	48	48	48
# Observation	628	561	617	551	617	551

Table 6: Investment Channel (2SLS).

Note: The dependent variable is real GDP growth, real private investment growth, or real public investment growth. The endogenous variable is foreign debt (the debt instrument of portfolio investment divided by GDP) instrumented with the sovereign CDS spread. Control variables are the lag of human capital index, government consumption to GDP ratio (logged), trade openness (logged), inflation rate, initial level of GDP per capita (logged), banking crisis dummy, general government gross debt to GDP ratio (logged), regulatory quality, and growth of private credit to GDP ratio. Standard errors in parenthesis are clustered on country. *** p<0.01, ** p<0.05, * p<0.1

foreign debt leads to a 0.779 percentage point increase in total investment growth. The coefficient is much larger than that of GDP growth shown in columns 1 and 3 of Table 4. The result remains unchanged when we include additional controls as shown in column 2. Hence, the results show that an increase in investment, in response to an increase in foreign debt, leads to an increase in GDP growth. Columns 3–6 of Table 6 decompose the total investment into private and public investments. The coefficients of foreign debt on private investment are positive and significant (columns 3 and 4). This result is consistent with that of total investment growth

in columns 1 and 2. Moreover, it also supports the channel of a possible crowding in of private investment when public debt increases. In contrast, the coefficients on public investment are much smaller and insignificant (column 5 and 6) possibly due to the counter-cyclical nature of fiscal stimulus packages.

To summarize, we show that foreign debt increases private investment. If foreign debt is largely private, the link to private investment is straightforward. If it is largely public, government procurement of goods and services may still increase private investment.[9] Moreover, even without this direct link, foreign debt might increase private investment if foreign debt correlates positively with private debt.

4   The Dynamic Effects of Foreign Debt

The analysis presented in the previous sections focuses on the contemporaneous effects of foreign debt on both GDP and investment growth. To investigate the dynamic effects on the subsequent levels of both GDP and investment growth, this section performs the local projection analysis (LP-OLS) developed by Jordà (2005). The LP-OLS specification is described as follows:

$$\Delta_h GDP_{i,t+h} = \ln GDP_{i,t+h} - \ln GDP_{i,t-1} = \beta^h Foreign\_debt_{i,t} + \Gamma^h X_{i,t-1}$$
$$+ \delta_i^h + \gamma_t^h + \varepsilon_{i,t+h}^h \quad (3)$$

where $\Delta_h GDP_{i,t+h}$ is the cumulative growth of real GDP in country i from year $t-1$ to $t+h$ (for $h = 0, 1, 2,$ and 3). The sequence of coefficients β^h will capture the impulse response of GDP to an increase in foreign debt. In the local projections, we fix foreign debt on the right-hand-side in year t, and estimate real GDP growth on the left-hand-side into the future. For example, with $h = 0$, β^0 is the effect of an increase in foreign debt in year t on GDP growth from year $t - 1$ to t. Thus, it captures the contemporaneous effect of foreign debt on GDP growth (estimated coefficients are the same as those in column 4 in Table 3). Similarly, with $h = 2$, β^2 will capture the effect of an increase in foreign debt in year t on the cumulative

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[9]It is well-known that companies such as Lockheed Martin for defense, Boeing for aircraft, Amazon, IMB, and Microsoft for information technology, to just name a few, are large contractors of the US government.

GDP growth from year $t-1$ to $t+2$. Here, we define the growth rate as a log change in real GDP, so that the sequence of coefficients β^h can be interpreted as the effect of foreign debt on the log level of subsequent real GDP. [10]
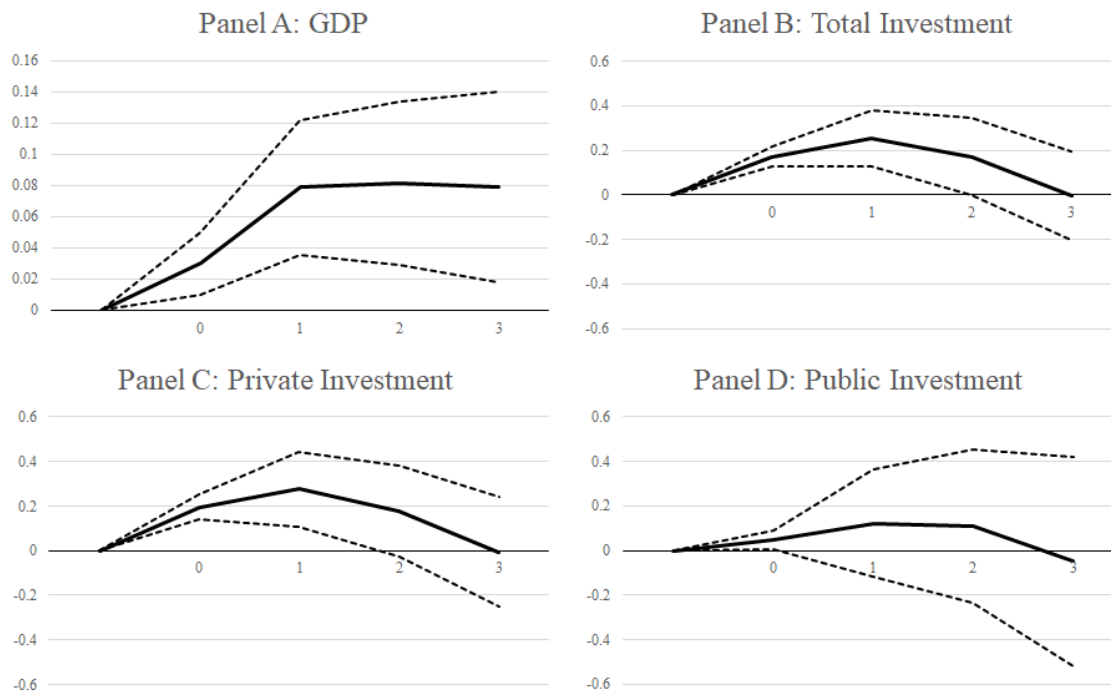

Figure 3: Impulse Response of Real GDP and Investment Growth (LP-OLS).

Note: The solid line represents the response of the dependent variable to an increase in foreign debt for forecast horizon h=0, 1, 2, and 3. Dashed line represents the 95% confidence interval calculated based on the standard error clustered on country. The horizontal axis represents the year after an increase in foreign debt. The dependent variable is cumulative growth of real GDP (panel A), total investment (panel B), private investment (panel C), or public investment (panel D) Control variables are the lag of human capital index, government consumption to GDP ratio (logged), trade openness (logged), inflation rate, initial level of GDP per capita (logged), country-fixed effects and time-fixed effects. The sample excludes 27 outlier countries.

Panel A of Figure 3 shows the impulse response of GDP to an increase in foreign debt,

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[10]The LP-IV analysis, where foreign debt is instrumented with the CDS spread, presents similar results. In that analysis, we observe more persistent effects of foreign debt compared to the LP-OLS analysis. However, there remains concern that the current CDS spread correlates with the subsequent (future) error terms because the spread is a forward-looking variable. This may cause violation of the orthogonal condition for a valid instrument.

using the sample excluding 27 outlier countries. The dynamic effect of foreign debt is positive and significant over years. This result indicates that an increase in foreign debt leads to an increase in the level of GDP in subsequent years, and the positive effects remain over time. We can interpret the dynamic effect as a convergence process to a new steady state in response to an increase in foreign debt. Panel B of Figure 3 shows the impulse responses of total investment to an increase in foreign debt. The dynamic effect is first positive and significant supporting the investment channel but becomes smaller and insignificant as the forecast horizon gets longer. We can interpret this as investment returning to its original steady state while GDP converges to a new steady state as shown in panel A. Contrasting the dynamics of GDP and investment we can see that foreign debt first increases domestic investment and then GDP. The enhanced production capacity through capital accumulation may expand GDP in subsequent years while domestic investment returns to its original level.

Panels C and D of Figure 3 show the dynamic effect when total investment is decomposed into private and public investments. Panel C shows that the dynamic effect on private investment is similar to that in panel B of Figure 3. The dynamic effect of foreign debt is first positive and significant but becomes smaller and insignificant as the forecast horizon gets longer. This result suggests that private investment returns to its original steady state level as total investment in panel B. In contrast, the dynamic effect on public investment is much smaller and insignificant (panel D of Figure 3). Therefore, the LP-OLS analysis suggests that an increase in foreign debt leads to an increase in private investment and then GDP growth in subsequent years.

5   The Mechanism of Upstream Capital Flows

The main result of this paper is that an increase in foreign debt, in response to an decrease in the sovereign default risk, leads to an increase in GDP growth through capital accumulation. This section relates our findings to upstream capital flows and global imbalances as discussed in Gourinchas and Jeanne (2013) and Alfaro et al. (2014).

Table 7 reports the summary statistics of key variables using the panel IV sample as in Table 4 for two groups of countries: OECD and non-OECD countries. Panel A reports the summary statistics of the actual GDP growth. Column 1 shows that the mean of actual GDP growth is higher in non-OECD than OECD countries. Panel B reports predicted GDP growth, i.e., the fitted value of regressing actual GDP growth on our controls (initial GDP, human capital index, government consumption, trade openness, inflation rate, growth of credit to GDP ratio, regulatory quality, banking crisis dummy, government debt to GDP ratio, country-fixed effects, and time-fixed effects). Comparing actual and predicted GDP growth we find that our controls underestimate actual GDP growth of OECD countries (column 1 of panels A and B); the mean of predicted GDP growth of OECD countries (-0.137) is lower than that of actual GDP (2.117). On the other hand, our controls overestimate actual GDP growth of non-OECD countries. The whole sample (i.e., OECD + Non-OECD) shows a reasonable predictive power of our growth regression in every period (top rows of panels A and B). The results remain unchanged when we focus on the mean of four sub-periods (column 2–5 of panels A–B). The results on actual and predicted investment growth are similar (available on request).

How does the inclusion of foreign debt change the above analysis? First, we observe that the mean of foreign debt of OECD countries is larger than that of non-OECD countries (column 1 of Panel C). The average size of foreign debt of OECD countries is 1.075 percent of GDP, while that of non-OECD countries is 0.716. Second, the mean of the CDS spread of OECD countries is lower than that of non-OECD countries (column 1 of panel D). The results largely hold when we focus on the mean of the four sub-periods (columns 2–5 of panels C and D) except for the period from 2012 to 2015 that includes Greece in 2012. Lastly, as shown in panel B of Table 11, we find that the inclusion of foreign debt in our specification enhances the predictive power (R square) of our model for GDP growth (investment) in OECD countries by 2.2 percent (2.9 percent).[11] [12]

The above findings suggest that sovereign default risks are responsible for upstream capital flows that increase GDP growth not explained by the standard fundamentals

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[11]The enhancement of the predictive power by including foreign debt is more modest in the full sample and non-OECD sample (panels A and C of Table 11).

[12]The coefficients of foreign debt are statistically significant only in OECD sample (columns 4–5 of Table 10).

	Panel IV sample (50 countries)				
	Full period	Cross-sectional mean of sub-period			
	1997-2015	2001-2003[†]	2004-2007	2008-2011	2012-2015
	(1)	(2)	(3)	(4)	(5)
Panel A: ΔGDP (actual)					
OECD and Non-OECD	2.908	3.522	5.316	1.661	2.336
OECD	2.117	2.333	4.085	0.637	1.790
Non-OECD	3.698	4.631	6.393	2.770	2.956
Panel B: ΔGDP (fitted, excl. foreign debt)					
OECD and Non-OECD	3.278	n/a	5.918	1.929	2.443
OECD	-0.137	n/a	1.844	-1.781	-0.647
Non-OECD	7.029	n/a	9.621	6.315	5.814
Panel C: Foreign debt					
OECD	1.075	1.192	1.240	1.911	0.057
Non-OECD	0.716	0.052	0.620	0.672	1.135
Panel D: CDS spread					
OECD	2.769	1.792	0.292	1.649	6.506
Non-OECD	5.130	4.438	1.378	3.385	10.372

Table 7: Summary Statistics of Panel IV Sample.

Note: The fitted value of GDP growth is estimated by the regression of actual GDP growth on initial GDP, human capital index, government consumption, trade openness, inflation rate, growth of private credit to GDP ratio, regulatory quality, banking crisis dummy, government debt to GDP ratio, time-fixed effects, and country-fixed effects. †CDS spread of OECD countries is available from 2001 onward.

in OECD countries. Our mechanism presented in this section is consistent with the finding in Gourinchas and Jeanne (2013) that foreign reserve holdings by fast-growing emerging economies hold the key to the allocation puzzle and that in Alfaro et al. (2014) that sovereign-to-sovereign transactions are responsible for upstream capital flows. Moreover, the novel channel of foreign debt and growth we identify via the CDS spread points to the "real" effects of the "exorbitant privilege" the US and other OECD countries have (c.f., Gourinchas and Rey, 2007).

6   Conclusion

We find a positive relationship between foreign debt and GDP growth. Using the sovereign default risk as an instrumental variable we find that the relationship is

causal in nature. Moreover, using a local projection analysis we find that an increase in foreign debt leads to an increase in investment and then GDP growth in subsequent years. On average, the sovereign default risk is lower and foreign debt is higher in OECD than non-OECD countries. This suggests that sovereign default risks are responsible for upstream capital flows that contribute to GDP growth in OECD countries. Foreign debt accounts partially for growth not explained by standard controls in OECD countries. More comprehensive data that decompose the debt instrument in portfolio investment by the type of issuers (public vs private) would allow us identify the exact channel how foreign debt increases investment.

7 Appendix

OECD Countries (as of 2015)				
Australia	Austria	Belgium†	Canada	Chile
Czech Republic	Denmark	Estonia	Finland	France
Germany	Greece	Hungary	Iceland	Ireland†
Israel	Italy	Japan	Korea	Luxembourg†
Mexico	Netherlands†	New Zealand	Norway	Poland
Portugal	Slovakia	Slovenia	Spain	Sweden
Switzerland†	Turkey	United Kingdom†	United States	
Non-OECD Countries (as of 2015)				
Albania	Algeria‡	Argentina	Armenia	Bahrain†
Bangladesh	Barbados†	Belize	Bolivia	Botswana
Brazil	Bulgaria	Burundi	Cambodia	Cameroon
Central African Rep	China	Colombia	Congo (Brazzaville)‡	Costa Rica
Côte d'Ivoire	Croatia	Cyprus†	Dominican Republic	Ecuador‡
Egypt‡	El Salvador	Gabon‡	Gambia	Ghana
Guatemala	Haiti	Honduras	Hong Kong†	India
Indonesia	Iran‡	Iraq‡	Jamaica	Jordan
Kazakhstan‡	Kenya	Kuwait‡	Kyrgyzstan	Latvia
Lesotho	Liberia	Lithuania	Malawi	Malaysia
Mali	Malta†	Mauritania	Mauritius†	Mongolia
Morocco	Mozambique	Namibia	Nepal	Nicaragua
Niger	Pakistan	Panama†	Paraguay	Peru
Philippines	Qatar‡	Romania	Russia‡	Saudi Arabia‡
Senegal	Serbia	Sierra Leone	Singapore†	South Africa
Sri Lanka	Sudan	Tanzania	Thailand	Togo
Tunisia	Uganda	Ukraine	Uruguay	Venezuela‡
Vietnam	Zambia	Zimbabwe		

Table 8: List of countries.

Note: †Financial center (Lane and Milesi-Ferretti (2018)). ‡Oil exporter, oil rents (% of GDP, average of 1980-2015) exceed 8%.

Oil rents, % of GDP (average from 1980 to 2015)			
Country	Oil rents	Country	Oil rents
Kuwait[‡]	42.707	Egypt[‡]	11.369
Iraq[‡]	37.894	Ecuador[‡]	9.725
Saudi Arabia[‡]	37.874	Russia[‡]	8.208
Qatar[‡]	33.075	Indonesia	5.842
Congo (Brazzaville)[‡]	32.619	Norway	5.670
Gabon[‡]	24.469	Malaysia	5.662
Iran[‡]	19.754	Bahrain	5.449
Algeria[‡]	18.541	Tunisia	5.322
Venezuela[‡]	17.217	Sudan	5.149
Kazakhstan[‡]	13.289	⋮	⋮

Table 9: Ranking of Oil Rents (% of GDP)

Note: ‡Oil exporter. Oil rents are the difference between the value of crude oil production at world prices and total costs of production

	ΔGDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Second stage/single equation						
Foreign debt	0.264*	0.171*	0.229**	0.167**	0.0913**	0.110
	(0.142)	(0.091)	(0.099)	(0.084)	(0.039)	(0.085)
First stage						
CDS spread	-0.082***	-0.090***	-0.088***	-0.085***	-	-
	(0.026)	(0.024)	(0.021)	(0.021)		
First stage F-statistic	9.978	13.275	18.024	16.221	-	-
Estimator	2SLS	2SLS	2SLS	2SLS	FE	FE
Sample	Full	Full	Excl. outlier and US	Excl. outlier and US	Excl. outlier	Excl. outlier
Country group	Both	Both	Both	Both	OECD	Non-OECD
Country-fixed Effect	✓	✓	✓	✓	✓	✓
Time-fixed Effect	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Crisis Dummy		✓		✓	✓	✓
Government Debt/GDP		✓		✓	✓	✓
Regulatory Quality		✓		✓	✓	✓
ΔCredit/GDP		✓		✓	✓	✓
# Country	66	66	49	49	26	24
# Observation	795	715	636	568	312	263
Within R^2	-	-	-	-	0.621	0.542

Table 10: Additional specification.

Note: The dependent variable is real GDP growth. The endogenous or independent variable is foreign debt (the debt instrument of portfolio investment divided by GDP) instrumented with sovereign CDS spread. Control variables are the lag of human capital index, government consumption to GDP ratio (logged), trade openness (logged), inflation rate, initial level of GDP per capita (logged), banking crisis dummy, general government gross debt to GDP ratio (logged), regulatory quality, and growth of private credit to GDP ratio. Standard errors in parenthesis are clustered on country. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

	Within R^2 (FE estimator using panel IV sample)		
	(1)	(2)	(3)
	Excl. Foreign debt	Incl. Foreign debt	Difference
Panel A: OECD and Non-OECD			
ΔGDP	0.536	0.546	0.010
ΔInvestment	0.418	0.435	0.018
ΔInvestment^{Priv}	0.436	0.452	0.016
ΔInvestment^{Pub}	0.107	0.109	0.002
Panel B: OECD			
ΔGDP	0.599	0.621	0.022
ΔInvestment	0.477	0.506	0.029
ΔInvestment^{Priv}	0.502	0.531	0.029
ΔInvestment^{Pub}	0.175	0.175	0.001
Panel C: Non-OECD			
ΔGDP	0.538	0.542	0.004
ΔInvestment	0.538	0.549	0.011
ΔInvestment^{Priv}	0.520	0.537	0.018
ΔInvestment^{Pub}	0.170	0.170	0.000

Table 11: Comparison of predictive power.

Note: This table reports within R^2. The dependent variable is real GDP growth, total investment growth, private investment growth, or public investment growth. The independent variable is foreign debt (the debt instrument of portfolio investment divided by GDP). Control variables are the lag of initial GDP, human capital index, government consumption, trade openness, inflation rate, growth of private credit to GDP ratio, regulatory quality, banking crisis dummy, government debt to GDP ratio, time-fixed effects, and country-fixed effects.

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