Public debt and the dollar

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Abstract

We examine the relationship between the broad dollar exchange rate and public debt, using a global panel of over 140 countries. We show that a broad dollar appreciation is associated with higher public debt in the medium run. This pattern is mostly driven by emerging market and developing economies. We further show that it occurs especially in countries that have higher shares of FX debt and for which the market perceptions of debt sustainability are more adverse.

Keywords: public debt, fiscal policy, broad dollar exchange rate

1 INTRODUCTION

The major shocks that have hit the global economy over the past two decades – the Global Financial Crisis (GFC) and the COVID-19 pandemic – have lifted public debt to post WWII-highs (BIS, 2023). This increase has coincided with concerns about a secular decline in GDP growth rates (Rachel and Summers, 2019), as well as with a more recent rise in government borrowing costs as central banks hiked interest rates in the face of the post-pandemic inflation surge (OECD, 2025). These developments raise concerns about fiscal sustainability and underscore the need to understand the drivers of public debt accumulation.

One factor affecting the evolution of public debt is the exchange rate. The effects are most direct in the case of foreign currency-denominated debt, where a currency depreciation increases the debt-to-GDP ratio measured in the domestic currency and therefore, *ceteris paribus*, the debt servicing burden. The US dollar is particularly important, given its dominant role in global finance (Obstfeld and Zhou, 2022). The events of the 1980s are a case in point: the dollar appreciation that accompanied the tightening of US monetary policy contributed to the debt crises in emerging market and developing economies (EMDEs) that had large dollar liabilities.

But even for sovereigns that mostly borrow in local currency, developments in the dollar could indirectly affect public debt. Indeed, an appreciation of the broad US dollar exchange rate, which measures the value of the dollar against all major trading partners of the United States, is generally associated with tighter global financial conditions (Shin, 2019). These effects tend to outweigh those of the bilateral dollar exchange rates (Avdjiev et al., 2019). The broad dollar exchange rate has also been documented to be a risk factor for economic growth, especially in emerging market economies. Hofmann and Park (2020) show that a broad dollar appreciation dampens growth-at-risk (the lowest 5% of growth outcomes), affecting investment and exports, working through the financial channel. In addition, commodity-exporting EMEs tend to be negatively affected through the commodity price channel, as their terms-of-trade deteriorate when the dollar appreciates; see e.g. Allen et al. (2025). Such effects could also have implications for public debt ratios. Yet, although debt sustainability analyses frequently examine the effects of exchange rates (see e.g. IMF, 2021), academic literature has provided less evidence

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on the implications of the broad US dollar exchange rate, which is closely related to global financial conditions. We aim to bridge this gap in the literature.

In this paper, we examine the effects of the broad US dollar exchange rate on public debt in a global panel of over 140 countries, spanning both advanced economies (AEs) and EMDEs. Our baseline estimates focus on the relationship between the dollar and future public debt over a medium-term horizon of three years. We also investigate the importance of a potentially relevant channel driving the effects, the share of sovereign borrowing denominated in foreign currency.

We report two key findings. First, while a current broad dollar appreciation is associated with higher public debt ratios over the medium run in the global panel of countries, the effect is mostly driven by EMDEs – there is no statistically significant relationship in advanced economies. Second, the effect occurs in those EMDEs where a larger share of debt is denominated in foreign currency. Moreover, it takes place in countries where market perceptions of debt sustainability, captured by sovereign credit ratings, are more adverse.

In addition to papers analysing the global role and implications of the US dollar mentioned above, our paper is related to three other strands of literature.

First, it relates to studies analysing the drivers of public debt and deficits. An earlier theoretical literature modelled public debt as a means of redistributing income over time (Barro, 1979; Lucas and Stokey, 1983). Public debt has also been shown to result from political economy considerations, influencing the choices of successor governments (Alesina and Tabellini, 1990). There are a number of papers analysing systematic fiscal behaviour through fiscal reaction functions where debt stabilisation is an important consideration (e.g. Bohn, 1998; Ghosh et al., 2013; Mauro et al., 2015; Mendoza and Ostry, 2008). Blanchard (2019) discusses the costs of public debt in an environment of low interest rates. Di Serio (2024) and Patel and Peralta-Alva (2025) analyse the drivers of public debt using VAR models, but do not focus on the effects of the exchange rate. Another recent paper has examined the determinants of public debt in an "at risk" framework, evaluating how various economic and financial factors affect the future public debt distribution (Furceri et al., 2025). We contribute to this literature by focusing in particular on the effects of the broad dollar exchange rate on debt dynamics.

The second related strand in the literature examines the implications of the exchange rate for public debt. Related to debt sustainability analyses mentioned above, Calvo, Izquierdo and Talvi (2003) and Carrera and Vergara (2012) highlight how currency depreciations can change the path of primary balances that would be consistent with sustainable fiscal policy in Latin America. Acosta-Ormaechea (2020) shows that intra-year exchange rate fluctuations affect public debt projections in economies with large foreign currency denominated liabilities, as flows (e.g. interest payments) are converted into local currency using average annual

exchange rates, but stocks (e.g. the public debt ratio) are converted with year-end exchange rates. Fisera, Workie Tiruneh and Hojdan (2021) study the impact of exchange rate depreciations on external debt ratios in a panel of emerging economies, focusing on the bilateral US dollar rate, while Coulibaly et al. (2024) examine the impact of large exchange rate depreciations on public debt in Africa. We add to this literature in two ways. First, we examine the public debt implications of the broad dollar, which, as discussed above, has been highlighted to be closely linked to global financial conditions. Second, we analyse the implications in a global sample, including advanced as well as emerging and developing economies.

Third, the paper adds to research that studies the implications of the currency denomination of debt. Earlier literature highlighted the inability of EMDE sovereigns to borrow in local currency, a phenomenon referred to as "original sin" (Eichengreen and Hausmann, 1999). These countries had fragile financial positions and were highly sensitive to foreign shocks, resulting in greater macroeconomic volatility. Yet, as emerging economies developed their domestic government bond markets (Mehrotra, Miyajima and Villar, 2012), the risks associated with EME sovereign borrowing evolved as well. Carstens and Shin (2019) discuss the "original sin redux", where the currency risks have shifted from the emerging market sovereign borrowers to the advanced economy lenders, but emerging market currency depreciations still tighten EMEs' financial conditions. At the same time, Eichengreen, Hausmann and Panizza (2023) point out that lower income EMDEs have generally not graduated from "original sin" and continue to borrow predominantly in foreign currency. We contribute to this literature by comparing the medium-term effects of fluctuations in the broad US dollar exchange rate on public debt between countries at different levels of foreign currency borrowing.

This paper is structured as follows. The next section describes the methodology and data. This is followed by empirical evidence in section 3. Finally, section 4 concludes.

2 METHODOLOGY AND DATA

We analyse the drivers of public debt by means of panel fixed effects ordinary least squares regressions of the type:

$$debt_{i,t+h} = \alpha_i + X_{it}\beta + \epsilon_{it} \quad (1)$$

In (1), the dependent variable is the level of public debt h years ahead, expressed in percent of GDP. The data are based on ex-post realised figures. The vector X_{it} contains the explanatory variables at time t; α_i denotes country fixed effects, included to account for time-invariant factors that could affect country-specific debt developments; and ϵ_{it} is the error term.[1]

[1] We note that our exercise is a forecasting-type exercise that does not establish causality. Thus, similarly to work on growth-at-risk (Adrian, Boyarchenko and Giannone, 2019), we include the current value of the dependent variable as part of the regressors but do not apply instrumental variable techniques to establish causal relationships.

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The explanatory variables in (1) can be defined into three broad groups.

First, we include global factors that could affect public debt. Our key variable of interest is the change in the broad nominal US dollar exchange rate, defined so that an increase denotes a USD appreciation. This variable measures the value of the US dollar against the currencies of United States' main trading partners (26 economies). Its tendency to signal fluctuations in global financial conditions has been well established (see Shin (2019) and the references therein). The global block also includes the changes in global food prices and global oil prices, respectively. These global variables vary across time but not across countries.[2] Their inclusion is consistent with studies employing panel data econometrics to analyse, for example, the impact of the broad US dollar exchange rate on economic activity (Hofmann and Park, 2020), as well as on cross-border bank flows and investment (Avdjiev et al., 2019).

A second block consists of variables related to current fiscal policy and fiscal space. Here, we include the current level of public debt, real GDP growth, primary fiscal balance, interest expenditures and government revenues.

A third block consists of crisis related variables. We include a dummy for the Global Financial Crisis (GFC) which obtains a value of one in 2008 and 2009, and zero otherwise. We also include a similarly defined dummy variable for systemic banking crises to capture the potentially large fiscal costs of financial distress (Borio, Farag and Zampolli, 2023).[3]

When evaluating the channels through which changes in the US dollar could affect future debt ratios, we estimate an otherwise identical model to (1), but additionally interact the US dollar exchange rate with variables capturing various country-specific debt characteristics for which sufficient cross-country data are available. In particular, we consider the share of public debt denominated in foreign currency; the share of external debt (private and public) denominated in foreign currency; and the sovereign credit rating of the country, as indicated by the average of foreign currency long-term sovereign debt rating given by Moody's, Standard and Poor's, and Fitch ratings. The objective of this exercise is to understand the debt characteristics that could render the public debt ratios in some economies particularly sensitive to fluctuations in the US dollar.

As to data sources, all fiscal variables are from the IMF's Public Finances in Modern History database (an updated and expanded version of Mauro et al., 2015).[4]

[2] As our dependent variable, the *h*-years-ahead public debt ratio, is country-specific, but the broad dollar measures the value of the dollar against all major trading partners, there is less of a concern about reverse causality from debt to the dollar.
[3] All of the variables in the global block, i.e. the broad dollar exchange rate, global food and global oil prices, display only weak correlation (with correlation coefficients below 0.1) with the dummy variables for the GFC and systemic banking crises, respectively.
[4] https://www.imf.org/external/datamapper/datasets/FPP.

The data for gross public debt refer to the general government sector whenever available (central government otherwise). At the start of our sample period in 2000, the public debt data refer to the general government in 80 economies and to the central government in 68 economies. The broad nominal US dollar exchange rate is from the US Federal Reserve. The data on banking crises are from Nguyen, Castro and Wood (2022) which extends the database of Laeven and Valencia (2020); the data on currency crises are from the same source. The data on the share of public debt denominated in foreign currency are from the updated dataset of Arslanalp and Tsuda (2014); data on the share of external debt in foreign currency and sovereign credit ratings are from Kose et al. (2022). Finally, the data on global commodity prices are from the World Bank.[5] Appendix table A1 lists the data sources and data transformations.

We estimate the model over 2000-19, thus excluding the fiscal consequences of the COVID-19 pandemic. All data are annual. The global panel covers 148 economies, 30 of which are classified as advanced and 118 as emerging and developing, based on the country classification in the IMF's Public Finances in Modern History database. Appendix table A2 lists the countries in the two groups. For some of the estimated models, the country coverage is narrower due to data availability.

The fiscal variables are expressed in percent of GDP, and the GDP growth rate is in percentage. A logarithmic transformation is applied to the broad US dollar index, global food and global oil prices; these three series are subsequently multiplied by 100 and first differences are taken (see also table A1). Appendix table A3 lists summary statistics of the variables included in the baseline model (excluding any dummy variables).

3 EMPIRICAL EVIDENCE

This section presents the empirical evidence. First, we discuss the estimates from the baseline model regarding the relationship between the dollar and future public debt. Second, we analyse the channels that could underpin the key findings. Third, we evaluate the implications of alternative exchange rate measures for future public debt.

3.1 BASELINE RESULTS

The results from the baseline model for the global sample of 148 economies are shown in table 1. The dependent variable is the three-year-ahead public debt ratio, expressed as percentage of GDP. Column (1) includes as explanatory variables only the current debt ratio and the current percent change in the broad USD exchange rate.

The estimates in column (1) show that a broad USD appreciation is systematically related to higher public debt over the medium term in the global sample. In particular, a one percent dollar appreciation in year t is associated with around a 0.6

[5] https://www.worldbank.org/en/research/commodity-markets.

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percentage point higher public debt ratio after three years. The relationship is highly statistically significant. Column (1) also indicates an important persistence in public debt – a one percentage point increase in public debt-to-GDP today carries over to a 0.6 percentage point rise in government debt three years down the road.

Table 1

Baseline model, all economies

	(1)	(2)	(3)	(4)	(5)
	All econ.				
Variables	$Debt_{t+3}$				
Debt	0.636***	0.636***	0.621***	0.626***	0.611***
	(0.040)	(0.040)	(0.045)	(0.042)	(0.046)
ΔDollar	0.584***	0.570***	0.390***	0.602***	0.539***
	(0.079)	(0.094)	(0.080)	(0.083)	(0.098)
GDP growth			-0.450***		-0.489***
			(0.123)		(0.132)
Primary balance			-0.891***		-0.899***
			(0.152)		(0.154)
Interest expenditures			-0.225		-0.322
			(0.962)		(0.985)
Government revenues			0.290		0.310*
			(0.180)		(0.176)
Food price inflation		0.003			0.172***
		(0.043)			(0.052)
Oil price inflation		-0.008			-0.080**
		(0.033)			(0.040)
GFC				-3.273***	-4.900***
				(1.143)	(1.053)
Banking crises				7.047***	4.123**
				(2.407)	(2.033)
Constant	20.178***	20.205***	15.177***	20.735***	15.429***
	(2.103)	(2.104)	(5.637)	(2.224)	(5.522)
Observations	2,960	2,960	2,960	2,960	2,960
R-squared	0.426	0.426	0.465	0.431	0.471
# of economies	148	148	148	148	148

*Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is the three-year-ahead public debt ratio, $Debt_{t+3}$. All explanatory variables are at period t. All models include country fixed effects.*

These results remain robust to the inclusion of a battery of control variables, as shown in the other columns of table 1. Column (2) adds other global variables, i.e. growth in food and oil prices; column (3) includes variables related to fiscal policy and fiscal space; column (4) considers dummy variables related to crises; and column (5) all of the above. Most importantly, the coefficient on *ΔDollar* is only slightly lower in column (5) than in column (1) and remains highly statistically significant. Higher real GDP growth and higher primary balances lead to lower public debt ratios in the medium run. And while banking crises lead to persistently

higher public debt, consistent with the large fiscal costs of financial crises, the opposite is true for the GFC in the global sample.

Table 2

Baseline model, advanced economies

	(1)	(2)	(3)	(4)	(5)
	AEs				
Variables	$Debt_{t+3}$				
Debt	0.779***	0.794***	0.716***	0.787***	0.762***
	(0.059)	(0.059)	(0.065)	(0.070)	(0.065)
ΔDollar	-0.318***	0.109	-0.386***	-0.354***	0.064
	(0.084)	(0.080)	(0.077)	(0.091)	(0.102)
GDP growth			-0.388*		0.166
			(0.221)		(0.237)
Primary balance			-1.274***		-1.204***
			(0.266)		(0.225)
Interest expenditures			-3.180***		-3.788***
			(0.833)		(0.798)
Government revenues			1.603***		1.645***
			(0.476)		(0.459)
Food price inflation		0.276***			0.236***
		(0.053)			(0.046)
Oil price inflation		-0.039			-0.001
		(0.032)			(0.034)
GFC				8.001***	6.566**
				(2.666)	(2.559)
Banking crises				6.874**	4.880**
				(2.642)	(2.201)
Constant	18.899***	17.031***	-34.698*	16.642***	-41.509**
	(3.862)	(3.917)	(17.339)	(4.597)	(16.569)
Observations	600	600	600	600	600
R-squared	0.558	0.567	0.644	0.610	0.682
# of economies	30	30	30	30	30

*Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is the three-year-ahead public debt ratio, $Debt_{t+3}$. All explanatory variables are at period t. All models include country fixed effects.*

We also note that employing the Hausman test on the model in column (5) of table 1 provides support for the fixed effects specification. In particular, we clearly reject the null hypothesis that the individual effects are uncorrelated with the regressors (*p*-value below 0.01). While the Pesaran-Yamagata test for slope homogeneity vs. heterogeneity on the same specification rejects slope homogeneity (*p*-value below 0.01), we prefer to apply the standard fixed effects model. Allowing for slope heterogeneity would arguably lead to imprecise estimates, given the relatively short time dimension of our panel.

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Tables 2 and 3 show that the debt-increasing effect of dollar appreciation in the global sample stems from the impact obtained for EMDEs. In particular, for AEs, table 2 shows that the coefficient on *ΔDollar* is not statistically significant when all the control variables are included (column (5) in table 2). In some of the estimated models, the coefficient on the broad USD exchange rate is actually negative, suggesting that a dollar appreciation would be associated with *lower* public debt ratios in the medium run. By contrast, for EMDEs, table 3 shows that a dollar appreciation leads to higher public debt. In these economies, the coefficient on *ΔDollar* is highly statistically significant in all models and close in economic significance to that observed in the global sample (table 1). In particular, column (5) in table 3 suggests that a one percent appreciation in the broad USD dollar exchange rate is associated with a 0.7 percentage point increase in public debt ratios three years down the road in EMDEs.

There are also other interesting differences between the variables affecting future public debt in AEs and EMDEs. For one, the public debt ratios in EMDEs benefit from higher growth even over the medium term, while there is no statistically significant relationship in AEs. Meanwhile, the coefficient on interest expenditures is positive and significant in AEs but statistically insignificant in EMDEs. This suggests that higher interest expenses trigger future government deleveraging in AEs, perhaps due to the perceived need to improve fiscal health. Indeed, if we replace three-years-ahead public debt by future primary balances (either one, two or three-years-ahead) as the left-hand side variable, we obtain a positive and statistically significant coefficient on interest expenditures for AEs.[6] This implies that higher interest expenditures today lead to higher future primary balances and reduce public debt ratios.[7] Finally, banking crises and the GFC are associated with higher public debt in AEs, while the GFC prompted deleveraging by the public sector in EMDEs. These findings may partly reflect the sample period (2000-19) which generally featured more frequent financial stress in advanced economies than in their emerging market counterparts.

[6] These results are available upon request.
[7] This result is consistent with Tkacevs and Vilerts (2019) who document a positive impact of government borrowing costs on cyclically adjusted primary balances for a sample of OECD countries.

Table 3

Baseline model, emerging market and developing economies

	(1)	(2)	(3)	(4)	(5)
	EMDEs				
Variables	$Debt_{t+3}$				
Debt	0.621***	0.620***	0.592***	0.609***	0.577***
	(0.046)	(0.046)	(0.055)	(0.047)	(0.055)
ΔDollar	0.778***	0.666***	0.571***	0.813***	0.662***
	(0.088)	(0.113)	(0.089)	(0.090)	(0.117)
GDP growth			-0.418***		-0.480***
			(0.124)		(0.137)
Primary balance			-0.803***		-0.810***
			(0.168)		(0.166)
Interest expenditures			0.392		0.394
			(1.209)		(1.223)
Government revenues			0.162		0.182
			(0.187)		(0.181)
Food price inflation		-0.046			0.163***
		(0.051)			(0.061)
Oil price inflation		-0.008			-0.101**
		(0.041)			(0.048)
GFC				-5.805***	-6.878***
				(1.205)	(1.119)
Banking crises				-2.652	-3.156
				(2.663)	(2.599)
Constant	18.894***	19.140***	17.440***	20.108***	18.465***
	(2.269)	(2.251)	(5.421)	(2.341)	(5.233)
Observations	2,360	2,360	2,360	2,360	2,360
R-squared	0.414	0.415	0.449	0.421	0.458
# of economies	118	118	118	118	118

*Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is the three-year-ahead public debt ratio, $Debt_{t+3}$. All explanatory variables are at period t. All models include country fixed effects.*

To what extent do these results hold for other estimation horizons? The baseline results discussed above relate to the medium term, given that the dependent variable is the three-year-ahead public debt ratio. Appendix table A3 shows the estimates for models where the dependent variable is either the one-, three- or five-year-ahead debt ratio. All the models include the full set of control variables (not shown). The results confirm the key result that the relationship between the US dollar and future debt is stronger for EMDEs than it is for AEs, across the different horizons. When the one-year-ahead debt ratio is used (first column), the change in the US dollar exchange rate also obtains a positive and statistically significant coefficient in the group of AEs. However, its economic magnitude is only around one half of the coefficient estimate in EMDEs. For the five-year-ahead debt ratio (third column), the coefficient on the change in the exchange rate is not statistically significant for AEs, but it remains significant for EMDEs.

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3.2 CHANNELS

Why would the change in the US dollar exchange rate be systematically related to the future level of public debt in one group of countries while remaining insignificant in others? An important factor is likely to be the structure of public debt, in particular its currency denomination.

To examine this issue, we first use data on the share of public debt denominated in foreign currency, obtained from the updated dataset of Arslanalp and Tsuda (2014). For data consistency reasons, we only use data for EMDEs, 115 of which have available data for at least part of our sample period.[8] Small island nations aside, some EMDEs have *all* of their outstanding public debt denominated in foreign currency during part of the sample, including Cambodia, El Salvador and Nicaragua. The opposite – all outstanding public debt denominated in *local* currency – is also true for some EMDEs during part of the sample period, including China, Iran and Saudi Arabia. While we do not have information on the exact currency composition of FX denominated debt for our sample, a large part of FX debt is generally assumed to be denominated in the US dollar. Important exceptions are European emerging markets where FX debt tends to be predominantly denominated in euros (and, in some cases, Swiss francs).

We interact the change in the US dollar exchange rate with a dummy variable equal to one if FX denominated debt in the economy in a particular year is higher than the sample median (53%) and zero otherwise. The results are shown in the first two columns of table 4, where the dummy variable is denoted as "FX share of debt".

The results show that an appreciation of the US dollar is systematically related to higher future public debt in EMDEs where FX denominated debt accounts for a larger share of total public debt. Column (1) in table 4 includes only the current level of public debt, the change in the dollar exchange rate, a dummy denoting a high FX share of public debt and the associated interaction variable between the exchange rate and the dummy for high FX share. While the interaction variable obtains a positive coefficient in column (1), it is not statistically significant. However, when the battery of control variables is included (column (2)), the interaction variable obtains a statistically significant positive coefficient. The coefficient estimates imply that in EMDEs with a high share of FX debt, a one percent appreciation of the US dollar is associated with a 0.8 percentage point higher public debt ratio over the medium term (0.464 + (0.338 * 1) = 0.802, with a *p*-value below 0.01). For EMDEs with lower FX-denominated debt, the impact is lower (0.464), and the difference between the two groups of countries is statistically significant at the 95% level. We also note that EMDEs with higher FX debt shares on average have almost three percentage points lower public debt ratios than their other EMDE peers – the coefficient on the dummy variable "FX share of debt" on its own is -2.939 and it is weakly statistically significant. This result might stem from the lower debt limits that EMDEs with high FX debt shares could face given their

[8] The corresponding data for AEs refer to debt securities only (updated dataset of Arslanalp and Tsuda, 2012).

greater vulnerabilities. Alternatively, FX debt might be cheaper to issue (with a lower interest rate than domestic currency debt), resulting in lower accumulated debt ratios over time.

TABLE 4

Evidence on the underlying channels

	(1)	(2)	(3)	(4)	(5)
Variables			**Debt$_{t+3}$**		
Debt	0.618***	0.572***	0.453***	0.490***	0.574***
	(0.051)	(0.056)	(0.088)	(0.104)	(0.055)
ΔDollar	0.644***	0.464***	-0.168	-0.138	0.362**
	(0.145)	(0.162)	(0.137)	(0.149)	(0.140)
ΔDollar * FX share of debt	0.243	0.338**			
	(0.181)	(0.170)			
FX share of debt	-4.046*	-2.939*			
	(2.208)	(1.713)			
ΔDollar * Ext FX debt			0.609**	0.419**	
			(0.231)	(0.160)	
Ext FX debt			-5.696***	-4.674**	
			(2.004)	(2.011)	
Food price inflation		0.154**		0.287***	0.044
		(0.063)		(0.073)	(0.063)
Oil price inflation		-0.101**		-0.158**	-0.118**
		(0.051)		(0.061)	(0.048)
GDP growth		-0.602***		-0.672**	-0.484***
		(0.181)		(0.290)	(0.137)
Primary balance		-0.781***		-1.139**	-0.820***
		(0.165)		(0.497)	(0.167)
Interest expenditures		0.186		-0.243	0.403
		(1.223)		(1.577)	(1.219)
Government revenues		0.174		0.670	0.174
		(0.175)		(0.485)	(0.180)
GFC		-7.508***		-6.370***	-8.959***
		(1.122)		(2.023)	(1.180)
Banking crises		-2.544		-3.926	-2.970
		(2.632)		(4.909)	(2.646)
ΔVIX					0.078***
					(0.015)
Constant	21.225***	21.357***	31.699***	12.452	19.697***
	(1.987)	(5.148)	(4.607)	(16.130)	(5.193)
Observations	2,202	2,202	487	487	2,360
R-squared	0.413	0.455	0.266	0.385	0.463
# of economies	115	115	38	38	118

*Note: Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. The dependent variable is the three-year-ahead public debt ratio, Debt$_{t+3}$. All explanatory variables are at period t. All models include country fixed effects.*

We also investigate the relevance of *external* debt denominated in foreign currency for the exchange rate-public debt relationship. In addition to external FX debt incurred by the public sector, private sector FX liabilities could also add to future public debt. Unsustainable credit booms to finance consumption and investment by foreign capital can eventually lead to financial strains, a drop in output, exchange rate depreciation and a deterioration of public finances, coupled with fiscal stimulus to reignite economic growth (see also Borio, Farag and Zampolli, 2023). Governments may also resort to bailouts of private borrowers, including through the rescue of failing banks. We use the variable "external debt in foreign currency in percent of total external debt" from Kose et al. (2022). Data availability is much sparser in this case than in the results discussed earlier – only 38 economies can be included in the estimation.

Using these data, we again create a dummy variable (denoted by "Ext FX debt") that obtains the value of one for those country-year observations that exceed the sample median and a value of zero otherwise. We observe that no advanced economy falls into the country group with higher external FX debt share (corresponding to above 90% of total external debt). Notably, some EMDEs have *all* of their external debt (public + private) denominated in foreign currency. The country featuring most annual observations with fully FX denominated external debt in our sample is Namibia, followed by Moldova. By contrast, the lowest share of FX denominated external debt in our sample occurred in Cyprus (5.1% in 2011).

Despite the much smaller sample in these estimations, the share of external debt denominated in FX also appears to matter for the dollar-public debt relationship. In column (3) where the estimation only includes a narrow set of control variables, the interaction variable between *ΔDollar* and the dummy variable "Ext FX debt" is positive and statistically significant. The same holds when all the control variables are included (column (4)). The coefficient estimates in column (4) imply that in economies with a higher FX denominated share of external debt, a one percent appreciation of the US dollar is associated with a 0.3 percentage point higher public debt ratio over the medium term (-0.138 + (0.419 * 1) = 0.281, with a *p*-value of 0.055). In economies with a lower FX share of external debt, there is no statistically significant relationship. However, as mentioned earlier, the estimates should be interpreted with some caution due to the much smaller available estimation sample. Moreover, we acknowledge that, for the common available sample period, the share of public debt denominated in foreign currency and the share of external debt in foreign currency are positively and closely correlated (correlation coefficient of 0.57). This means that for estimations employing the FX share of total external debt, the FX share of public debt might be an important driving factor.

Another, complementary, channel for the baseline results could be a global risk-off shock, leading to increased demand for safe assets, capital outflows from EMDEs and dollar appreciation. The currency depreciation in EMDEs can then mechanically raise their debt ratios. In this case, the correlation between USD appreciation and higher debt ratios in EMDEs can reflect capital flow reversals. To incorporate this channel,

we include the change in the log VIX index in the estimation in column (5), capturing an increase in global risk aversion. The coefficient estimate on this variable is statistically significant and suggests that a 10% increase in the VIX index is associated with a 0.8 percentage point increase in the public debt ratio in EMDEs three years ahead.

The previous results suggest that the currency denomination of debt plays an important role in the dollar-public debt relationship. We next show that it is the economies deemed most vulnerable by the rating agencies that experience an increase in public debt over the medium term when the broad dollar appreciates.

To see this, we consider interaction variables similar to those used above, interacting the change in the dollar exchange rate with a dummy variable capturing the sovereign credit rating. The data that we use to construct the dummy refers to the average rating of foreign currency long-term sovereign debt given by Moody's, Standard and Poor's, and Fitch, and is obtained from Kose et al. (2022). The latter authors transform the credit ratings into a numerical variable that ranges from 1 (worst rating) to 21 (highest rating). Over our sample period, the rating for AEs ranges from 3 to 21, with an average of 18. For EMDEs, the range is from 1 to 19, with a mean of 10. Thus, the average rating is much lower for EMDEs.

As with the variables related to the currency denomination of debt, we create a dummy variable that obtains a value of one for the country-year observations when a country's credit rating is above the sample median and zero otherwise, and also interact the dummy variable with the change in the log broad dollar exchange rate. The credit rating variable is available for almost the entire baseline sample of AEs and EMDEs, unlike the indicators for the currency denomination of debt.

Table 5 shows that a broad dollar appreciation has little effect on future public debt in countries with stronger credit ratings. Consider column (2), where the sample includes both AEs and EMDEs, and the estimation uses a full set of control variables. In economies with below-median credit ratings, a one percent broad dollar appreciation is associated with 0.636 percentage point higher public debt three years down the road. This effect is highly statistically significant. By contrast, in countries with above-median credit ratings, the relationship between the dollar and public debt is close to zero and not statistically significant (0.636 – (0.596 * 1) = 0.040, with a *p*-value of 0.658.)

Column (4) provides corresponding evidence for advanced economies only, with a full set of control variables. In this group, the dollar appreciation has little effect on future public debt, and the sovereign credit rating does not seem to matter for the relationship between the exchange rate and future public debt. At the same time, there are only a handful of country-year observations among advanced economies where sovereign credit ratings fall below the global sample median – these correspond to less than 5% of all observations in the advanced economy sample.

Table 5

Interaction between credit ratings, exchange rate and public debt

	(1)	(2)	(3)	(4)	(5)	(6)
	All econ.		AEs		EMDEs	
Variables	$Debt_{t+3}$					
Debt	0.723***	0.693***	0.785***	0.783***	0.699***	0.639***
	(0.077)	(0.077)	(0.069)	(0.074)	(0.108)	(0.116)
ΔDollar	0.667***	0.636***	-0.342	-0.020	0.695***	0.556***
	(0.133)	(0.142)	(0.369)	(0.313)	(0.135)	(0.150)
ΔDollar * Credit rating	-0.587***	-0.596***	0.025	0.092	-0.214	-0.427**
	(0.171)	(0.147)	(0.417)	(0.354)	(0.195)	(0.165)
Credit rating	3.115	1.808	1.163	5.108	2.751	1.379
	(2.461)	(1.798)	(3.373)	(3.686)	(2.772)	(2.000)
GDP growth		-0.701***		0.115		-0.808***
		(0.199)		(0.229)		(0.228)
Primary balance		-1.253***		-1.145***		-1.232***
		(0.184)		(0.236)		(0.235)
Interest expenditures		-0.897		-3.895***		0.048
		(1.203)		(0.804)		(1.735)
Government revenues		0.628**		1.696***		0.487
		(0.277)		(0.442)		(0.304)
Food price inflation		0.286***		0.240***		0.287***
		(0.056)		(0.047)		(0.068)
Oil price inflation		-0.129***		-0.003		-0.171***
		(0.035)		(0.038)		(0.046)
GFC		-3.374**		6.049**		-5.915***
		(1.342)		(2.588)		(1.539)
Banking crises		1.715		5.536**		-4.465
		(2.044)		(2.227)		(3.242)
Constant	16.087***	4.304	17.429**	-49.681***	15.964***	10.900
	(4.774)	(8.743)	(7.044)	(15.924)	(5.503)	(8.905)
Observations	2,149	2,149	600	600	1,549	1,549
R-squared	0.423	0.497	0.558	0.684	0.384	0.460
# of economies	125	125	30	30	95	95

*Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is the three-year-ahead public debt ratio, $Debt_{t+3}$. All explanatory variables are at period t. All models include country fixed effects.*

By contrast, the debt consequences of broad dollar appreciations vary strongly within the group of EMDEs. Column (6) shows that in EMDEs with lower credit ratings, a 1% broad dollar appreciation is associated with a 0.556 percentage point increase in the level of public debt three years on. This effect is highly statistically significant. In EMDEs with a higher credit rating, the effect is only 0.101 percentage points and it is not statistically significant (0.556 – (0.427 * 1) = 0.129, with a *p*-value of 0.317). Thus, broad dollar appreciations are associated with higher future public debt in economies that are also considered more vulnerable by rating agencies and thus have lower foreign currency sovereign ratings.

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3.3 FURTHER EVIDENCE ON THE EXCHANGE RATE

The previous estimations used the first difference of the log broad dollar exchange rate in the estimations, i.e. the appreciation or depreciation of the dollar exchange rate. In this section, we consider three other exchange rate measures.

First, we use the *level* of the exchange rate in the estimation instead of the first difference. The rationale is that perhaps the level of the broad dollar – say, a historically strong level – could matter for future debt developments. The results are shown in table 6. Columns (1) and (2) show the results for the global sample; columns (3) and (4) for AEs; and columns (5) and (6) for EMDEs.

In the global sample, the level of the broad dollar is not associated in a statistically significant way with future public debt. This is the case when only current public debt and the dollar exchange rate are included as control variables (column (1) in table 6) and when all the control variables are included (column (2)).

The same message arises in the AE and EMDE samples considered separately. To be sure, when only current public debt and the dollar exchange rate are included as control variables, there is some evidence of a statistically significant relationship between the level of broad dollar and future public debt. And, interestingly, the relationship is actually negative for AEs, implying that a higher level of the broad dollar is associated with lower future public debt (column (3) in table 6). For EMDEs, by contrast, the relationship is positive, like the baseline estimation (column (5)). However, when all control variables are included (columns (4) and (6)), in neither AEs or EMDEs do we find a statistically significant relationship between the level of the broad dollar and future public debt. These findings suggest that it is indeed the change in the dollar exchange rate (i.e., appreciation or depreciation) that has persistent effects on the debt trajectory.

As a second alternative exchange rate measure, we replace the change in the broad dollar by a dummy variable capturing currency crises. We use data from Nguyen et al. (2022), where currency crises are defined according to the depreciation of the domestic currency against the US dollar. Specifically, the authors define the occurrence of a currency crisis when the nominal depreciation of the currency is at least 30% a year and it is at least 10% higher than the previous year's change. Using this definition, our estimation sample features 73 crises, two of which occurred in AEs and 71 in EMDEs.

Table 6

Results with the level of the broad dollar exchange rate

	(1)	(2)	(3)	(4)	(5)	(6)
	All econ.		AEs		EMDEs	
Variables	$Debt_{t+3}$					
Debt	0.636***	0.609***	0.748***	0.762***	0.592***	0.568***
	(0.044)	(0.048)	(0.065)	(0.065)	(0.054)	(0.058)
Dollar (level)	0.086	0.054	-0.315***	-0.013	0.225***	0.092
	(0.057)	(0.045)	(0.078)	(0.044)	(0.067)	(0.059)
Food price inflation		0.052		0.218***		0.022
		(0.057)		(0.045)		(0.067)
Oil price inflation		-0.105***		-0.005		-0.130***
		(0.038)		(0.033)		(0.045)
GDP growth		-0.506***		0.170		-0.507***
		(0.138)		(0.235)		(0.145)
Primary balance		-0.923***		-1.182***		-0.855***
		(0.156)		(0.219)		(0.169)
Interest expenditures		-0.358		-3.784***		0.349
		(0.984)		(0.798)		(1.224)
Government revenues		0.343*		1.638***		0.232
		(0.178)		(0.460)		(0.183)
GFC		-3.543***		6.633**		-4.999***
		(1.013)		(2.410)		(1.073)
Banking crises		4.453**		4.875**		-2.816
		(2.087)		(2.232)		(2.764)
Constant	-19.143	-9.856	166.439***	-35.171	-83.496***	-24.090
	(25.263)	(21.728)	(37.202)	(23.650)	(29.608)	(27.552)
Observations	2,960	2,960	600	600	2,360	2,360
R-squared	0.410	0.466	0.577	0.682	0.393	0.451
# of economies	148	148	30	30	118	118

*Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is the three-year-ahead public debt ratio, $Debt_{t+3}$. All explanatory variables are at period t. All models include country fixed effects.*

Table 7 shows that the implications of currency crises for public debt appear to differ from those resulting from changes in the broad dollar exchange rate, but the statistical significance of the results is weak. Considering those specifications where all control variables are included (columns (2), (4), (6)), we obtain a weakly statistically significant and negative relationship between currency crises and future public debt in the sample of EMDEs. In particular, a currency crisis today is associated with four percentage points lower public debt three years down the road, perhaps because it hinders countries' access to debt markets. Another reason could be that currency crises tend to be associated with higher future inflation (see graph 5 in Banerjee et al., 2024), which would then lower future debt ratios through an increase in the denominator (nominal GDP). For AEs, there is no statistically significant relationship, which is not surprising given the absence of frequent currency crises in this country group.

TABLE 7

Implications of currency crises

	(1)	(2)	(3)	(4)	(5)	(6)
	All econ.		AEs		EMDEs	
Variables	$Debt_{t+3}$					
Debt	0.644***	0.616***	0.759***	0.768***	0.623***	0.581***
	(0.040)	(0.050)	(0.062)	(0.067)	(0.045)	(0.059)
Currency crises	-1.130	-4.124	23.039**	7.068	-1.587	-4.213*
	(2.669)	(2.522)	(8.432)	(8.106)	(2.669)	(2.418)
GDP growth		-0.524***		0.225		-0.525***
		(0.154)		(0.212)		(0.162)
Primary balance		-0.914***		-1.126***		-0.851***
		(0.158)		(0.240)		(0.173)
Interest expenditures		-0.271		-3.670***		0.427
		(1.019)		(0.739)		(1.261)
Government revenues		0.330*		1.588***		0.220
		(0.186)		(0.465)		(0.193)
Food price inflation		0.044		0.198***		0.011
		(0.057)		(0.043)		(0.067)
Oil price inflation		-0.109***		0.006		-0.139***
		(0.039)		(0.031)		(0.047)
GFC		-3.968***		6.875**		-5.714***
		(1.083)		(2.627)		(1.153)
Banking crises		4.232**		4.808*		-2.253
		(2.052)		(2.460)		(2.658)
Constant	20.093***	15.431***	19.774***	-40.358**	19.270***	18.445***
	(2.088)	(5.849)	(4.052)	(16.156)	(2.221)	(5.575)
Observations	2,912	2,912	588	588	2,324	2,324
R-squared	0.402	0.459	0.564	0.685	0.376	0.443
# of economies	147	147	30	30	117	117

*Note: Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. The dependent variable is the three-year-ahead public debt ratio, $Debt_{t+3}$. All explanatory variables are at period t. All models include country fixed effects.*

As a third alternative, instead of using the nominal broad dollar, we use the real broad dollar exchange rate, thus taking into consideration the relative price levels between countries. The results are shown in appendix table A5. We find that the coefficients on the change in the broad real dollar exchange rate are similar in magnitude and statistical significance to those for the nominal broad exchange rate. This result is likely to stem from price stickiness in the short run and the tendency of nominal exchange rates to fluctuate more than the relative price levels.

4 CONCLUSION

In this paper, we have shown that an appreciation of the broad dollar is associated with an increase in public debt ratios over the medium term. However, the strength of the relationship varies greatly among economies. It is generally stronger in EMDEs and especially in those countries that have larger shares of foreign

currency-denominated public debt. By contrast, the effect is small or non-existent in advanced economies and in those countries that predominantly borrow in their domestic currency. We have also shown that the positive relationship between the broad dollar appreciation and future public debt arises especially in countries that are deemed more vulnerable by rating agencies and thus have lower foreign currency sovereign ratings.

While we have explored the relationship between the broad dollar and the level of public debt, future research could provide useful insights into the bond market implications of exchange rate changes. This includes the effects of exchange rate changes for market liquidity, depth and market access for sovereign borrowers, for example.

Disclosure statement

The author has no conflicts of interest to declare.

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APPENDIX

Table A1

Data sources, units and transformations

Variable	Source	Unit & transformation
Government debt	IMF's Public Finances in Modern History (IMF PFMH)	% of GDP, level
Primary balance	IMF PFMH	
Interest expenditures	IMF PFMH	
Gov't revenues	IMF PFMH	
GDP growth	IMF PFMH	%
ΔDollar	US Federal Reserve	First difference of log level, multiplied by 100
Food price inflation	World Bank	
Oil price inflation	World Bank	
GFC		1 in 2008-09; 0 otherwise
Banking crises	Nguyen et al. (2022)	1 in crisis years; 0 otherwise
Currency crises	Nguyen et al. (2022)	
External FX debt	Kose et al. (2022)	% of total external debt
FX share of public debt	Update of Arslanalp and Tsuda (2014)	% of total public debt
Credit rating	Kose et al. (2022)	1 (worst) to 21 (best)
ΔVIX	FRED database	First difference of log level, multiplied by 100

TABLE A2

List of countries in the sample, by country group

AEs	EMDEs			
United States	South Africa	St. Lucia	Angola	Tunisia
United Kingdom	Argentina	St. Vincent & Gren.	Burundi	Uganda
Austria	Bolivia	Suriname	Cabo Verde	Burkina Faso
Belgium	Brazil	Trinidad & Tobago	Central African Rep.	Solomon Islands
Denmark	Chile	Bahrain	Chad	Fiji
France	Colombia	Iran	Comoros	Kiribati
Germany	Costa Rica	Jordan	Congo, Rep.	Vanuatu
Italy	Dominican Republic	Kuwait	Congo, Dem. Rep.	Papua New Guinea
Luxembourg	Ecuador	Lebanon	Benin	Marshall Islands
Netherlands	El Salvador	Oman	Equatorial Guinea	Micronesia
Norway	Guatemala	Qatar	Ethiopia	Azerbaijan
Sweden	Haiti	Saudi Arabia	Gabon	Albania
Switzerland	Honduras	UAE	Ghana	Georgia
Canada	Mexico	Yemen	Guinea-Bissau	Kyrgyz Republic
Japan	Nicaragua	Bangladesh	Guinea	Bulgaria
Finland	Panama	Bhutan	Kenya	Moldova
Greece	Paraguay	Myanmar	Lesotho	Russia
Iceland	Peru	Cambodia	Madagascar	Tajikistan
Ireland	Uruguay	Sri Lanka	Morocco	China
Portugal	Venezuela	India	Mozambique	Ukraine
Spain	Antigua & Barbuda	Indonesia	Niger	Uzbekistan
Australia	Bahamas, The	Korea	Nigeria	Hungary
New Zealand	Aruba	Malaysia	Rwanda	Mongolia
Cyprus	Barbados	Maldives	Seychelles	Croatia
Israel	Dominica	Pakistan	Senegal	North Macedonia
Czech Republic	Grenada	Philippines	Namibia	Bosnia & Herz.
Slovak Republic	Guyana	Thailand	Sudan	Poland
Estonia	Belize	Vietnam	Eswatini	Romania
Latvia	Jamaica	Djibouti	Tanzania	
Slovenia	St. Kitts and Nevis	Algeria	Togo	

Table A3

Summary statistics

Variable	Mean	Std. dev.	Min	Max
Debt	52.718	35.665	0.488	269.305
ΔDollar	0.434	4.598	-6.354	12.306
ΔDollar_real	0.142	4.333	-6.525	10.921
Dollar	462.867	9.071	448.661	475.117
GDP growth	3.710	4.715	-36.392	110.505
Prim. balance	0.420	5.516	-30.289	52.533
Interest exp.	2.058	1.942	0.000	17.314
Gov't revenues	28.918	13.981	0.637	136.204
Food price infl.	2.958	11.718	-18.583	28.905
Oil price infl.	2.678	15.773	-23.968	39.338
ΔVIX	-2.298	25.351	-35.586	62.259

Note: Debt, primary balance, interest expenditures and government revenues are expressed as percentage of GDP. The table excludes variables used in the estimation as dummy variables. The summary statistics for all variables are based on 2,960 observations.

TABLE A4

Relationship between the US dollar and debt over different horizons

	All econ.		
Variables	**Debt$_{t+1}$**	**Debt$_{t+3}$**	**Debt$_{t+5}$**
Debt	0.904***	0.611***	0.354***
	(0.029)	(0.046)	(0.057)
ΔDollar	0.479***	0.539***	0.982***
	(0.051)	(0.098)	(0.120)
Constant	3.631	15.429***	24.203***
	(2.622)	(5.522)	(6.776)
Observations	2,960	2,960	2,810
R-squared	0.820	0.471	0.248
# of economies	148	148	148
	AEs		
	Debt$_{t+1}$	**Debt$_{t+3}$**	**Debt$_{t+5}$**
Debt	0.960***	0.762***	0.505***
	(0.020)	(0.065)	(0.088)
ΔDollar	0.275***	0.064	0.243
	(0.043)	(0.102)	(0.164)
Constant	-11.822**	-41.509**	-46.109**
	(5.628)	(16.569)	(20.687)
Observations	600	600	570
R-squared	0.914	0.682	0.455
# of economies	30	30	30
	EMDEs		
	Debt$_{t+1}$	**Debt$_{t+3}$**	**Debt$_{t+5}$**
Debt	0.891***	0.577***	0.319***
	(0.036)	(0.055)	(0.070)
ΔDollar	0.540***	0.662***	1.154***
	(0.062)	(0.117)	(0.143)
Constant	4.776*	18.465***	25.731***
	(2.489)	(5.233)	(6.614)
Observations	2,360	2,360	2,240
R-squared	0.806	0.458	0.250
# of economies	118	118	118

*Note: All variables include the full set of control variables (not shown), as in column 5 of tables 1, 2 and 3. Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. The dependent variable is either the one-year, three-year or the five-year-ahead public debt ratio, as indicated in the column headings. All explanatory variables are at period t. All models include country fixed effects.*

TABLE A5

Model with real broad dollar exchange rate

	(1)	(2)	(3)	(4)	(5)	(6)
	All econ.		AEs		EMDEs	
Variables	$Debt_{t+3}$					
Debt	0.635***	0.611***	0.779***	0.762***	0.616***	0.575***
	(0.040)	(0.046)	(0.059)	(0.065)	(0.046)	(0.055)
ΔDollar_real	0.578***	0.506***	-0.391***	0.126	0.796***	0.615***
	(0.084)	(0.096)	(0.092)	(0.102)	(0.091)	(0.116)
Food price inflation		0.123**		0.243***		0.102
		(0.054)		(0.044)		(0.063)
Oil price inflation		-0.059		0.007		-0.075
		(0.041)		(0.036)		(0.049)
GDP growth		-0.497***		0.160		-0.491***
		(0.134)		(0.239)		(0.138)
Primary balance		-0.915***		-1.222***		-0.829***
		(0.155)		(0.226)		(0.167)
Interest expenditures		-0.359		-3.801***		0.366
		(0.987)		(0.805)		(1.226)
Government revenues		0.323*		1.646***		0.196
		(0.175)		(0.459)		(0.181)
GFC		-4.417***		6.524**		-6.269***
		(1.049)		(2.524)		(1.121)
Banking crises		4.214**		4.840**		-3.099
		(2.039)		(2.206)		(2.607)
Constant	20.412***	15.368***	18.850***	-41.544**	19.336***	18.524***
	(2.125)	(5.547)	(3.904)	(16.565)	(2.288)	(5.271)

	(1)	(2)	(3)	(4)	(5)	(6)
	All econ.		**AEs**		**EMDEs**	
Variables			**$Debt_{t+3}$**			
Observations	2,960	2,960	600	600	2,360	2,360
R-squared	0.424	0.470	0.560	0.682	0.412	0.457
# of economies	148	148	30	30	118	118

*Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is the three-year-ahead public debt ratio, $Debt_{t+3}$. All explanatory variables are at period t. All models include country fixed effects.*