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

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Motivation

- Covid-19 pandemic revived interest in fiscal determinants of inflation

- Inflation reached multi-decade highs

- Strong fiscal stimulus in a number of countries
  - coupled with supply disruptions, strong demand and expansionary monetary policy

Motivation, II

- Predicting how fiscal policy affects inflation has become more important

- Fiscal expansion contributes to increasing aggregate demand and inflation, through the effect on economic slack

- In textbook models, fiscal expansion typically leads to exchange rate appreciation, which reduces the effect on inflation

- But fiscal expansion could also reduce confidence and increase concerns about fiscal sustainability, leading to higher country risk and exchange rate depreciation
  - Particularly relevant for emerging market and developing economies (EMDEs)

Motivation, III

- Are EMDEs more vulnerable today to an increase in fiscal deficits?

- Higher public debt, including after the Covid-19 pandemic

- Less foreign currency public debt (overcoming "original sin", Eichengreen and Hausmann (1999))...

- ... but foreign investors in domestic debt market still relevant ("original sin redux", Carstens and Shin (2019))

- Increasing adoption of inflation targeting

Motivation, IV

- Central banks interested not only in modal forecasts but also in risks around central forecasts

- Risk management approach to monetary policy

  - Take actions that reduce the likelihood of very high or very low inflation outcomes (eg Greenspan (2004))

- Because tail risks to inflation might shift with fiscal policy, a realistic forecast distribution cannot be produced by using ordinary regression techniques

Effect of higher deficits on inflation forecast distribution

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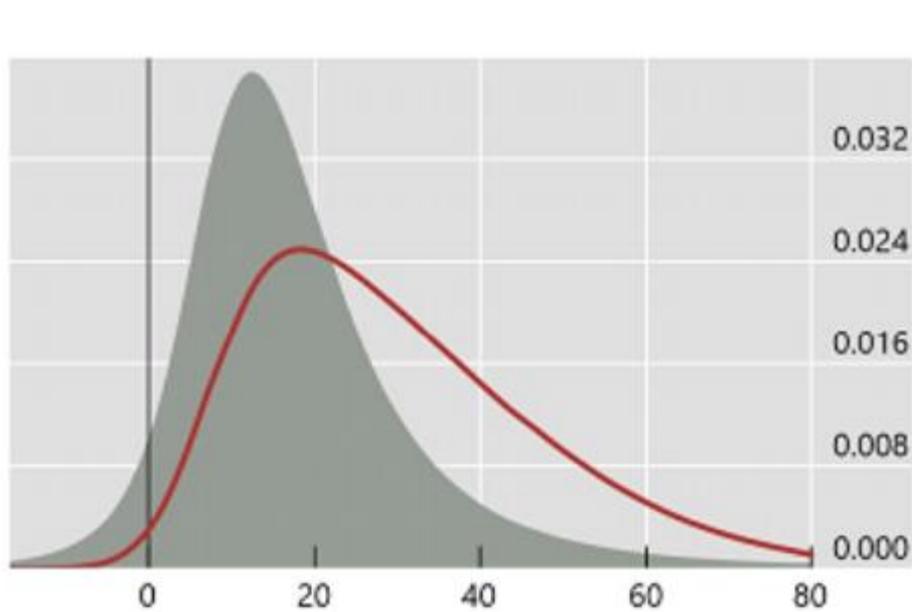
(a) Emerging market and developing economies
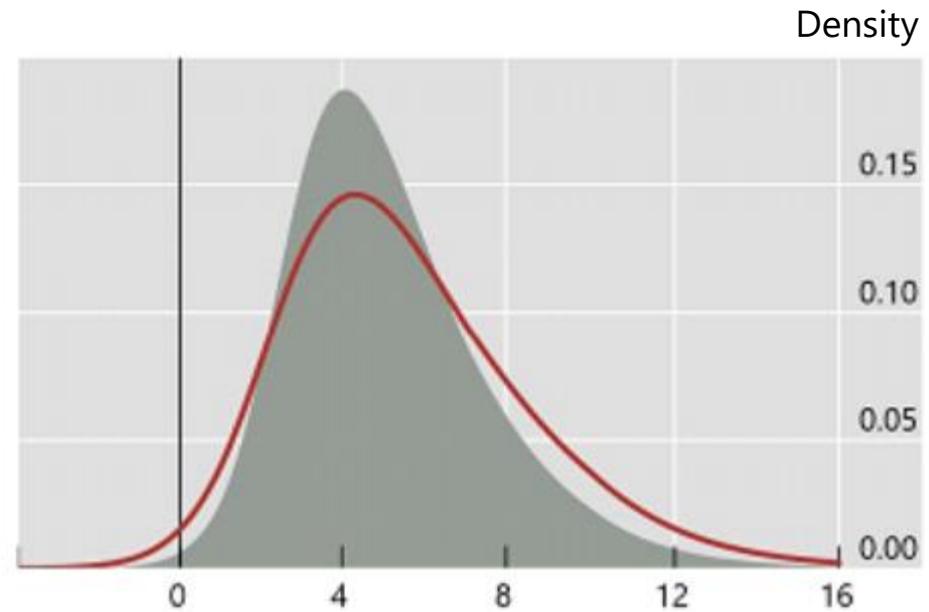
(b) Advanced economies

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This paper

- Examines how fiscal deficits affect inflation risk in EMDEs

- Uses novel methods for panel quantile regressions with fixed effects

- Also examines how exchange rates respond, "external channel"

- Evaluates how various macro-financial and institutional changes in EMDEs affect the deficit-inflation link

- Sample of 26 EMDEs, annual data from 1960 onwards

Main results

- Fiscal deficits have non-linear effects on inflation

- Deficit-inflation link much stronger in EMDEs than in advanced economies (AEs)

- External channel important: exchange rate depreciates, with non-linear effects, and sovereign risk rises

  - High FX debt and foreign holdings increase the exchange rate effects

- Monetary policy regime matters for deficit-inflation link

  - Smaller effects in inflation targeting regimes

Structure of presentation

- Relationship with previous literature

- Methodology and data

- Baseline results

  - Deficit-inflation, deficit-exchange rate relationships and the sovereign risk channel

- Relevance of the monetary policy regime

Relationship with previous literature

- Effects of fiscal deficits on inflation (eg Catao and Terrones (2005); Lin and Chu (2013); Fischer et al (2002))

- Fiscal deficits and exchange rates (eg Monacelli and Perotti (2010); Kim and Roubini (2008); Ilzetzki et al (2013))

- How inflation targeting affects inflation and inflation expectations (eg Ball and Sheridan (2004); Lin and Ye (2007); Gurkaynak et al (2010))

- Non-linearities in the Phillips curve (eg Lopez-Salido and Loria (2022); Busetti et al (2021); Forbes et al (2021); Banerjee et al (2020))

Methodology

- Quantile panel Phillips curves with fixed effects (Machado and Santos Silva (2019))

- Allows to analyse how the entire inflation forecast distribution changes, instead of focusing on the conditional mean of inflation

- $\hat{Q}_\tau(\pi_{i,t+1}|x_{it}) = x_{it}\,\hat{\beta}_t$

  - where $x_{it} = \left(\Delta def_{i,t}, \Delta y_{i,t}, \pi_{i,t}, \Delta exc_{i,t}, \Delta oil_{i,t}\right)$

  - LHS variable: one-year-ahead inflation

  - RHS variables: change in deficit; real GDP growth; current inflation; log change in exchange rate and in oil price

Methodology, II

- Obtain coefficients at 5%, 25%, 50%, 75% and 95% quantiles

- Distributions smoothed to follow a skewed-t distribution (Adrian et al (2019))

- Also consider linear models for various dependent variables
    - $y_{i,t+1} = x_{it}\,\widehat{\beta}_t$

Data

- Annual; time period 1960-2019
  - Shorter series for many EMDEs
  - Exclude inflation rates above 600%

- Sample includes 26 EMDEs:
  - 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

- 22 advanced economies used as comparison group in some estimations

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How do increases in fiscal deficits affect inflation risks?

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Effects of higher deficits on inflation are non-linear
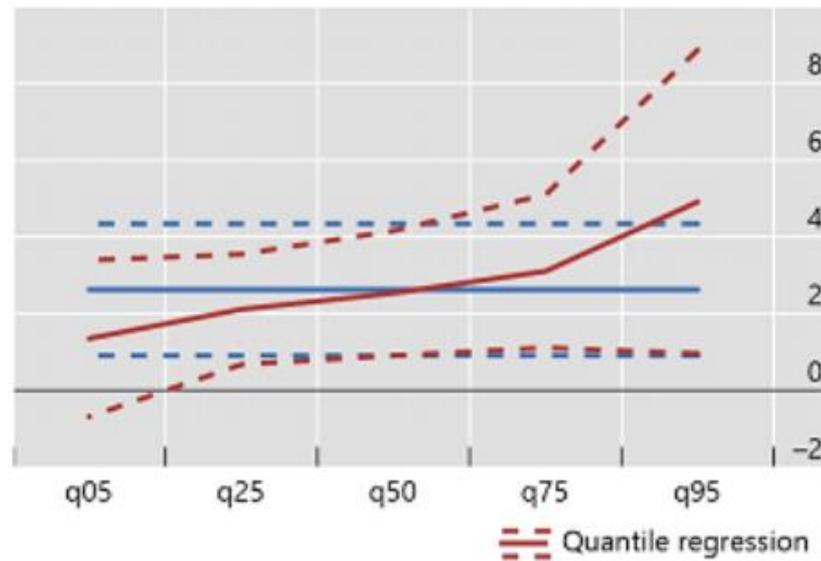
(a) Emerging market and developing economies
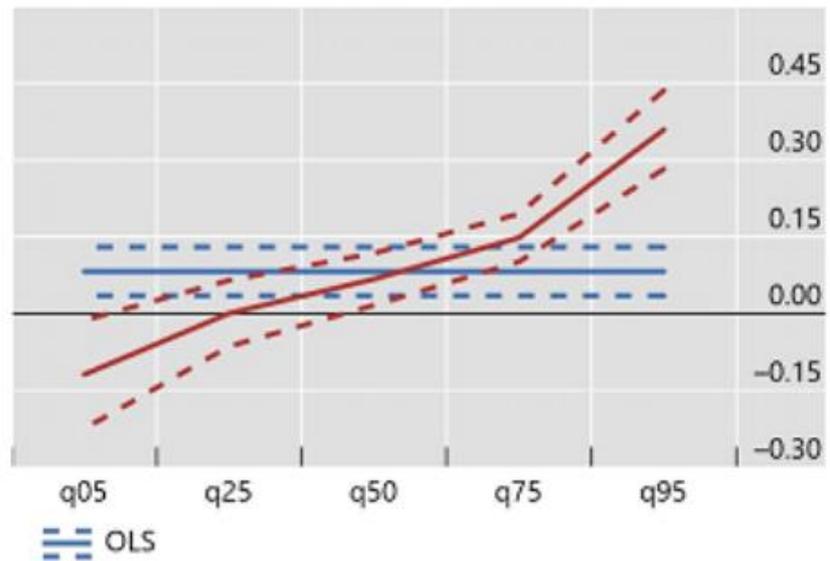
(b) Advanced economies

Baseline results for 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}	1.353	2.110**	2.531**	3.103**	4.911**
	(1.239)	(0.872)	(0.988)	(1.211)	(2.402)
π_{it}	0.0891	0.422***	0.606***	0.858***	1.652***
	(0.296)	(0.0986)	(0.0989)	(0.148)	(0.539)
Δy_{it}	0.142	0.688**	0.991***	1.405**	2.708
	(0.849)	(0.301)	(0.343)	(0.576)	(1.855)
Δexc_{it}	0.116	0.197**	0.242***	0.303**	0.497
	(0.214)	(0.0940)	(0.0906)	(0.139)	(0.438)
Δoil_{it}	0.0494	0.0468	0.0454	0.0435	0.0373
	(0.0416)	(0.0288)	(0.0282)	(0.0347)	(0.0729)
$SovereignCrisis_{it}$	10.23	14.61**	17.05***	20.37***	30.85*
	(9.298)	(6.216)	(6.279)	(7.674)	(16.78)
Observations	1,080	1,080	1,080	1,080	1,080

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Non-linearities in (other) risk factors

- Higher current inflation increases likelihood of high future inflation
  - Consistent with more frequent price adjustments at high inflation rates (eg Alvarez et al (2019))

- Real GDP growth has larger effects at right tail
  - Consistent with flatter Phillips curve at low inflation rates (eg Busetti et al (2021))

- Exchange rate effects also larger at the right tail

Extensions and robustness tests

- Changes to the model specification

- Considering a longer inflation horizon

- Comparing emerging Asia with Latin America

- Using fiscal shocks instead of changes in fiscal deficits

Replacing fiscal deficits by fiscal shocks

- Correlation of deficits with other explanatory (macro) variables

- Consider a more exogenous measure by using deviations from an estimated fiscal reaction function; similar to Corsetti et al (2022)

  - Regress primary deficits on lagged primary deficits, lagged level of government debt and output gap

  - Identify fiscal shocks as residuals from the estimated spending rule

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Results are robust to using fiscal shocks

Inflation forecast quantiles	5% π_{t+1}	25% π_{t+1}	50% π_{t+1}	75% π_{t+1}	95% π_{t+1}
$FiscalShock_{it}$	-0.959	1.025	1.726**	2.723***	7.113**
	(2.189)	(0.654)	(0.730)	(0.965)	(3.176)
π_{it}	-0.252	0.383***	0.608***	0.928***	2.335***
	(0.442)	(0.113)	(0.123)	(0.199)	(0.778)
Δy_{it}	-0.562	0.522	0.905**	1.449**	3.848*
	(1.274)	(0.347)	(0.387)	(0.599)	(2.077)
Δexc_{it}	0.262	0.247**	0.241**	0.234**	0.201
	(0.340)	(0.120)	(0.0943)	(0.119)	(0.503)
Δoil_{it}	0.0321	0.0465	0.0516*	0.0589*	0.0909
	(0.0532)	(0.0293)	(0.0281)	(0.0345)	(0.0817)
$SovereignCrisis_{it}$	4.298	13.62*	16.91***	21.59***	42.21**
	(14.13)	(7.091)	(6.138)	(6.168)	(16.39)
Observations	1,057	1,057	1,057	1,057	1,057

How important is the exchange rate channel?

Fiscal deficits and "exchange rate-at-risk"
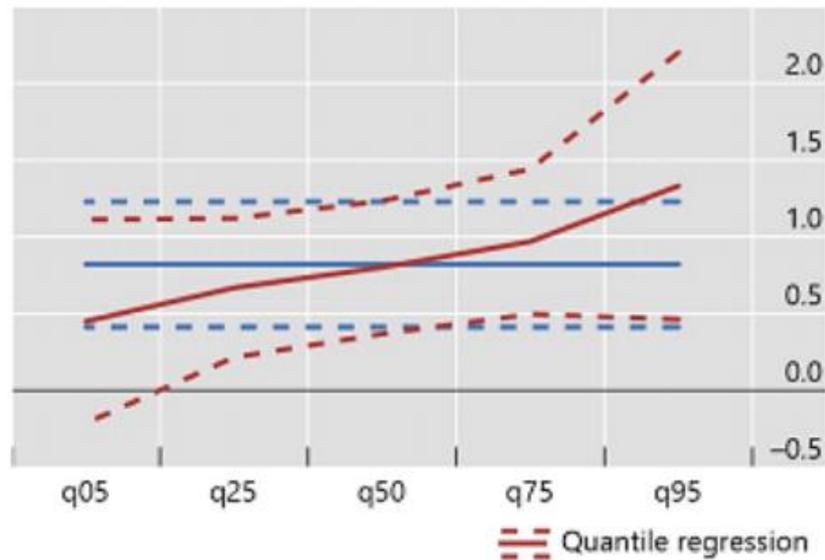
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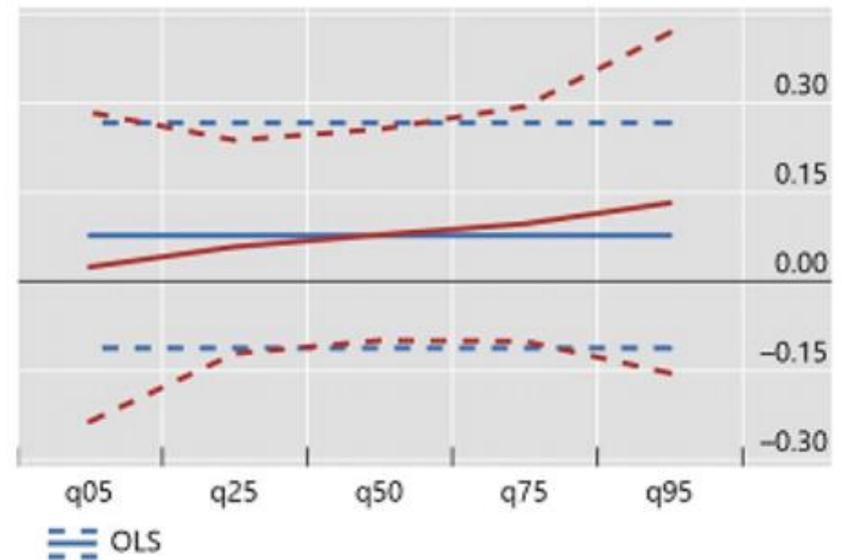
(b) Advanced economies

Evaluating the sovereign risk channel

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VARIABLES	(1) ΔExc rate$_{t+1}$	(2) ΔCDS spread$_{t+1}$	(3) ΔSov rating$_{t+1}$
Δdef_{it}	0.821***	24.48*	0.0752**
	(0.248)	(12.75)	(0.0296)
π_{it}	0.113***	-28.35	-0.00892
	(0.0291)	(19.81)	(0.00909)
$\Delta CDSspread_{it}$		0.107	
		(0.0963)	
Δy_{it}	0.140	-7.369	-0.0446
	(0.190)	(6.959)	(0.0284)
Δexc_{it}	0.379***	-3.499**	0.00979
	(0.0479)	(1.439)	(0.0111)
Δoil_{it}	-0.000157	0.379	0.000634
	(0.0129)	(0.338)	(0.00179)
$SovereignCrisis_{it}$	3.539	479.9*	6.418***
	(4.369)	(254.7)	(1.962)
i_t^{US}	0.782***	35.27**	0.00722
	(0.148)	(12.45)	(0.0140)
$EqVol_t^{US}$	0.622	35.05	-0.101
	(0.402)	(45.71)	(0.0761)
$\Delta SovRating_{it}$			0.0359
			(0.0458)
Observations	1,079	337	599
R-squared	0.442	0.449	0.302
Number of countryid	26	20	25

EME currency depreciates as deficits rise when FX share of debt and foreign holdings are high

	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}	-0.317	-0.771**	0.235	0.214
	(0.255)	(0.353)	(0.424)	(0.320)
$\Delta def_{it} * D_{it}$	1.104***	1.164**	0.951	1.137**
	(0.331)	(0.501)	(0.645)	(0.459)
D_{it}	0.699	-2.140	-1.159	-0.173
	(1.034)	(1.926)	(1.011)	(0.977)
π_{it}	-0.0870	0.0461	0.113***	0.118***
	(0.248)	(0.262)	(0.0280)	(0.0277)
Δexc_{it}	0.237***	0.307***	0.381***	0.374***
	(0.0506)	(0.0537)	(0.0453)	(0.0451)
Δy_{it}	0.165	-0.0684	0.104	0.129
	(0.140)	(0.116)	(0.192)	(0.196)
Δoil_{it}	0.0516**	0.0685***	-0.000634	-0.00109
	(0.0202)	(0.0217)	(0.0129)	(0.0129)
i_t^{US}	0.241	-0.759***	0.765***	0.779***
	(0.283)	(0.230)	(0.152)	(0.151)
$Eqvol_t^{US}$	1.316	1.600*	0.617	0.575
	(1.107)	(0.919)	(0.421)	(0.433)
$SovereignCrisis_{it}$			3.299	2.709
			(4.420)	(4.215)
Observations	335	334	1,079	1,066
R-squared	0.089	0.151	0.447	0.448
Number of countryid	19	21	26	26

EMEs FX reserves

USD trillions

EMEs: AR, BR, CL, CN, CO, CZ, HK, HU, ID, IN, KR, MX, MY, PH, PL, SA, SG, TH, TR and ZA.

Source: IMF, *International Financial Statistics*.

Higher FX reserves provide insulation against depreciations

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}	1.096	1.482***	1.710***	2.008***	2.592**
	(0.735)	(0.563)	(0.571)	(0.651)	(1.052)
$\Delta def_{it} * D_{it}$	-0.848	-1.242*	-1.475**	-1.780***	-2.377**
	(0.954)	(0.700)	(0.656)	(0.672)	(0.992)
D_{it}	-1.493	-2.393*	-2.925**	-3.621**	-4.986*
	(1.782)	(1.381)	(1.369)	(1.613)	(2.730)
π_{it}	0.0972*	0.105***	0.109***	0.115***	0.126***
	(0.0564)	(0.0388)	(0.0327)	(0.0264)	(0.0390)
Δexc_{it}	0.130*	0.279***	0.367***	0.482***	0.708***
	(0.0770)	(0.0566)	(0.0507)	(0.0576)	(0.0920)
Δy_{it}	0.435*	0.244	0.131	-0.0169	-0.307
	(0.259)	(0.177)	(0.188)	(0.245)	(0.439)
Δoil_{it}	0.00893	0.00307	-0.000403	-0.00494	-0.0138
	(0.0221)	(0.0133)	(0.0134)	(0.0175)	(0.0352)
$SovereignCrisis_{it}$	9.368	5.678	3.495	0.640	-4.957
	(6.522)	(4.593)	(4.497)	(5.068)	(9.294)
i_{it}^{US}	0.274	0.455***	0.561***	0.701***	0.975**
	(0.226)	(0.156)	(0.153)	(0.210)	(0.398)
$EqVol_{it}^{US}$	-0.721	0.439	1.125**	2.022***	3.782**
	(0.982)	(0.579)	(0.545)	(0.726)	(1.520)
Observations	1,078	1,078	1,078	1,078	1,078

Relevance of the monetary policy regime

IT periods are associated with weaker deficit-inflation link

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}	1.470	2.474**	3.037**	3.855***	6.104**
	(1.573)	(1.088)	(1.195)	(1.451)	(2.974)
$\Delta def_{it} * D_{it}$	-1.290	-2.208**	-2.722**	-3.469***	-5.524**
	(1.352)	(1.044)	(1.118)	(1.310)	(2.422)
D_{it}	-1.530	-2.652	-3.281*	-4.195**	-6.708*
	(2.854)	(1.933)	(1.740)	(1.725)	(3.621)
π_{it}	0.0986	0.430***	0.616***	0.886***	1.629***
	(0.277)	(0.100)	(0.0999)	(0.151)	(0.531)
Δy_{it}	0.0659	0.602**	0.902**	1.338**	2.538
	(0.844)	(0.305)	(0.351)	(0.603)	(1.897)
Δexc_{it}	0.102	0.182*	0.227**	0.292*	0.471
	(0.209)	(0.0938)	(0.0935)	(0.151)	(0.456)
Δoil_{it}	0.0463	0.0375	0.0325	0.0254	0.00559
	(0.0388)	(0.0261)	(0.0251)	(0.0322)	(0.0727)
$SovereignCrisis_{it}$	9.087	13.57**	16.07**	19.72**	29.75*
	(9.433)	(6.309)	(6.423)	(8.118)	(17.18)
Observations	1,080	1,080	1,080	1,080	1,080

Significance of IT remains in the post-1985 sample

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}	0.841	1.853***	2.254***	2.939**	4.955
	(2.509)	(0.680)	(0.806)	(1.239)	(4.027)
$\Delta def_{it} * D_{it}$	-1.014	-1.574***	-1.795***	-2.174***	-3.288
	(1.734)	(0.567)	(0.596)	(0.834)	(2.771)
D_{it}	-4.185	-4.254*	-4.282*	-4.329	-4.468
	(4.859)	(2.408)	(2.502)	(3.117)	(7.948)
π_{it}	-0.353	0.328	0.598***	1.059***	2.416*
	(0.880)	(0.201)	(0.207)	(0.320)	(1.359)
Δy_{it}	0.381	0.950**	1.175**	1.560**	2.693
	(1.556)	(0.386)	(0.468)	(0.728)	(2.404)
Δexc_{it}	0.338	0.227*	0.183	0.108	-0.112
	(0.402)	(0.138)	(0.143)	(0.215)	(0.741)
Δoil_{it}	-0.00232	0.0250	0.0358	0.0543	0.109
	(0.0537)	(0.0200)	(0.0249)	(0.0366)	(0.106)
$SovereignCrisis_{it}$	-0.478	6.144	8.761	13.25	26.43
	(36.93)	(12.44)	(10.42)	(11.81)	(44.69)
Observations	792	792	792	792	792

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Periods of IT also change the deficit-exchange rate link

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}	0.694	0.934***	1.074***	1.262***	1.622***
	(0.503)	(0.340)	(0.318)	(0.349)	(0.622)
$\Delta def_{it} * D_{it}$	-1.258**	-1.427***	-1.525***	-1.658***	-1.911***
	(0.636)	(0.419)	(0.346)	(0.386)	(0.734)
D_{it}	-1.027	-1.805	-2.254**	-2.863**	-4.025*
	(1.855)	(1.190)	(1.051)	(1.239)	(2.301)
π_{it}	0.119**	0.116***	0.114***	0.112***	0.107**
	(0.0571)	(0.0400)	(0.0333)	(0.0285)	(0.0455)
Δexc_{it}	0.108	0.265***	0.355***	0.479***	0.713***
	(0.0803)	(0.0548)	(0.0529)	(0.0584)	(0.0997)
Δy_{it}	0.466*	0.247	0.120	-0.0526	-0.381
	(0.264)	(0.176)	(0.191)	(0.244)	(0.438)
Δoil_{it}	-0.00141	-0.00304	-0.00399	-0.00527	-0.00772
	(0.0211)	(0.0133)	(0.0138)	(0.0176)	(0.0345)
$SovereignCrisis_{it}$	9.478	5.798	3.669	0.786	-4.715
	(6.303)	(4.549)	(4.642)	(5.763)	(10.40)
i_t^{US}	0.296*	0.490***	0.601***	0.753***	1.042***
	(0.177)	(0.133)	(0.149)	(0.216)	(0.386)
$EqVol_t^{US}$	-0.523	0.495	1.084**	1.881**	3.403**
	(0.947)	(0.509)	(0.509)	(0.772)	(1.637)
Observations	1,079	1,079	1,079	1,079	1,079

Conclusions

- An increase in fiscal deficits has non-linear effects on future inflation

  - Effects are also much larger in EMDEs than in AEs

- Evidence that the exchange rate channel is relevant in EMDEs

  - Non-linear effects of fiscal deficits on the exchange rate

- Evolution of EMDE macro-financial characteristics important; eg moving away from "original sin"; higher FX reserves

- Inflation targeting associated with much weaker deficit-inflation relationship

- Results highlight important country heterogeneity and relevance of policy frameworks