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When are fiscal deficits inflationary in low-income countries?

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When Are Fiscal Deficits Inflationary in Low-Income Countries?

Michael Bleaney[1], Atsuyoshi Morozumi[1] and Zakari Mumuni[2]

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Abstract

Previous research has found that the relationship between fiscal deficits and inflation is conditional on income levels: deficits tend to be inflationary in developing countries but not in advanced economies. We show that *within* low-income countries (LICs) the relationship is again conditional: only when relatively poor institutions fail to hold governments accountable to the general public are fiscal deficits inflationary in LICs.

JEL Classification: E31, H62, O23

Keywords: Fiscal deficits, Inflation, Government accountability

Centre for Research in Economic Development and International Trade, University of Nottingham

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1 Introduction

Catão and Terrones (2005) find that the relationship between fiscal deficits and inflation differs across income levels: deficits are inflationary in developing countries (i.e., emerging economies and low-income countries), but not in advanced economies.[1] This paper, using data on 52 low-income countries (LICs) from 1980 to 2016, shows that there is systematic variation in the deficit-inflation relationship *even within* LICs. Specifically, although the quality of institutions is generally low in LICs compared to advanced and emerging market economies, it can still vary widely within them, and we examine how this alters the deficit-inflation relationship. Our focus is on a type of institutions which affect the degree to which a government is accountable to the general public.[2] We show that while the deficit-inflation relationship does not hold for LICs in general, the relationship holds robustly when relatively poor institutions fail to hold governments accountable and restrain citizens from political participation.

2 Motivation

Why may institutions matter for the deficits-inflation relationship? Catão and Terrones (2005, page 543) themselves mention the possible role of institutions (albeit without specifying their type) when interpreting their results on the role of income levels in the relationship: they posit that weak institutions, associated with fiscal profligacy, make it difficult to manage inter-temporal budget constraints. Our conjecture, focusing on the type of institutions affecting the degree of government accountability, is that when such institutions constrain governments and ensure the public's political participation, the political leadership may be more sensitive to the public's dislike of inflation, so that fiscal shocks that lead to a build-up of public debt tend to

1 Their paper is inspired by a theoretical work of Sargent and Wallace (1981), which indicates that in a regime of fiscal dominance where fiscal policy is set independently, an increase in the present value of fiscal deficits must be accompanied by a rise in the present value of seigniorage to maintain the government's budget constraint. Other recent empirical works also suggest a significant relationship between fiscal policies and inflation in developing countries. For instance, Bleaney and Francisco (2016) find a robust relation between deficits and inflation in Sub-Saharan Africa.

2 We define institutions broadly as "rules and organisations of a society that affect economic incentives of different agents and shape interactions among them". We highlight institutions affecting government-citizen (i.e. vertical) relations, as opposed to citizen-citizen (i.e. horizontal) relations. This way of categorising types of institutions (vertical vs horizontal) follows Acemoglu and Johnson (2005). Institutions affecting the vertical relations include competitive elections, freedom of media, and transparency of government policies.

induce fiscal consolidations rather than a resort to seigniorage revenue, as documented for example for the United States by Bohn (1998). By contrast, countries with unaccountable governments are liable to suffer from fiscal dominance, where monetary policy is subordinate to fiscal policy and consequently inflation is more likely to result in the long run.

3 Econometric Methodology and Data

We use the mean group (MG) and pooled mean group (PMG) methods of Pesaran et al. (1999) that allow independent dynamics for each country. In the MG method, separate autoregressive distributed lag (ARDL) models are estimated for each country and the average of each parameter across all countries is taken. The PMG method is similar to MG, but with the difference that the long-run relationship between fiscal deficits and inflation is constrained to be equal across countries, and maximum likelihood methods are used in the estimation. A test of the PMG homogeneity restriction forms the basis for choosing between the MG and PMG methods in each case. Only countries with at least 20 annual successive observations are included in the sample. The baseline estimated equation is of the form:

$$\pi_{i,t} = \delta_{0i} def_{i,t} + \delta_{1i} def_{i,t-1} + \lambda_i \pi_{i,t-1} + \zeta_i trend_{i,t} + \mu_i + \epsilon_{i,t}, \quad (1)$$

where $\pi_{i,t}$ and $def_{i,t}$ are inflation rates and budget deficits in country i in year t, $trend_{i,t}$ is a country-specific trend, μ_i represents fixed effects. Reparameterizing Eq. (1) in error correction form yields:

$$\Delta\pi_{i,t} = \phi_i\left(\pi_{i,t-1} - \theta_i def_{i,t}\right) + \delta_{1i}^{*} \Delta def_{i,t} + \zeta_i trend_{i,t} + \mu_i + \epsilon_{i,t}, \quad (2)$$

where $\phi_i = -(1-\lambda_i)$, $\theta_i = (\delta_{0i} + \delta_{1i})/(1-\lambda_i)$, and $\delta_{1i}^{*} = -\delta_{1i}$. Our interests are the long-run coefficient (θ_i) and the error-correction speed of adjustment parameter (ϕ_i). In PMG/MG methods, it is only possible to test for interaction between variables by splitting the sample. We thus estimate Eq. (2), splitting LICs according to the quality of institutions affecting government accountability.

The data are annual, covering 52 LICs for the 1980-2016 period. The Appendix A explains the country classification by income, and gives the list of LICs. The inflation rate is

calculated as the annual percent change in the consumer price index. Fiscal deficits at a general government level are used to reflect the relevance of not only central governments but also local governments and public enterprises in inflationary episodes. Fiscal deficits are divided by GDP.[3] The Appendix B presents the data sources, together with the descriptive statistics corresponding to the reference regressions (Table 1). Following Morozumi and Veiga (2016), institutions affecting government accountability are proxied by "democracy/autocracy (democracy, for short)" and "executive constraints (constraints)" (both from Polity IV), and "voice and accountability (voice)" (from World Bank's Worldwide Governance Indicators, WGI). Briefly, while "executive constraints" measures the degree of institutionalized constraints on the decision-making powers of chief executives, "democracy" captures the degree to which citizens' political participation is guaranteed as well as the element covered by "constraints".[4] "Voice" aggregates various existing measures regarding citizens' political participation and other factors affecting government accountability, such as freedom of the press and the transparency of public policies.[5] Thus, all the proxies reflect institutional elements affecting the accountability of a government.

4 Results

Our hypothesis is that fiscal deficits tend to be inflationary when institutions fail to hold governments accountable, so that even among LICs, where the degree of accountability is generally low, the deficit-inflation relation may not be observed if institutions are relatively strong. Table 1 estimates Eq. (2) for all 110 countries available (including LICs), for all 52 LICs, and then for the sub-samples of LICs with relatively strong and weak institutions.

For all countries (Columns 1 and 2), the Hausman test supports PMG (the p-value is 0.402), for which the deficit coefficient is significantly negative, contrary to common expectations. For LICs (Columns 3 and 4), the fiscal deficit coefficient is positive for both MG

3 This follows Fischer et al., (2002), Bleaney and Francisco (2016) and others. The main reason why we do not divide deficits by narrow money (Catão and Terrones, 2005 do) is due to the limited availability of narrow money measures for LICs.

4 The variable names of "democracy" and "constraints" in Polity IV are "POLITY2" and "XCONST", respectively.

5 Since WGI data are available only after 1996, for the level of "voice" before 1995 (after 1980), we use the value in 1996.

and PMG, with the MG coefficient being significant. Since the Hausman test favours MG (the p-value is 0.080), this result is in line with the previous literature on the role of income levels. The MG coefficient indicates that in the long run a one percentage point increase in the deficit-to-GDP ratio is associated with a 0.54 percentage point increase in inflation rate. To note, EC coefficients (ϕ) are negative and significant throughout.

Columns 5 to 8 split LICs into ones with relatively strong and weak institutions using the median of national (sample-period) averages of "democracy" amongst LICs as a cut-off. This yields 26 (26) LICs with strong (weak) institutions. For strong institutions (Columns 5 and 6), the Hausman test cannot reject the PMG model, in which the long-run deficit coefficient is negative and insignificant. However, for weak institutions (7 and 8), the deficit coefficient is positive and significant in both MG and PMG, with the preference for MG, implying that the expected positive relationship holds. Therefore, even amongst LICs institutional quality affecting government accountability appears decisive in the deficits-inflation relationship: only when institutions are relatively poor does the significant relationship emerge.

Table 1: Institutions (measured by "democracy") and the deficits-inflation relationship in LICs

	All countries		Low income countries (LICs)					
Institutions	All		All		Strong		Weak	
	PMG	MG	PMG	MG	PMG	MG	PMG	MG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fiscal deficit (θ)	-0.0838***	0.111	0.0451	0.535**	-0.0368	0.00871	0.117**	1.061***
	(-3.79)	(0.53)	(1.10)	(2.05)	(-0.59)	(0.03)	(2.02)	(2.58)
EC (ϕ)	-0.587***	-0.633***	-0.721***	-0.773***	-0.762***	-0.807***	-0.682***	-0.738***
	(-21.90)	(-24.29)	(-20.59)	(-24.06)	(-15.94)	(-17.78)	(-13.52)	(-16.30)
Countries	110	110	52	52	26	26	26	26
Observations	3024	3024	1419	1419	704	704	715	715
Hausman_p		0.402		0.0804		0.880		0.0404

Notes: The dependent variable is the annual percent change in the consumer price index. The model is Eq. (2) and the fiscal deficits coefficient is the long-run elasticity. Countries with strong institutions are ones with the national average of "democracy" above the median of the averages amongst LICs. Constants and coefficients on other variables are not shown for brevity. Hausman_p is the p-value from the Hausman test, testing the homogeneity of LR elasticity. t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 conducts four different robustness checks on the role of institutions in the deficit-inflation relation in LICs, still using "democracy" as a proxy. First, in Panel A, Columns 1 to 4 categorise LICs into the ones with strong and weak institutions using the 33rd percentile (instead of the median) of the long-run averages, leaving 18 (instead of 26) LICs as ones with weak institutions. Results are even stronger for countries with particularly weak institutions: both the PMG and MG coefficients are positive and significant, with the Hausman test supporting the latter. Second, acknowledging that previous literature has found the deficit-inflation relationship to be particularly strong for high–inflation countries (e.g., Catão and Terrones, 2005; Lin and Chu, 2013), Columns 5 to 8 exclude countries with relatively high inflation rates.[6] The fact that the relationship is robust for weak institutions suggests that high inflation itself does not drive the result.

Third, in Panel B, Columns 1 to 4 present the results based on the ARDL model with 2 lags (both in inflation and deficits). Though the PMG result is insignificant even under weak institutions, the MG result (which is favoured with the p-value of 0.064) provides reassurance. Last, we added extra controls of oil price inflation and exchange rate regimes to Eq. (2). The results are robust regardless of the choice of methods (PMG is supported this time).[7] Regarding results based on the other institutional proxies: "constraints" and "voice", the Appendix C summarises the results focusing on weak institutions (under strong institutions, the deficit-inflation relationship is never significantly positive in the model preferred by the Hausman test). The results generally stand when these alternative proxies are used.[8]

6 To be precise, after hyper-inflators are omitted (which is done routinely, see the Appendix for details), we further exclude countries in the top decile of average inflation over the sample period. Consequently, 8 LICs are removed.

7 Though not shown for brevity, the signs of long-run coefficients on these variables in Columns 5 to 8 are often as expected (a few coefficients with statistical significance): higher oil price inflation and more flexible exchange rate regimes tend to be associated with higher inflation.

8 Admittedly, the results on "voice" are relatively weak, but this may be related to the fact that the variable is available only after 1996 (and we used the value in 1996 to measure institutional proxy prior to 1996).

Table 2: Robustness checks on institutions (measured by "democracy") and the deficit-inflation relationship in LICs

Panel A								
Specifications	Using 33rd percentile threshold				Excluding high-inflation countries			
Institutions	Strong		Weak		Strong		Weak	
	PMG	MG	PMG	MG	PMG	MG	PMG	MG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fiscal deficit (θ)	-0.00206	0.204	0.174**	1.161**	-0.0410	-0.151	0.106*	1.014***
	(-0.04)	(0.66)	(2.27)	(2.55)	(-0.65)	(-0.86)	(1.85)	(2.78)
EC (ϕ)	-0.751***	-0.806***	-0.667***	-0.710***	-0.770***	-0.819***	-0.719***	-0.752***
	(-17.43)	(-21.02)	(-11.05)	(-12.56)	(-15.45)	(-17.42)	(-13.46)	(-14.57)
Countries	34	34	18	18	22	22	22	22
Observations	917	917	502	502	601	601	604	604
Hausman_p		0.522		0.0641		0.532		0.0175
Panel B								
Specifications	Using 2 lags				With additional controls			
Institutions	Strong		Weak		Strong		Weak	
	PMG	MG	PMG	MG	PMG	MG	PMG	MG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fiscal deficit (θ)	-0.0694	-0.00933	-0.0468	1.007**	-0.00364	0.0266	0.279***	0.958**
	(-1.09)	(-0.03)	(-1.01)	(1.99)	(-0.05)	(0.07)	(2.94)	(2.19)
EC (ϕ)	-0.826***	-0.898***	-0.765***	-0.854***	-0.744***	-0.846***	-0.599***	-0.701***
	(-13.33)	(-15.11)	(-10.40)	(-12.79)	(-11.52)	(-12.27)	(-11.13)	(-14.89)
Countries	25	25	26	26	21	21	22	22
Observations	659	659	689	689	572	572	572	572
Hausman_p		0.851		0.0635		0.654		0.514

Notes: See notes to Table 1. Only LICs are considered.

5 Concluding remarks

This paper shows that just because countries are poor does not mean that a positive deficits-inflation relationship is observed: in LICs only when government accountability is relatively low does this relation hold robustly. We hope that revealing this possible heterogeneity of the deficit-inflation relationship within LICs contributes to understanding better why empirical research has often failed to uncover the expected positive relationship.

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Appendix

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A: Income level classification of a country and the list of LICs

We categorise countries by income levels using the following three steps. First, for each of the years when PPP-adjusted GDP per capita are available from World Bank's World Development Indicator (1990-2016), we sort all the available countries into four groups: the highest 25th percentile, 25th-50th, 50th-75th and 75th-100th (the PPP-adjusted GDP is only available from 1990). Second, based on the number of times each country appears in those four groups over the period, we temporarily denote countries that appear in the top 25th percentile most frequently as high-income countries; countries appearing in the 25th-50th (50th-75th, 75th-100th) most frequently as upper-middle (lower-middle, low) income countries. Third, we re-categorise the four groups into three by combining the bottom two (i.e., lower-middle and low) groups, resulting in our final classification of high-income countries (HICs), emerging market economies (EMEs), and low-income countries (LICs). This way, our classification takes account of the fact that some countries grow fast while others stay stagnant over decades. Then, 1) keeping countries with (at least) 20 annual, successive observations to estimate Eq.(2), 2) ensuring the availability of the three institutional proxies ("constraints", "democracy", "voice"), and 3) excluding hyperinflaters (defined as a country with average inflation rates of more than 50 percent) leave 52 LICs for the reference specification (see Table 1). (Within LICs, Angola, Bolivia, and Uzbekistan are categorised as hyperinflaters for our sample period.) The list of the countries with their levels of institutions according to the respective proxies are shown in Table A-1, where like Table 1, the median of long-term, sample-period averages of each proxy among LICs is used as a cut-off.

Table A-1: List of 52 LICs with institutional levels

Country	Constraints	Democracy	Voice	Country	Constraints	Democracy	Voice
Bangladesh	Low	High	High	Kenya	High	Low	Low
Benin	Low	High	High	Kyrgyz Republic	High	Low	Low
Bhutan	Low	Low	Low	Lesotho	High	High	High
Burkina Faso	Low	Low	High	Madagascar	High	High	High
Burundi	Low	Low	Low	Moldova	High	High	High
Cabo Verde	High	High	High	Mongolia	High	High	High
Cambodia	Low	High	Low	Morocco	Low	Low	Low
CAR	Low	Low	Low	Mozambique	Low	Low	High
Chad	Low	Low	Low	Namibia	High	High	High
China	Low	Low	Low	Niger	Low	Low	Low
Comoros	High	High	High	Pakistan	High	High	Low
Djibouti	Low	Low	Low	Papua New Guinea	High	High	High
Ecuador	High	High	High	Paraguay	High	High	High
El Salvador	High	High	High	Philippines	High	High	High
Eritrea	Low	Low	Low	Republic of Congo	Low	Low	Low
Ethiopia	Low	Low	Low	Rwanda	Low	Low	Low
Fiji	High	High	High	Senegal	High	High	High
Georgia	High	High	High	Solomon Islands	High	High	High
Ghana	High	High	High	Sri Lanka	High	High	High
Guatemala	High	High	High	Sudan	Low	Low	Low
Guinea	Low	Low	Low	Swaziland	Low	Low	Low
Guinea-Bissau	Low	Low	Low	Tanzania	Low	Low	Low
Honduras	High	High	High	Togo	Low	Low	Low
India	High	High	High	Tunisia	Low	Low	Low
Indonesia	High	Low	Low	Ukraine	High	High	High
Jordan	Low	Low	Low	Yemen	Low	Low	Low

Note: CAR: Central African Republic

B: Data sources and descriptive statistics

General government deficits (divided by GDP) are primarily from IMF's World Economic Outlook (WEO), based on net lending/borrowing, general government, percentage of GDP. This is complemented by the corresponding data from the European Commission's AMECO database and the OECD Economic Outlook database. Inflation data are annual percentage change in consumer prices from World Bank's World Development Indicators (WDI), complemented by the corresponding data from IMF's WEO. The descriptive statistics corresponding to the reference regressions (Table 1) are in Table B-1. As noted above, hyperinflaters are excluded. (Also, Equatorial Guinea, exhibiting a quite high level of deficits, about 80 percent of GDP on average over our sample period, is omitted. Its inclusion, however, does not change any of the main results, particularly because the country is not categorised as LIC.)

Table B-1: Descriptive statistics for LICs (corresponding to Table 1)

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
All countries					
Inflation	3,024	7.856	16.01	-18.11	368.5
Deficit/GDP	3,024	2.395	7.310	-43.30	151.3
All LICs					
Inflation	1,419	9.911	16.03	-18.11	268.2
Deficit/GDP	1,419	3.112	5.054	-40.34	46.24
LICs with strong institutions					
Inflation	704	9.963	16.71	-11.29	268.2
Deficit/GDP	704	2.672	4.155	-17.80	22.94
LICs with weak institutions					
Inflation	715	9.861	15.34	-18.11	164.2
Deficit/GDP	715	3.545	5.776	-40.34	46.24

Notes: Both inflation and deficit/GDP are in percent.

Regarding control variables used in robustness checks, oil price inflation data, obtained as an annual percentage change in crude petroleum price, are from IMF's International Financial Statistics (IFS), and exchange rate regime data, available till 2014 (inclusive), are from Bleaney and Tian (2017). The institutional proxies of "democracy/autocracy (democracy)" and "executive constraints (constraints)" are both from Polity IV. In the original dataset, the former is called

POLITY2, and the latter XCONST. “Voice and accountability (voice)” is from World Bank’s Worldwide Governance Indicators (WGI).

Reference for Section B

Bleaney, M., Tian, M., 2017. Measuring exchange rate flexibility by regression methods. Oxford Economic Papers, 69 (1), 301-319

C: Summary of results using "constraints" and "voice"

See Table C-1.

Table C-1: Institutions (measured by "constraints" and "voice") and the deficits-inflation relationship in LICs under weak institutions

Specifications	Reference		Thresholds		No high-inflation		2 lags		With controls	
Institutions	Weak									
	PMG	MG	PMG	MG	PMG	MG	PMG	MG	PMG	MG
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constraints										
Deficit (θ)	0.103*	0.722*	0.171**	1.025**	0.0926*	0.612*	-0.0360	0.993**	0.295***	1.060***
	(1.83)	(1.82)	(2.25)	(2.36)	(1.66)	(1.81)	(-0.77)	(1.99)	(3.22)	(2.63)
Countries	26	26	18	18	22	22	26	26	22	22
Observations	719	719	505	505	608	608	709	709	587	587
Hausman_p		0.166		0.0896		0.141		0.0649		0.511
Voice										
Deficit (θ)	0.0931	0.909**	0.0328	0.591	0.0847	0.900**	-0.0433	0.936*	0.253***	0.959**
	(1.64)	(2.16)	(0.57)	(1.09)	(1.51)	(2.44)	(-0.93)	(1.86)	(2.63)	(2.19)
Countries	26	26	18	18	23	23	26	26	22	22
Observations	692	692	484	484	616	616	678	678	564	564
Hausman_p		0.0997		0.391		0.0371		0.0972		0.489

Notes: Only LICs with weak institutions are considered. The dependent variable is the annual percent change in the consumer price index. The baseline model is Eq. (2) and the fiscal deficits coefficient is the long-run elasticity. "Reference" specification corresponds to the one in Table 1 (Columns 7 and 8). Constants and coefficients on other variables, including EC coefficient, are not shown for brevity. (EC coefficients are negative and significant for all the estimations.) Hausman_p is the p-value from the Hausman test, testing the homogeneity of LR elasticity. t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$