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Central Bank Independence and Sovereign Borrowing

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Abstract

This paper studies the impact of central bank independence on sovereign borrowing, using an index that captures institutional constraints on central bank lending to the government across 155 countries from 1972 to 2023. The findings show that tighter lending to the executive significantly reduces sovereign interest rates and raises the debt-to-gross domestic product ratio in developing countries. These effects reflect the executive's improved ability to borrow at lower costs under greater central bank independence. The results are robust to multiple tests, but there are no significant effects in advanced economies. From a policy perspective, the results highlight the key role of independent central banks as catalysts for reducing governments' borrowing costs and enhancing the government's borrowing capacity.

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Produced by the Research Support Team

Central Bank Independence and Sovereign Borrowing*†

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> "I want the Bank [of France] to be enough in the hands of the Government, but not too much. I do not ask that it lends money to the Government, but that it provides it with facilities."[1]
>
> *Napoleon Bonaparte, 1806*

1 Introduction

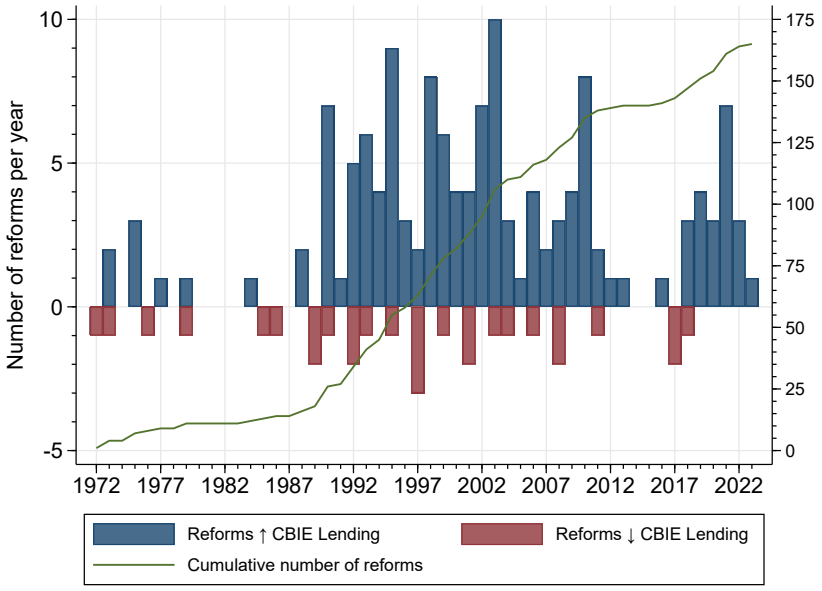
The relationship between central banks and fiscal authorities is at the heart of the debate on central bank independence. Historically, the first central banks were created as fiscal agents to the sovereign, mainly with the purpose of financing war spending.[2] In this context, central bank independence was completely absent. This close fiscal-monetary linkage remained largely unchallenged until the 1970s, when institutional reforms began limiting central bank lending to the government. Figure 1 shows the distribution of reforms that increased (blue bars) or decreased (red bars) the conditions on central bank lending to the government over the past five decades, for a sample of 155 countries. The chart is based on an index that we built to measure the legal provisions that shield the central bank from lending to the government, and that we introduce and describe in detail in this paper. Throughout the period 1972-2023, reforms introducing tighter restrictions on lending to the government have been steadily implemented. The independence of central banks in lending accelerated in the late 1980s and early 1990s. However, we also notice a few cases that go in the opposite direction and reduce the independence of their central banks in the same period.

Given this major institutional shift, it is key to understand the effects of central bank independence on sovereign borrowing. Does restricting central bank financing constrain government debt accumulation? And does it influence interest rates on sovereign bonds? In this paper, we address these questions by studying the effect of reforms affecting the central bank's ability to lend to the sovereign. In particular, we look at the impact of these reforms

[1] Original text: "Je veux que la Banque soit assez dans les mains du Gouvernement et n'y soit pas trop. Je ne demande pas qu'elle lui prête de l'argent, mais qu'elle lui procure des facilités." Quote from Ramon (1929); Yasuo (2011).

[2] The Bank of England was established in 1694 with the purpose of waging the English government's war against France in the Low Countries (Encyclopædia Britannica, 2025). The Swedish Riksbank, established in 1668, was mainly used to finance war expenditure throughout the 17th and 18th centuries (Hendrickson, 2020). Napoleon Bonaparte, who instigated the creation of the Banque de France in 1800, later pressured the central bank to provide favorable lending to war contractors (Rouanet, 2021; Chadha and Newby, 2013). As (Broz, 1998, pp. 206) put it, "the main societal public good [of central banks] was fiscal in nature and involved improving government credit worthiness during wartime".

Figure 1: Reforms increasing or decreasing the central bank's lending limits to the government (1972-2023)



Note: The figure shows the frequency of reforms that decrease/increase lending limits to the government, together with the cumulative number of reforms in central bank independence between 1972 and 2023.
Source: Romelli (2022, 2024).

on a country's share of public debt-to-GDP and the interest rate paid on such debt.

These questions are highly relevant, as the issue of whether central banks should finance government debt continues to be both contentious and salient. The introduction of quantitative easing programs alongside rising sovereign debt levels and the concerted monetary and fiscal expansions adopted in many economies during the Covid-19 pandemic, reignited the debate about the role of central banks as fiscal agents (Blanchard, 2023; Moschella, 2024; Adrian et al., 2024). In this context, some scholars re-examined the role of central bank monetary financing in supporting government interventions (Blanchard, 2019; Galí, 2020; Blanchard and Pisani-Ferry, 2020; Adrian et al., 2021), including its potential role in providing 'helicopter money' (Galí, 2020; Yashiv, 2020).

However, existing studies on the link between central bank independence and sovereign debt dynamics present mixed findings. The literature found that higher central bank independence leads to lower debt (Grilli et al., 1991; von Hagen and Harden, 1995), government deficits (Grilli et al., 1991; Bodea, 2013; Bodea and Higashijima, 2017), and monetary financing (Hooley et al., 2021). While these results indicate a positive fiscal performance, they also reveal important nuances. Central bank independence seems to be effective only

in countries with strong democratic institutions, such as the rule of law or constraints on executive power (Bodea and Higashijima, 2017; Jung et al., 2025). Moreover, other studies found less clear results: such as no significant relationship between central bank independence and government deficits (Sikken and de Haan, 1998), or interest rates (Alesina and Summers, 1993), and that the lack of central bank independence in developing countries does not result in monetization of election-related fiscal expansions (Alpanda and Honig, 2009).

Moreover, these analyses rely on a broad index of central bank independence, which encompasses other elements beyond the specific restrictions on monetary financing of public debt. For example, the index developed by Cukierman et al. (1992), which remains the most widely used in the literature, also incorporates other dimensions of central bank independence, such as the central bank's objectives and the procedures for appointing or dismissing its governor. In this index, only 55 percent of the criteria are strictly related to lending to the government.[3] We improve on previous studies by focusing on independence specifically in terms of the limitations of the central bank's lending to the government.

To this end, we create an index of central bank independence that focuses solely on the restrictions around the central bank's ability to finance sovereign debt. This index is based on the Central Bank Independence - Extended (CBIE) index of Romelli (2024), which builds on existing indices of central bank independence to develop the most comprehensive index of independence. We isolate in this index only those aspects related to monetary financing, creating a sub-index that we call CBIE Lending, and that measures the independence of central banks only in terms of lending to the government. For example, our indicator captures whether there are legal limits on central bank lending or which institution determines the financing conditions for the government. This index allows us to evaluate the benefits that stem specifically from the central bank's independence in lending.

Using this index on 155 countries for the years from 1972 to 2023, we investigate the effect of central bank independence on lending on sovereign debt. Our focus is on the impact of independence on public debt as a share of GDP and on the cost of borrowing, measured by interest rates charged on sovereign debt. We use local projections to estimate these effects. This approach allows us to assess not only the magnitude of the effect, but also its duration over time.

[3]The other aspects look at the independence of the head of the central bank (25 percent), of policy formulation (25 percent), and of the objectives (6 percent).

We find that tightening lending conditions has significant effects on sovereign debt in developing countries, whereas the impact in advanced economies is somewhat more muted. In developing economies, a reform increasing the central bank's independence in lending results in higher debt-to-GDP ratios and lower borrowing costs. Ten years after a reform, debt is, on average, 2.52 percentage points higher, and the interest rate is 58 basis points lower than it would be in the absence of the reform. In advanced economies, we find the reverse effect: debt-to-GDP tends to fall, while interest rates tend to increase. However, these effects vanish over time, which is not the case for developing countries, where the effects are persistent. The results are robust to several tests, including an instrumental variable specification that allows us to reduce potential endogeneity biases. We also observe the effect on interest rates to be more pronounced in high-inflation developing countries, while the effect on debt is higher in low-inflation scenarios. Moreover, we see that the fall in interest rates is sharper when a country is not part of an IMF program.

These estimates indicate that stricter rules on central bank lending improve borrowing conditions for developing countries, as they can take on more debt at cheaper rates. At first glance, the result may appear counterintuitive, especially the increase in public debt. If the government cannot rely on the central bank for buying its debt, we would expect it to issue less debt. However, by imposing restrictions on monetary financing, the government gains credibility as a borrower. Investors are confident that the government has more limits in inflating debt away through debt monetization, and are therefore more willing to purchase sovereign debt, reducing the risk premia, suggesting that investors perceive debt as more sustainable after this type of reform. This is in line with our results that show that in developing economies the interest rate on sovereign debt falls after a reform. Faced with cheaper rates gained from enhanced credibility, the government has more room to increase sovereign debt compared to a scenario with no reform.

We contribute to the literature in multiple ways. First, most of the long-standing literature on central bank independence focuses on the impact of these reforms on inflation (Alesina and Gatti, 1995; Loungani and Sheets, 1997; Cukierman et al., 1998; Cukierman and Lippi, 1999; Hayo, 1998; Lim, 2021; Athanasopoulos et al., 2025). As mentioned in this section, several studies examine its impact on fiscal conditions. While some studies examine the impact of independence on debt, they use broader central bank independence indexes that look at different aspects of independence beyond government lending. We improve on

these studies by looking specifically at reforms that tighten the central bank's ability to finance government debt. Moreover, while previous research found that central bank independence lowered debt (Grilli et al., 1991) and had no effect on interest rates (Alesina and Summers, 1993), we find that these reforms actually increased debt and lowered interest rates.[4]

Second, our paper provides evidence of the positive spillovers of central bank credibility stemming from higher independence. In general, the literature has found that independence increases the credibility of central bank monetary policy (Blinder, 2000; Garriga and Rodriguez, 2020; Du et al., 2020; Reis, 2019, 2022; Willems and Zettelmeyer, 2022; Romelli, 2022; Jung et al., 2025).[5] Scholars have already provided evidence that the credibility channel of central bank independence can benefit sovereign borrowing, showing that higher central bank independence lengthens the average maturity of government debt (Nöh, 2019) and improves the credit ratings of a country (Kashyap and Stein, 2023; Cormier, 2024). We enrich this literature by focusing on debt-to-GDP and the interest rate as outcome variables.

The rest of the paper is organized as follows. In section 2, we describe our data, while section 3 presents the empirical strategies employed in the paper. Section 4 presents the results, and section 5 concludes.

2 Data and descriptive statistics

This section describes the data used in the analysis. The index of central bank independence used in the paper is presented in Section 2.1. Section 2.2 discusses our dependent variables, i.e., the debt-to-GDP ratio and the interest rate on government debt, while Section 2.3 describes the additional control variables used in the analysis.

2.1 Index of central bank lending to the government

In this paper, we use information from the Central Bank Independence - Extended (CBIE) index introduced in Romelli (2022), and updated by Romelli (2024) for a sample of 155

[4]The difference with respect to these two studies is not just the index of independence we use, but also the size of the time series and the empirical methodology.

[5]For instance, Reis (2019) finds that central banks have limited scope to lower fiscal burdens directly, but Reis (2022) argues that "governments can avoid sovereign debt crises without sharp turns of austerity as long as public debt is seen as special [...]. This requires central banks to be more independent, not less so".

countries over the period 1972 to 2023.[6] This index combines the classical indices of central bank independence, i.e., the Grilli et al. (1991) and Cukierman et al. (1992) indices, to develop a comprehensive index of central bank independence that covers a wider range of central bank characteristics. In its most disaggregated format, this new index provides information on 42 criteria of central bank institutional design.

In our empirical analysis, we use the sub-index of CBIE that refers to the limitations on central bank lending to the government (CBIE Lending, hereafter). This index captures the legal framework governing central bank lending to the government, based on eight key criteria: i) restrictions on advances to the government; ii) limitations on central bank purchases of government securities in the primary or secondary market; iii) constraints on the central bank's ability to trade in these markets; iv) authority over the terms and conditions of lending; v) the scope of government-related entities eligible to receive central bank credit; vi) the legal definition of quantitative limits on such lending; vii) the maturity of the loans; and viii) the applicable interest rate conditions. Exact coding rules are defined for each category, and a rating between zero and one is assigned to each criterion. We provide the details on the coding of each criterion used in the construction of the sub-index on limitations on lending to the government in Appendix B. The degree of CBIE Lending is computed as the average of these criteria and its value ranges from 0 (lowest independence and loose limits) to 1 (maximum independence and stricter constraints).[7]

Table 1 provides an overview of the evolution of the CBIE Lending index over time. As central banks became increasingly independent, the limitations on lending to the government increased. The average level of the index rises throughout the period of our analysis. The limited number of reversals underscores the broad-based acceptance of the need to restrict government monetary financing across the world.

2.2 Government debt and interest rates

Our two main outcomes of interest are the government debt-to-GDP ratio and the interest cost of the debt. With these variables, we can explore if restricting the central bank's ability to finance the government affects the cost of government's lending (interest rate on sovereign debt) and its size (debt-to-GDP). The main source of data is the Public Finances in Modern

[6] See Appendix Table A for the full set of countries and information on data availability.

[7] These criteria are also those reported in the 'Limitations on lending to the government' sub-index of the widely used Cukierman et al. (1992) index of CBI.

Table 1: Summary statistics on the evolution of the CBIE Lending index

Period	# of Countries	# of Obs	# of Reforms	# of Reversals	Mean	Min	Max
Full sample							
1972-1979	93	719	7	4	0.396	0	1
1980-1989	110	1034	3	4	0.385	0	1
1990-1999	150	1368	51	9	0.45	0	1
2000-2009	156	1549	42	7	0.58	0	1
2010-2019	156	1560	20	4	0.647	0	1
2020-2023	156	624	14	0	0.688	0	1
Advanced economies							
1972-1979	25	193	3	1	0.36	0	0.938
1980-1989	26	257	1	3	0.344	0	0.938
1990-1999	34	321	16	0	0.485	0	1
2000-2009	34	340	8	0	0.735	0	1
2010-2019	34	340	1	0	0.768	0	1
2020-2023	34	136	0	0	0.788	0	1
Developing countries							
1972-1979	68	526	4	3	0.409	0	1
1980-1989	84	777	2	1	0.398	0	1
1990-1999	116	1047	35	9	0.439	0	1
2000-2009	122	1209	34	7	0.536	0	1
2010-2019	122	1220	19	4	0.613	0	1
2020-2023	122	488	14	0	0.661	0	1

Notes: Table provides summary statistics for the CBIE Lending index of limitation on central bank lending to the government from Romelli (2022, 2024). The sample of Advanced economies includes all OECD member countries in 2020. The sample of Developing countries includes all non-OECD member countries in 2020.

History database from the IMF (Mauro et al., 2015). Crossing this information with the CBIE Lending indicator allows us to cover 125 countries. As is standard in the literature, we use data on value of general government gross debt as a share of GDP. We estimate the implied government interest rate expenses on debt by computing the ratio between the amount of government interest expenses and government debt. Table 2 provides some descriptive statistics of these two variables.

Table 2: Summary statistics

	Obs	Mean	Std. Dev.	Min	Max
Debt to GDP					
All countries	4827	53.113	36.213	0.488	357.687
Advanced economies	1396	57.407	38.650	2.974	258.373
Developing economies	3431	51.365	34.029	0.488	357.687
Interest rate					
All countries	4753	5.164	4.212	0.0126	96.834
Advanced economies	1396	5.701	3.532	0.133	27.055
Developing economies	3357	4.940	4.446	0.013	96.834

Note: Table provides summary statistics for government debt interest costs of debt compiled in IMF - Public Finances in Modern History (Mauro et al., 2015) and updated until 2023. Interest rate is estimated as the ratio of interest expense to debt, both as percentages of GDP.

2.3 Additional control variables

To capture possible confounding effects, we include a set of additional control variables. These controls can be grouped into three main categories: business cycle, economic openness, and institutional factors.[8]

First, to capture business-cycle effects, we include real GDP growth and inflation. We further control for three expenditure measures: general government consumption, gross fixed capital formation, and final consumption expenditure, each expressed as a percentage of GDP, since government spending and investment cycles can mechanically drive public-debt ratios.

Second, we account for a country's openness and external financing environment by including the following indicators: a country's degree of openness to trade, net FDI inflows (% of GDP), exchange rate stability index, and the Chinn–Ito index of de jure financial openness.

Finally, to account for the level of institutional quality, we include two additional variables. First, the overall Polity Score index, which measures the strength of democratic institutions, with lower values indicating a more autocratic regime. Second, the index of legal constraints on the executive, previously used in Acemoglu et al. (2008) to measure the potential interference of governments on central banks. Both indicators are from the Polity IV dataset (PolityIV, 2014). These institutional covariates ensure that our estimates are

[8]See Appendix C for definitions and data sources; Appendix Table C.2 reports summary statistics.

not simply a reflection of different institutional regimes.

3 Empirical Strategy

This section outlines our empirical strategy aimed at investigating the long-run effects of tighter controls on central bank lending to the government on the debt-to-GDP ratio and the implied interest rate on government debt.

3.1 Local projections

We estimate the dynamic effects of restrictions on central bank lending to the government using local projections (Jordà, 2005). This approach directly estimates the effects on the outcome variables at multiple horizon dates separately: horizon $t+h$ outcomes are projected on $t=0$ values.

Specifically, we estimate the following system of h equations:

$$y_{c,t+h} - y_{c,t-1} = \alpha_c^h + \gamma_t^h + \Lambda^h CBIEL_{c,t} + \beta_{1lh} \sum_{l=0}^{l=p} (y_{c,t-l} - y_{c,t-1-l}) + \\ + \beta_{2fh} \sum_{f=0}^{f=h} CBIEL_{c,t+f} + \beta_{3h}' X_{c,t} + u_{c,t+h} \quad (1)$$

where c are countries in our sample and h= 1,2,..,10 are the forecast horizons.[9]

Our dependent variable, $y_{c,t+h} - y_{c,t-1}$, is expressed in cumulative changes over the horizon period h from time t-1 to time $t+h$. Depending on the specification, our dependent variable is the government debt-to-GDP ratio and interest rate on government debt. *CBIEL* is the CBIE Lending index of restrictions on central bank lending to the government in country c at time t. Λ^h is the coefficients of interest, as it shows the effects of restricting central bank lending to the government on y. In our specification, we also include the leads of the treatment variable to address the downward bias induced by overlapping forecast horizons.[10]

[9] As Jordà (2005) points out, consistency of the estimated coefficients does not require a joint estimation of the sequence of the h system of equations. Rather, the impulse response of each outcome variable can be estimated separately for each horizon. As shown in Montiel Olea and Plagborg-Møller (2021), the local projections method estimates are the same as the vector auto-regression ones, so our models naturally include auto-regressive terms.

[10] The direction of the bias that the inclusion of forwards of the treatment value addresses depends on the particular situation. In our case, overlapping the forecast horizon biases downwards our estimates of

Country-specific intercepts, α_c, absorb the impact of time-invariant country characteristics, while year-fixed effects, γ_t, allow us to account for time-dependent factors common across countries.

The vector $X_{i,t}$ includes the set of covariates associated with the business cycle of a country, its economic openness and institutional quality. To control for business-cycle fluctuations, we include annual real GDP growth, the GDP-deflator inflation rate, and three expenditure measures, general government consumption, gross fixed capital formation, and final consumption expenditure, all expressed as percentages of GDP. These variables ensure that expansions or contractions in output or public spending are not incorrectly attributed to our shock. We then capture a country's external environment with the trade-openness ratio, net FDI inflows, the exchange-rate stability index, and the Chinn–Ito index of financial openness. Finally, we control for cross-country differences in institutional quality with the Polity score and the executive-constraints index. All of these variables enter contemporaneously in each horizon's regression.[11]

Although local projections estimate each horizon's response independently, we augment each regression by including up to h lags of the change of our outcome variables to capture their dynamic feedback. In the debt-to-GDP equation, we add the interest rate lagged through horizon h, implying that changes in financing costs feed into the stock of debt only gradually. Conversely, in the interest-rate equation, we include the debt-to-GDP ratio lagged up to h periods, as debt shock can exert upward or downward pressure on borrowing rates throughout the forecast window.

Finally, to account for the potential cross-sectional (spatial) correlation, inference is based on the spatial correlation corrected errors (Driscoll and Kraay, 1998).[12]

the treatment effects of central bank reform. Untreated observations just prior to a reform have higher average outcomes (due to the positive effect of the subsequent treatment), while the outcomes for treated observations are not contaminated by additional subsequent central bank reforms because any such reforms (if they happen at all) are outside our longest forecasting horizon. To see the effects of the forwards of the treatment variable in our case, consider a treatment effects framework of central bank reform when reform takes place at time t and is not reversed thereafter. For an observation immediately prior to treatment, i.e., a control observation at time *t-1*, the outcome values at horizon *t-1+h* mechanically overlap with the subsequent treatment (within the forecast horizon h). The leads of the treatment variable, therefore, account for the effect any such subsequent reforms within the horizon h have on the outcome at that horizon h from an untreated observation.

[11] Adding lags of these controls produces substantively similar estimates.

[12] Montiel Olea and Plagborg-Møller (2021) argue that a lag-augmentation in local projection specifications obviates the need for an auto-correlation correction, and therefore suggest that standard heteroskedasticity robust (Eicker-Huber-White) errors suffice. In our case, differences in error estimation do not affect our inference.

3.2 State dependent local projections

The local projections model presented so far assumes that the effects of tighter restrictions on lending to the government are the same on average across countries. However, these effects might be state-dependent, i.e., conditional on some dimension of the economy. Local projections provide a flexible framework to test these hypotheses.[13]

Equation 2 presents the state-dependent local projections specification we apply:

$$y_{c,t+h} - y_{c,t-1} = S_{c,t}\Bigg[\alpha_c^h + \gamma_t^h + \Lambda^h CBIEL_{c,t} + \beta_{1lh}\sum_{l=0}^{l=p}(y_{c,t-l} - y_{c,t-1-l}) + \\ + \beta_{2lh}\sum_{f=0}^{f=h} CBIEL_{c,t+f} + \beta_{3h}' X_{c,t}\Bigg] + u_{i,t+h} \tag{2}$$

where $S_{c,t}$ is a dummy variable indicating the state of the economy, while the rest of the equation is the same as of Equation 1. In our analysis, we present results for two state variables. In particular, we test if the impact of CBIE Lending on fiscal outcomes change depending on (1) the level of inflation at time t, and (2) in the presence of an IMF program.

3.3 Estimates with a binary treatment

The empirical strategy presented so far uses the CBIE Lending index in Romelli (2022), which is a continuous variable. In this way, we can observe if different degrees of independence from the government's fiscal pressures influence the outcome variables. This approach captures the *gradual* effect of CBIE Lending.

To complement this approach, we isolate the impact of major institutional shifts. Specifically, we construct a binary reform indicator that equals one in any year when a legal change raises the CBIE Lending index by more than the sample median positive change (0.23) and zero otherwise. This dummy abstracts from the precise magnitude of the index after the reform and instead captures the discrete effect of sizeable steps toward greater independence.

In our sample, we find that 114 of the 155 countries have reformed their degree of CBIE Lending since 1972. These countries have implemented 137 reforms that tightened

[13] State-dependent local projections have recently gained popularity in macroeconomic research and have extensively been applied, for example, to analyzing the effects of austerity (Auerbach and Gorodnichenko, 2012; Ramey and Zubairy, 2018). de Haan and Wiese (2022) applied state-dependent models to estimate the effects of labor and product market reforms on economic growth.

restrictions on lending to the government, and 28 reforms that relaxed such conditions.

Appendix D presents the evolution of the CBIE Lending index for the countries in our sample. Figures D.1-D.4 in the Appendix show that applying the median threshold preserves the salient information: reforms are infrequent, typically large, and most countries experience only one such episode. Hence, the binary indicator effectively singles out the years in which substantive constraints on central-bank lending were introduced.

This binary index is coded as a staggered treatment in the language of experimental design. Once a country is treated, it is considered to remain treated. This approach allows us to study the persistence of reform effects over time.

3.4 Instrumental variables local projections

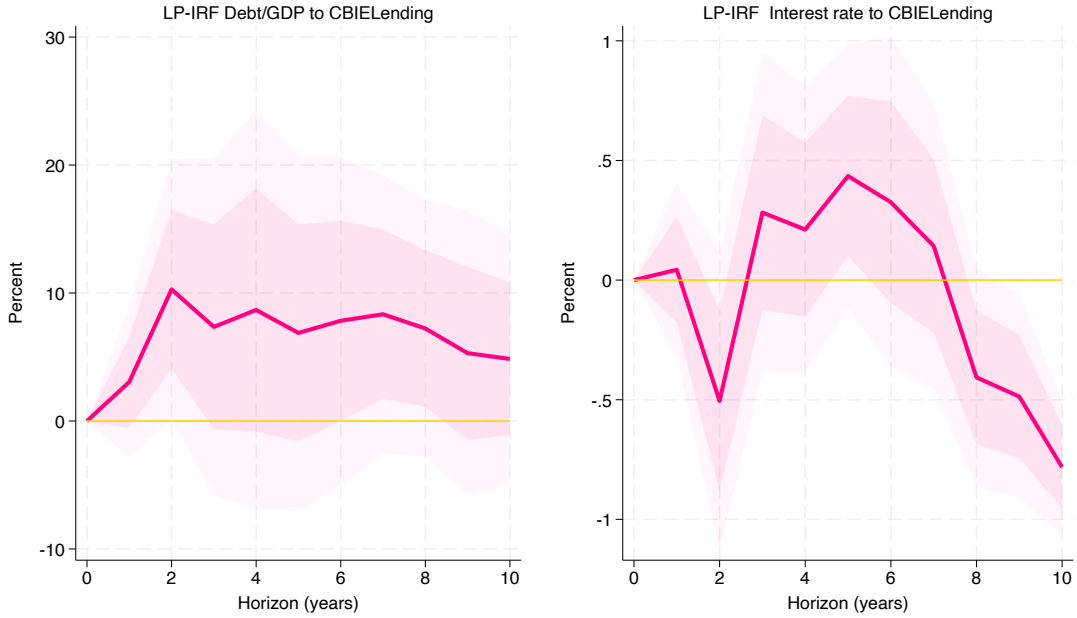
To address the potential endogeneity of central bank institutional design, we also implement an instrumental variable estimation of the CBIE Lending index. Romelli (2022) shows that one of the main determinants of central bank reform is peer pressure, as countries that are further away from their regional peers in terms of central bank design are more likely to adopt reforms that increase their level of independence.[14] We define our instrument of peer pressure as the 75th percentile of the distribution of the CBIE Lending index in a region in a given year, excluding the own-country observation. We group countries by regions using the same classification of Acemoglu et al. (2019). We expect regional neighbors with more independent central banks to indirectly put more pressure on a country to reform its central bank institutional design. In addition, we also add two dummies, one for IMF programs and the other for monetary unions, which have been shown to affect the impact of the reform process of a central bank. These dummies take the value 1 in the five years prior to receiving an IMF loan or joining a monetary union. In the estimates of the first stage, regressions reported in Appendix E, we show that our instrument is indeed highly correlated with the level of CBIE Lending. In our specifications, we include the same set of time-varying controls that we use in the OLS local projections estimates.

[14] A similar approach based on waves of reforms has been used as instrumental variable for central bank independence in Bodea and Hicks (2015) and Athanasopoulos et al. (2025), and for the independence of bank supervisors in Fraccaroli et al. (2025). This method was originally introduced by Acemoglu et al. (2019), who exploit waves of democratization in the construction of their instruments.

4 Results

This section presents the results of the analysis, including our main local projections results (section 4.1), the results for central bank reform (section 4.2), and IV local projection estimations (section 4.3).

Figure 2: Local projections, CBIE Lending index, all countries, 1972-2023.



Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the implied interest rate (right panel) to a one-point change in the CBIE Lending index at horizon h on the x-axis. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

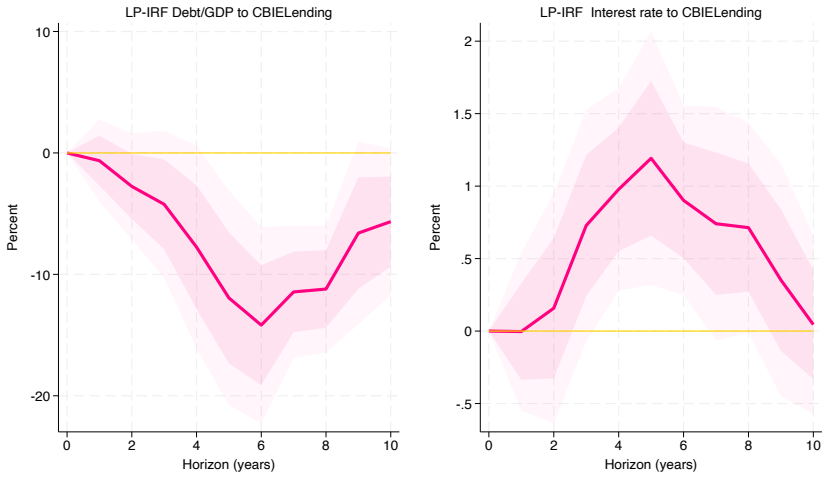
4.1 Baseline local projections

In Figures 2 and 3, we report the main findings of our analysis. In these graphs we present the local projections estimates of coefficients Λ^h in equation (1) at horizons h= 1,2,..,10 for the debt-to-GDP ratio in the left panels and the interest rate on the right panels. We present results for the full sample of countries in our analysis, for advanced economies, and developing countries. The results presented in Figure 2 suggest that, for the full sample of countries in our analysis, tighter restrictions on central bank lending to governments are associated with higher public debt, but there is no significant effect on the interest rate.

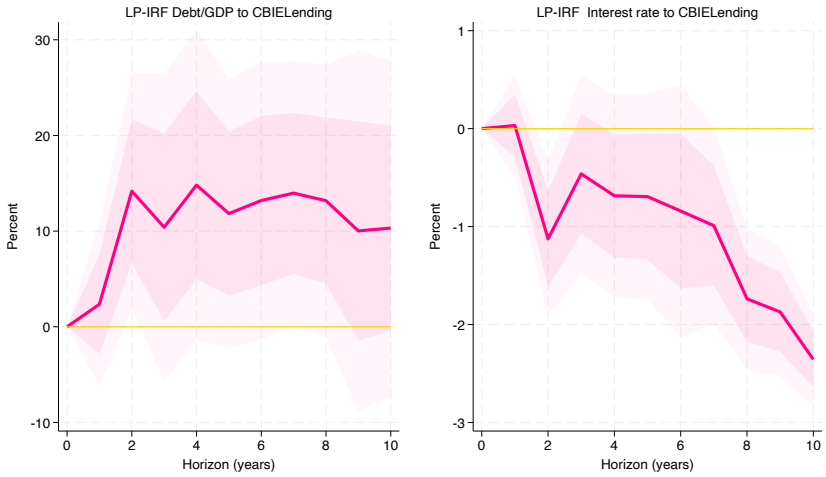
However, when we analyze the subsamples of advanced economies (Figure 3a) and developing countries (Figure 3b) separately, important divergences arise. For advanced

Figure 3: Local projections, CBIE Lending index, subgroups, 1972-2023.

(a) Advanced economies



(b) Developing countries



Notes: The panels show the cumulative response of the Debt/GDP ratio (left) and the implied interest rate (right) to a one-point change in the CBIE Lending index at horizon h. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

economies, Figure 3a shows that higher central bank independence in lending leads to a decrease in the public debt-to-GDP ratio and a temporary increase in the interest rate on debt. However, the magnitude of the effect weakens significantly over time. The effect on debt is strongest six years after the reform, when the debt-to-GDP ratio is 14.18 percentage points lower than its expected path in the absence of the reform. But this effect gradually weakens: by year ten, debt-to-GDP is 5.66 percentage points below the baseline. The weakening of the effect is even starker for the results on interest rate. The effect of the reform on the interest rate peaks five years after the reform, with an increase of 1.19 percentage points. But this effect fades out on the tenth year, where the registered increase is only 0.04 percentage points.

The results for developing countries differ substantially. Figure 3b shows that tightening the lending conditions to the government is associated with a lasting increase in the debt-to-GDP ratio in the medium term (left panel) and a persistent decline in the interest rate on government debt (right panel). The debt-to-GDP ratio rises sharply two years after the reform, reaching 14.18 percentage points above the pre-reform counterfactual. The effect persists ten years into the reform, where debt is 10.32 percentage points higher. On the interest rate side, we notice that the reform sharply reduces the cost of debt after two years, when the interest fall by 0.29 percentage points. The effect intensifies over time: after ten years, the reform reduces the interest rate on debt by 2.36 percentage points below the baseline. To assess the economic magnitude, note that the average change in the CBIE Lending index in our sample is 0.244 points. Scaling the impulse responses accordingly, this implies that the effect of a typical reform implies a 2.52 percentage point increase in the debt-to-GDP ratio and a 58 basis point reduction in interest rates ten years after the reform. These results indicate that tightening central bank lending to the government allows developing countries to carry more debt at more favorable interest rate conditions.

The lack of consistent effects for advanced economies may reflect the fact that many reforms in central bank independence were implemented in the early 2000s as part of European countries' effort to qualify for Eurozone access.[15] The Maastricht convergence criteria to access the Europe's monetary union required a country to strengthen central bank independence, while maintaining low debt-to-GDP and long-term interest rates. However, the

[15]Not all reforms in advanced economies are from Europeans or Eurozone countries. Countries that reform central bank independence include, for instance, Singapore, Iceland and Norway, among others. For more details, see Figure D.1 in the Appendix.

2007–2008 financial crisis disrupted this trajectory for interest rates on debt. The crisis was accompanied by a breakdown in market confidence, which led to 'overpriced' interest rates relative to economic fundamentals (De Grauwe and Ji, 2012; Beirne and Fratzscher, 2013). In support of this interpretation, when we exclude the post-2007 period, the effects on interest rates and debt for advanced economies vanish, pointing to the central role of the crisis in reshaping the debt-interest rate nexus.[16]

The results for developing countries deserve further analysis. A typical increase in the CBIE Lending index (0.244 points) raises the debt-to-GDP ratio by approximately 2.21 percentage points on impact. This corresponds to a 4.3 percent increase relative to the sample average debt-to-GDP ratio of 51 percent. Regarding the effect on the cost of debt, the same reform in CBIE Lending reduces the implied interest rate by about 0.57 percentage points, or 11.4 percent relative to the 5 percent average interest rate in the sample. Read together, these back-of-the-envelope calculations show that improvements in the lending index translate into meaningful shifts in debt-to-GDP ratios and non-trivial changes in funding costs.

We perform several robustness checks on these baseline estimations. We first estimate the models using only countries that reformed their central banks. The results are qualitatively the same (see Appendix Figure F.1 and F.2). We also test the robustness of the results when including or excluding different periods of interest. In one test, we omit observations before 1980 (to avoid a change in the economic environment in the immediate aftermath of the collapse of the Bretton Woods system), and we make the sample end in 2002 or in 2007 (to exclude the Global financial crisis period). The results are consistent, though for some sub-periods, the precision of the estimates might be impacted by the smaller sample size.[17]

4.1.1 State-Dependent Estimates

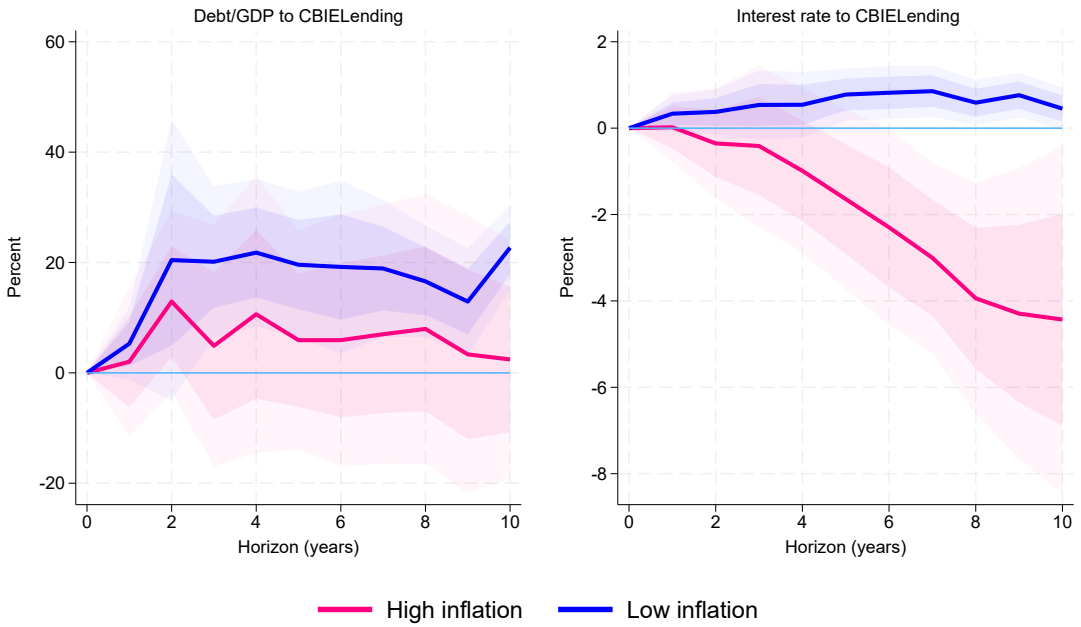
In this section, we present the results for the non-linear (state-dependent) estimates, focusing our analysis on developing countries. We present evidence on two state variables: the level of inflation of a country and the presence of an IMF program in the last two years before the reform in CBIE Lending. Figure 4 shows that in the "high-inflation" group, tightening lending restrictions to the government allows countries to reduce the interest rate on sovereign debt substantially. This suggests that the credibility effect of having a

[16] We do not show these estimates in the paper for brevity. Results are available upon request.
[17] These additional results are available upon request.

more independent central bank more than offsets the potential negative impact of short-run funding constraints. Conversely, in the "low-inflation" group, the same policy shift allows countries to sustain higher debt-to-GDP ratios, albeit at the cost of a small uptick in borrowing costs.

We read these results as evidence that the credibility gain from tighter lending limits is state-contingent: countries that tighten lending conditions in more unstable macroeconomic environment enjoy larger interest-rate relief. While this is not the case for low-inflation countries, both high- and low-inflation countries tend to increase their debt after a reform in CBIE Lending.

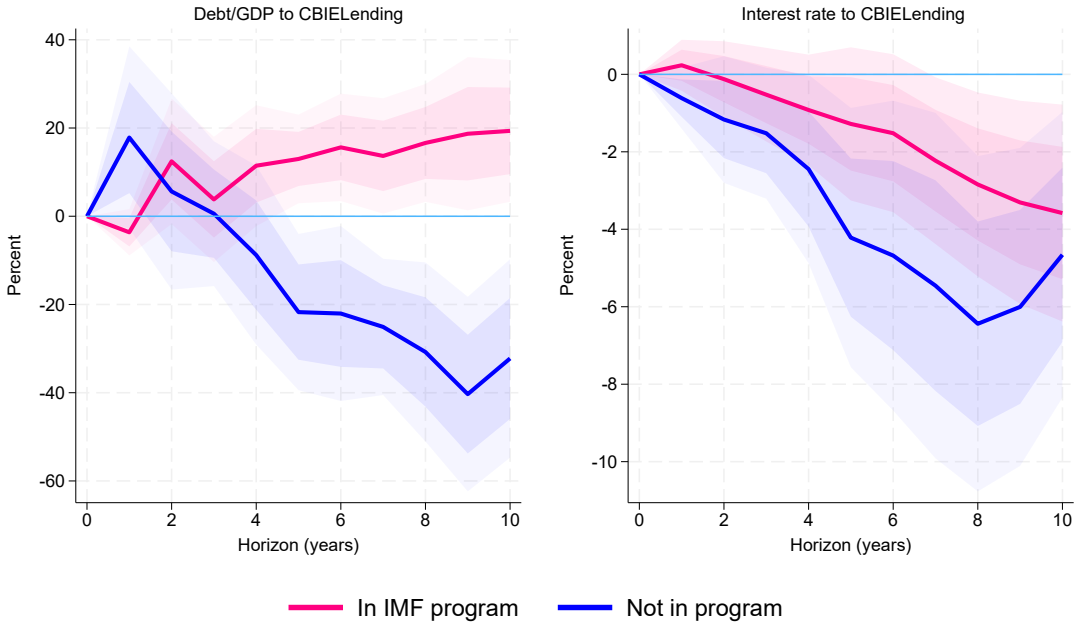
Figure 4: State dependent local projections, by level of inflation, developing countries, 1972-2023.



Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the interest rate (right panel) to a one-point change in the CBIE Lending index at horizon h on the x-axis. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

Figure 5 shows that there does not seem to be a differential effect when we condition the estimates on the presence of an IMF program in a country in the two years before a reform. This finding partially addresses concerns about the endogeneity of central bank reforms, as countries would not choose to reform their central bank in the wake of an IMF program if there are no additional benefits of doing so.

Figure 5: State dependent local projections, IMF program.



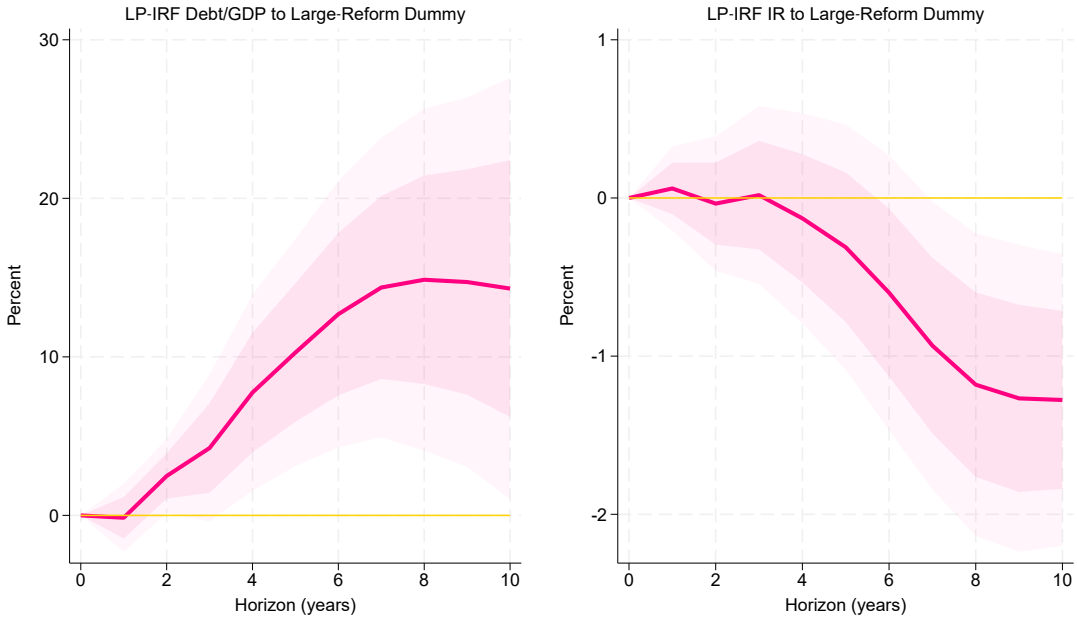
Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the interest rate (right panel) to a one-point change in the CBIE Lending index at horizon h on the x-axis. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

4.2 Binary treatment variable

In this section, we focus on the analysis of central bank reform in developing economies. In particular, we estimate the baseline local projections model with a binary indicator that takes the value of one starting from the year of a major change in the central bank legislation, tightening the conditions for lending to the government, and zero before that year. The results in Figure 6 closely replicate our baseline analysis. A central bank reform that reduces monetary financing to the government allows countries to increase their debt-to-GDP ratio in the medium term, while the interest rate on debt drops significantly.[18]

[18]Recall that in both the debt-to-GDP model and the interest rate model we account for secular trends. The effects shown are additional to the global changes in debt and interest rates over the period and represent the difference between "treated" and "untreated" countries in the treatment effects terminology.

Figure 6: Local projections, central bank reform dummy, developing countries, 1972-2023.

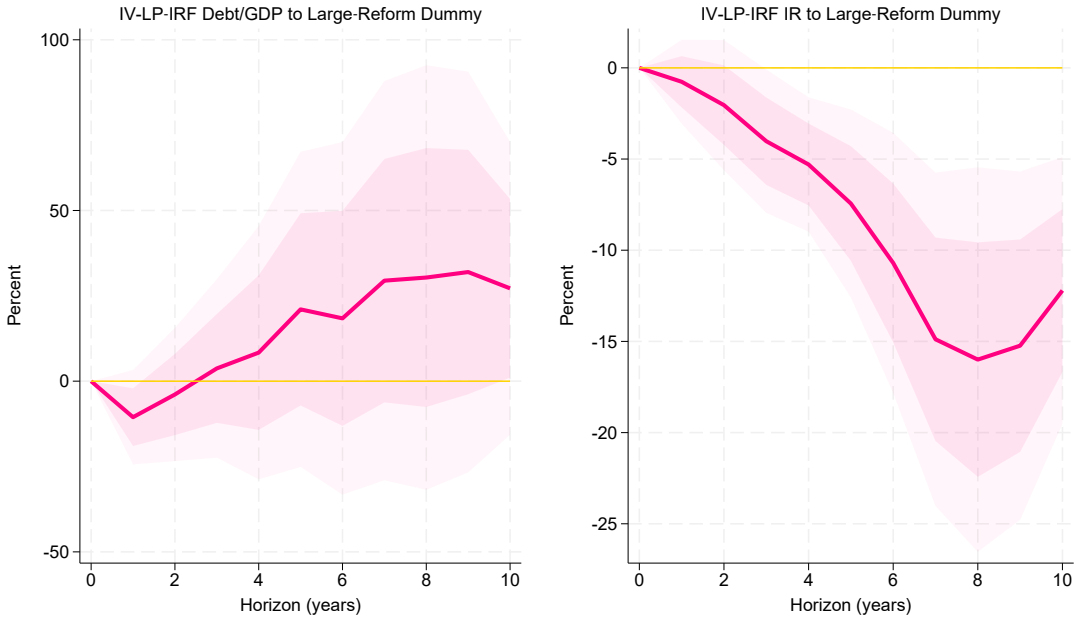


Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the implied interest rate (right panel) to central bank reform at horizon h on the x-axis. CBI reform is proxied by a dummy variable that takes the value of one when the CBIE Lending index in a country increases by more than the median increase in our sample. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

4.3 Instrumental variables local projections

In this section, we present the results of the LP-IV estimation, where we use regional peer pressure and dummies for IMF programs and monetary union adoption to instrument the CBIE Lending index for developing economies. Figure 7 displays the IV results, which are considerably stronger than the OLS estimates. These results alleviate concerns about the endogeneity of central bank reforms, as well as the possibility of omitted variables that attenuate the estimated effects.

Figure 7: Local projections, IV, Developing countries, 1972-2023.



Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the implied interest rate (right panel) to central bank reform at horizon h on the x-axis. CBI reform is proxied by a dummy variable that takes the value of one when the CBIE Lending index in a country increases by more that the median increase in our sample. The reform dummy is instrumented by the 75-percentile of the distribution of the CBIE Lending index in regional peer countries. We use the Acemoglu et al. (2019) classification of regions. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

5 Conclusions

This paper revisits a fundamental question in macroeconomic governance: how does central bank independence impact sovereign debt? Using a novel dataset covering 155 countries from 1972 to 2023, we show that credible institutional limits on monetary financing have significant long-run effects in developing countries. In particular, they ease governments' borrowing constraints by lowering sovereign interest rates, thereby expanding fiscal space. Such restrictions can sustain higher public debt-to-GDP ratios without incurring higher interest rates.

Our findings offer a word of caution for recent discussions about the future of macroeconomic management. Ultimately, it is the credibility of the macroeconomic policy framework that underwrites any large-scale "ad hoc" or "emergency" interventions—whether through quantitative easing, as in the decade following the Global Financial Crisis, or through more direct monetary financing of public debt, as some propose for the future. The paradox, how-

ever, is that such credibility can be depleted much faster than it can be restored (Blinder, 2007; Romelli, 2024; Kern et al., 2024).[19]

From a policy perspective, there are three main implications. First, as Willems and Zettelmeyer (2022, page 77) observe, "cross-country differences in central bank credibility could be part of the explanation why all countries do not seem to be created equal when it comes to sustaining a given debt level. Countries that wish to enjoy greater fiscal space should invest in building central bank credibility." Second, to the extent that central bank independence and credibility have contributed to the global increase in debt and the decline in interest rates, any proposals to expand the use of monetary financing and prolonged quantitative easing should be weighed against the risk of undermining this independence and jeopardizing the fiscal space gained over recent decades. As Willems and Zettelmeyer (2022) put it, central bank independence is a "fiscal asset" that can strengthen state capacity but remains vulnerable to other policy choices. Finally, based on this proposed logic, any efforts to undermine the political independence of central banks and blur the distinctions between central banking and fiscal policy may result in deteriorating government borrowing conditions, thus limiting the fiscal space essential for supporting vital policy programming.

[19]Indeed, as Martin (2015) shows, the additional debt and state capacity made possible by central bank reform and lower inflation can become a liability in future crises: the larger the accumulated debt, the greater the pressure on the central bank to monetize it during a shock, heightening the risk of fiscal dominance and eventually eroding debt value as inflation returns to pre-reform levels.

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Appendix

A Economies

Table A.1: Analyzed economies

Economy, year of first analyzed legislation, and development cluster					
Afghanistan	2003	Dev	Dominica	1983	Dev
Albania	1992	Dev	Dominican Republic	1959	Dev
Algeria	1962	Dev	Ecuador	1957	Dev
Angola	1997	Dev	Egypt, Arab Rep.	1957	Dev
Anguilla	1987	Dev	Equatorial Guinea	1972	Dev
Antigua and Barbuda	1983	Dev	Estonia	1993	Adv
Argentina	1935	Dev	Ethiopia	1994	Dev
Australia	1959	Adv	Finland	1966	Adv
Austria	1955	Adv	France	1936	Adv
Azerbaijan	1996	Dev	Gabon	1972	Dev
Bahrain	1973	Dev	Gambia, The	1971	Dev
Bangladesh	2003	Dev	Georgia	1995	Dev
Belarus	1990	Dev	Germany	1957	Adv
Belgium	1948	Adv	Ghana	1975	Dev
Benin	1956	Dev	Greece	1959	Adv
Bolivia	1945	Dev	Grenada	1983	Dev
Bosnia and Herzegovina	1997	Dev	Guatemala	1959	Dev
Botswana	1975	Dev	Guinea-Bissau	1956	Dev
Brazil	1964	Dev	Guinea	1994	Dev
Brunei	1984	Dev	Haiti	1979	Dev
Bulgaria	1991	Dev	Hungary	1991	Dev
Burkina Faso	1956	Dev	Iceland	1966	Adv
Burundi	1965	Dev	India	1934	Dev
Cambodia	1954	Dev	Indonesia	1953	Dev
Cameroon	1972	Dev	Iran, Islamic Rep.	1972	Dev
Canada	1954	Adv	Iraq	1964	Dev
Central African Republic	1972	Dev	Ireland	1942	Adv
Chad	1972	Dev	Italy	1948	Adv
Chile	1953	Dev	Côte d'Ivoire	1956	Dev
China	1995	Dev	Jamaica	1992	Dev
Colombia	1923	Dev	Japan	1957	Adv
Comoros	1987	Dev	Jordan	1971	Dev
Costa Rica	1953	Dev	Kazakhstan	1993	Dev
Croatia	1991	Dev	Kenya	1984	Dev
Cuba	1959	Dev	Kuwait	1968	Dev
Cyprus	1963	Adv	Kyrgyzstan	1992	Dev
Czechia	1991	Adv	Lao PDR	1995	Dev
Congo, Dem. Rep.	1993	Dev	Latvia	1992	Adv
Denmark	1942	Adv	Lebanon	1969	Dev

Note: The table reports information on the list of analyzed economies, the first year of availability of the CBIE Lending index and their developmental cluster, i.e. *Adv* for advanced economies and *Dev* for developing economies.

Table A.1 Continued: Analyzed countries

Economy, year of first analyzed legislation, and development cluster					
Liberia	1974	Dev	Saint Kitts and Nevis	1983	Dev
Libya	1996	Dev	Saint Lucia	1983	Dev
Lithuania	1994	Adv	St. Vincent and the Grenadines	1983	Dev
Luxembourg	1983	Adv	Saudi Arabia	1957	Dev
Macao S.A.R	2000	Dev	Senegal	1956	Dev
Macedonia	1992	Dev	Seychelles	1986	Dev
Malawi	1989	Dev	Sierra Leone	1963	Dev
Malaysia	1982	Dev	Singapore	1991	Adv
Maldives	1982	Dev	Slovak Republic	1992	Adv
Mali	1984	Dev	Slovenia	1991	Adv
Malta	1994	Adv	Somalia	1960	Dev
Mauritania	1956	Dev	South Africa	1956	Dev
Mauritius	1966	Dev	Korea, Rep.	1950	Adv
Mexico	1960	Dev	Spain	1962	Adv
Moldova	1992	Dev	Sri Lanka	1953	Dev
Mongolia	1996	Dev	Sweden	1966	Adv
Montenegro	2005	Dev	Switzerland	1953	Adv
Morocco	1959	Dev	Taiwan, China	1979	Adv
Myanmar	1952	Dev	Thailand	1942	Dev
Namibia	1990	Dev	Bahamas, The	1974	Dev
Nepal	1955	Dev	Togo	1956	Dev
Netherlands	1948	Adv	Trinidad and Tobago	1964	Dev
New Zealand	1933	Adv	Tunisia	1958	Dev
Niger	1956	Dev	Türkiye	1970	Dev
Nigeria	1969	Dev	Turkmenistan	1994	Dev
Norway	1966	Adv	Uganda	1966	Dev
Oman	2000	Dev	Ukraine	1991	Dev
Pakistan	1972	Dev	United Arab Emirates	1980	Dev
Panama	1941	Dev	United Kingdom	1946	Adv
Paraguay	1952	Dev	Tanzania	1966	Dev
Peru	1962	Dev	United States of America	1951	Adv
Philippines	1948	Dev	Uruguay	1938	Dev
Poland	1997	Dev	Uzbekistan	2000	Dev
Portugal	1962	Adv	Venezuela, RB	1939	Dev
Qatar	1993	Dev	Viet Nam	1990	Dev
Congo, Rep.	1972	Dev	Yemen, Rep.	1971	Dev
Romania	1991	Dev	Zambia	1971	Dev
Russian Federation	1992	Dev	Zimbabwe	1956	Dev
Rwanda	1997	Dev			

Note: The table reports information on the list of analysed economies, the first year of availability of the CBIE Lending index and their developmental cluster, i.e. *Adv* for advanced economies and *Dev* for developing economies.

B Coding rules for the CBIE Lending index

This section summarizes the guiding principles used for the construction of the sub-index on Limitations on lending to the government (CBIE Lending index).

1)	Limitations on advances	
	Advances to government prohibited	1.00
	Advances permitted, but with strict limits (e.g., up to 15 percent of government revenue)	0.67
	Advances permitted, and the limits are loose (e.g., over 15 percent of government revenue)	0.33
	No legal limits on lending	0.00
2)	Lending to government	
	Not allowed	1.00
	In the secondary market with restricted limits	0.75
	In the secondary market with lax or without limits	0.50
	In the primary market with limits or approved by central bank board with a qualified majority	0.25
	In the primary market without limits	0.00
3)	Who decides financing conditions to government (maturity, interest, amount)?	
	Central bank defines terms and conditions	1.00
	Specified by the bank charter	0.67
	Agreed between the central bank and executive	0.33
	Decided by the executive branch alone	0.00
4)	Potential borrowers from the central bank	
	Only the government	1.00
	Government plus local governments	0.67
	All of the above plus public enterprises	0.33
	All of the above and to the private sector, also if it is not mentioned otherwise	0.00
5)	Limits on central bank lending defined	
	As an absolute cash amount	1.00
	As a percentage of central bank capital or other liabilities	0.67
	As a percentage of government revenues	0.33
	As a percentage of government expenditure	0.00
6)	Maturity of advances	
	Within 6 months	1.00
	Within 1 year	0.67
	More than 1 year	0.33
	No mention of maturity in the law	0.00
7)	Interest rates on advances	
	At market rates	1.00
	Interest rates not specified in law	0.50
	At below market rates	0.00
8)	Central bank prohibited from buying or selling government securities in the primary market	
	Yes	1.00
	No	0.00

C Data

Table C.1: Data and data sources

Variable	Definition	Data sources
	Dependent variable	
Debt to GDP	Gross public debt, percent of GDP	IMF - Public Finances in Modern History
Interest rate on debt	Interest rate espenses on on public debt (in %) calculated using the formula: $InterestRate_{c,t} = \frac{\text{Interest paid on public debt, percent of GDP}}{Grosspublicdebt,percentofGDP}$	IMF - Public Finances in Modern History
	Explanatory variables	
CBIE Lending	Index on restrictions to lending to the government, subcomponent of the Central Bank Independence - Extended (CBIE) index	Romelli (2022, 2024)
Real GDP growth	Annual percentage growth rate of GDP at market prices based on constant local currency.	World Bank: NY.GDP.MKTP.KD.ZG
Inflation	Inflation, consumer prices (annual %)	World Bank: FP.CPI.TOTL.ZG
Government expenditure	Government expenditure, percent of GDP	IMF - Public Finances in Modern History
Government expenditure	Government expenditure, percent of GDP	IMF - Public Finances in Modern History
Gross fixed capital formation	Gross fixed capital formation, percent of GDP	World Bank: NE.GDI.FTOT.ZS
Final consumption expenditure	Final consumption expenditure (% of GDP)	World Bank: NE.CON.TOTL.ZS
Openness to trade	Degree of openness to trade of a country. $Opnness_{c,t} = \frac{Imports_{c,t}+Exports_{c,t}}{GDP_{c,t}}$.	World Bank
Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	World Bank: BX.KLT.DINV.WD.GD.ZS
Exchange Rate Stability	Measure of exchange rate stability, computed as the annual standard deviations of the monthly exchange rate between the home country and the base country.	Aizenman et al. (2008)
Chinn-Ito index	Index of capital account openness, Chinn–Ito de jure index (0–1).	Chinn and Ito (2008)
Polity	Index that measures the difference between the democratic and the autocratic score of a country, ranging from +10 (strongly democratic) to -10 (strongly autocratic).	PolityIV (2014)
Executive constraints	Constraints on the executive	PolityIV (2014)

Table C.2: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Debt to GDP	4922	53.064	36.257	.488	357.687
Interest rate on debt	4835	5.144	4.208	.013	96.834
CBIE Lending	6854	.53	.318	0	1
Real GDP growth	7323	3.58	7.002	-64.047	153.493
Inflation	7309	34.925	439.464	-31.905	26765.86
Government expenditure	4949	30.514	18.205	2.147	594.77
Gross fixed capital formation	6057	22.45	7.529	-2.424	93.547
Final consumption expenditure	6257	78.605	15.24	12.173	186.912
Openness to trade	6320	76.533	49.328	.021	437.327
Foreign direct investment	7004	3.634	14.318	-440.131	449.083
Exchange Rate Stability	6273	.628	.328	.001	1
Chinn-Ito index	6584	.473	.367	0	1
Polity	6097	1.785	7.352	-10	10
Executive constraints	6178	.773	17.191	-88	7

Table presents descriptive statistics for control variables included in the analysis.

D Evolution of CBIE Lending index

Figure D.1: CBIE Lending index, advanced economies, 1972-2023

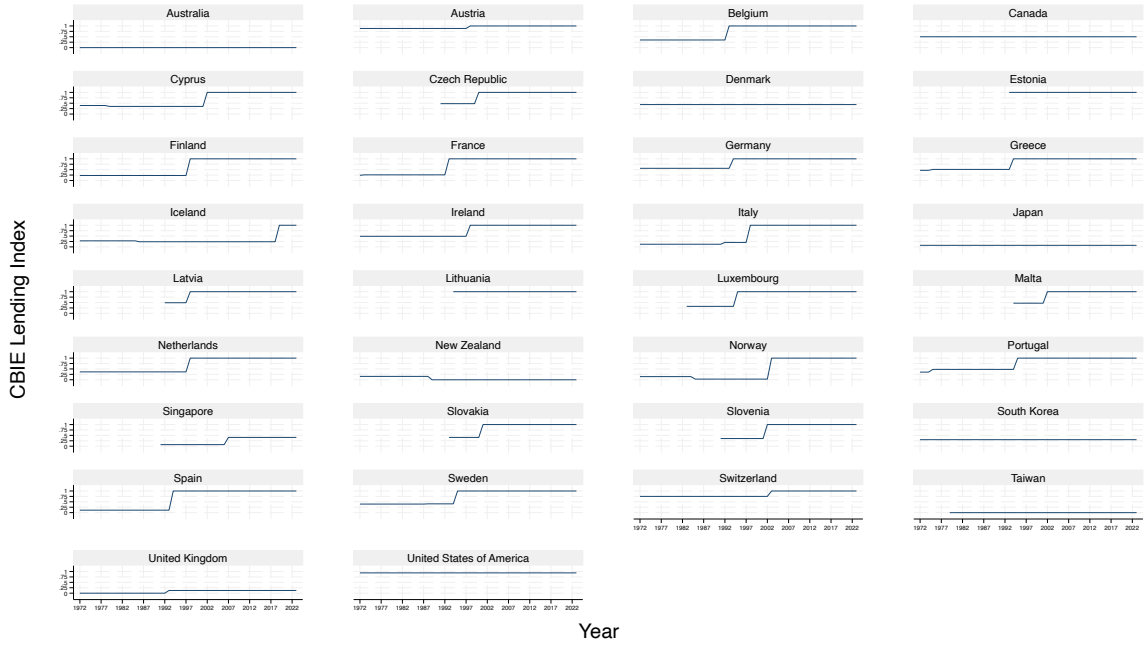


Figure D.2: CBIE Lending index, developing countries (Part I), 1972-2023

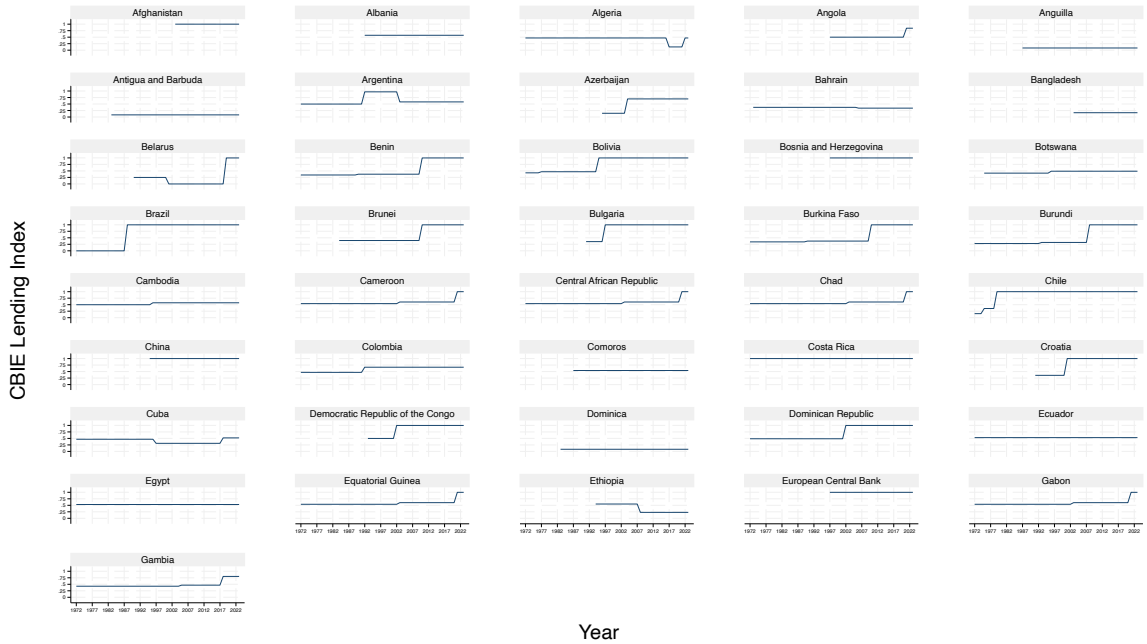


Figure D.3: CBIE Lending index, developing countries (Part II), 1972-2023

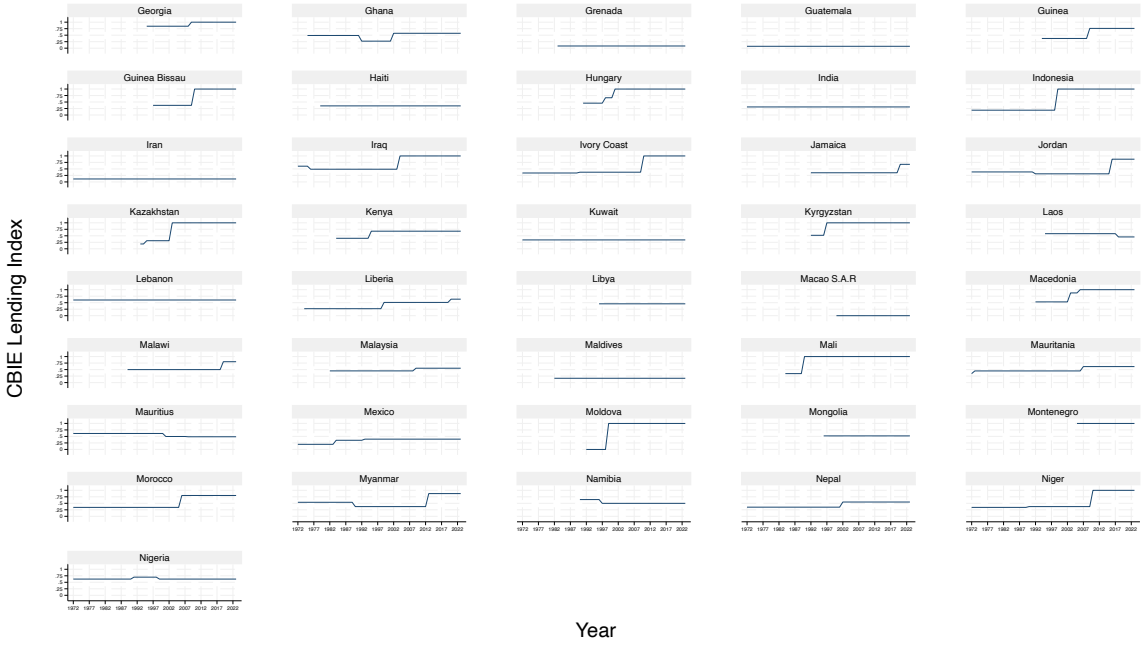
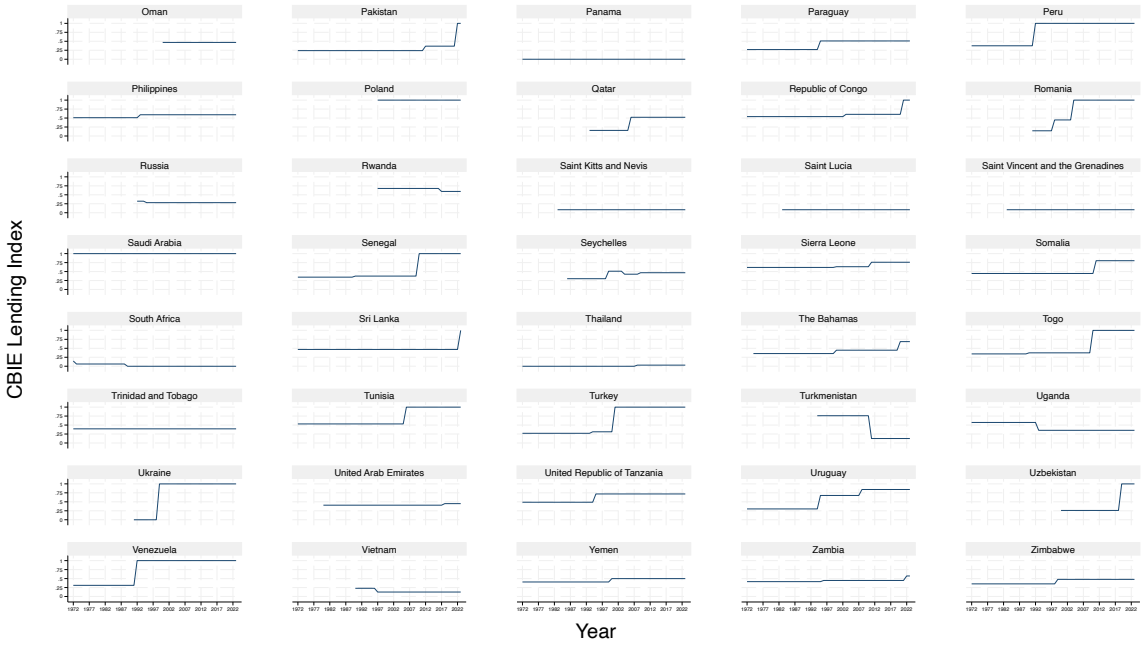


Figure D.4: CBIE Lending index, developing countries (Part III), 1972-2023



E IV Local projection estimation

Table E.1 presents the first stage of our IV estimation.

Table E.1: IV First stage estimates

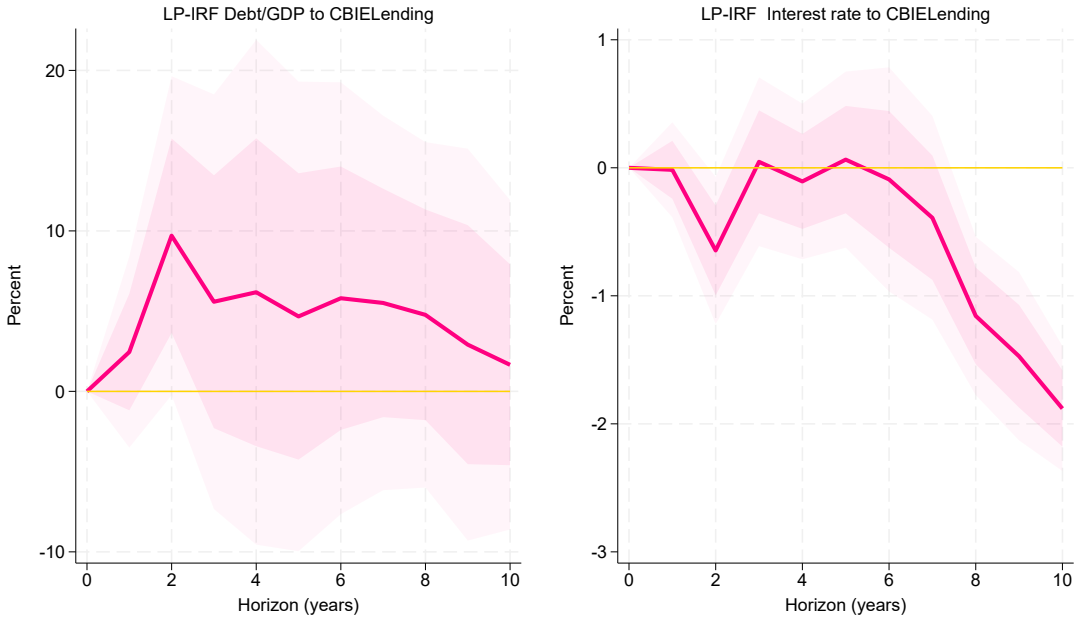
	Debt/GDP			Interest rate		
Regional pressure$_{t-1}$	0.477***	0.411**	0.370***	0.492***	0.491***	0.356***
	(0.072)	(0.127)	(0.072)	(0.074)	(0.127)	(0.072)
IMF program	0.025	0.014	0.021	0.024	-0.004	0.025
	(0.016)	(0.050)	(0.016)	(0.017)	(0.056)	(0.017)
Monetary union	0.016	0.027	0.078***	0.011	0.005	0.095***
	(0.049)	(0.052)	(0.018)	(0.049)	(0.052)	(0.023)
Observations	3210	1143	2067	3196	1143	2053
Countries	109	29	80	109	29	80
Controls	Yes	Yes	Yes	Yes	Yes	Yes

The table shows the first-stage results of the IV estimation. We instrument the CBIE Lending index of restriction on central bank lending to the government from Romelli (2022) with a measure of regional peer pressure and two dummies for IMF programs and monetary union membership.

F Additional results

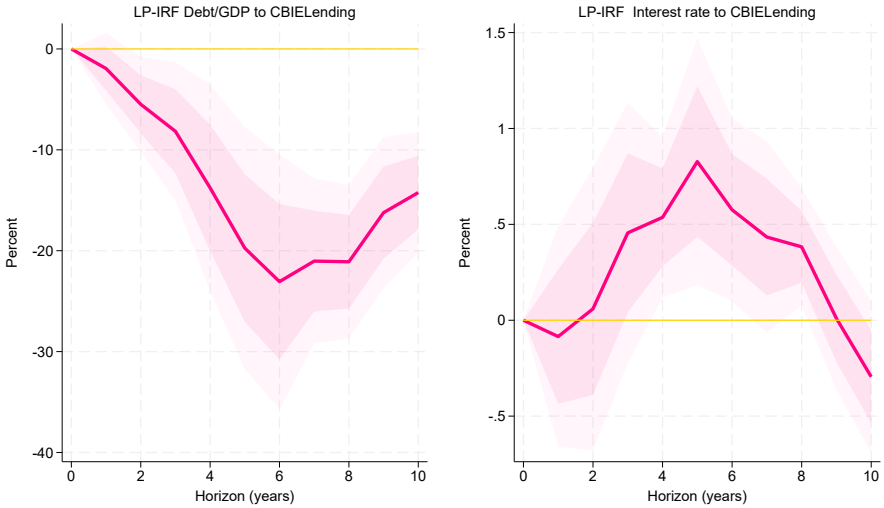
Appendix Figures F.1, F.2a, and F.2b show the results when we only included countries that reformed their lending to the government legislation for the whole sample, advanced countries, and developing countries, respectively.

Figure F.1: Local projections, CBIE Lending index, all reforming countries, 1972-2023.

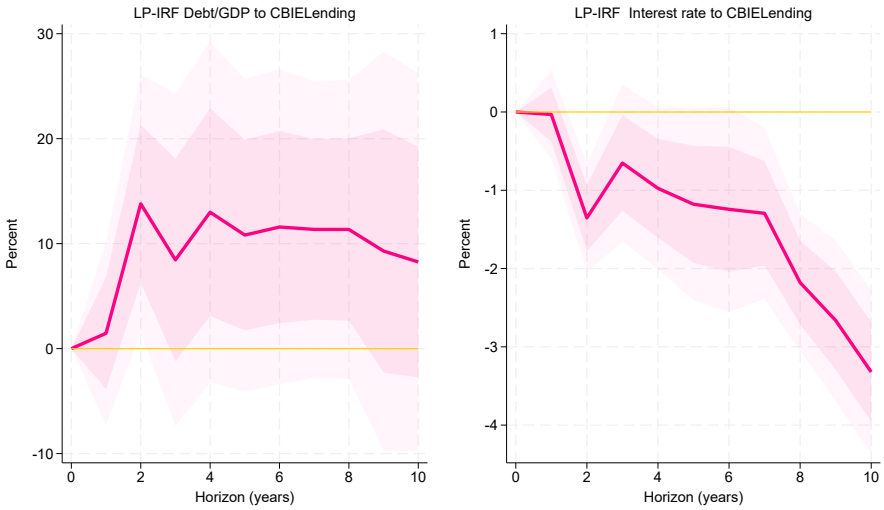


Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the implied interest rate (right panel) to a one-point change in the CBIE Lending index at horizon h on the x axis. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

Figure F.2: Local projections, CBIE Lending, for groups of reforming countries



(a) Advanced countries with reforms

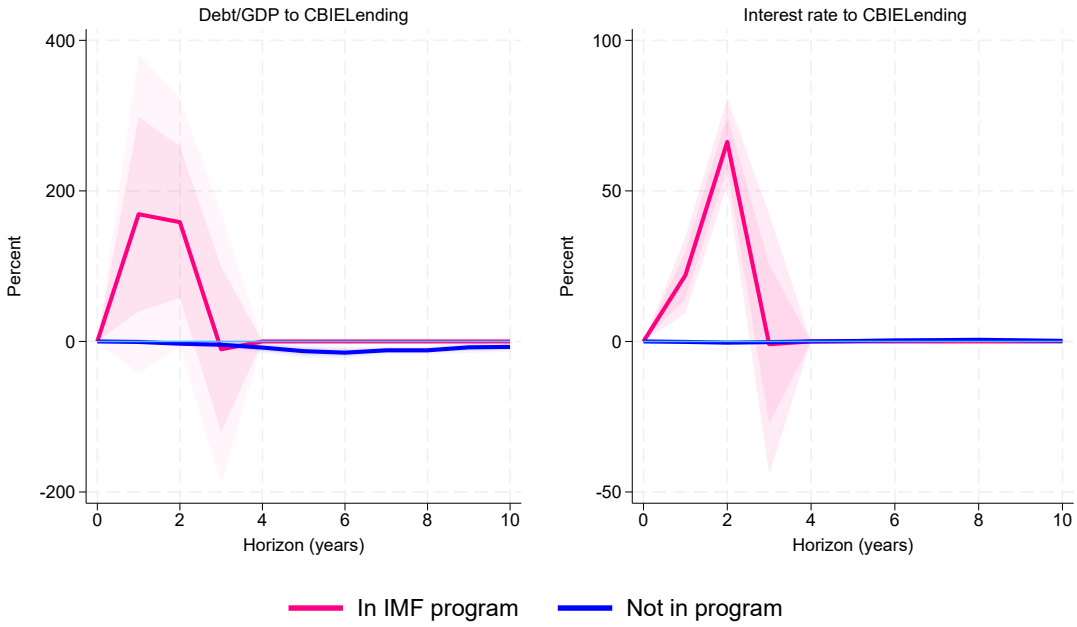


(b) Developing countries with reforms

Notes: Each panel shows the cumulative response of the debt-to-GDP ratio (left) and the implied interest rate (right) to a one-point change in the CBIE Lending index at horizon h. Shaded bands are the 68% and 90% confidence intervals (Driscoll–Kraay SEs).

Appendix figures F.3 presents the estimates for advanced economies for the state dependent models when inflation is the state variable.

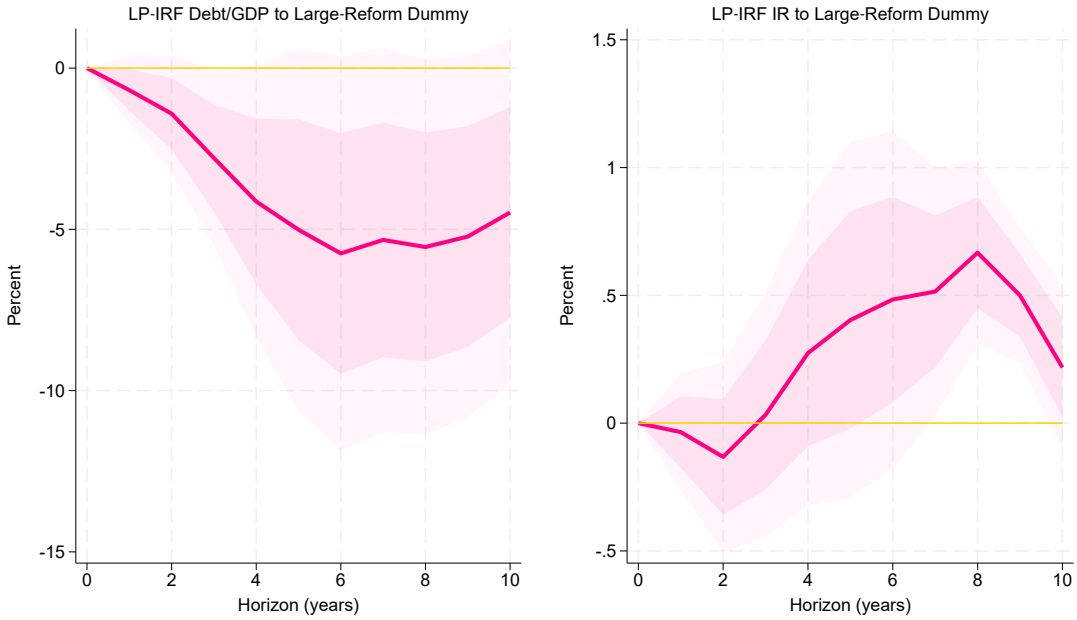
Figure F.3: State dependent local projections, by IMF programs, advanced economies, 1972-2023



Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the implied interest rate (right panel) to a one point change in the CBIE Lending index at horizon h on the x axis. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

Appendix figures F.4 presents the estimates for advanced economies for CBIE Lending reform.

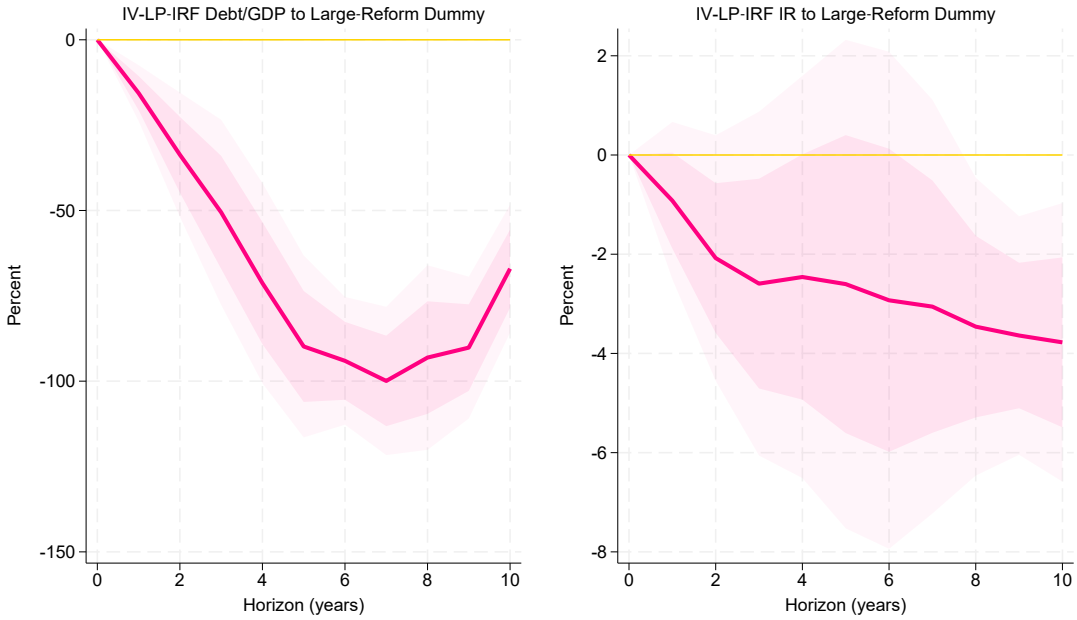
Figure F.4: Local projections, dichotomous index, Advanced countries, 1972-2023.



Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the implied interest rate (right panel) to central bank reform at horizon h on the x axis. CBI reform is proxied by a dummy variable that takes the value of one when the CBIE Lending index in a country increases by more that the median increase in our sample. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.

Appendix figures F.5 presents the estimates for advanced economies for the IV estimation.

Figure F.5: Local projections, IV, Advanced economies, 1972-2023.



Notes: The figure shows the cumulative response of the debt to GDP ratio (left panel) and the implied interest rate (right panel) to central bank reform at horizon h on the x-axis. CBI reform is proxied by a dummy variable that takes the value of one when the CBIE Lending index in a country increases by more than the median increase in our sample. The reform dummy is instrumented by the 75-percentile of the distribution of the CBIE Lending index in regional peer countries. We use the Acemoglu et al. (2019) classification of regions. Shaded areas denote the 68% and 90% confidence intervals using Driscoll and Kraay (1998) standard errors.