Debt shocks and the dynamics of output and inflation in emerging economies

ADB-PIER conference on "Monetary and Fiscal Policies in Emerging Markets Amid Heightened Uncertainty"

John Beirne¹ Nuobu Renzhi² May 20-21, 2024

¹Asian Development Bank

²Capital University of Economics and Business, China

- 1. Introduction
- 2. Related literature
- 3. Data and empirical methodology
- 4. Empirical results
- 5. Concluding remarks

Introduction

Motivation and contribution

- Higher stocks of public debt, tighter global monetary conditions, and widening deficits have amplified debt sustainability risks for EMEs in recent years.
- This paper estimates the impact of exogenous public debt shocks in EMEs over the period 2000 to 2022 on the trajectory of output and inflation over short and longer horizons.
- We also examine the role of **EME fundamentals** in affecting the baseline responses of output and inflation to debt shocks.
- Paper goes beyond prevailing related studies that have **mainly** focused on output.
- Policy implications for EMEs on enhancing resilience to spikes in debt.

Related literature

- Debt over a certain threshold can reduce growth (Reinhart and Rogoff, 2010; Baum, Checherita-Westphal, and Rother 2013).
- Lack of consensus: Negative relationship, no threshold (Panizza and Presbitero, 2014; Kumar and Woo, 2015).
- The trajectory of debt matters for the impact on growth (de Soyres et al, 2022). Chudik, Mohaddes, Pesaran, and Raissi, 2017).
- Other work on **private and corporate debt**, systemic risk and recessions (Jorda et al, 2013; Bernardini and Forni, 2017).

Related literature (contd.)

- Persistent fiscal deficits and excessive debt constrain the central bank from tightening monetary policy, leading to amplified inflation expectations (Sargent and Wallace, 1981).
- Fiscal tightening in inflation-targeting central bank economies helps to reduce inflation (Catão & Terrones 2003; de Mendonça & Machado 2013; Coibion, Gorodnichenko, and Weber 2021, Brandao-Marques et. al (2023).
- Cevik and Miryugin (2023) find the extent of fiscal policy shocks on inflation are closely driven by the initial **level of fiscal space**.
- **Debt-inflation trap** for highly-indebted EMEs (Kwon, McFarlane, and Robinson, 2009).

Data and empirical methodology

Data description:

- yearly observations for 34 EMEs over the period 2000 to 2022.
- · We collect IMF data on:
 - > the real GDP as the domestic output measure;
 - the year-on-year change of the consumer price index as a measure of the inflation rate;
 - > actual and projected public debt relative to GDP.

Country sample: Brazil; Bulgaria; Chile; People's Republic of China (PRC); Colombia; Czech Republic; Egypt; Greece; Hong Kong, China; Hungary; Indonesia; Israel; Republic of Korea; Kuwait; Mauritius; Mexico; Malaysia; Morocco; Nigeria; Pakistan; Peru; the Philippines; Poland; Qatar; Romania; Russian Federation; Saudi Arabia; Singapore; South Africa; Taipei, China; Thailand; Ukraine; Viet Nam; United Arab Emirates.

Identification

- Toidentify exogenous shocks in public debt, following de Soyres et al. (2022), we use the forecast errors from various vintages of the IMF WEO publications.
- We compute the debt shocks in debt-to-GDP terms, with the shock applied only to public debt and not to GDP, to isolate the impact from the debt component only.

Public debt shocks

• Specifically, public debt shocks are defined as follows:

 $debt_{i,t}^{shock} = \Delta \ln debt_{i,t}^{actual} - \Delta \ln debt_{i,t}^{forecast} (1)$

- $\Delta \, \ln {\it debt}_{r,t}^{\,\, actual}$: the log growth rate of the actual debt to GDP ratio and
- $\Delta \ln debt$ forecast : the log growth rate of the forecasted debt to actual GDP ratio projected by IMF analysts in the October of the same year.
- The change between the actual and projected public debt levels is thus identified as an exogenous shock to public debt as the forecast errors, absent any unanticipated policy changes (e.g., Auerbach and Gorodnichenko, 2012).

 Following the framework proposed by Jorda (2005), we use the panel local projection (LP) method to estimate the model and calculate impulse responses to exogenous public debt shocks.

The baseline linear model can be given as follows:

$$y_{i,t+h} - y_{i,t-1} = \alpha_i^h + \lambda_t^h + \sum_{l=0}^L \delta_l^h z_{i,t-l} + \beta^h debt_{i,t}^{shock} + \varepsilon_{i,t+h}, (2)$$

- y is the variable of interest (e.g., real GDP or inflation);
- debt shock is the series of identified public debt shocks;
- *z* is a vector of control variables including lagged values for *y* and *debt* ^{shock} as well as other control variables (includes 2 years of lagged values);
- α_i denotes economy-specific fixed effects, and λ_t represents the time fixed effects.

We further adapt the LP framework to allow for nonlinearities in the specification that are associated with domestic and global financial conditions.

$$y_{i,t+h} - y_{i,t-1} = \alpha_i^h + \lambda_t^h + \sum_{l=0}^L \delta_l^h z_{i,t-l} + \beta^h debt_{i,t}^{shock} + \theta^h FC_{i,t} \times debt_{i,t}^{shock} + \varepsilon_{i,t+h},$$
(3)

- where FC_{i,t} refers to financial conditions variables,
 - domestic financial condition index (averaging the central bank policy rate and 10-year government bond yield) and global financial conditions (VIX index)

To investigate whether economy-specific characteristics matter in the estimation, we extend the local projection as follows:

$$\begin{aligned} y_{i,t+h} &- y_{i,t-1} \\ &= \alpha_i^h + \lambda_t^h + \sum_{m \in M} I[\sum_{l=0}^L \delta_{m,l}^h z_{i,t-l} + \beta_m^h \ debt_{i,t}^{shock} + \theta_m^h \ FC_{i,t} \\ &\times \ debt_{i,t}^{shock} \right] + \varepsilon_{i,t+h} \end{aligned}$$
(4)

• we incorporate a dummy variable *I* that takes a value of 1 for EMEs whereby their level of economy-specific characteristic (e.g., levels of initial public debts, income classifications, or regional categorizations) falls within a certain level $m \in M$ distributions.

Empirical results

Baseline results

Following an unanticipated increase in public debt²

- · real GDP decreases persistently
- the inflation rate responds positively



²The solid line in each graph represents the estimated impulse responses in percentage over the following 5 years to a one percentage point positive public debt shock. The shaded area represents represent 68% (dark) and 90% (light) confidence bands.

Robustness: adding lags of initial debt level as controls

- We add two lags of the initial debt-to-GDP ratio as additional controls.
 - > broadly **consistent** with our baseline estimates.



Robustness: dropping lags of dependent variables

 One may be concerned that endogeneity issues may arise if there is a correlation between the lags of the dependent variables and the excluded lags subsumed in the error term (e.g., Nickell-bias).

broadly consistent with our baseline estimates



Extensions: conditioning on initial debt levels

Does the ex-ante level of public debt matter in shaping the response dynamics to the debt shock?

- · High vs. low initial level of public debt:
 - the negative impact of the unanticipated public debt increase on real GDP for high debt group is much stronger than the baseline case.



Extensions: conditioning on initial debt levels

- High-debt economies experience a significant decrease in inflation rate in response to a public debt rise:
 - ➢ Aggregate demand channel → Debt sustainability concerns may further weaken the aggregate demand for EMEs with high debt levels.



Extensions: conditioning on domestic financial conditions

Do domestic financial conditions matter?

- We interact the public debt shock with our constructed financial conditions index:
 - Tighter domestic financial conditions amplify the impact of an unanticipated increase in public debt on output;
 - Regarding the inflation rate, the overall responses are more muted and show opposite signs compared to the baseline.



Extensions: conditioning on global financial conditions

What about global financial conditions?

• Interacting the public debt shock with the VIX index: the impact of public debt shocks on output and inflation is **somewhat weaker** with tighter global financial conditions.



Does EME income level matter in shaping the response dynamics to the debt shock?

 high vs. lower-income economies following the World Bank income classification³

³We define lower-income economies as the combination of lower-mid-income and upper-mid-income economies in our EME sample, including Egypt; Morocco; Nigeria; Pakistan; Philippines; Ukraine; Vietnam; Brazil; Bulgaria; People's Republic of China; Colombia; Indonesia; Malaysia; Mauritius; Mexico; Peru; Russia; South Africa; and Thailand.

Extensions: conditioning on income levels

- For lower-income EMEs, the responses are much larger compared to the baseline estimates, thus lower-income EMEs could suffer significantly from public debt shocks;
- For high-income EMEs, the responses are smaller in magnitude.



Extensions: Asia vs. other EMEs

- For non-Asian EMEs, the responses are much larger compared to the baseline estimates
- For the Asian EME group, the overall response is smaller in magnitude.



Concluding remarks

Key findings and implications

- We show that **real GDP falls** significantly after an unanticipated increase in public debt, while the **inflation rate responds positively**.
- The estimates vary depending on EME fundamental characteristics.
 - Higher initial debt levels, tighter domestic financial conditions, and lower income levels amplify the negative responses of real GDP, while tighter global financial conditions dampen the negative impacts of debt shocks;
 - For lower income countries, debt shocks amplify significantly inflation, while for high debt, there may be disinflationary effects.
- Implications for public debt sustainability.
 - Lower initial levels of debt or a declining debt trajectory can mitigate the negative repercussions of debt shocks on growth.
 - Shifting towards higher income boosts the resilience of both growth and inflation to debt shocks.