Fiscal sources of inflation risk in EMDEs: the role of the external channel*

Ryan Banerjee† Aaron Mehrotra‡ Fabrizio Zampolli§

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Abstract

We examine how changes in fiscal deficits affect near-term future inflation in a panel of emerging market and developing economies (EMDEs). Using a novel method for quantile panel regressions with fixed effects, we find that an increase in the fiscal deficit has highly non-linear effects on inflation - that is, a larger impact on upside tail risks than on average inflation. These effects are substantially larger in EMDEs than in advanced economies. We also show that an increase in the fiscal deficit raises the risk of future currency depreciation, especially when the share of sovereign debt in foreign currency is large or when a sizeable share of sovereign debt is held by foreign residents. Finally, we find that the effects of fiscal deficits on future inflation are strongly attenuated in inflation targeting regimes.

JEL Codes: E31; E52; E62; E63.
Keywords: Fiscal deficit, inflation, exchange rate depreciation, sovereign risk, emerging market and developing economies, original sin, inflation targeting.

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†Bank for International Settlements. E-mail address: ryan.banerjee@bis.org
‡Bank for International Settlements. E-mail address: aaron.mehrotra@bis.org
§Bank for International Settlements. E-mail address: fabrizio.zampolli@bis.org

1 Introduction

The Covid-19 pandemic has rekindled interest in the fiscal determinants of inflation. After the re-opening of the economy, inflation has reached in many countries levels not seen in the past two decades. This reflects both supply disruptions and strong demand, the latter being fuelled not only by extremely expansionary monetary policies but also - in a large number of countries - by large fiscal stimuli. There is a concern that fiscal policy may add fuel to fire, especially in countries with a troubled history of fiscal indiscipline and high inflation (see eg Esquivel et al. (2019) and World Bank (2021))[1].

Predicting how fiscal policy might impact on inflation has therefore gained greater prominence of late. Central banks need accurate forecasts to calibrate their monetary policy response. A fiscal expansion contributes to increasing domestic aggregate demand along with the interest rate set by the central bank. The ensuing smaller economic slack then leads to higher inflation through a standard Phillips curve. At the same time, other channels may also be relevant. One is through the exchange rate. In textbook models, a fiscal expansion typically leads to a currency appreciation (eg Auerbach and Gorodnichenko (2016)), which then partly offsets the inflationary impact of smaller economic slack. However, if a fiscal expansion is expected to significantly worsen the fiscal accounts, it might lead to an erosion of investors' confidence and a currency depreciation, which then magnifies the initial inflation response (eg Ghosh et al. (2013)). This channel is likely to be more relevant in emerging market and developing economies (EMDEs) than in advanced economies.

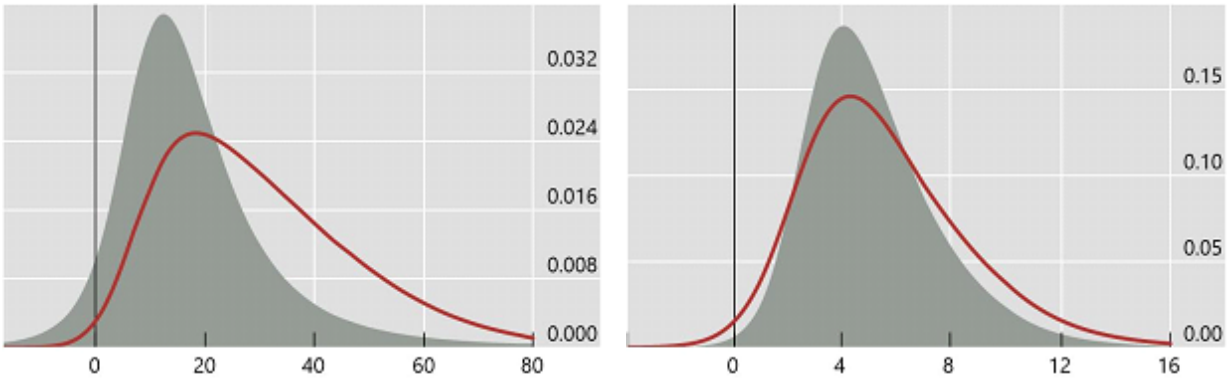
An important question is whether EMDEs are today more vulnerable to large currency depreciation and inflation increase following a relaxation of fiscal policy. For one, public debt in many EMDEs is larger today than at the start of the millennium - in some cases,

[1]For the recent debate regarding the inflationary consequences of fiscal stimulus in the United States, see Krugman (2021) and Summers (2021).

well beyond levels that used to be associated with sovereign stress in the past. On the other hand, large number of EMDEs have overcome the "original sin" - that is, the inability to borrow in their own currency (Eichengreen and Hausmann (1999)). This makes countries less likely to default, other things equal. But even if most sovereign borrowing is now in domestic currencies, a large share of this debt is still held by foreign investors whose positions are typically not fully hedged against currency risk.[2] This may expose the borrowing country to fluctuations in the value of its currency as investors respond to fiscal news. Thus, a priori, it is not clear whether the link between fiscal deficit and inflation is necessarily weaker as a result. In addition, an increasing number of EMDEs have adopted inflation targeting. This should contribute to stabilising inflation expectations and supporting the domestic currency in response to fiscal shocks.

Central banks are typically interested not only in forecasting the effects of deficits on average or modal inflation outcomes, but also in assessing the risks surrounding those central forecasts. This allows them to take action to reduce the likelihood of very high (or very low) inflation outcomes (eg Greenspan (2004); Kilian and Manganelli (2008) discuss the relevance of risk management approach to monetary policy making). Because the tail risks to inflation generally shift as a result of a change in fiscal policy, a realistic forecast distribution cannot be produced by using ordinary regression techniques such as forecasting from an OLS model. Figure 1 illustrates this point. Using data over six decades, the figure shows how a two standard deviation in the fiscal deficit changes the one-year-ahead inflation forecast distribution - from grey to red - in EMDEs (left-hand panel) and advanced economies (right-hand panel). Beside having much stronger effects in EMDEs than in advanced economies, it substantially increases upside tail risks to inflation in the former - the right tail shifts visibly to the right.

[2] In other words, currency mismatches have not disappeared but have shifted from borrowers to lenders, a phenomenon dubbed "original sin redux" by Carstens and Shin (2019). Because of this, foreign investors' response to changes in policy may amplify fluctuations in the exchange rate.



(a) Emerging market and developing economies (b) Advanced economies

Figure 1: **The effect of higher deficits on the inflation forecast distribution are greater in EMDEs.** This figure shows the conditional forecast distribution of the inflation rate over the next year. The grey shaded density shows the conditional distribution evaluated at the sample means of all variables. The red density shows the conditional distribution evaluated at a two standard deviation increase in the change in the fiscal deficit, with other control variables at their means. The left-hand panel shows the conditional distributions of inflation estimated with the sample of emerging and developing economies. The right-hand panel shows the conditional distributions of inflation with the sample of advanced economies.

In this paper, we examine how higher deficits affect inflation risk in a sample of EMDEs. We use novel methods for quantile panel regressions with fixed effects (Machado and Santos Silva (2019)), which allow us to examine how higher deficits affect the entire inflation forecast distribution. We also shed light on how the exchange rate moves as deficits increase. Moreover, we evaluate how higher public debt ratios, the lower degree of '"original sin" and the adoption of inflation targeting have affected the strength of the deficit-inflation relationship.

We report four main findings. First, increases in deficits have highly non-linear effects on inflation, raising especially right-tail inflation risks. Moreover, the deficit-inflation link is much stronger in EMDEs than in advanced economies.

Second, the exchange rate channel is important, and also much stronger in EMDEs than in advanced economies. We show that the exchange rate depreciates, on average, as deficits rise. Moreover, measures of sovereign risk deteriorate, likely contributing to the observed exchange rate depreciation. We also document non-linearities between deficits

and exchange rates, with higher deficits increasing the risk of large depreciations.

Third, higher deficits are followed by exchange rate depreciation in particular when the share of sovereign debt in foreign currency is large or when a sizeable share of debt is held by foreign residents. Thus, the shift from "original sin" to "original sin redux" has not insulated EMDEs from the exchange rate effects of higher deficits. At the same time, we find that the size of the overall debt stock - denominated in either domestic or foreign currency - plays a smaller role for the exchange rate response when deficits rise.

Fourth, the underlying monetary policy regime matters strongly for the deficit-inflation link. In particular, the effect of higher deficits on inflation is considerably muted in inflation targeting regimes. We show that, under that regime, the effects of rising deficits on the exchange rate are also attenuated. Interestingly, in inflation targeting EMDEs, we document the textbook effect of appreciating exchange rates in response to an increase in fiscal deficits.

The paper is related to various strands of literature. A number of papers have examined how fiscal deficits affect inflation (eg Catao and Terrones (2005); Lin and Chu (2013); Fischer et al. (2002); Bordo and Levy (2021)). However, except for Lin and Chu (2013), these studies have not examined the effects of deficits on the entire distribution of inflation. We add further to this literature by examining how the evolving monetary policy regimes of EMDEs have affected the fiscal deficit-inflation relationship.

We also add to the literature that analyses how changes in fiscal policy affect exchange rates (eg Monacelli and Perotti (2010); Kim and Roubini (2008); Ilzetzki et al. (2013); Benetrix and Lane (2013); Alberola-Ila et al. (2021)). We contribute to this research in two ways. First, we examine the effects of fiscal deficits on the entire distribution of exchange rate changes, which has to our knowledge not been examined in previous literature. Second, we highlight important differences in the exchange rate effects between economies with different degrees of macro-financial vulnerabilities, such as foreign holdings

of sovereign debt or the share of debt in foreign currency.

Our paper is also related to studies that examine whether the monetary policy regime of inflation targeting influences inflation outcomes and expectations (eg Ball and Sheridan (2004); Lin and Ye (2007); Gürkaynak et al. (2010)). We contribute to this literature by highlighting how inflation targeting helps mitigate both inflation and exchange rate risks stemming from higher fiscal deficits.

Finally, our paper adds to studies that have highlighted non-linearities in the Phillips curve (eg López-Salido and Loria (2020); Busetti et al. (2021); Forbes et al. (2021)). We contribute to this literature by focusing on the non-linear effects on inflation of fiscal deficits, and by examining how monetary policy frameworks interact with fiscal deficits to affect such non-linearities.

The rest of the paper is structured as follows. The next section describes the methodology and the data sources. Section 3 presents the baseline empirical results. Section 4 considers extensions and robustness tests. Section 5 concludes.

2 Methodology and data

In order to examine the effect of fiscal deficits on inflation risks, we use novel methods for panel quantile regressions with fixed effects (see Machado and Santos Silva (2019)). We estimate the conditional quantiles of future headline inflation using a location-scale model, written as:

$$\pi_{t+1} = a_i + X'_{it}\beta + (\delta_i + X'_{it}\gamma)U_{it}, \tag{1}$$

where the dependent variable π_{t+1} is one-year-ahead inflation. The vector of explana-

tory variables is:

$$X'_{it} = (\Delta def_{it}, \pi_{it}, \Delta y_{it}, \Delta exc_{it}, \Delta oil_{it}, SovereignCrisis_{it}), \tag{2}$$

where Δdef_{it} is the year-on-year change in fiscal deficit as a percentage of GDP; π_{it} is the current level of headline inflation; Δy_{it} denotes the year-on-year change in real GDP; Δexc_{it} is the change in the bilateral exchange rate against the US dollar; Δoil_{it} denotes the change in oil prices denominated in local currency; and $SovereignCrisis_{it}$ is a dummy variable that captures the occurrence of sovereign debt crisis in year t. $\Delta y_{it}, \Delta exc_{it}$, and Δoil_{it} are measured in logarithms and are multiplied by 100.

In (1), the parameters $(\alpha_i, \delta_i), i = 1, \ldots, n$ denote the individual i fixed effects. From Eq (1), we have $\Pr[\delta_i + X'_{it}\gamma > 0] = 1$. We assume the sequence $\{X_{it}\}$ is strictly exogenous, iid for any fixed i and independent across i. U_{it} are unobserved random variables, iid across countries i and years t, orthogonal to X_{it} and normalised to satisfy $E[U] = 0$ and $E[|U|] = 1$. We obtain the conditional quantiles for one-year-ahead average inflation using:

$$Q_\pi(\tau|X_{it}) = (\alpha_i + \delta_i q(\tau)) + X'_{it}\beta + X'_{it}\gamma q(\tau). \tag{3}$$

In (3), the scalar $\alpha_i(\tau) = \alpha_i + \delta_i q(\tau)$ is the quantile-τ fixed effect for economy i. $\alpha_t(\tau)$ captures the time-invariant effect of individual country characteristics that potentially vary depending on where the country lies in the conditional inflation distribution. We estimate the coefficients for 5 quantiles: 5%, 25%, 50%, 75% and 95%. We estimate the confidence intervals by using a block bootstrapping with 1,000 replications, clustering on country.

For a given country and year, each predicted quantile from Eq (3) represents a point in the CDF $F(\cdot)$ of the one-year-ahead inflation forecast. To address noise in our quantile estimates, following Adrian et al. (2019), we interpolate the semiparametrically the pre-

dicted quantiles using the skewed $t-$ distribution (see Azzalini and Capitanio (2003)).The distribution is described by the following function:

$$f(\pi;\mu,\sigma,\alpha,\nu) = \frac{2}{\sigma} t\Big(\frac{\pi-\mu}{\sigma};\nu\Big) T\left(\alpha\frac{\mu-\pi}{\sigma}\sqrt{\frac{\nu+1}{\nu+\frac{(\pi-\mu)^2}{\sigma}}};\nu+1\right). \tag{4}$$

In Eq (4), $t(\cdot)$ and $T(\cdot)$ are the PDF and the CDF of the student-T distribution, respectively. The distributional parameters μ (location), σ (scale), ν (kurtosis), and α (skewness) are estimated for each country-year pair by minimising the mean squared error between the five predicted quantiles and the distribution-implied values. In other words, we select parameter estimates that minimize the following objective function:

$$(\hat{\mu}_{it+h},\hat{\sigma}_{it+h},\hat{\alpha}_{it+h},\hat{\nu}_{it+h}) = \text{argmin}\sum_{\tau}(\hat{Q}_{\pi_{t+h|x_t}}(\tau|x_t) - F^{-1}\big(\tau;\mu,\sigma,\alpha,\nu\big)\big)^2 \tag{5}$$

We also use quantile regressions to investigate the effects of fiscal deficits on the exchange rate distribution. In this case, the left-hand side variable is the one-year-ahead change in the log exchange rate, Δexc_{it+1}, where an increase denotes a depreciation of the domestic currency against the US dollar. In these specifications, we include as additional explanatory variables the US Federal funds rate, i_{it}^{US} and US equity return volatility as a proxy for global investor risk aversion, $EqVol_{it}^{US}$.

Finally, to shed additional light on the exchange rate channel, we use simple linear models with fixed effects to analyse the effects of fiscal deficits on CDS spreads, $CDSspread_{it+1}$, and on the foreign currency long-term sovereign debt rating, $SovRating_{it+1}$. Linear models are also applied when interacting the increase in fiscal deficits with EME macro-financial characteristics, such as the share of FX debt, and analysing their joint effect on the exchange rate.

The data are annual, covering 26 emerging and developing economies from 1960 to 2019.[3] For many EMDEs, the time series are shorter due to data availability. In order to exclude extreme outliers, we omit country-year observations where current inflation and one-year-ahead inflation rates exceed 600%.

Data for fiscal balances, interest payments and government debt are from Mauro et al. (2015) and have been extended forward to 2019 using data from IMF Fiscal Monitor. Real GDP and inflation are from national sources and the exchange rates are from the BIS. The oil price is that of West Texas Intermediate (WTI), transformed from US dollars into local currency. The years for sovereign debt crises are from Laeven and Valencia (2020).

Other indicators, discussed next, are generally available for much shorter time periods than the baseline series mentioned above. As a source for 5-year sovereign CDS spreads, the foreign currency long-term sovereign debt rating and general government debt held by non-residents, we use Kose et al. (2017). For government debt in foreign currency, we use BIS data on the share of total general government debt securities that is denominated in foreign currency.[4]

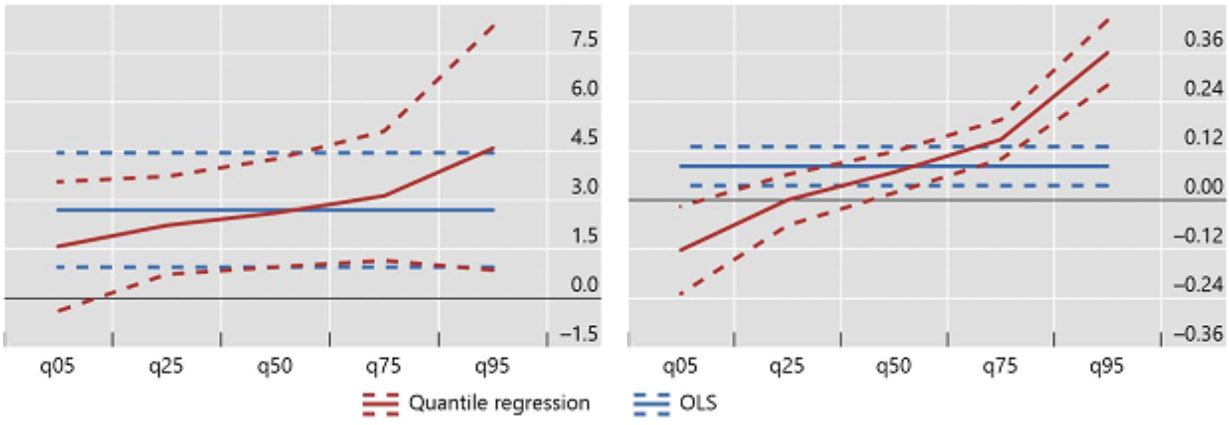
3 Empirical evidence

3.1 Baseline model

In this section, we highlight the non-linear effects of deficits on inflation in emerging market economies and analyse in detail the exchange rate channel. Finally, we highlight the important role played by the monetary policy regime.

[3]The economies included are Bolivia, Brazil, Chile, China, Colombia, Dominican Republic, Ghana, Hong Kong SAR, Honduras, Haiti, Hungary, Indonesia, Israel, India, Korea, Mexico, Nicaragua, Peru, Philippines, Poland, Romania, Russia, Thailand, Turkey, Uruguay and South Africa. As a comparison group for some of the estimated models, we consider 22 advanced economies: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and the United States.

[4]See https://www.bis.org/statistics/secstats.htm?m=$6_3 3_6 15$



(a) Emerging market and developing economies (b) Advanced economies

Figure 2: **Quantile regression estimates of fiscal deficits on inflation.** This figure shows the estimated coefficients in quantile regressions of inflation rate over the next year $t+1$ on changes in the fiscal deficit-to-GDP ratio in year t. Coefficients are shown by the q% quantile (x-axis); e.g. q50 denotes the 50% quantile. The left-hand panel shows coefficients estimated in the sample of emerging and developing economies while the right-hand panel shows the coefficients estimated in the sample of advanced economies. Quantile estimates are shown with 90% confidence bands using a block bootstrap clustered by country. OLS estimates are shown with 90% confidence bands clustered by country.

Figure 2 shows that an increase in fiscal deficits has larger effects on the right tail of the inflation forecast distribution. Moreover, the effects on inflation are considerably stronger in emerging market and developing economies than in advanced economies. The coefficient estimates suggest that, in EMDEs, a one percentage point increase in fiscal deficits raises future inflation by 3 percentage points at the median of the inflation forecast distribution. At the right tail, ie at 95% quantile, the effect is around 4.5 percentage points. Thus, an increase in fiscal deficits raises especially the probability of high future inflation outcomes. The estimates for EMDEs compare with increases of 0.1 percentage points (median) and 0.35 percentage points (95% quantile) for AEs.

The coefficient estimates on the left tail are not statistically significant at 90% level in either group of countries. However, the point estimate on the right-tail falls outside the 90% confidence interval of the left tail, suggesting significant non-linearity across the forecast distribution.

Not surprisingly, the levels of inflation across the quantiles vary notably between

EMDEs and AEs. Whereas the levels of inflation are similar at the 5% quantile (0.7% in EMDEs and 0.3% in AEs), the differences are greater at the median (7.3% in EMDEs vs 3.1% in AEs) and especially at the 95% quantile (74.7% in EMDEs vs 16.2% in AEs). These differences, together with the different marginal effects of higher deficits, account for the results in Figure 1 that showed how the entire inflation forecast distribution shifts as a result of higher deficits.

Beyond fiscal deficits, there are important non-linearities in the other explanatory variables as well (Table 1). Higher current inflation increases the probability of high future inflation outcomes, as the coefficient is larger at the right tail of the inflation forecast distribution. This observation is consistent with prices being adjusted more frequently when inflation is high (see eg Alvarez et al. (2019)). Similarly, real GDP growth and the occurrence of sovereign debt crisis have larger effects on the right tail of the inflation forecast distribution. The result for real GDP growth is in line with a flatter Phillips curve at low inflation rates (see eg Busetti et al. (2021)). The coefficient on the exchange rate is also higher in magnitude on the right tail and highly economically significant, but the statistical significance tends to be weak.[5] Table A.1 in the Appendix shows corresponding evidence for advanced economies.

[5]We show in Section 4.1 that when average inflation over the next three years is considered as the dependent variable, the coefficient on the exchange rate is both economically and statistically highly significant, highlighting the importance of the exchange rate channel in EMDEs.

Inflation forecast quantiles	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
Δdef_{it}	1.572	2.197**	2.578***	3.096***	4.576**
	(1.284)	(0.913)	(0.992)	(1.103)	(2.281)
π_{it}	0.100	0.422***	0.617***	0.883***	1.642**
	(0.302)	(0.0895)	(0.109)	(0.190)	(0.646)
Δy_{it}	0.213	0.652**	0.920***	1.284***	2.323
	(0.707)	(0.270)	(0.291)	(0.452)	(1.491)
Δexc_{it}	0.0899	0.117	0.134	0.156	0.221
	(0.207)	(0.0733)	(0.0964)	(0.181)	(0.534)
Δoil_{it}	0.0556	0.0532*	0.0518*	0.0498	0.0442
	(0.0466)	(0.0311)	(0.0293)	(0.0322)	(0.0657)
$SovereignCrisis_{it}$	12.05	16.03**	18.45***	21.74***	31.16*
	(9.654)	(6.495)	(6.401)	(7.596)	(16.99)
Observations	1,080	1,080	1,080	1,080	1,080

Table 1: **Quantile regression estimates of inflation risk in the sample of EMDEs.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it}. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

3.2 The exchange rate channel

In textbook models, a fiscal expansion is generally expected to lead to exchange rate appreciation (eg Auerbach and Gorodnichenko (2016)). However, and perhaps more prominently in EMDEs, fiscal expansion could lead to a loss of confidence by economic agents and a rise in country risk, especially if a country is perceived to have little or no fiscal space (eg Ghosh et al. (2013)), depreciating the exchange rate.

The first column of Table 2 shows that, on average in our EMDE sample, an increase in fiscal deficits is associated with an exchange rate depreciation.[6] The point estimate suggests a 1.5% depreciation, after one year, in response to a one percentage point increase in fiscal deficits. This corresponds to a 3.1% depreciation associated with a one standard deviation increase in deficits (2.1 percentage points).

[6]The exchange rate is defined so that an increase denotes a depreciation of the EMDE currency against the US dollar.

Furthermore, as fiscal deficits increase, EME sovereign risk rises. The second column in Table 2 shows that a one percentage point increase in fiscal deficits is associated with around 25 basis points increase in the 5-year sovereign CDS spread, although the relationship is only statistically significant at the 10% level.

Moreover, the rating of the country's sovereign foreign currency debt deteriorates as fiscal deficits rise (third column), with the effect being significant at the 5% level. The sovereign rating is converted to a numeric scale where higher values indicate lower ratings, with a one notch deterioration corresponding to to an increase in the index of around 0.05 units. Thus, the coefficient estimate suggests that a one percentage point increase in deficits is associated with a deterioration in the country's sovereign foreign currency debt rating y around 1.5 notches.

Regarding the coefficients on the other control variables, we note that higher policy rates in the United States result in EME exchange rate depreciations (Column 1) and higher CDS spreads (Column 2), with both effects statistically significant at the 1% level.

VARIABLES	(1) Exc rate$_{t+1}$	(2) CDS spread$_{t+1}$	(3) Sov rating$_{t+1}$
Δdef_{it}	1.460***	24.76*	0.0763**
	(0.465)	(13.06)	(0.0301)
π_{it}	0.184***	-26.56	-0.00922
	(0.0475)	(18.87)	(0.00931)
$\Delta CDSspread_{it}$		0.105	
		(0.0963)	
Δy_{it}	0.311	-9.740	-0.0434
	(0.228)	(8.098)	(0.0304)
Δexc_{it}	0.272***	-5.186**	0.00936
	(0.0556)	(2.475)	(0.0109)
Δoil_{it}	0.000827	0.350	0.000536
	(0.0164)	(0.308)	(0.00172)
$SovereignCrisis_{it}$	8.557	363.0	6.479***
	(5.567)	(234.5)	(1.901)
i_t^{US}	0.879***	34.24***	0.00770
	(0.183)	(11.69)	(0.0141)
$EqVol_t^{US}$	1.326	31.89	-0.101
	(1.202)	(44.73)	(0.0770)
$\Delta SovRating_{it}$			0.0309
			(0.0498)
Observations	1,079	337	599
R-squared	0.413	0.460	0.302
Number of countryid	26	20	25

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: **Increases in fiscal deficits result in weaker exchange rates and increase country risk.** This table shows the estimated coefficients from OLS regressions of the log change in the nominal exchange rate (column (1)), the sovereign CDS spread (column (2)) and the sovereign rating (column (3)) in $t+1$ regressed on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, log change in the local price of oil, Δoil_{it}, a dummy variable taking on the value 1 in sovereign crisis years $SovereignCrisis_{it}$, change in the sovereign CDS spread $\Delta CDSspread_{it}$, and the change in the sovereign rating $\Delta SovRating_{it}$. The sovereign rating is converted to a numeric scale where higher values indicate lower ratings. For the external variables we also include the level of interest rates in the United States i_t^{US} and realised equity volatility of the S&P 500 $EqVol_t^{US}$ to control for the influence of global financial conditions. Estimated regressions include country fixed effects. Robust standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

3.3 Further evidence on exchange rate effects

Given the importance of the exchange rate channel, coupled with the historically high exchange rate pass-through to inflation in EMDEs (eg Ha et al. (2019)), this section further

analyses the relationship between fiscal deficits and exchange rates. The focus is on how longer-term changes in EMDEs' macro-financial characteristics have affected the deficit-exchange rate link.

Table 3 shows the outcomes from linear fixed effect regressions, where deficits are interacted with a dummy variable, D_{it}, based on different dimensions of macro-financial vulnerabilities. As an example, in the first column, D_{it} obtains a value of one if the share of FX debt in total public debt is above the sample median; the second column does the same for the share of foreign holdings of sovereign debt, and so on. An important caveat in these exercises is that the sample size is significantly smaller than in the baseline models due to more limited data availability.

The first column of Table 3 shows that an increase in fiscal deficits leads to an EMDE currency depreciation when the share of sovereign debt denominated in foreign currency is above the sample median (17%). In this case, a one percentage point increase in deficits is associated with a 1.1% exchange rate depreciation. Notably, when FX debt is below the sample median, an increase in deficits has no statistically significant effect on the exchange rate.

Similar results obtain for foreign holdings of EMDE sovereign debt (second column). In this case, when the share of sovereign debt held by foreign residents is above the sample median (35.7%), a one percentage point increase in deficits leads to around 0.4% exchange rate depreciation (-0.76%+1.15%*1=0.39%). By contrast, with below-median share of foreign holdings, an increase in deficits is met with exchange rate appreciation in the following year, in line with a textbook model.

	FX share Δexc_{it+1}	Nonres holding Δexc_{it+1}	Total govt debt Δexc_{it+1}	Int pay to GDP Δexc_{it+1}
Δdef_{it}	-0.310	-0.756**	0.542	0.623
	(0.249)	(0.358)	(0.506)	(0.427)
$\Delta def_{it} * D_{it}$	1.124***	1.154**	1.541	1.569*
	(0.337)	(0.508)	(1.122)	(0.804)
D_{it}	0.581	-2.139	-0.358	-0.629
	(1.053)	(1.930)	(1.389)	(1.304)
π_{it}	-0.114	0.0394	0.183***	0.189***
	(0.263)	(0.266)	(0.0486)	(0.0472)
Δexc_{it}	0.232***	0.306***	0.275***	0.272***
	(0.0454)	(0.0537)	(0.0552)	(0.0536)
Δy_{it}	0.135	-0.0744	0.283	0.298
	(0.146)	(0.116)	(0.236)	(0.232)
Δoil_{it}	0.0508**	0.0682***	-0.000151	-0.00114
	(0.0196)	(0.0216)	(0.0162)	(0.0158)
i_t^{US}	0.265	-0.754***	0.876***	0.867***
	(0.294)	(0.228)	(0.196)	(0.186)
$Eqvol_t^{US}$	1.189	1.620*	1.289	1.324
	(1.184)	(0.920)	(1.210)	(1.306)
$SovereignCrisis_{it}$			7.831	7.359
			(5.565)	(5.381)
Observations	335	334	1,079	1,066
R-squared	0.085	0.149	0.420	0.421
Number of countryid	19	21	26	26

Table 3: **Macro-financial characteristics and EMDE exchange rate effects.** This table shows the estimated coefficients in OLS regressions of changes in the log exchange rate between year t and $t+1$. The control variables are the change in the fiscal deficit Δdef_{it}, a dummy variable taking the value of one if the variable listed at the topic of the column in period t is above the sample average D_{it} as well as the interaction of the dummy variable and the change in the deficit. In column (1) the dummy variable takes the value of one if the foreign currency share of government debt is above the sample median, column (2) if the share of non-resident holding of government debt are above the sample median, column (3) if the total government debt-to-GDP ratio is above the sample mean, column (4) if the interest expenses on government debt are above the median. We also control for the annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, log change in the local price of oil, Δoil_{it} and a dummy variable taking the value of one in sovereign crisis years. We also include the level of interest rates in the United States i_t^{US} and realised equity volatility of the S&P 500 $EqVol_t^{US}$ to control for the influence of global financial conditions. Estimated regressions include country fixed effects. Robust standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

By contrast, the size of overall government debt stock as share of GDP (regardless of currency) appears to play little role. In particular, as shown in the third column, there is no statistically significant interaction between total public debt and the change in deficit.[7]

[7]This finding is robust to an alternative construction of the dummy variable, splitting the sample based

When we split the sample instead by the ratio of interest payments to GDP[8], we find some evidence that an increase in deficits is associated with future depreciations in countries with higher interest burdens. In particular, a one percentage point increase in deficits is associated with a 1.6% depreciation, but the coefficient is significant only at 10% level.

One interpretation of the previous results is that greater concern about the fiscal health of the sovereign is more likely to lead to exchange rate depreciation when a larger share of debt is denominated in foreign currency, and when a larger share of debt is held by non-residents. In this sense, the results suggest that moving from FX-denominated debt ("original sin") to foreign holdings of sovereign debt ("original sin redux") has not insulated EMDEs from the exchange rate effects of higher deficits. In Alberola-Ila et al. (2021), upon default, foreign investors are subject to larger haircuts than domestic ones, and excess return through exchange rate depreciation is required as compensation for the additional risk.[9] In Blanchard (2004), foreign investors have higher risk aversion than domestic ones, so that an increase in default risk leads to capital outflows.

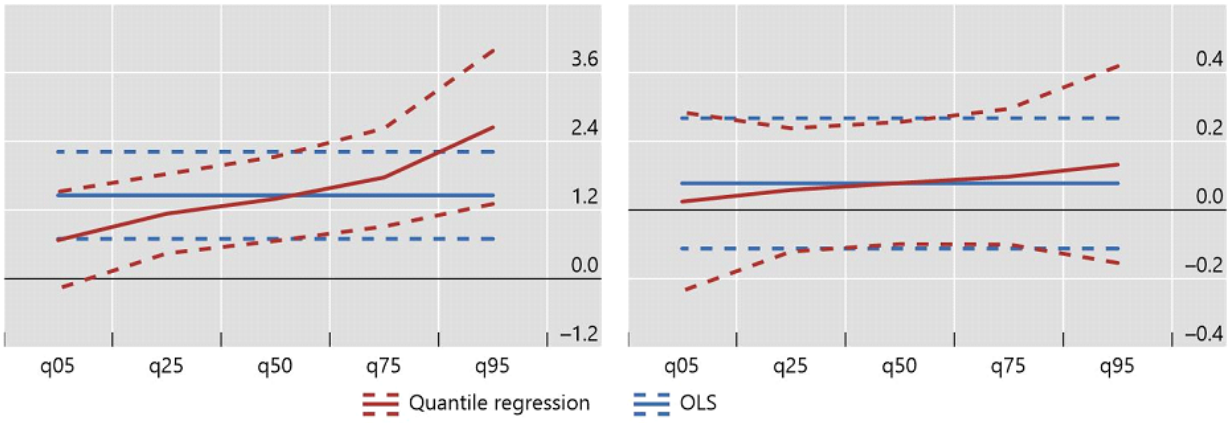
As further evidence for the exchange rate effects of higher deficits, we consider a model of "exchange rate at risk". The model is estimated for the entire baseline sample period, in contrast to estimations conditioning on FX debt or on foreign holdings, where data availability constrains the sample. Figure 3 shows the coefficient on deficits from a quantile regression where the dependent variable is the one-year-ahead change in the bilateral exchange rate against the US dollar (and where higher values imply a larger exchange rate depreciation).

Similarly to the non-linearity associated with inflation, an increase in fiscal deficits is found to have larger effects in the right-tail of EMDE exchange rate distribution (see

on the median level of public debt for each year. This approach takes into account the gradual increase in EMDE debt ratios over time.

[8]Defined as the difference between the primary balance and overall balance.

[9]Similarly, in Broner et al. (2014), the government is less likely to default on its obligations to domestic than to foreign investors, leading domestic investors to hold an increasing share of debt when sovereign risk is high.



(a) Emerging market and developing economies (b) Advanced economies

Figure 3: **Exchange rate channel: quantile regression coefficients of one-year-ahead change in the exchange rate regressed on changes in the fiscal deficit.** This figure shows the estimated coefficients in quantile regressions of the log change in the exchange rate between year t and $t+1$ on changes in the fiscal deficit-to-GDP ratio in year t. Coefficients are shown by the q% quantile (x-axis); e.g. q50 denotes the 50% quantile. The left-hand panel shows coefficients estimated in the sample of emerging and developing economies while the right-hand panel shows the coefficients estimated in the sample of advanced economies. Quantile estimates are shown with 90% confidence bands using a block bootstrap clustered by country. OLS estimates are shown with 90% confidence bands clustered by country.

Figure 3, left panel). In other words, higher deficits raise the risk of larger exchange rate depreciations. An increase in fiscal deficits by one percentage point is found to be associated with 1.4% depreciation in the following year at the median, and with 2.6% at the right tail of the distribution. By contrast, higher deficits do not affect exchange rates in an economically or statistically significant way in AEs, and there is little non-linearity in the relationship across the forecast distribution (right panel).

Non-linearities are present also in a number of other explanatory variables (see Table 4). Higher inflation raises the probability of greater future exchange rate depreciations, as does a greater exchange rate depreciation in the current year. Moreover, an increase in the Fed funds rate increases the likelihood of larger EMDE exchange rate depreciations, with a 100 basis points increase associated with a 1.7% depreciation at the 95% quantile. The effect of US interest rates on EMDE exchange rate distributions appears to be much stronger than for AE currencies (see Table A.2 in the Appendix).

Exchange rate forecast quantiles	5% Δexc_{it+1}	25% Δexc_{it+1}	50% Δexc_{it+1}	75% Δexc_{it+1}	95% Δexc_{it+1}
Δdef_{it}	0.673	1.135**	1.395***	1.768***	2.642***
	(0.500)	(0.446)	(0.422)	(0.513)	(0.811)
π_{it}	0.106	0.152***	0.178***	0.215***	0.301*
	(0.0730)	(0.0452)	(0.0492)	(0.0754)	(0.157)
Δexc_{it}	0.0146	0.168***	0.254***	0.378***	0.667***
	(0.0940)	(0.0639)	(0.0575)	(0.0690)	(0.145)
Δy_{it}	0.247	0.288	0.311	0.344	0.422
	(0.316)	(0.194)	(0.211)	(0.321)	(0.672)
Δoil_{it}	0.0233	0.00998	0.00251	-0.00822	-0.0334
	(0.0228)	(0.0160)	(0.0154)	(0.0206)	(0.0374)
$SovereignCrisis_{it}$	9.185	8.813*	8.604	8.303	7.599
	(7.175)	(5.195)	(5.603)	(7.016)	(13.27)
i_t^{US}	0.368*	0.670***	0.839***	1.083***	1.653***
	(0.211)	(0.154)	(0.171)	(0.251)	(0.475)
$EqVol_t^{US}$	-2.580*	-0.277	1.019	2.879	7.235
	(1.553)	(0.623)	(1.002)	(2.009)	(4.778)
Observations	1,075	1,075	1,075	1,075	1,075

Table 4: **Quantile regression estimates of exchange rate risk in the sample of EMDEs.** This table shows the estimated coefficients in quantile regressions of log changes in the exchange rate between year t and $t+1$, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} and a dummy variable taking the value of one in sovereign crisis years. We also include the level of interest rates in the United States i_t^{US} and realised equity volatility of the S&P 500 $EqVol_t^{US}$ to control for the influence of global financial conditions. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Given that both the share of FX debt and the share of foreign holdings matter for the exchange rate effects of deficits, this raises the question to what extent they also matter for the inflation outcomes. To investigate the issue, we estimate the original inflation-at-risk model with the interaction variables for FX debt and non-resident holdings, respectively. The results are shown in Tables A.3 and A.4 in the Appendix.

We find that in economies with above-median FX share of government debt (Table A.3), higher deficits are followed by higher inflation. The effect is non-linear, being higher in the right tail of the inflation forecast distribution. By contrast, in economies with above-median foreign holdings (Table A.4), deficits show no statistically significant relationship

with future inflation. While the effect in lower quantiles is economically significant, it's not statistically different from zero. In this sense, the implications of high shares of FX debt for inflation differ from those of high foreign holdings of sovereign debt.

What explains the previous findings? The effect through exchange rate pass-through is one potential factor. In particular, the exchange rate depreciation in the case of FX debt is stronger than in the case of foreign holdings, which could then contribute to differences in the eventual inflation outcome. However, better anchored inflation expectations could also account for some of the differences. For economies with above-median FX debt, the average level of inflation expectations for the next calendar year is notably higher (5.6%) than in the case of above-median foreign holdings (3.3%). The next section discusses the relevance of the monetary policy regime in greater detail.

3.4 Importance of monetary policy regime

To what extent do the effects of higher deficits on inflation hinge on the prevailing monetary policy regime? Monetary policy response could potentially play a key role. If the central bank raises interest rates to counteract the inflationary effects of higher deficits, fiscal deficits would not lead to higher inflation, at least beyond a short horizon. If monetary policy is focused on stabilising inflation over the medium term, as in an inflation targeting (IT) regime, any correlation between fiscal deficits and future inflation is likely to be weak. To investigate the issue, we re-estimate the inflation-at-risk model, interacting fiscal deficits with a dummy variable that obtains a value of one for the years when a central bank had in place a numerical target for inflation, and zero during other periods.

Inflation forecast quantiles	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
Δdef_{it}	1.608	2.530**	3.042**	3.902***	5.797**
	(1.570)	(1.126)	(1.231)	(1.412)	(2.913)
$\Delta def_{it} * D_{it}$	-1.323	-2.173**	-2.646**	-3.440***	-5.189**
	(1.348)	(1.087)	(1.158)	(1.250)	(2.271)
D_{it}	-2.147	-4.040*	-5.091**	-6.858***	-10.75**
	(3.771)	(2.453)	(2.109)	(2.174)	(5.157)
π_{it}	0.101	0.437***	0.624***	0.937***	1.628**
	(0.287)	(0.0944)	(0.108)	(0.199)	(0.672)
Δy_{it}	0.113	0.542**	0.781***	1.182**	2.065
	(0.685)	(0.268)	(0.295)	(0.493)	(1.455)
Δexc_{it}	0.0990	0.116	0.125	0.141	0.175
	(0.193)	(0.0745)	(0.105)	(0.196)	(0.548)
Δoil_{it}	0.0527	0.0427	0.0371	0.0277	0.00712
	(0.0427)	(0.0278)	(0.0265)	(0.0297)	(0.0651)
$SovereignCrisis_{it}$	10.05	14.35**	16.73**	20.74**	29.58*
	(9.734)	(6.338)	(6.637)	(8.306)	(17.08)
Observations	1,080	1,080	1,080	1,080	1,080

Table 5: **Fiscal deficits, inflation-at-risk and inflation targeting regimes.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t Δdef_{it}, an indicator variable taking the value of one if the country is in an inflation targeting regime D_{it} as well as the interaction of the inflation targeting dummy variable and the change in the deficit. We also control for annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, log change in the local price of oil, Δoil_{it} and a dummy variable taking the value of one in sovereign crisis years. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5 confirms that the inflationary effects of higher deficits are considerably weaker in IT regimes. Moreover, the attenuating effect of the monetary policy regime holds across the inflation forecast distribution. At the median of the distribution, a one percentage point increase is associated with a 3.0 percentage point increase in inflation when a central bank is not pursuing inflation targeting but only 0.4 percentage point in the IT regime (3.04%-2.65%*1=0.39%). At the right tail, ie at the 95% quantile, the effect is 5.8 percentage points for non-inflation targeters but only 0.6 points for those in an IT regime (5.80%-5.19%*1=0.61%).

We also note that inflation targeting is associated with lower future inflation across the

inflation forecast distribution, as indicated by the coefficient on the dummy variable on its own. For example, at the median of the distribution, inflation rates are 5.1 percentage points lower in IT than in non-IT regimes. At the 95% quantile, the difference rises to 11 percentage points. Taken together, these results suggest that inflation targeting strongly counteracts the inflationary effects of higher deficits.

Exchange rate forecast quantiles	5% Δexc_{it+1}	25% Δexc_{it+1}	50% Δexc_{it+1}	75% Δexc_{it+1}	95% Δexc_{it+1}
Δdef_{it}	0.899	1.457***	1.778***	2.265***	3.266***
	(0.615)	(0.509)	(0.528)	(0.624)	(0.910)
$\Delta def_{it} * D_{it}$	-1.317*	-1.808***	-2.090***	-2.518***	-3.399***
	(0.684)	(0.520)	(0.482)	(0.540)	(0.891)
D_{it}	-0.616	-1.892	-2.627*	-3.740**	-6.030
	(2.414)	(1.586)	(1.572)	(1.890)	(4.068)
π_{it}	0.112	0.153***	0.177***	0.212***	0.286*
	(0.0737)	(0.0464)	(0.0491)	(0.0743)	(0.152)
Δexc_{it}	0.0229	0.169**	0.253***	0.381***	0.643***
	(0.0988)	(0.0671)	(0.0605)	(0.0753)	(0.129)
Δy_{it}	0.189	0.230	0.254	0.290	0.364
	(0.363)	(0.205)	(0.215)	(0.337)	(0.692)
Δoil_{it}	0.0131	0.00212	-0.00419	-0.0137	-0.0334
	(0.0236)	(0.0166)	(0.0170)	(0.0205)	(0.0385)
$SovereignCrisis_{it}$	8.373	8.218	8.128	7.993	7.715
	(7.259)	(5.091)	(5.513)	(7.209)	(13.59)
i_t^{US}	0.366*	0.554***	0.662***	0.825***	1.162**
	(0.219)	(0.159)	(0.179)	(0.269)	(0.466)
$EqVol_t^{US}$	-1.475	0.549	1.715	3.481	7.112
	(1.473)	(0.597)	(1.159)	(2.247)	(4.980)
Observations	1,075	1,075	1,075	1,075	1,075

Table 6: **Fiscal deficits, exchange rate and inflation targeting regimes.** This table shows the estimated coefficients in quantile regressions of log changes in the exchange rate between year t and $t+1$, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, an indicator variable taking the value of one if the country is in an inflation targeting regime D_{it} as well as the interaction of the inflation targeting dummy variable and the change in the deficit. We also control for the annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} and a dummy variable taking the value of one in sovereign crisis years. We also include the level of interest rates in the United States i_t^{US} and realised equity volatility of the S&P 500 $EqVol_t^{US}$ to control for the influence of global financial conditions. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The transmission of higher deficits through exchange rates to inflation is also different

in inflation targeting regimes. Notably, higher deficits are associated with exchange rate appreciation, as in the textbook model, in inflation targeting regimes. This is shown by the coefficient on the interaction variable, which is negative and higher in absolute value than the coefficient on fiscal deficits, across the exchange rate distribution. At the median of the distribution, a one percentage point increase in fiscal deficits is associated with a 1.8 % depreciation in non-IT regimes but a 0.3% appreciation in inflation targeting regimes (1.78%-2.09%*1=-0.31%). This small exchange rate appreciation in IT regimes partly accounts for the muted inflation impact in this regime. We also note that inflation targeters generally see a smaller risk of large exchange rate depreciations over time (see the coefficients on D_{it} which decline strongly when moving to the higher quantiles).

Another source for the lower inflation effects of higher deficits during IT could be the behaviour of inflation expectations. In particular, using Consensus expectations for the next calendar year, we find that these expectations rise by around 20 basis points in non-IT economies in the year when deficits increase, but they remain broadly unchanged in inflation targeters.

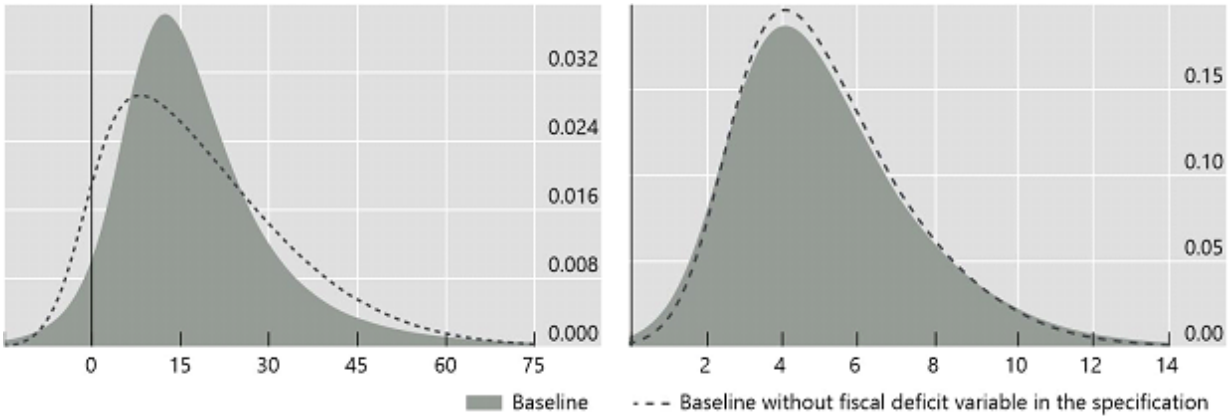
4 Extensions and robustness

In this section, we consider a number of extensions and robustness tests. We make changes to the model specification; analyse differences across countries; shed further light on the exchange rate effects; and, finally, provide more evidence on the relevance of the monetary policy regime.

4.1 Model specification

We examine the effects of some changes to the model specification. First, we estimate the baseline model without fiscal deficit and examine the resulting density functions. Not

surprisingly, the differences are greater in the case of emerging market economies than for AEs (see Figure 4). For EMDEs, excluding fiscal deficits from the model results in more downside inflation risk, with the density function covering more deflationary outcomes. For AEs, the differences are minor.



(a) Emerging market economies (b) Advanced economies

Figure 4: **Inflation forecast density functions with and without fiscal deficit controls.** This figure shows the conditional forecast distribution of the inflation rate over the next year. The grey shaded density shows the conditional distribution evaluated at the sample means of all variables in our baseline specification including changes in the fiscal deficit. The blue dotted density shows the conditional distribution derived from a model which excludes fiscal deficits. The left-hand panel shows the conditional distributions of inflation estimated with the sample of emerging and developing economies. The right-hand panel shows the conditional distributions of inflation with the sample of advanced economies.

While the baseline results suggest that deficits raise future inflation and upside inflation risks in the near term, a question arises as to what extent medium-term inflation risks are affected. To investigate this, we estimate the inflation risk model with the average inflation over the next three years as the dependent variable and report the results in Table A.5 in the Appendix.

Table A.5 suggests that the relationship between fiscal deficits and EMDE inflation is statistically and economically significant even when average inflation over the next three years is considered. However, there is now little nonlinearity between deficits and future inflation, and the coefficient estimates tend to be lower across the forecast distribution. This is probably not surprising, given that policy has more time to respond to medium-term

inflation risks resulting from higher deficits. Importantly, the exchange rate pass-through is economically sizeable and highly statistically significant when inflation over the next three years is considered, in all quantiles except the 5% quantile. This finding confirms the relevance of the exchange rate channel for inflation.

Next, we replace fiscal deficits in the model by measure of fiscal shocks. As deficits could be correlated with and be partly endogenous to some other explanatory variables, in particular GDP growth, we replace fiscal deficits by a more exogenous measure. We estimate in a panel a fiscal rule that links primary deficits to lagged primary deficits, the lagged level of government debt and the output gap. We then use the residual from this regression as an exogenous measure of fiscal expansion. This approach follows that of Corsetti et al. (2012) who identify fiscal shocks as residuals from an estimated spending rule.

	5%	25%	50%	75%	95%
Inflation forecast quantiles	π_{t+1}	π_{t+1}	π_{t+1}	π_{t+1}	π_{t+1}
$FiscalShock_{it}$	-0.795	1.100	1.714**	2.600***	6.340**
	(2.042)	(0.691)	(0.704)	(0.939)	(2.972)
π_{it}	-0.324	0.372***	0.598***	0.924***	2.298**
	(0.494)	(0.108)	(0.123)	(0.225)	(0.905)
Δy_{it}	-0.568	0.490	0.832**	1.327***	3.413**
	(0.982)	(0.329)	(0.346)	(0.495)	(1.707)
Δexc_{it}	0.234	0.177	0.159	0.132	0.0196
	(0.341)	(0.115)	(0.111)	(0.177)	(0.618)
Δoil_{it}	0.0334	0.0494	0.0546*	0.0620*	0.0936
	(0.0594)	(0.0318)	(0.0283)	(0.0325)	(0.0762)
$SovereignCrisis_{it}$	5.771	14.90**	17.86***	22.13***	40.14**
	(14.12)	(6.976)	(6.341)	(6.852)	(18.94)
Observations	1,057	1,057	1,057	1,057	1,057

Table 7: **Quantile regression estimates of inflation risk with fiscal shocks.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on fiscal shocks $FiscalShock_{it}$, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it}. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

The results with a measure of fiscal shocks are highly similar to the baseline model

(Table 7). Fiscal shocks display identical non-linearities with respect to future inflation as fiscal deficits, with much larger effects at the right tail of the inflation forecast distribution. The same non-linearity is also observed for current inflation and real GDP growth, respectively. One difference from the baseline model is that the coefficient on fiscal shocks at the left tail is negative (although it is not statistically different from zero).

4.2 Country composition

We then consider various changes to the country composition of the panel. As the first test, we investigate whether the results are robust to the exclusion of lower income economies from the sample. Such economies may face more volatility, including in inflation, as well as more persistent shocks. Using the GDP per capita (USD) in 2019 from the IMF WEO, we exclude economies in the lowest quantile of the income distribution: Haiti, Nicaragua, Ghana, Honduras, India and Bolivia. Table 8 shows that our results do not hinge on the inclusion of the lower income countries in the sample. By contrast, the coefficient estimates are highly comparable (and even somewhat higher) in the smaller sample that excludes these economies.

Inflation forecast quantiles	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
Δdef_{it}	1.289	2.205**	2.682**	3.421***	5.332**
	(1.452)	(1.102)	(1.147)	(1.300)	(2.701)
π_{it}	0.107	0.462***	0.647***	0.933***	1.673**
	(0.301)	(0.0760)	(0.110)	(0.199)	(0.704)
Δy_{it}	0.168	0.771***	1.086***	1.572***	2.832*
	(0.755)	(0.268)	(0.293)	(0.486)	(1.720)
Δexc_{it}	0.194	0.183**	0.177	0.168	0.144
	(0.217)	(0.0904)	(0.125)	(0.209)	(0.623)
Δoil_{it}	0.0396	0.0425	0.0440	0.0463	0.0524
	(0.0486)	(0.0306)	(0.0302)	(0.0361)	(0.0843)
$SovereignCrisis_{it}$	12.06	16.59**	18.95***	22.61***	32.07*
	(10.66)	(6.830)	(6.620)	(7.976)	(19.08)
Observations	862	862	862	862	862

Table 8: **Quantile regression estimates of inflation risk excluding lower income countries.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} estimated on the sample of EMDEs but excluding low income countries. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Next, we analyse differences across two major EME regions, Asia and Latin America. Whereas previous literature has highlighted the contribution of fiscal and monetary policies to elevated inflation in Latin America (see eg Kehoe and Nicolini (2021)), inflation has generally been lower in emerging Asia. Such differences are also highlighted in our results. The median fiscal deficit over the sample period has been 75% higher and the median increase in fiscal deficits some 40% higher in Latin America than in emerging Asia. But perhaps even more important differences are found for the effects of fiscal deficits on inflation. As shown in Tables A.6 and A.7 in the Appendix, the effects for Latin American countries are similar to the ones obtained for the entire sample, whereas those for emerging Asia are economically very small and not statistically different from zero.

Other differences between emerging economies could emerge due to the role of regulated prices in CPI. For example, when oil prices rise, these may have smaller effects on future

inflation in economies where the share of regulated and administered prices is larger. We find that this is indeed the case, evaluating simple correlations between the oil price change and inflation at different horizons, for countries with below/above median share of regulated prices.[10] When considering headline inflation as the left-hand side variable and the contemporaneous oil price change as the explanatory variable, the coefficient on oil prices is 0.96 (standard error of 0.24) for the country sample with a low regulated price share and 0.38 (standard error of 0.24) for a high regulated price share. When we use one-year-ahead inflation in the left-hand side, the pass-through of oil prices increases in the group with a high regulated price share, but remains statistically insignificant (coefficient of 0.51 with a standard error of 0.35).

4.3 Exchange rate effects

Especially since the early 2000s, EMEs have accumulated large FX reserves, serving as buffers against the risk of sudden stops in capital flows and exchange rate depreciations. To what extent do these FX reserves mitigate the exchange rate effects of higher fiscal deficits? We estimate the model of "exchange rate-at-risk", with an interaction variable that obtains the value of one for periods where FX reserves - measured as ratio to GDP - are above the sample median. The results in Table A.8 in the Appendix show that FX reserves do provide some insulation against relatively large exchange rate depreciations (those at the 75% quantile), although the results are only weakly statistically significant.[11]

Another factor that may affect the results is the presence of exchange rate pegs in some economies over parts of the sample. Excluding exchange rate pegs as defined by the

[10] The data on regulated prices are from a BIS survey of central banks and cover 13 EMEs. See Table A3 in https://www.bis.org/publ/bppdf/bispap49c.pdf.

[11] If we instead consider those economies with FX reserves at the highest quartile as those that obtain a value of 1 for the dummy variable, we find that reserves provide strong insulation against exchange rate depreciations. In this case, the interaction variable with fiscal deficits obtains a statistically significant coefficient at all quantiles except the 5% quantile, and is very close in absolute magnitude to the coefficient on fiscal deficits alone. These results are available upon request.

classification of Ilzetzki et al. (2019) reduces the EMDE sample by 23% compared to the baseline. When exchange rate pegs are excluded, the effects of deficits on inflation are larger than in the baseline estimates but the differences are relatively small (see Table A.9 in the Appendix).

4.4 Relevance of monetary policy

As inflation targeting regimes were adopted towards the end of the sample when inflation rates were lower, a question arises to what extent the results regarding smaller inflation effects of deficits reflect the monetary policy regime or simply a time effect of overall lower inflation. We deal with this issue in two ways. First, we estimate the model with the inflation targeting dummy for the post-1985 sample. As the first EMDEs in our sample adopted inflation targeting in 1992 and 1994 (Israel and Peru respectively), a sample starting in 1986 yields a sufficient number of non-inflation targeting years even for the early adopters, while excluding the prominent high inflation decades of 1960s and 1970s for all economies. Second, instead of using inflation targeting to identify the monetary policy regime, we use a measure of cyclicality of monetary policy, following Vegh and Vuletin (2013). We estimate correlations between the cyclical components of short-term interest rates and real GDP, using the HP filter with a smoothing parameter of 100 to isolate the cyclical component of the two series. A positive correlation between the series it taken to indicate countercyclical monetary policy (such that there are higher interest rates during good times). The dummy variable then obtains of value of one during periods of countercyclical monetary policy and zero otherwise. For this measure, compared to formal inflation targeting, there is more variation both within and across economies over the entire sample period.[12]

[12]To capture time variation in the cyclicality of monetary policy within economies, we use moving correlations over three-year rolling windows.

The results confirm the relevance of monetary policy. Inflation targeting retains its importance also in the post-1985 sample (see Table 9). And, countercyclicality of monetary policy has qualitatively similar effects as inflation targeting; however, the effects are less statistically significant (see Table A.10 in the Annex). Indeed, the interaction dummy for countercyclical monetary policy and fiscal deficits obtains a statistically significant coefficient only at the 75% quantile, and only at the 10% level.

	5%	25%	50%	75%	95%
Inflation forecast quantiles	π_{t+1}	π_{t+1}	π_{t+1}	π_{t+1}	π_{t+1}
Δdef_{it}	0.868	1.852***	2.245***	2.861**	4.682
	(2.570)	(0.637)	(0.778)	(1.261)	(4.370)
$\Delta def_{it} * D_{it}$	-0.820	-1.454***	-1.708***	-2.105**	-3.278
	(1.774)	(0.479)	(0.535)	(0.833)	(2.880)
D_{it}	-3.867	-5.501*	-6.154*	-7.178*	-10.20
	(6.606)	(3.130)	(3.244)	(4.165)	(10.77)
π_{it}	-0.326	0.350*	0.621***	1.044***	2.296
	(0.975)	(0.186)	(0.211)	(0.349)	(1.451)
Δy_{it}	0.236	0.801***	1.027***	1.381**	2.426
	(1.181)	(0.302)	(0.361)	(0.606)	(1.976)
Δexc_{it}	0.180	0.104	0.0737	0.0259	-0.115
	(0.417)	(0.0899)	(0.142)	(0.268)	(0.860)
Δoil_{it}	0.0179	0.0351	0.0419*	0.0526	0.0844
	(0.0549)	(0.0218)	(0.0254)	(0.0377)	(0.103)
$SovereignCrisis_{it}$	0.154	5.688	7.902	11.37	21.61
	(34.80)	(11.98)	(10.51)	(13.09)	(46.62)
Observations	792	792	792	792	792

Table 9: **Fiscal deficits, inflation-at-risk and inflation targeting regimes, post-1985.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t Δdef_{it}, an indicator variable taking the value of one if the country is in an inflation targeting regime D_{it} as well as the interaction of the inflation targeting dummy variable and the change in the deficit. We also control for annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, log change in the local price of oil, Δoil_{it} and a dummy variable taking the value of one in sovereign crisis years estimated in the post 1985 sample of EMDEs. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

To what extent are changes in fiscal policy and the behaviour of deficits behind the different dynamics observed during IT and non-IT periods? Sims (2004) discusses how monetary policy centred on inflation control requires an appropriate fiscal backing. How-

ever, identifying the fiscal regime for EMDEs is not a straightforward task. For example, in Mauro et al. (2015) that identifies periods of fiscal prudence and profligacy for 55 economies over multiple decades, there are notably fewer periods identified for EMDEs than for their advanced economy counterparts. Still, simple statistical evidence regarding the behaviour of deficits may provide some clues. For example, comparing the variance of deficits over IT and non-IT periods using the test by Levene (1960) shows that we can reject the null hypothesis that the variance of deficits over those periods are the same (p-value below 0.01). By contrast, the persistence of deficits does not appear to have seen a statistically significant shift between non-IT and IT periods.[13] Taking the evidence together, it seems plausible that changes in fiscal policy have accounted for some of the observed changes in the deficit-inflation relationship, but that monetary policy has also played an important role.

We close with a note regarding monetary financing, ie financing of the budget deficit through an increase in monetary base. Monetary financing has been a prominent contributor to high inflation in EMDEs in the past (see eg the discussion in World Bank (2021), Chapter 4). That said, Agur et al. (2022) argue that it is not easy to identify historical episodes of monetary financing, given that central banks have been reluctant to openly use the tool. The presence of monetary financing episodes in our sample is reduced as we exclude country-year observations with inflation exceeding 600%. Nevertheless, some years of monetary financing, such as those for Bolivia, Peru and Turkey, as identified in World Bank (2021), Annex 4.4, fall into our sample periods. Therefore, they can partly account for the strong relationship between fiscal deficits and inflation observed at the right tail of the inflation forecast distribution.

[13] We estimate an AR(1) model of fiscal deficits, additionally including an interaction variable of an inflation targeting dummy with lagged fiscal deficits. In this estimation, the interaction variable obtains a negative coefficient, but it is not statistically significant at the 10% level.

5 Conclusions

In this paper, we have highlighted the effects of higher deficits on inflation and exchange rates in a panel of emerging market and developing economies. We showed that the effects of higher deficits on inflation and exchange rates are non-linear, and are larger in the right tails of the inflation and exchange rate distributions. We also documented that various macro-financial and institutional dimensions have implications for the effects of higher deficits on EMDE exchange rates. In particular, higher deficits lead to exchange rate depreciations especially when the share of foreign currency-denominated debt is sizeable and when foreign holdings of sovereign debt are high. Thus, the shift from FX debt to larger foreign holdings of sovereign debt has not insulated EMDEs from the exchange rate effects of higher deficits. Finally, we show that the effects of deficits on both inflation and exchange rates are smaller when an economy is pursuing a policy of inflation targeting. Overall, the results suggest that fiscal deficits have important implications for both inflation and exchange rate dynamics in EMDEs and that there is important heterogeneity in the effects between countries with different macro-financial and institutional characteristics.

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Appendix

Inflation forecast quantiles	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
Δdef_{it}	-0.122*	0.000467	0.0683**	0.148***	0.360***
	(0.0664)	(0.0385)	(0.0319)	(0.0279)	(0.0479)
π_{it}	0.432***	0.691***	0.835***	1.003***	1.453***
	(0.140)	(0.0567)	(0.0255)	(0.0168)	(0.130)
Δy_{it}	0.204***	0.275***	0.314***	0.361***	0.484***
	(0.0397)	(0.0288)	(0.0269)	(0.0271)	(0.0572)
Δexc_{it}	-0.0260	-0.0210	-0.0182**	-0.0150*	-0.00625
	(0.0271)	(0.0139)	(0.00803)	(0.00831)	(0.0278)
Δoil_{it}	0.0167	0.00969	0.00581	0.00129	-0.0108
	(0.0111)	(0.00658)	(0.00455)	(0.00329)	(0.00753)
$SovereignCrisis_{it}$	1.117**	0.711**	0.486*	0.224	-0.480
	(0.512)	(0.327)	(0.272)	(0.280)	(0.591)
Observations	1,258	1,258	1,258	1,258	1,258

Table A.1: **Baseline model in the sample of advanced economies.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} estimated on the sample of advanced economies. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Exchange rate forecast quantiles	5% Δexc_{it+1}	25% Δexc_{it+1}	50% Δexc_{it+1}	75% Δexc_{it+1}	95% Δexc_{it+1}
Δdef_{it}	0.0243	0.0582	0.0783	0.0968	0.132
	(0.160)	(0.108)	(0.111)	(0.119)	(0.182)
π_{it}	0.00477	0.120*	0.189**	0.251**	0.372**
	(0.0585)	(0.0650)	(0.0849)	(0.108)	(0.162)
Δexc_{it}	0.245***	0.256***	0.263***	0.269***	0.281***
	(0.0340)	(0.0181)	(0.0146)	(0.0211)	(0.0406)
Δy_{it}	0.219	-0.110	-0.304***	-0.482***	-0.825***
	(0.145)	(0.0851)	(0.0788)	(0.0935)	(0.150)
Δoil_{it}	0.00233	0.0298***	0.0460***	0.0609***	0.0896***
	(0.0129)	(0.00816)	(0.00811)	(0.00984)	(0.0148)
$SovereignCrisis_{it}$	5.596***	-3.431**	-8.766***	-13.67***	-23.11***
	(1.738)	(1.350)	(1.306)	(1.394)	(1.982)
i_{it}^{US}	0.0258	0.154**	0.229***	0.299***	0.433***
	(0.114)	(0.0717)	(0.0581)	(0.0669)	(0.100)
$EqVol_{it}^{US}$	0.800	1.128*	1.322***	1.500***	1.844***
	(1.047)	(0.649)	(0.468)	(0.388)	(0.669)
Observations	1,258	1,258	1,258	1,258	1,258

Table A.2: **Quantile regression estimates of exchange rate risk in the sample of AEs.** This table shows the estimated coefficients in quantile regressions of log changes in the exchange rate between year t and $t+1$, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} and a dummy variable taking the value of one in sovereign crisis years. We also include the level of interest rates in the United States i_t^{US} and realised equity volatility of the S&P 500 $EqVol_t^{US}$ to control for the influence of global financial conditions estimated on the sample of advanced economies. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	5%	25%	50%	75%	95%
Inflation forecast quantities	π_{t+1}	π_{t+1}	π_{t+1}	π_{t+1}	π_{t+1}
Δdef_{it}	-0.0233	-0.0166	-0.0110	-0.00510	0.00747
	(0.122)	(0.106)	(0.0999)	(0.124)	(0.177)
$\Delta def_{it} * D_{it}$	0.183	0.222	0.256*	0.291**	0.365**
	(0.215)	(0.169)	(0.135)	(0.125)	(0.162)
D_{it}	-0.222	-0.164	-0.114	-0.0624	0.0478
	(0.704)	(0.487)	(0.534)	(0.748)	(1.340)
π_{it}	0.222*	0.355***	0.468***	0.587***	0.839***
	(0.115)	(0.111)	(0.109)	(0.114)	(0.135)
Δy_{it}	0.293***	0.268***	0.247***	0.225***	0.178
	(0.112)	(0.0825)	(0.0691)	(0.0833)	(0.147)
Δexc_{it}	0.0307	0.0393**	0.0465***	0.0541***	0.0702**
	(0.0204)	(0.0172)	(0.0164)	(0.0199)	(0.0280)
Δoil_{it}	0.0124*	0.0102	0.00838	0.00646	0.00239
	(0.00741)	(0.00648)	(0.00687)	(0.00892)	(0.0140)
Observations	335	335	335	335	335

Table A.3: **Inflation-at-risk, original sin.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, an indicator variable taking the value of one if the country is classified as having above median foreign currency government debt D_{it} as well as the interaction of the original sin dummy variable and the change in the deficit. We also control for annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it}. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	5%	25%	50%	75%	95%
Inflation forecast quantiles	π_{t+1}	π_{t+1}	π_{t+1}	π_{t+1}	π_{t+1}
Δdef_{it}	-0.168	-0.0886	-0.0304	0.0302	0.149
	(0.212)	(0.163)	(0.140)	(0.133)	(0.164)
$\Delta def_{it} * D_{it}$	0.384	0.287	0.216	0.142	-0.00378
	(0.235)	(0.176)	(0.155)	(0.160)	(0.236)
D_{it}	0.0407	0.0212	0.00708	-0.00767	-0.0367
	(0.735)	(0.457)	(0.303)	(0.280)	(0.612)
π_{it}	0.418***	0.507***	0.571***	0.638***	0.770***
	(0.137)	(0.124)	(0.115)	(0.111)	(0.117)
Δy_{it}	0.205***	0.216***	0.225***	0.233***	0.250**
	(0.0781)	(0.0707)	(0.0714)	(0.0817)	(0.109)
Δexc_{it}	0.00411	0.0176	0.0275**	0.0377**	0.0579**
	(0.0234)	(0.0169)	(0.0140)	(0.0152)	(0.0240)
Δoil_{it}	-0.000442	-6.29e-05	0.000213	0.000501	0.00107
	(0.00462)	(0.00514)	(0.00634)	(0.00823)	(0.0114)
Observations	334	334	334	334	334

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.4: **Inflation-at-risk, original sin redux.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, an indicator variable taking the value of one if the country is classified has having above median foreign ownership of government debt D_{it} as well as the interaction of the original sin redux dummy variable and the change in the deficit. We also control for annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it}. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Inflation forecast quantiles	5% $\overline{\pi}_{t+1,t+2,t+3}$	25% $\overline{\pi}_{t+1,t+2,t+3}$	50% $\overline{\pi}_{t+1,t+2,t+3}$	75% $\overline{\pi}_{t+1,t+2,t+3}$	95% $\overline{\pi}_{t+1,t+2,t+3}$
Δdef_{it}	1.926**	1.749***	1.661***	1.523***	1.147*
	(0.828)	(0.549)	(0.474)	(0.414)	(0.677)
π_{it}	-0.0724	0.210**	0.350**	0.570***	1.168***
	(0.169)	(0.0915)	(0.138)	(0.202)	(0.402)
Δy_{it}	0.369	0.753**	0.944***	1.243***	2.056**
	(0.466)	(0.303)	(0.308)	(0.374)	(0.805)
Δexc_{it}	-0.0648	0.178**	0.298***	0.487***	1.001**
	(0.215)	(0.0786)	(0.110)	(0.188)	(0.463)
Δoil_{it}	0.0723**	0.0483*	0.0365	0.0178	-0.0328
	(0.0322)	(0.0273)	(0.0295)	(0.0336)	(0.0464)
$SovereignCrisis_{it}$	21.24**	18.23***	16.73***	14.39	8.014
	(10.02)	(6.485)	(6.247)	(8.884)	(19.22)
Observations	1,076	1,076	1,076	1,076	1,076

Table A.5: **Distribution of average three-year-ahead inflation, EMEs.** This table shows the estimated coefficients in quantile regressions of the average inflation rate over the next three years $\pi_{t+1,t+2,t+3}$, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it}. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Inflation forecast quantiles	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
Δdef_{it}	-0.0703	-0.00575	0.0279	0.0710	0.230
	(0.178)	(0.138)	(0.192)	(0.356)	(0.862)
π_{it}	0.162**	0.331***	0.420***	0.533***	0.952***
	(0.0699)	(0.0509)	(0.0650)	(0.0910)	(0.192)
Δy_{it}	0.425***	0.437***	0.443**	0.451	0.479
	(0.111)	(0.163)	(0.216)	(0.332)	(0.637)
Δexc_{it}	-0.0782*	-0.0738	-0.0714	-0.0685	-0.0575
	(0.0445)	(0.0484)	(0.0567)	(0.0808)	(0.149)
Δoil_{it}	-0.0121	-0.00633	-0.00336	0.000469	0.0146
	(0.00988)	(0.00748)	(0.00773)	(0.00926)	(0.0198)
$SovereignCrisis_{it}$	-19.98	0.0446	10.48	23.88	73.28*
	(25.88)	(20.56)	(20.11)	(21.52)	(39.90)
Observations	339	339	339	339	339

Table A.6: **Inflation-at-risk in the sample of Asian EMDEs.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} estimated on the sample of Asian EMDEs. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Inflation forecast quantiles	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
Δdef_{it}	0.823	2.112**	2.844***	4.017**	8.216
	(4.297)	(0.944)	(1.081)	(1.778)	(6.977)
π_{it}	-0.0399	0.427**	0.692***	1.117**	2.637
	(0.936)	(0.173)	(0.246)	(0.446)	(1.661)
Δy_{it}	0.282	0.996**	1.403***	2.053**	4.382
	(2.057)	(0.451)	(0.516)	(0.859)	(3.126)
Δexc_{it}	-0.593	-0.327	-0.176	0.0661	0.933
	(0.738)	(0.213)	(0.326)	(0.565)	(1.828)
Δoil_{it}	0.118	0.0739*	0.0488	0.00863	-0.135
	(0.136)	(0.0380)	(0.0388)	(0.0623)	(0.223)
$SovereignCrisis_{it}$	5.577	18.38	25.66*	37.32*	79.06
	(33.15)	(14.21)	(14.06)	(19.60)	(57.49)
Observations	284	284	284	284	284

Table A.7: **Inflation-at-risk, Latin American EMDEs.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} estimated on the sample of Latin American EMDE. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Exchange rate forecast quantiles	5% Δexc_{it+1}	25% Δexc_{it+1}	50% Δexc_{it+1}	75% Δexc_{it+1}	95% Δexc_{it+1}
Δdef_{it}	0.791	1.751***	2.274***	3.092***	4.662**
	(0.829)	(0.631)	(0.686)	(0.935)	(1.954)
$\Delta def_{it} * D_{it}$	-0.331	-1.053	-1.447	-2.063*	-3.245
	(1.064)	(0.976)	(0.987)	(1.207)	(2.117)
D_{it}	-1.546	-2.597*	-3.171*	-4.068*	-5.789
	(1.897)	(1.538)	(1.771)	(2.407)	(4.553)
π_{it}	0.0810	0.139***	0.171***	0.220***	0.315**
	(0.0675)	(0.0457)	(0.0472)	(0.0697)	(0.158)
Δexc_{it}	0.0264	0.176***	0.257***	0.385***	0.630***
	(0.0933)	(0.0653)	(0.0583)	(0.0711)	(0.135)
Δy_{it}	0.171	0.240	0.277	0.336	0.448
	(0.328)	(0.197)	(0.217)	(0.338)	(0.730)
Δoil_{it}	0.0205	0.00823	0.00152	-0.00898	-0.0291
	(0.0228)	(0.0177)	(0.0168)	(0.0210)	(0.0381)
$SovereignCrisis_{it}$	9.125	8.506	8.169	7.641	6.628
	(7.349)	(5.549)	(5.339)	(6.401)	(10.39)
i_{it}^{US}	0.300	0.513***	0.629***	0.811***	1.159**
	(0.260)	(0.182)	(0.198)	(0.295)	(0.558)
$EqVol_{it}^{US}$	-1.663	0.511	1.697	3.551*	7.109
	(1.629)	(0.878)	(1.231)	(2.142)	(5.047)
Observations	1,078	1,078	1,078	1,078	1,078

Table A.8: **Fiscal deficits, exchange rate and FX reserves.** This table shows the estimated coefficients in quantile regressions of log changes in the exchange rate between year t and $t+1$, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, an indicator variable taking the value of one if the country has above median exchange rate reserves D_{it} as well as the interaction between the high reserves dummy variable and the change in the deficit. We also control for the annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} and a dummy variable taking the value of one in sovereign crisis years. We also include the level of interest rates in the United States i_t^{US} and realised equity volatility of the S&P 500 $EqVol_t^{US}$ to control for the influence of global financial conditions. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Inflation forecast quantiles	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
Δdef_{it}	2.083	2.779**	3.170***	3.712***	5.341**
	(1.404)	(1.095)	(1.146)	(1.339)	(2.683)
π_{it}	0.110	0.432***	0.612***	0.863***	1.617**
	(0.305)	(0.0910)	(0.104)	(0.172)	(0.658)
Δy_{it}	0.289	0.834**	1.139***	1.563***	2.838
	(0.784)	(0.379)	(0.367)	(0.556)	(1.816)
Δexc_{it}	0.107	0.130	0.143	0.161	0.215
	(0.216)	(0.0868)	(0.107)	(0.182)	(0.554)
Δoil_{it}	0.0567	0.0601*	0.0621*	0.0648*	0.0729
	(0.0496)	(0.0352)	(0.0337)	(0.0379)	(0.0743)
$SovereignCrisis_{it}$	15.01	18.31**	20.17***	22.75***	30.50*
	(10.80)	(7.373)	(6.741)	(8.551)	(17.79)
Observations	870	870	870	870	870

Table A.9: **Fiscal deficits and inflation, excluding countries with exchange rate pegs.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it} estimated on the sample of EMDEs without exchange rate pegs. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Inflation forecast distribution	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
Δdef_{it}	2.457	3.660*	4.377*	5.467**	8.754*
	(3.306)	(2.189)	(2.428)	(2.640)	(5.142)
$\Delta def_{it} * D_{it}$	-1.403	-2.825	-3.672	-4.959*	-8.844*
	(3.162)	(2.130)	(2.438)	(2.768)	(5.318)
D_{it}	7.679	2.300	-0.904	-5.775**	-20.47*
	(6.097)	(2.021)	(0.990)	(2.533)	(11.14)
π_{it}	0.102	0.501***	0.739***	1.101***	2.193**
	(0.460)	(0.0972)	(0.136)	(0.240)	(0.909)
Δy_{it}	0.843	0.960***	1.029***	1.135**	1.455
	(0.822)	(0.340)	(0.335)	(0.442)	(1.260)
Δexc_{it}	-0.186	-0.149	-0.126	-0.0925	0.00964
	(0.313)	(0.104)	(0.140)	(0.240)	(0.732)
Δoil_{it}	0.0395	0.0341	0.0309	0.0260	0.0113
	(0.0654)	(0.0293)	(0.0267)	(0.0317)	(0.0978)
$SovereignCrisis_{it}$	19.66	22.73**	24.56***	27.34***	35.74
	(16.85)	(9.072)	(8.896)	(10.24)	(26.09)
Observations	870	870	870	870	870

Table A.10: **Fiscal deficits, inflation-at-risk and countercyclical monetary policy.** This table shows the estimated coefficients in quantile regressions of inflation rate over the next year π_{t+1}, on changes in the fiscal deficit-to-GDP ratio in year t, Δdef_{it}, an indicator variable taking the value of one if the country is classified has having countercyclical monetary policy D_{it} as well as the interaction of the dummy variable and the change in the deficit. We also control for annual inflation rate π_{it}, GDP growth, Δy_{it}, log change in the bilateral USD exchange rate Δexc_{it}, and log change in the local price of oil, Δoil_{it}. Estimated regressions include quantile-τ fixed effects for economy i. Block bootstrap standard errors clustered by country shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1.