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Tread with Care: Benefits and Costs of Domestic Debt Restructurings

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ABSTRACT: With increasing debt vulnerabilities, domestic debt may become an important—though still distinct—part of debt restructurings. This paper aims to contribute to the discourse by examining the factors that precipitate domestic debt restructurings (DDRs) and their implications for macro-fiscal outcomes. We find that: (i) DDRs are less effective than external debt restructurings (EDRs) in reducing public debt and interest payments; and (ii) they entail deeper, more persistent costs to output and domestic credit. Still, well-designed DDRs can be critical for restoring macroeconomic stability and sustainability, regardless of costs. Their impacts depend on design, instruments, sovereign-bank nexus, concurrent fiscal consolidation, and financial development. Finally, the paper shows that gross international reserves and the presence of an IMF-supported program can mitigate the costs associated with DDRs while preserving their debt relief benefits.

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WORKING PAPERS

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Contents

I. Introduction

Domestic debt restructurings (DDRs) have become more frequent in emerging market and developing economies (EMDEs), often as a response to rising debt distress and limited financing options. Over the past four decades, 134 sovereign debt restructurings involving domestic debt governed by domestic law have been recorded (Erce et al., 2022), with a notable rise since the 1990s. This shift has coincided with a decline in External Debt Restructurings (EDRs) and reflects a broader shift toward domestic debt financing (Annex Figure AIII.1), driven by financial deepening, economic growth, the development of local debt markets (Burger and Warnock, 2006; Abbas and Christensen, 2010; IMF, 2020), or constraints in accessing external financing, especially for low-income countries. Indeed, since the 1990s, EMDE governments have increasingly turned to domestic debt issuance—a shift from their traditional reliance on external borrowing, which was driven by underdeveloped local markets and restrictions on foreign investment (CGFS, 2007). More recently, domestic debt issuance also surged during the COVID-19 pandemic, due to the unanticipated need for funding and limited access to international markets.

According to the IMF (2024), this growing debt burden is part of a broader global trend: public debt is projected to surpass $100 trillion (93 percent of global GDP) in 2024 and could approach 100 percent of GDP by 2030. While debt is expected to stabilize or decline in some countries, it remains well above pre-pandemic levels, and more than half of global debt is concentrated in countries where it is not projected to stabilize. Political and structural factors—including increased fiscal spending pressures, aging populations, defense and security spending, and economic uncertainty—suggest that debt levels could rise even higher than current projections. Against this backdrop, DDR is likely to become an increasingly relevant tool for managing debt vulnerabilities (Mitchener and Trebesch, 2023). That said, while sovereigns have significant flexibility in restructuring domestic debt—often through changes in domestic laws—such restructurings must balance their fiscal benefits with the need to maintain financial sector stability and economic growth. The complexities and trade-offs involved in DDR are an active area of discussion in the Global Sovereign Debt Roundtable (GSDR, 2024).

Despite the growing share of domestic debt, the literature has generally overlooked the determinants and macro-fiscal impacts of DDRs and has mostly focused on EDRs (Tomz and Wright, 2007; Borensztein and Panizza, 2009; Levy-Yeyati and Panizza, 2011; Asonuma and Trebesch, 2016; Trebesch and Zabel, 2017; Kuvshinov and Zimmermann, 2019; Asonuma et al., 2024; Atsebi et al., 2024; Atsebi et al., 2025). This paper seeks to fill this gap by employing an empirical methodology that limits the endogeneity of DDRs and provides new insights into the trade-offs between fiscal relief and economic costs of DDRs. Unlike EDRs, which primarily affect external creditors, DDRs have significant domestic spillover effects. In fact, DDRs involve domestic creditors—particularly banks and pension funds—which creates strong interdependencies between sovereign and financial sector balance sheets (Merler and Pisani-Ferry, 2012; IMF, 2021), especially in countries with a large share of domestic debt or a strong sovereign-bank nexus (Mitchener and Trebesch, 2023). Moreover, defaulting on domestic-law debt may have more severe consequences for the private sector than defaulting on foreign-law debt (Gelpern and Panizza, 2022; IMF, 2021). While external defaults primarily raise concerns about losing access to international capital markets, domestic defaults are more directly tied to financial stability risks and broader distributional impacts (D'Erasmo and Mendoza, 2016; Sosa-Padilla, 2018; Erce and Mallucci, 2018; Thaler, 2021). Consequently, DDRs pose unique risks, including financial instability, disruptions in credit markets, and economic downturns, while also offering benefits by reducing the public debt burden and interest bill.

Against this backdrop, this paper seeks to understand when DDRs occur, whether they provide fiscal relief, how they affect economic activity and financial stability, and what factors contribute to or alleviate the benefits and costs of DDRs. Our contributions to the literature are several. First, we provide new insights into the determinants of DDRs. Second, we offer a robust empirical analysis of the macro-fiscal impacts of DDRs while distinguishing them from EDRs. We do so by employing the Augmented Inverse Probability Weighted (AIPW) estimator, which helps address the endogeneity of debt restructurings (DRs). Third, we examine the differentiated macro-fiscal impacts of DDRs in low-income countries (LICs) compared to emerging markets (EMs), conditional on the design features of DDRs—post-default, face value reduction, maturity extension, coupon reduction—, and instruments used—bank vs. bond restructurings. Fourth, we document how fiscal policy stance in the aftermath of DDRs, financial development and the degree of the sovereign-bank nexus play a key role in shaping the benefits and costs of DDRs. Fifth, we provide evidence that gross international reserves and the presence of an IMF-supported program are critical to alleviating the economic costs of DDRs while improving their fiscal benefits.

Our key findings are summarized in Table 1. They reveal that, first, DDRs are more likely to occur in countries with weaker financial systems, enforced fiscal rules, amidst fiscal crises—specifically, external defaults and loss of market access—a recession characterized by a negative output gap, and rising levels of public debt to GDP and interest payments to GDP. Second, we show that while DDRs are associated with a significant decline in public debt and interest payments, this decline is less pronounced compared to EDRs. In addition, DDRs tend to have a more adverse impact on output and domestic credit, which persists into the medium term, compared to EDRs. These findings contribute to a deeper understanding of the trade-offs associated with different types of debt restructurings. While DDRs are sometimes an unavoidable tool for addressing fiscal stress, their implementation should be carefully designed to mitigate their significant costs and challenges (Togo et al., forthcoming).[1]

Third, DDRs' fiscal benefits and economic costs are contingent upon several factors. Specifically, we find that LICs experience greater fiscal relief with more moderate economic costs, while EMs face steeper economic contractions, prolonged credit tightening, and lower fiscal relief. We also reveal that while face value reductions maximize debt relief, they impose the highest economic costs. Maturity extensions, in contrast, offer a more measured approach, achieving fiscal gains with relatively lower GDP contraction. Coupon reductions effectively reduce interest and debt burdens but pose financial stability risks due to significant credit contractions. Post-default restructurings and bank loan renegotiations impose the most severe macro-financial disruptions.

Fourth, we provide evidence that DDRs involving a stronger sovereign-bank nexus or followed by fiscal consolidation exhibit a more pronounced decline in public debt and interest payments. At the same time, these episodes are also associated with a steeper GDP contraction and a greater reduction in domestic credit. In addition, we show that DDRs in countries with higher financial development are associated with a less pronounced reduction in public debt and interest payments and, at the same time, entail significantly higher economic costs, including sharper GDP contractions and more substantial declines in domestic credit. Conversely, DDRs in less financially developed countries result in greater fiscal relief without imposing medium-term economic costs as the transmission of the DDR impact on the broader economy is weaker. Fifth, we highlight the critical role of gross international reserves and IMF-supported programs in preserving the

[1] A well-designed DDR can support debt relief and fiscal adjustment, helping restore macro stability and sustainability. Without it, many countries resort to monetary financing or costly short-term borrowing—fueling inflation, destabilizing banks, and derailing reforms. DDRs, when properly managed, avert these risks and their side effects can be mitigated through strong design and safeguards.

benefits of DDRs while minimizing their costs. DDRs outside of IMF-supported programs and/or in countries with limited reserves are associated with smaller fiscal relief and more severe economic costs.

Finally, while our study offers new evidence on the benefits and costs of DDRs, it does not aim to provide a definitive answer as to whether DDRs are ultimately worthwhile. Deciding whether to undergo a DDR will ultimately be based on a wide range of country-specific circumstances, not least including comparisons with viable alternatives. Nonetheless, our findings suggest that compared to countries that maintain sound macroeconomic and fiscal policies—and thereby avoid the need for a costly DDR—those that undergo DDRs face significant economic costs, even as they achieve reductions in debt and interest payments.

The remainder of the paper is organized as follows. Section 2 presents the data and some stylized facts. Section 3 outlines the empirical methodology and focuses on our empirical approach to addressing endogeneity and estimating the causal impacts of DRs. Section 4 discusses the main results. Section 5 presents our robustness checks. Section 6 explores sensitivity analyses. Finally, Section 7 concludes.

II. Data and Stylized Facts

1. Data

Our analysis covers 142 emerging markets and developing economies (EMDEs)—81 EMs and 61 LICs—over the period 1987–2021. We specifically focus on EMDEs because these countries have experienced a significantly higher frequency of both domestic and external debt restructurings compared to advanced economies. In addition, these countries have witnessed significant shifts in their debt composition, including an increasing reliance on domestic debt (Annex Figure AIII.1) and changes in the composition of debt holders over time.

Our dependent variables include public debt to GDP ratio, interest payments to GDP ratio, gross domestic product (GDP), and domestic credit to the private sector. Our key variable of interest is DDRs, which are obtained from a novel dataset by Erce et al. (2022). We also use datasets on external debt restructurings with private creditors, Paris Club creditors, and China by Asonuma and Trebesch (2016), Horn et al. (2022), and Asonuma et al. (2023).

Erce et al. (2022) identified 134 sovereign debt restructuring events involving different domestic debt instruments governed by domestic law in 52 countries from 1980–2018. This approach allows for the identification of a higher coverage of DDRs compared to other definitions in the literature. While Erce et al. (2022) exclude de-facto defaults, such as those associated with hyperinflation, their database reports 39 DDRs not covered by IMF (2021) and 30 DDRs absent in Beers and de Leon-Manlagnit (2019). The identified DDRs are highly heterogeneous, varying in the perimeter of restructured debt, instrument type (e.g., bank loans, bonds, and deposits), restructuring design (e.g., face value reduction, maturity extension, coupon reduction, and whether the restructuring was preemptive or post-default), and mitigation measures. This heterogeneity presents an opportunity to examine how these differences shape the costs and benefits of DDRs. In the empirical analysis that follows, we focus on 97 DDR episodes—defined as groups of restructuring events occurring within the same year.

Concerns that the jurisdiction of issuance could attenuate the domestic impacts of DDRs by involving more non-resident creditors, thereby making DDRs resemble EDRs, are largely mitigated by the evidence of the

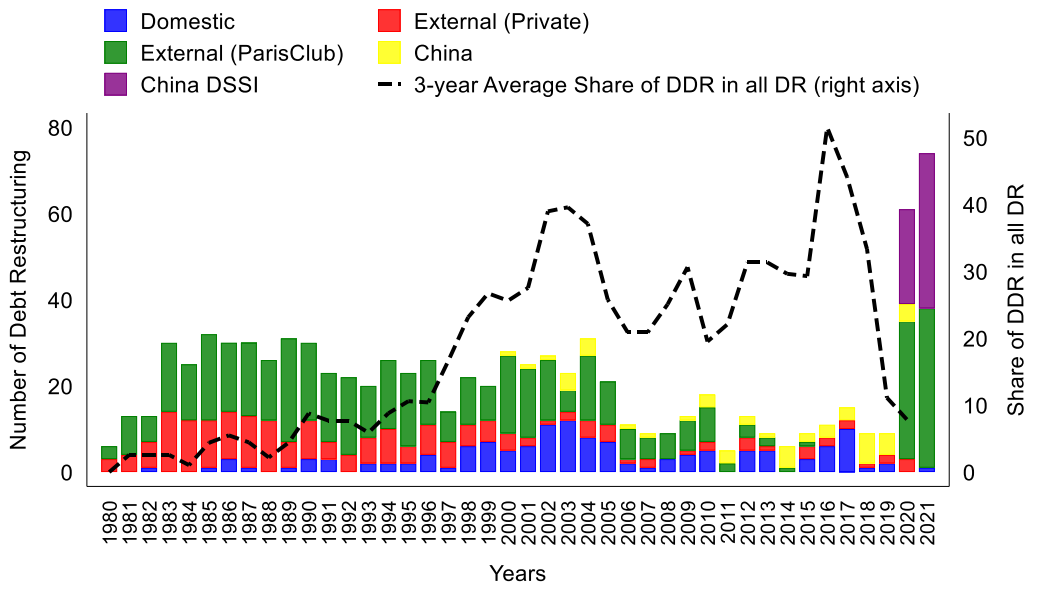
"triple coincidence"—domestic law, domestic investors, and local currency. Indeed, Erce et al. (2022) show that, in the most recent decade (2010–18), 75 percent of domestic-law restructurings involved debt held by domestic investors, a pattern consistent with earlier decades and reflecting a strong overlap between residence and jurisdiction. Also, 79 percent of domestic-law restructurings during this period involved debt denominated in local currency, further underscoring the predominantly domestic nature of these restructurings.

In line with the existing literature examining debt restructurings (e.g., Asonuma and Trebesch, 2016; Asonuma et al., 2017; Kuvshinov and Zimmermann, 2019; Asonuma et al., 2024; Atsebi et al., 2024; Atsebi et al., 2025), we include a broader set of control variables to predict the probability of DRs and attenuate omitted bias in the models analyzing the macro-fiscal impacts of each type of DRs. Annex I lists the countries included in the analysis, Annex II presents the list of DDRs, and Annex Table AIV.2. provides data sources.

2. Stylized Facts

This section discusses two key features of DDRs: their increasing prevalence and their common restructuring mechanisms.

Figure 1. Numbers of Debt Restructurings by Type over Time



Sources: Authors' calculations based on Erce et al. (2022), Asonuma and Trebesch (2016), Horn et al. (2022), and Asonuma et al. (2023).
Notes: This chart shows the number of debt restructurings by type over time. The dashed line shows the 3-year average share of domestic debt restructurings in all debt restructurings (right axis). The large numbers of external debt restructurings with the Paris Club (green bar) and China (purple bar) during 2020–21 are Debt Service Suspension Initiative (DSSI) during the COVID-19 pandemic.

First, DDRs have become increasingly prevalent over the past few decades (Figure 1). Between 1980 and 2021, there were 134 DDRs, compared to 189 EDRs with private creditors, 465 EDRs with official creditors—about 60 percent of which are Heavily Indebted Poor Countries (HIPC) initiatives and 62 cases were under the

Debt Service Suspension Initiative (DSSI) in 2020–21, 52 DRs with China, and 58 DSSI cases involving China in 2020–21. The frequency of DDRs has risen sharply since the 1990s, peaking in the 2000s, particularly as EDRs have become less frequent and hyper-inflation and financial repression were less used to address higher domestic debt.[2] This surge parallels the increasing share of domestic debt in the total debt portfolios of EMDEs, which reflects both changes in debt management strategies and the growing accessibility of domestic financial markets for government financing, or constraints on accessing external financing, especially for low-income countries. While DDRs remain uncommon in advanced economies, they are more frequent in EMDEs. Notably, DDRs are most prevalent in Latin America and the Caribbean, Sub-Saharan Africa, Eastern Europe, and Central Asia regions that, despite their diverse economic profiles, share common challenges in managing high levels of domestic debt.

Second, in terms of the restructuring mechanisms, DDRs typically occur after a default and are mainly characterized by maturity extensions and coupon reductions. Approximately 61 percent of DDRs happen post-default, indicating that these restructurings are often reactive measures in response to significant financial distress. This proportion is slightly higher than EDRs with private creditors, where 58.7 percent occur post-default. Maturity extensions and coupon reductions are the primary tools used in DDRs, with 85.5 percent and 83 percent of restructurings involving these mechanisms, respectively. These tools aim to alleviate immediate liquidity pressures by extending the time horizon for debt repayments and reducing the interest burden. In contrast, face value reductions, which directly reduce the principal amount of debt, are less common in DDRs, occurring in only 24 percent of cases. This rate is higher than that observed in DRs with China (5.8 percent) and EDRs with official creditors (19.6 percent), though it is lower than in EDRs with private creditors, where 34 percent of cases involve face value reductions. The predominance of maturity extensions and coupon reductions could reflect a strategy to mitigate immediate economic disruption while alleviating the costs on the domestic financial system.

III. Empirical Methodology

1. Dealing with the Endogeneity of Debt Restructurings

The relationship between debt restructurings and key economic outcomes—such as debt levels, interest payments, GDP, and domestic credit to the private sector—is susceptible to endogeneity, arising from selection and simultaneity biases. First, debt restructurings are not random events. Countries that restructure their debt often exhibit weaker macroeconomic fundamentals, institutional fragility, and heightened fiscal vulnerabilities relative to those that do not. These pre-existing conditions increase the likelihood of restructuring while simultaneously influencing the outcomes of interest, as highlighted in prior research (e.g., Asonuma et al., 2016; Kuvshinov and Zimmermann, 2019; Asonuma et al., 2024; Atsebi et al., 2024; Ando et al., 2024; Atsebi et al., 2025). Second, reverse causality also poses a challenge. Debt restructurings are often triggered by fiscal distress and deteriorating macroeconomic conditions, which themselves can be influenced by the restructuring

[2] Historically, EMDEs addressed excessive domestic debt through high inflation or financial repression in the 1980s and early 1990s. However, from the mid-1990s onwards, a shift occurred as many EMDEs liberalized their financial systems and implemented inflation targeting, reducing the reliance on inflationary measures to manage debt. This shift paved the way for DDRs to become a more common strategy for addressing domestic debt burdens. In addition, DDRs and hyperinflation events are generally not closely linked. Only 7 percent of DDRs occur within five years after a period of hyperinflation, and only 11 percent of hyperinflation events are followed by DDRs.

process. This creates a feedback loop that makes it difficult to disentangle the causal impacts of restructurings from their determinants.

To address these concerns, we employ a two-step methodology that combines the Augmented Inverse Probability Weighted (AIPW) estimator with Local Projections (LPs), drawing on techniques from prior research (Kuvshinov and Zimmermann, 2019; Asonuma et al., 2024; Atsebi et al., 2024; Ando et al., 2024). This framework provides a robust solution for causal inference in the context of debt restructurings. *In the first step*, we estimate the likelihood of a country undergoing a debt restructuring (its propensity score) based on country-specific characteristics. This allows us to reweight the sample and create a quasi-experimental setting where restructurings are treated as random events. This reweighting corrects for selection bias by balancing the characteristics of countries with and without debt restructuring. *In the second step*, we use LPs to model the dynamic impacts of debt restructurings on the outcome variables over a five-year period. We estimate LP models for countries with and without debt restructurings, separately, to capture the unique trajectories of each group. By comparing the observed outcomes with predicted counterfactuals—based on the characteristics of countries that maintain sound macroeconomic and fiscal policies and thereby avoid any type of DRs—we estimate the impact of debt restructurings while accounting for pre-restructuring trends and potential confounding factors.[3] The LP method also allows us to capture the nonlinear and heterogeneous impacts of restructurings over time.

By combining the propensity scores with the LP estimates, the AIPW estimator provides a semi-parametric Average Treatment Effect (ATE) estimation. This approach leverages both the reweighted sample and the outcome model and therefore help to correct for the endogeneity of debt restructurings. The AIPW estimator is particularly appealing because it is doubly robust, i.e., it is robust even when either the propensity score model or the outcome model is misspecified.

2. Local Projections

We employ the LP method to estimate the dynamic impacts of debt restructurings over a five-year horizon. Unlike traditional vector autoregression (VAR) models, LPs directly estimate impulse response functions without relying on restrictive assumptions. Thus, LPs are particularly suitable for capturing nonlinear, heterogeneous responses to events like debt restructurings (Atsebi et al., 2024; Ando et al., 2024). The model is specified as:

$$\Delta y^{k}_{i,t+h} = \Lambda^{k}_{h,1} DDR_{i,t} + \Lambda^{k}_{h,2} EDRp_{i,t} + \Lambda^{k}_{h,3} EDRo_{i,t} + \Theta^{k}_{h,L1} \Delta y^{k}_{i,t-1} + \Theta^{k}_{h,L2} \Delta y^{k}_{i,t-2} + X^{x}_{i,t} \beta^{h}_{h} + \alpha^{k}_{h,i} + \varepsilon^{k}_{i,t+h} \quad (1)$$

where *h* in [0;5] represents the time horizon, $\Delta y^{k}_{i,t+h}$ denotes the cumulative change in the dependent variable *k* between *t-1* and *t+h*. For all dependent variables except GDP, this is computed as $\Delta y^{k}_{i,t+h} = \left(y^{k}_{i,t+h} - y^{k}_{i,t-1}\right)$; for GDP, it is expressed as a percentage: $\Delta y^{k}_{i,t+h} = \left(y^{k}_{i,t+h} - y^{k}_{i,t-1}\right)/y^{k}_{i,t-1} * 100$ for GDP. The dependent variables capture the macro-fiscal impacts of debt restructurings, including public debt-to-GDP ratio, interest payments-to-GDP ratio, GDP, and domestic credit to the private sector. To disentangle the distinct impacts of various

[3] Given how our counterfactual is constructed, our analysis estimates the impact of DRs on debt, interest payments, GDP, and domestic credit by comparing countries that undergo a DR with those that avoid one. It does not assess what would have happened when countries in need of a DR to restore macroeconomic stability or debt sustainability choose to delay it. As such, our results should not be interpreted as the costs of conducting a DR relative to postponing or avoiding it when necessary. In fact, the latter may involve even greater costs, as delays often exacerbate vulnerabilities and deteriorate economic conditions—ultimately requiring deeper and more disruptive restructurings, consistent with the "too little, too late" literature.

types of restructurings and mitigate confounding biases arising from their frequent co-occurrence, we include indicator variables for all restructuring types in our regressions. Notably, approximately 40 percent of DDRs coincide with EDRs, necessitating their joint inclusion to avoid misattribution of effects. Omitting any type of debt restructuring from the specification would cause substantial bias, as the estimated impacts of DDRs and EDRs could be conflated. Specifically, $DDR_{i,t}$, $EDRp_{i,t}$, and $EDRo_{i,t}$ are dummies equal to one at the start of domestic debt restructurings, external debt restructurings with private creditors, and external debt restructurings with official creditors, respectively, and to zero in non-debt restructuring years. The coefficients $\Lambda^k_{h,1}$, $\Lambda^k_{h,2}$, and $\Lambda^k_{h,3}$ capture the impacts of DDRs, EDRs with private creditors, and EDRs with official creditors, respectively. The model accounts for pre-restructuring trends by including one- and two-year lagged changes in the dependent variables $\Delta y^k_{\mathrm{i},t-1}$ and $\Delta y^k_{\mathrm{i},t-2}$. The control vector $X^x_{i,t}$ include (i) the presence of crises—banking crises—and fiscal consolidation episodes in one of two years preceding the start of debt restructurings, and (ii) macroeconomic and institutional characteristics, including the output gap and rule of law. Finally, country fixed impacts $\alpha^k_{h,i}$ account for time-invariant unobserved heterogeneity, while $\varepsilon^k_{i,t+h}$ represents the idiosyncratic error term.

3. The AIPW Estimator

To correct for endogeneity arising from selection bias and reverse causality, we use the AIPW estimator, which combines propensity score and outcome models to estimate the ATE. The ATE is defined as:

$$ATE = \Lambda_h = \mathbb{E}\big[y_{i,t+h}(1) - y_{i,t+h} \mid DR_{i,t} = 1\big] - \mathbb{E}\big[y_{i,t+h}(1) - y_{i,t+h} \mid DR_{i,t} = 0\big], \forall\, h \quad (2)$$

Where $DR_{i,t}$ is either DDR, EDRs with private creditors, and EDRs with official creditors.[4] Since $\mathbb{E}\big[y_{i,t+h}(1) - y_{i,t+h} \mid DR_{i,t} = 0\big]$ is not observable, we estimate a counterfactual using the conditional independence assumption: $\big[y_{i,t+h}(d) - y_{i,t+h}\big] \perp DR_{i,t} | Z_{i,t}, \forall\, h; d \in \{0,1\}$. This assumption implies that the treatment assignment (i.e., debt restructurings) and potential outcomes are independent conditional on the set of covariates $Z_{i,t}$ used to predict the likelihood or propensity score $\hat{p}_{i,t}$ of debt restructurings.[5] This allows to estimate the ATE by comparing the outcomes in countries that underwent restructurings to those that did not, conditioning on the set of covariates $Z_{i,t}$, which includes variables that have been found critical in the literature to predict debt restructurings (e.g., Asonuma and Trebesch, 2016; Asonuma et al., 2017; Kuvshinov and Zimmermann, 2019; Asonuma et al., 2024; Atsebi et al., 2024; Atsebi et al., 2025), notably (i) the presence of financial crises—banking crises, fiscal crises[6]—and fiscal consolidation episodes in one of two years preceding the start of debt restructurings, (ii) macroeconomic and institutional characteristics, namely output gap, and the log of GDP per capita (PPP-adjusted), real GDP growth, the log of public debt to GDP ratio, the log of interest payments to GDP ratio and rule of law, averaged over the two years preceding the debt restructurings, (iii) financial development indicators—adding measures for institutional and market development separately, (iv)

[4] For each type of debt restructuring (DR), we apply all steps of the AIPW method separately. Specifically, we estimate a treatment model to obtain the probability of initiating each type of DR—DDR, EDR with private creditors, and EDR with official creditors—by regressing a dummy variable (equal to 1 at the start of each respective DR episode) on the set of covariates $Z_{i,t}$ described above. We then estimate the second-stage outcome models separately for the treated and control groups corresponding to each DR type.
[5] Following Imbens (2004) and Cole and Hernán (2008), we truncated the maximum weight, defined by $1/\hat{p}_{i,t}$ for the treated group and $1/(1-\hat{p}_{i,t})$ for the control group, to 10. In the robustness analysis, we change the maximum weight to 5.
[6] In an alternative specification, we examine how different components of fiscal crises—such as defaults or other types of debt restructurings, exceptionally large IMF financing, and loss or cost of market access—affect the likelihood of debt restructurings.

fiscal governance through a dummy for the presence and enforcement of fiscal rules, and (v) a dummy for election year in the two years preceding the debt restructurings.[7] Therefore, we rewrite the ATE as:

$$ATE = \Lambda_h = \mathbb{E}\left[y_{i,t+h}(1) - y_{i,t+h} \mid DR_{i,t} = 1\right] - \mathbb{E}\left[y_{i,t+h}(0) - y_{i,t+h} \mid DR_{i,t} = 0\right], \forall\, h \quad (3)$$

First, to estimate the likelihood of debt restructurings, we use the Covariate Balancing Propensity Score (CBPS) estimator, introduced by Imai and Ratkovic (2014). The CBPS method offers several advantages over traditional logit or probit models by ensuring perfect balance between treated and control groups and reducing bias from model misspecification (see Annex Table AIV.1). Second, the outcome model is estimated separately for both the treated and control groups. Using this model, we predict the potential outcomes $\widehat{\mathbb{E}}\left[y_{i,t+h}(d) - y_{i,t+h} \mid DR_{i,t} = d; X_{i,t}^{x}\right]; \forall\, h; d \in \{0,1\}$ for the entire sample, conditional on each group's characteristics. This provides the counterfactual outcomes for countries that underwent (or did not undergo) restructurings, conditioned on the control variables $X_{i,t}^{x}$. Finaly, the AIPW estimator combines the propensity scores and potential outcomes to estimate the ATE. The AIPW estimator is given by:

$$\hat{\Lambda}_h^{AIPW} = \frac{1}{n}\sum_i \sum_t \left(\left[\frac{DR_{i,t}(y_{i,t+h} - y_{i,t+h})}{\hat{p}_{i,t}}\right] - \left[\frac{(1 - DR_{i,t})(y_{i,t+h} - y_{i,t+h})}{1 - \hat{p}_{i,t}}\right] - \frac{DR_{i,t} - \hat{p}_{i,t})}{\hat{p}_{i,t}(1 - \hat{p}_{i,t})} \times \left[(1 - \hat{p}_{i,t})\widehat{\mathbb{E}}\left[y_{i,t+h}(1) - y_{i,t+h} \mid DR_{i,t} = 1; X_{i,t}^{x}\right] + \hat{p}_{i,t}\widehat{\mathbb{E}}\left[y_{i,t+h}(0) - y_{i,t+h} \mid DR_{i,t} = 0; X_{i,t}^{x}\right]\right]\right)$$

This method provides consistent estimates of the dynamic impacts of debt restructurings while addressing endogeneity concerns (Lunceford and Davidian, 2004; Glynn and Quinn, 2010). In particular, the AIPW method is well-suited to capture the effects of each type of DRs, especially given the overlap between DDR and EDR. It allows us to control for confounders in both the treatment and outcome models—for example, including EDR as a covariate when analyzing the impact of DDR. By conditioning on EDR (or other relevant factors such as fiscal crises) in both models, the estimated DDR effect represents the impact of DDR after ensuring that there are no longer differences in EDR status and other control variables between the treated and control groups. We also explicitly examine stand-alone DDR cases in the robustness analyses below to verify that our results are robust to cases where DDR occurs independently of EDR.

[7] Each covariate in $Z_{i,t}$ is selected based on its documented relevance in predicting debt restructurings. Financial and fiscal crises (i) capture distress triggers that often precede restructurings. Macroeconomic and institutional controls (ii)—including output gap, GDP per capita, growth, debt and interest burdens, and rule of law—proxy for economic performance, fiscal position, and institutional quality. Financial development indicators (iii), split by institutional and market, affect access to domestic financing. The fiscal rules dummy (iv) reflects commitment to fiscal discipline, while the election-year dummy (v) captures political incentives that may delay or accelerate restructurings.

IV. Main Results

1. Logit Estimates: The likelihood of DDRs

We first describe the macroeconomic environment in which domestic debt restructuring events are likely to occur.[8] We employ a traditional logit regression estimator to model the probability of DDR initiation. The marginal effects at means are displayed in Annex Figure AIII.2.[9]

Our logit regression results suggest that DDRs are more likely to occur in countries with EDRs with private creditors, weaker financial systems, enforced fiscal rules,[10] fiscal crises—specifically, external default and loss of market access, a recession characterized by a negative output gap, and rising levels of public debt to GDP and interest payments to GDP. Surprisingly, factors such as preceding fiscal consolidation, banking crises, real GDP growth, elections, and the status of rule of law do not significantly influence the likelihood of starting a DDR. The model demonstrates strong predictive power, with classification power at 98.5 percent, and an Area Under the Receiver Operating Curve (AUROC) at 0.8. These statistics indicate that our model can effectively distinguish between countries likely to experience DDRs and those unlikely to do so.

One striking finding is the inverse relationship between financial development and the likelihood of DDRs. Specifically, countries with less developed financial systems are more prone to DDRs. There are two possible explanations: (i) financial sector development may enhance resilience to DDRs by improving government access to domestic financing and through the stabilizing role of domestic debt in providing hedge and liquidity (Willems and Zettelmeyer, 2022; Martinez et al., 2023; Sturzenegger and Sosa-Padilla, 2023); (ii) in countries with advanced financial systems, authorities prefer avoiding DDRs due to their anticipated larger economic impact because of the deeper transmission of negative shocks through the financial system. While both factors are certainly at play, the latter explanation appears more plausible, as we explore in the following section. Our results indicate that the costs of DDRs can be more severe in financially developed economies, particularly in terms of economic growth and domestic credit availability. In these countries, the impairment of banks' balance sheets is more easily transmitted across the economy due to greater financial inclusion and interconnectedness. These factors exacerbate economic downturns by affecting credit flows, in contrast to countries with underdeveloped financial systems, where such shocks are less pronounced due to the more limited role of domestic financial institutions.

Furthermore, our findings indicate that the probability of initiating a DDR rises significantly in countries with higher public debt-to-GDP ratios and increasing debt interest burdens. This suggests that DDRs often serve as a response to unsustainable fiscal paths. The presence of enforced fiscal rules—while typically associated with improved fiscal discipline—may also increase the likelihood of DDRs in contexts of rising debt vulnerabilities, as rules limiting the size of public debt may compel governments to act sooner, especially when other options to restore sustainability are limited or politically costly. An alternative explanation could come from the

[8] While we don't directly control for currency composition, we link predicted DDR probabilities to the domestic debt share. Results (available on request) show the probability of initiating a DDR decreases as the domestic share increases—though it increases again past a threshold for LICs. This may reflect the greater difficulty of restructuring when domestic creditor exposure is high, or the stabilizing role of domestic debt in providing hedge and liquidity (Willems and Zettelmeyer, 2022; Martinez et al., 2023; Sturzenegger and Sosa-Padilla, 2023).

[9] Given our focus on DDRs, we report results only for this type of debt restructuring. Nonetheless, our findings suggest that the model also performs well in explaining EDRs, indicating that our variable selection effectively captures the determinants of both DDRs and EDRs. These results can be obtained upon request.

[10] Enforced fiscal rules refer to countries with high compliance rates of fiscal rules.

existence of common factors—such as high debt or external scrutiny (e.g., IMF programs or donor pressure)—that drive both the adoption or enforcement of fiscal rules and the likelihood of DDR. Finally, fiscal crises—especially those involving external defaults and rising market access costs—are strongly correlated with an increased likelihood of DDRs.

2. CBPS Estimates: Covariate Balancing Scores

While the logit model provides valuable insights into the determinants of DDRs, our baseline specification leverages the CBPS estimator. This approach ensures that covariates are perfectly balanced across treated and control groups to estimate a causal ATE. Although we include the logit-based propensity scores in the robustness checks, the CBPS method is superior in achieving balance and isolating the "pure" impacts of DDRs on macroeconomic and fiscal outcomes. To evaluate the balancing properties of the CBPS relative to the logit model, we compare the differences in the means and variances of key observables before and after weighting by propensity scores obtained with each method. The results of the balance diagnostics are presented in Annex Table AIV.1 for all type of DRs.

First, they show pronounced disparities in macroeconomic, fiscal, and institutional characteristics between countries that undertake any type of DRs and those that do not (Panel A—unweighted), as suggested by the logit results for DDRs above. These disparities, if left unaddressed, could confound the estimation of DR impacts. Second, when weighting the treated and control groups using CBPS-derived propensity scores (Panel B—CBPS weighted), we perfectly eliminate the imbalances in characteristics, as indicated by Rubin's (2001) criteria for covariate balance. Third, the logit-based propensity scores perform less effectively in achieving balance (Panel C—weighted logit), which underscores the advantages of the CBPS method. The improved balance between treated and control groups when using the CBPS stems from its dual optimization of covariate balance and propensity score estimation, which offers an advantage over traditional propensity score methods (Imai and Ratkovic, 2014). The predicted propensity scores for the treated and control groups are provided in Annex Figure AIII.3 for each type of DRs. Countries in the treated (control) group receive a high (low) likelihood of DRs, while countries in the treated (control) group with propensity score close to zero (one) receive higher weights. Besides, this figure also shows considerable overlaps between the distributions of propensity scores for the treated and control groups. In sum, by mimicking a scenario in which DRs occur randomly, the CBPS approach enables us to accurately estimate the ATE of DRs on key macroeconomic and fiscal outcomes.

3. The ATE impacts of Debt Restructurings on Public Debt, Interest Payments, GDP, and Domestic Credit

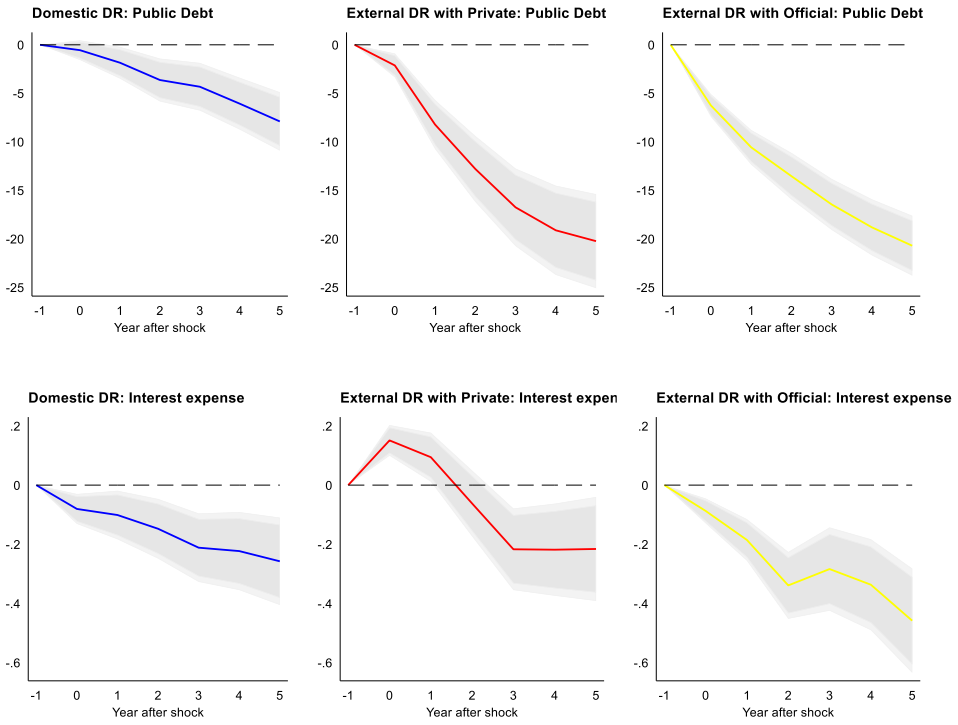
Our key findings are summarized in Table 1. In this section, we present our baseline results, which, to the best of our knowledge, is the first attempt to disentangle the impacts of DDRs and EDRs on public debt, interest payments, GDP, and domestic credit to the private sector.[11] By disentangling the impacts of DDRs and EDRs with private and official creditors, we provide novel insights into the macro-fiscal impacts of these distinct types of debt restructurings. The results are shown in Annex Tables AIV.3 to 5, and Figures 2 and 3 depict them graphically. Our findings indicate that DDRs reduce public debt to GDP and interest payments to GDP but

[11] We also investigate the impacts of DDRs on financial stability indicators, including the financial stability stress index from Ahir et al. (2023), non-performing loans (NPLs), returns on assets (RoA), and returns on equity (RoE) from the IMF's Financial Soundness Indicators (FSI) database. The findings show that DDRs induce a significant disruption of the financial stability, characterized by an increase in financial stress, NPLs, and a decline in RoA and RoEs. However, given to limited data availability for these indicators, the regressions could cover only less than 10 episodes of DDRs. Therefore, we decided not to report these findings, although they remain available upon request.

impose significant and persistent economic costs, including long-lasting and sharp declines in GDP and domestic credit.[12] Also, both types of EDRs provide greater fiscal relief with less severe and shorter-lasting economic costs.

Regarding the fiscal impact, we find that debt restructurings lead to significant reductions in public debt and interest payments, but the magnitude of these impacts varies significantly across restructuring types. Over a five-year horizon, DDRs reduce public debt by an average of 7.9 percentage points (ppts) of GDP, markedly smaller than the declines observed for EDRs with private creditors (20.2 ppts of GDP) and EDRs with official creditors (20.7 ppts of GDP). These findings underscore the comparatively limited fiscal relief provided by DDRs, which can be explained by their design, the need to safeguard the financial sector, as DDRs often involve lower face-value reductions compared to EDRs, especially those with private creditors where haircuts are typically larger (Das et al., 2012; Meyer et al., 2022), and their adverse effects on the economy and financial stability. Similarly, interest payments decrease significantly following DDRs, with a reduction of 0.25 ppt of GDP over five years. While this decline is slightly smaller than the 0.45 ppt of GDP decrease observed for EDRs with official creditors, it is slightly higher than the 0.2 ppt of GDP decline observed for EDRs with private creditors.

Figure 2. ATE Estimates, Impacts of DRs on Public Debt and Interest Payments



Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in public debt (upper panel) and interest payments (lower panel).

[12] In fact, the heterogeneity of DDRs would typically work against finding significant effects; thus, the presence of robust and significant patterns in our findings suggests that common underlying dynamics do exist across these diverse restructuring episodes.

Table 1. Summary of Findings

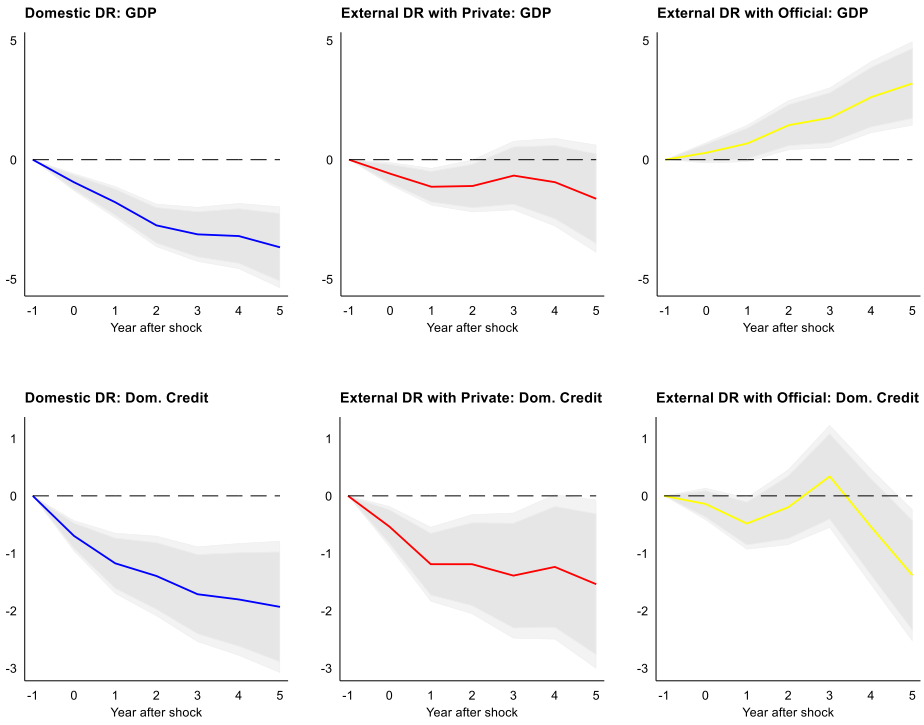
	Public Debt (h=5)	Interest Payments (h=5)	GDP (h=5)	Domestic Credit (h=5)
Baseline				
DDRs	↓	↓	↓↓	↓
EDRs with private creditors	↓↓↓↓	↓	0	↓
EDRs with official creditors	↓↓↓↓	↓↓	↑	↓
Sensitivity				
Level of Development				
DDRs in LICs	↓↓	↓↓	↓	0
DDRs in EMs	↓	↓	↓↓	↓↓↓
Design of DDRs				
Post-default DDRs	↓	↓	↓↓	↓↓
Face value red. DDRs	↓↓↓	↓↓	↓↓↓	↓↓
Maturity change DDRs	↓	↓	↓	↓
Coupon reduction DDRs	↓↓	↓↓	↓↓	↓↓
Instruments of DRs				
Bank loan DDRs	↓	↓	↓↓	↓
Bond DDRs	↓↓	↓↓	↓	↓
Sovereign-Bank Nexus				
DDRs with High Sov-Bank Nexus	↓	↓↓↓	↓↓↓	↓↓
DDRs with Low Sov-Bank Nexus	↓↓	0	0	↓
Fiscal Stance				
DDRs with fiscal consolidation	↓↓↓	↓↓↓	↓↓	↓↓
DDRs with fiscal expansion	↓	↓	↓	↓
Financial Development				
DDRs with High fin. development	↓	↓	↓↓	↓↓
DDRs with Low fin. development	↓↓↓↓	↓↓↓	0	0
Gross International Reserves				
DDRs with High international reserves	↓↓	↓	↓	0
DDRs with Low international reserves	0	0	↓↓↓	↓↓
IMF-supported programs				
DDRs with IMF-supported programs	↓↓↓↓	↓↓↓↓	↓	0
DDRs without IMF-supported programs	↓	0	↓↓↓	↓

Sources: Authors' calculations.

Notes: This table summarizes the key findings of the paper for the horizon h=5. Arrows indicate the direction and relative magnitude of the estimated impact within each outcome variable. Comparisons should only be made within each outcome variable (e.g., comparing the results for different types of DRs on public debt). 0 denotes no statistically significant effect. These arrows represent progressively stronger effects: negative effects ↓ (small), ↓↓ (moderate), ↓↓↓ (large), ↓↓↓↓ (very large); and positive effects: ↑ (small).

Regarding the economic impact, we show that while both DDRs and EDRs generally impose short-term economic costs, the medium-term impacts of DDRs are more severe and persistent. Five years after DDR, GDP remains 3.7 ppts below its counterfactual. In contrast, the medium-term impact of EDRs with private creditors is statistically insignificant, and GDP even increases following EDRs with official creditors. A similar pattern is observed for domestic credit to the private sector: DDRs lead to a cumulative decline of 1.9 ppts of GDP over five years, whereas the decline for both types of EDRs is comparatively smaller, ranging between 1.4 and 1.5 ppts of GDP. The prolonged GDP contractions and steep declines in domestic credit following DDRs align with studies that emphasize the adverse impacts of domestic debt restructurings. DDRs often impair the balance sheets of domestic banks and financial institutions that hold large shares of government debt, leading to tighter credit conditions and deeper economic downturns (IMF, 2021).

Figure 3. ATE Estimates, Impacts of DRs on GDP and Domestic Credit to the Private Sector



Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in GDP (upper panel) and domestic credit to the private sector (lower panel).

These findings contribute to a deeper understanding of the trade-offs associated with different types of debt restructurings. While DDRs are sometimes an unavoidable tool for addressing fiscal stress, their implementation should be carefully designed to mitigate their significant costs and challenges. A well-executed DDR must anticipate and minimize disruptions to the domestic financial system, while restoring debt sustainability as part of a comprehensive policy package that addresses underlying vulnerabilities. This approach contrasts with EDRs, which often provide greater fiscal relief with comparatively less severe

economic impacts, highlighting the importance of carefully weighing the trade-offs of each restructuring option.[13]

V. Robustness Checks

We examine the robustness of our results across a range of alternative specifications, including alternative sample selections, lower maximum weight used in the treatment models, using logit instead of CBPS, and extending the estimation horizon. These checks consistently support our baseline findings, with some variations in magnitude that offer further insights.

1. Keeping Countries with at Least One Type of Debt Restructurings

We re-estimate our models after excluding countries that have not experienced any debt restructurings. By doing so, we increase the homogeneity of our sample and mitigate potential biases arising from the inclusion of countries with fundamentally different economic, fiscal, and financial conditions.[14] By constructing counterfactuals solely from periods without debt restructurings in countries with at least one restructuring event, we align the control group more closely with the treatment group. The results, presented in Annex Figures AIII.4 and 5, are both qualitatively and quantitatively similar to our baseline findings. One exception is that the decline in domestic credit following EDRs is no longer statistically significant.

2. Focusing on DDRs with Only Resident Creditors and Excluding Deposit-Only DDRs

To address concerns that the inclusion of non-resident creditors in DDRs governed by domestic law might influence their impacts, and to better isolate the impact of DDRs occurring independently from EDRs, we re-estimate our models by excluding all DDRs that coincide with any type of EDRs identified based on residency. This approach allows us to focus on DDRs that predominantly involve resident creditors, i.e., DDRs not associated with EDRs and that are characterized by the "triple coincidence" of domestic law, resident creditors, and local currency. As highlighted by Erce et al. (2022), 75 percent of domestic-law restructurings in the most recent decade (2010–18) involved debt held by residents, and 79 percent were denominated in local currency, underscoring their predominantly domestic nature. The results, presented in Annex Figure AIII.6, point to the significant economic burden and limited fiscal relief associated with DDRs involving only resident creditors. While the results are qualitatively consistent with our baseline findings, they show different magnitudes, as expected. Specifically, the fiscal relief provided by DDRs with only resident creditors becomes even more limited, while the economic costs, particularly the decline in GDP, are more pronounced.

We also test the robustness of our findings by excluding deposit-only DDR given their unique nature.[15] These cases often involve unilateral government actions—such as freezing deposits, converting deposits into bonds—

[13] The results for EDRs with official creditors likely reflect the influence of HIPC initiatives, which account for about 60 percent of these cases. These initiatives typically offer substantial debt relief and may entail lower economic costs, given their structured design, predictable implementation, and the reform commitments required to reach the HIPC completion point.
[14] Our first-stage models and the estimated propensity scores derived using CBPS effectively eliminate all differences in characteristics between the treated and control groups, even when countries without any debt restructurings are included in the sample. This robustness of the CBPS approach ensures the comparability of treated and control units across all specifications.
[15] Of the 134 DDR episodes identified by Erce et al. (2022), only 18 involve deposits, and just 11 occurred without another restructuring (e.g., bonds or bank loans) within a two-year window.

on non-marketable instruments and are not always classified as restructurings in other datasets (e.g., IMF 2021). As they are not directly comparable to restructurings of marketable instruments (e.g., bonds or bank loans), we present results excluding them in Annex Figure AIII.7 The findings remain broadly consistent with the baseline: the decline in public debt is slightly larger, the decline in interest payments is slightly lower in the medium-term, while the declines in GDP and domestic credit are slightly smaller. Still, non-deposit DDRs remain significantly costlier than EDRs and offer less fiscal relief.

3. Alternative Maximum Weights Set in the Treatment Models

In this robustness check, we lower the maximum weight from 10, used in our baseline findings, to 5. Thus, we reduce the influence of country-year observations in the treated group with a low likelihood of experiencing DRs and in the control group with a high likelihood of DRs. The results are depicted in Annex Figures AIII.8 and 9. They generally confirm the robustness of the significance and magnitude of DR impacts, except that the decline in interest payments following EDR becomes smaller than those observed for both types of EDRs in the baseline.

4. Using Logit to Predict Propensity Scores

We assess the robustness of our findings by re-estimating the treatment models using a traditional logit approach instead of CBPS. The results, presented in Annex Figures AIII.10 and 11, remain qualitatively consistent. However, the estimated magnitudes are generally larger, highlighting the limited ability of logit to eliminate differences between treated and control groups (Annex Table AIV.1). Also, the decline in interest payments following EDRs becomes smaller than those observed for both types of EDRs. These results underscore the robustness of our baseline findings and reaffirm CBPS's superiority in achieving covariate balancing.

5. Extending the Horizon to 10 Years

We extend the estimation horizon from 5 to 10 years following the debt restructurings to assess whether the observed effects persist or change over a longer period. Although this approach reduces the sample size—requiring data availability for the full 10-year window—the extended results, depicted in Annex Figures AIII.12 and 13, align closely with our baseline findings. Our findings confirm that DDRs continue to reduce public debt and interest payments over the extended horizon but come at a steep and persistent economic cost, marked by prolonged declines in GDP and domestic credit. In contrast, EDRs deliver greater fiscal relief while imposing less severe and shorter-lived economic disruptions, with improved GDP outcomes following EDRs with official creditors.

VI. Sensitivity

We conduct a sensitivity analysis by examining how the effects of DDRs vary with countries' level of development (LICs vs EMs), the design of DDRs (i.e., whether they occurred post-default, involved a haircut or face value reduction, a maturity extension, or a coupon reduction), the instruments used (bank loan vs. bond restructuring), and several macro-financial characteristics, including the degree of sovereign-bank nexus, financial development, gross international reserves, and the presence of an IMF-supported program.

This sensitivity analysis provides insights into factors that either exacerbate the trade-off between the costs and benefits of DDRs or mitigate the costs while enhancing the benefits. To implement this analysis, we split our sample along the dimensions mentioned above. We estimate the effects separately for each group for categorical variables (e.g., LICs vs. EMs, IMF-supported program). For continuous variables, we stratify countries into two groups based on whether the value of the variable of interest for each country—measured as the average over the period of study—is above or below the sample median at the start of DDR. For instance, when analyzing the role of financial development, we classify countries as having either low or high financial development, depending on whether their average financial development level over the period of study is below or above the median of the sample at the start of DDR. The same methodology is applied to other key variables, such as the degree of sovereign-bank nexus and gross international reserves.

1. LICs vs. EMs

We start by examining the heterogeneous effects of DDRs across LICs and EMs. The findings, presented in Annex Figure AIII.14, indicate a marked distinction between LICs and EMs in terms of the benefits and costs of DDRs. Overall, LICs experience greater fiscal relief with more moderate economic costs, while EMs face steeper economic contractions, prolonged credit tightening, and lower fiscal relief.

Specifically, in LICs, DDRs lead to a substantial and sustained reduction in public debt, with the debt-to-GDP ratio falling by 14.2 ppts of GDP five years post-restructuring, compared to a more modest decline of 7.4 ppts of GDP in EMs. The reduction in interest payments is also greater in LICs, reaching 0.5 ppt of GDP by year five, compared to 0.2 ppt of GDP in EMs. In addition, GDP in LICs declines by 3.3 ppts five years after restructuring, whereas the contraction in EMs is steeper at 5 ppts. In LICs, DDRs lead to an initial decline of 0.6 ppt of GDP in domestic credit, but the effect dissipates after two years. In contrast, the contraction in domestic credit in EMs is both larger and more persistent, as it declines from 0.5 ppt of GDP in the first year to 4.3 ppts of GDP by year five.

2. Design and Instruments of DDRs

We also explore how the type of DDR—whether post-default, face value reduction, maturity extension, or coupon reduction—and the choice of instruments (bank loan vs. bond) shape the outcomes in terms of both benefits and costs.[16] We examine how each DDR strategy and instrument influences fiscal relief and economic costs and provide insights into the complex trade-offs policymakers must navigate. By differentiating the impacts of various DDR approaches, we aim to shed light on the nuanced impacts of these decisions. Our findings, illustrated in Annex Figures AIII.15 and 16, underscore that while DDRs can provide substantial debt relief and fiscal savings, they also carry significant economic risks, with their effects varying substantially based on the chosen approach and instruments.

Regarding DDR strategies, we find that, first, post-default restructurings provide moderate but delayed debt relief, becoming statistically significant two years after DDRs. While interest expenses decline, the reductions are modest compared to other DDR types. However, the economic costs are severe and prolonged, with sharp contractions in GDP and domestic credit, consistent with the findings of Asonuma and Trebesch (2016) and

[16] In addition, this approach enables us to test the robustness of our findings by distinguishing between restructurings involving marketable instruments (such as bank loans and bonds) and those involving non-marketable instruments (such as deposits). Given their differing characteristics, these two types of domestic debt restructurings may not be directly comparable and could generate distinct effects.

Asonuma et al. (2024) for EDRs. Second, among all DDR strategies, face value reduction delivers the most immediate and sustained debt relief and significantly lowers interest expenses. However, these benefits come at the cost of the deepest economic downturn, with GDP and domestic credit contracting sharply and persistently. Third, maturity extensions provide moderate debt relief, coupled with steady declines in interest expenses. While GDP contracts, the magnitude is less severe than in face value reductions. Similarly, domestic credit declines but less than in other restructuring types. Finally, coupon reductions deliver sustained interest expense relief, making them an effective tool for interest bill savings. Debt reduction effects are also significant, falling between those of maturity extensions and face value reductions. While GDP declines, the contraction is milder compared to face value reductions. However, the larger decline in domestic credit suggests that financial sector disruptions remain a key risk, as also noted by Das et al. (2012).

Regarding DDR instruments, we show that restructuring bank loans leads to significant public debt and interest expenses reduction, but the relief is less pronounced than in bond restructurings. The economic costs are more severe, with sharp GDP and credit contractions, highlighting the financial sector vulnerabilities inherent in renegotiating bank claims. This finding aligns with Bolton and Jeanne (2009), who emphasize the fragility of banking systems when sovereign debt restructurings involve large-scale loan renegotiations. By contrast, bond restructurings exhibit patterns similar to face value and coupon reductions—offering substantial debt relief and lower interest expenses but at the cost of GDP declines and credit contractions. This is in line with Sturzenegger and Zettelmeyer (2006), who document that bond restructurings typically provide more market-based debt relief but often entail significant economic costs.

To sum up, our findings highlight the complex trade-offs in DDR strategies. While face value reduction maximizes debt relief, it imposes the highest economic cost. Maturity extension, in contrast, offers a more measured approach, achieving fiscal gains with relatively lower GDP contraction. Coupon reductions effectively reduce interest and debt burdens but pose financial stability risks due to significant credit contractions. Post-default restructurings and bank loan renegotiations impose the most severe macro-financial disruptions.

3. Conditional on the Degree of Sovereign-Bank Nexus

A key unanswered question in the literature on sovereign debt restructurings is how the benefits and costs of DDRs vary with the degree of the sovereign-bank nexus. We hypothesize that sovereign-bank nexus can simultaneously amplify both the benefits and costs of restructuring, which can complicate policy decisions. Indeed, a higher sovereign-bank nexus is expected to yield sharper economic and financial costs (Acharya et al., 2014; Gennaioli et al., 2018), heightening the risk of financial distress following DDRs as banks face valuation losses.[17]

Our findings are reported in Annex Figure AIII.17. They reveal that five years after DDRs, those involving a stronger sovereign-bank nexus exhibit a more pronounced decline in public debt and interest payments. At the same time, these DDRs are also associated with a steeper GDP contraction and a greater reduction in domestic credit. These findings underscore the inherent trade-off in DDRs: while necessary for debt sustainability, they can impose significant short-term economic costs, particularly in economies with deep financial linkages between sovereigns and domestic banks. Additional intricacies of the sovereign-bank nexus, not captured in this analysis, will have a bearing on the cost of DDR. For example, banks may have a strong

[17] The sovereign-bank nexus ratio is defined as the share of bank loans and security holdings extended to the general government or state-owned enterprises relative to total banking sector assets.

capital position and high profitability because of the sovereign nexus. In this case, while a DDR will take a toll on their profitability, well-capitalized banks can still supply credit at the level similar to pre-DDR (Togo et al., forthcoming).

4. Conditional on Fiscal Policy Stance

We investigate how the fiscal policy stance following a DDR affects its macroeconomic outcomes. In the wake of a DDR, many countries face the imperative of restoring macroeconomic stability and credibility—often requiring sound fiscal policy and consolidation. Yet, because both DDR and fiscal consolidation aim to reduce fiscal pressures and may entail economic costs, disentangling their individual effects is challenging. One may argue that the observed effects cannot be fully attributed to the DDR itself, but rather to the fiscal policy implemented in its aftermath. Moreover, when pursued jointly, DDR and consolidation are more likely to deliver lasting reductions in debt and interest payments, though their adverse effects on the economy may also be amplified.

To assess the joint impact of DDR and fiscal stance, we re-estimate AIPW by splitting DDR episodes into two groups: those accompanied by consolidation and those accompanied by expansion. We do so by classifying fiscal stances based on the change in the primary balance from one year before to three years after DDR. We define a positive change as fiscal consolidation and a negative change as fiscal expansion.

Annex Figure AIII.18 presents the results. We find that DDRs combined with fiscal consolidation are associated with deeper and more durable declines in debt and interest payments. However, this comes at the cost of sharper contractions in GDP and domestic credit. Importantly, when comparing the differences in economic costs and fiscal relief between DDRs with fiscal consolidation and those with fiscal expansion over five years, the differences are less pronounced for the costs than for the fiscal relief. These findings underscore the importance of prudent fiscal policy even after a restructuring, though in practice, some countries may be reluctant to commit to consolidation post-DDR.

5. Conditional on Financial Development

We explore the sensitivity of DDR impacts based on the level of financial development. As we have shown, financial development is a critical determinant of the likelihood of initiating a DDR. We further analyze how financial development shapes the benefits and costs of DDRs. The results, reported in Annex Figure AIII.19, show that DDRs in countries with higher financial development are associated with a less pronounced reduction in public debt and interest payments but entail significantly higher economic costs, including sharper GDP contractions and more substantial declines in domestic credit. Conversely, DDRs in less financially developed countries result in greater fiscal relief without imposing medium-term economic costs. This pattern reflects the stronger transmission of financial shocks in more developed financial systems, where the negative effects of impaired financial systems propagate more broadly through credit channels. Thus, DDRs appear more beneficial in countries with less developed financial systems.

These findings align with previous literature on the interplay between financial development and economic crises. For example, Reinhart and Rogoff (2009) highlight that more developed financial systems can amplify the costs of sovereign debt crises due to their deeper integration with the real economy. Similarly, Gennaioli et al. (2014) demonstrate that domestic sovereign debt crises tend to have more severe repercussions in economies with higher financial development due to the significant exposure of domestic banks to government debt.

6. Some Mitigating Factors: Gross International Reserves and IMF-supported Programs

We analyze the role of mitigating factors, such as gross international reserves and IMF-supported programs, in shaping the economic impacts of DDRs. The conditional impacts of DDRs on gross international reserves and the presence of an IMF-supported program are reported in Annex Figures AIII.20 and 21, respectively. Overall, they provide evidence of the critical role of gross international reserves and IMF-supported program in preserving the benefits of DDRs while minimizing their costs. By contrast, DDRs outside of IMF-supported programs and/or in countries with limited international reserves are associated with smaller fiscal relief and more severe economic costs.

DDRs in countries with higher levels of international reserves as a percent of GDP achieve a more pronounced reduction in public debt to GDP ratio and interest payments to GDP ratio while incurring significantly lower economic costs, including smaller GDP losses and less severe declines in domestic credit. Conversely, DDRs in countries with lower international reserves yield more limited fiscal relief and impose greater economic disruptions. Indeed, higher reserves likely act as a buffer against the adverse effects of DDRs by providing liquidity to support domestic financial institutions and prevent disruptions in credit markets. This aligns with findings in the literature that international reserves enhance resilience during sovereign debt crises by lowering refinancing risks and stabilizing exchange rates (Dominguez et al., 2012; Bianchi and Sosa-Padilla, 2024).

Similarly, DDRs undertaken during IMF-supported programs show stronger fiscal outcomes and reduced economic costs. These programs provide financial assistance, technical support, and policy credibility, helping to stabilize economies during restructuring. The IMF's involvement can improve coordination between creditors and the sovereign, which is critical for successful restructuring outcomes. Furthermore, IMF-supported programs often promote structural reforms and fiscal consolidation, which strengthen economic fundamentals and reduce uncertainty. The IMF’s catalytic role in facilitating creditor confidence and securing external financing further reduces the severity of economic disruptions.

There are multiple additional mitigating factors that we are unable to capture systematically in our empirical analysis. Depending on the characteristic of holders of domestic debt, the DDR operation can be designed in a way that minimizes costs by allocating losses where they can be best absorbed while maximizing gains to the government and mitigating the meltdown of the financial system. For example, pension funds with a young population and long-time horizon can absorb maturity extension easier than banks can. Institutions that mark their assets to market prices may prefer a principal haircut, and coupons set at market rates. Those holding government debt in held-to-maturity portfolios may prefer no principal reduction but may be willing to take coupon reduction and some maturity extension. Additional mitigation measures may include setting up ELAs, resolution framework and the financial stability fund (Togo et al., forthcoming).

VII. Conclusion

This paper provides a comprehensive analysis of the determinants and macro-fiscal impacts of DDRs in EMDEs. Our findings highlight the trade-offs associated with DDRs: while they contribute to reducing public debt and interest payments, their economic costs are significant and persistent, particularly in terms of output loss and contraction in domestic credit. In contrast, EDRs, particularly those with official creditors, tend to deliver greater fiscal relief with less severe economic costs. While DDRs are sometimes an unavoidable tool for addressing fiscal stress, their implementation should be carefully designed to mitigate their significant costs. A

well-executed DDR must anticipate and minimize disruptions to the domestic financial system while restoring debt sustainability as part of a comprehensive policy package that addresses underlying vulnerabilities. In fact, while costly, DDRs can be critical for restoring macroeconomic stability and sustainability. Without them, many countries may resort to monetary financing or expensive short-term borrowing—fueling inflation, destabilizing banks, and derailing reforms. When properly managed, DDRs can avert these risks, with side effects mitigated through strong design and safeguards.

Our findings indicate that DDRs are more likely to occur in countries with weaker financial systems, higher debt burdens, and interest payments, stricter fiscal rules, and countries experiencing fiscal crises—particularly external defaults and loss of market access. Our results further highlight substantial heterogeneity in the impacts of DDRs. LICs experience relatively greater fiscal relief with more moderate economic costs, while EMs face steeper GDP contractions and prolonged credit decline. The design and instruments of DDRs also play a crucial role in shaping their outcomes. While face value reductions provide the most significant debt relief, they come at the expense of steep economic costs. Maturity extensions, in contrast, offer a more measured approach—achieving fiscal gains with relatively lower GDP contraction. Coupon reductions are effective in reducing interest and debt burdens but may induce a significant reduction in domestic credit. Post-default restructurings and bank loan renegotiations impose the most severe macro-financial costs. We also find that DDRs occurring in countries with a stronger sovereign-bank nexus or together with fiscal consolidation yield a sharper decline in public debt and interest payments, but these benefits come at the cost of a greater contraction in output and domestic credit. But the relatively lower gap for the costs compared to the fiscal reliefs when DDRs are followed by fiscal consolidation underscores the importance of prudent fiscal policy even after a restructuring. Next, we find that DDRs in countries with higher financial development are associated with a less pronounced reduction in public debt and interest payments but entail significantly higher economic costs, including sharper GDP contractions and more substantial declines in domestic credit. Conversely, DDRs in less financially developed countries result in greater fiscal relief without imposing medium-term economic costs. Finally, we identify key mitigating factors that can help alleviate DDR-related costs. Countries with higher gross international reserves or those that undertake a DDR under an IMF-supported program tend to experience milder economic contractions and higher fiscal relief after DDRs.

From a policy perspective, our findings imply that DDRs should be carefully designed to minimize disruptions to the financial sector, particularly in countries where developed financial markets and deep sovereign-bank linkages transmit the cost of DDRs to the broader economy (IMF, 2021). Evidence also suggests that securing buffers—such as gross international reserves—to mitigate DDR-related economic costs (IMF, 2013). The presence of an IMF-supported program appears to support better restructuring outcomes by stabilizing macroeconomic conditions and facilitating creditor coordination. In addition, considering DDRs alongside alternative fiscal consolidation strategies and external financing options may help reduce the risk of exacerbating economic downturns (IMF, 2021). As domestic debt continues to play a growing role in sovereign financing, the paper underscores that a well-calibrated approach to DDRs, in conjunction with sound fiscal and monetary policies, is important for ensuring debt sustainability while safeguarding economic growth and financial stability.

Annex I. List of Countries

Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Bahamas, The, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Chad, Chile, China, Colombia, Comoros, Democratic Republic of, Congo, Republic of, Congo, Costa Rica, Côte d'Ivoire, Croatia, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Fiji, Gabon, Gambia, The, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyz Republic, Lao PDR, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Republic of, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Samoa, São Tomé and Príncipe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, South Africa, South Sudan, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Türkiye, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia.

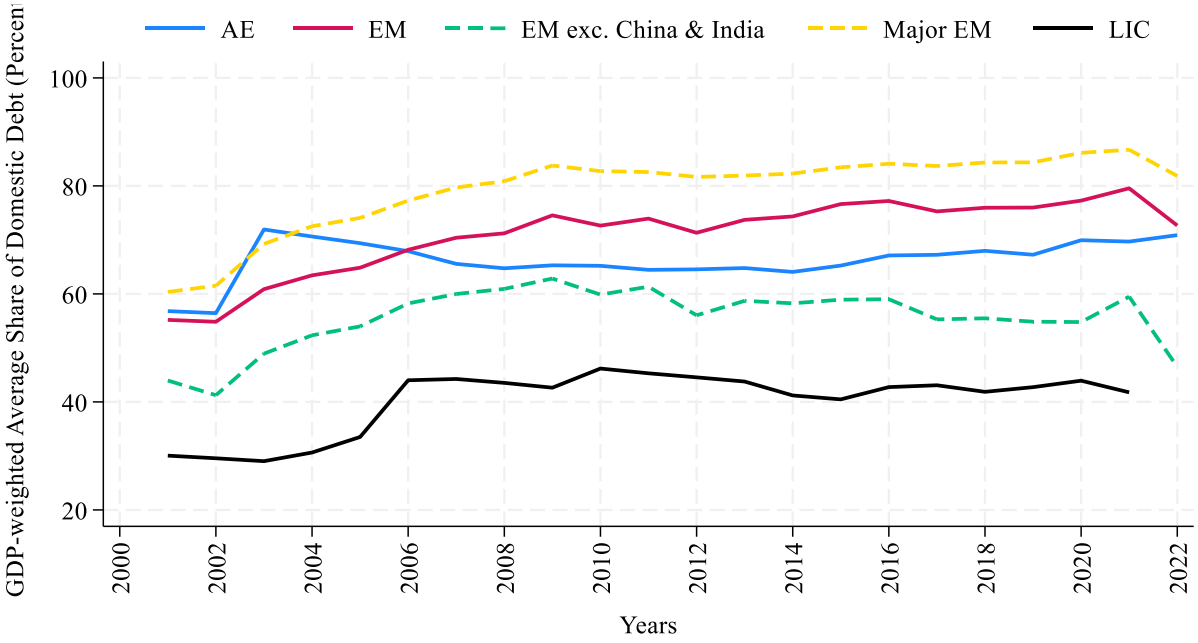
Annex II. List of DDRs

Country	Start date	End date	Instrument	Amount (mln US$)	Face value reduction	Maturity change	Coupon change	NPV loss (%)	Post-default restructuring
Mexico	Aug-82	Sep-82	Deposit	12000.0	1	0	0	0.308	1
Bolivia	Nov-82	Nov-85	Deposit	128.0	1	0	1		1
Peru	Aug-85	Apr-86	Deposit	1370.0	1	0	0		1
Brazil	Feb-86	Feb-86	Bonds	12270.0	0	1	1		0
Brazil	Jun-86	Jun-86	Bonds	2380.0	0	1	1		0
Brazil	1987	Jan-87	Bonds	848.4	0	1	0		0
Panama	Mar-88	Jul-90	Deposit	1890.0	0	1	1		1
Argentina	Dec-89	Dec-89	Bonds	650.0	0	1			0
Rwanda	1989	1990	Bonds	12.2	0	1	1		0
Côte d'Ivoire	Sep-89	1997	Banks loans and commercial credit	879.9	0	1	1		1
Liberia	Dec-89	Jan-06	Bonds	50.0				1.000	1
Liberia	Dec-89	May-07	Banks loans and commercial credit	7.2	1	1	1		1
Argentina	Jan-90	Jan-90	Deposit	3000.0	0	1	1	0.700	1
Brazil	Mar-90	Sep-91	Deposit	66500.0	0	1	1	0.650	1
Brazil	Mar-90	Sep-91	Bonds	62000.0	0	1	1		1
Kuwait	Aug-90	Aug-91	Deposit	26390.0	0	0	0	0.000	1
Slovenia	Apr-91	Jan-93	Deposit	1190.0	0	1	1		1
Macedonia	Sep-91	Apr-00	Deposit	1200.0	0	1	1		1
Serbia	Apr-91	Jan-01	Deposit	4060.0	0	1	1	0.115	1
Montenegro	Apr-91	Mar-08	Deposit	175.3	0	1	1	0.115	1
Croatia	Jan-92	Jun-95	Deposit	3290.0	1	1	1		1
Bosnia	Mar-92	Dec-03	Banks loans and commercial credit	7.1	0	0	0		1
Congo, Rep.	1992	2005	Banks loans and commercial credit	332.0	1	1			1
Bosnia	Mar-92	May-09	Deposit	2690.0		1	1	0.745	1
Central African Repu	1992	Jul-17	Banks loans and commercial credit	47.7	0	1	1		1
Peru	May-92	Aug-17	Bonds	500.0		1			1
Brazil	Nov-93	Nov-93	Banks loans and commercial credit	28000.0	0	1	1		1
Cameroon	Jul-93	1998	Banks loans and commercial credit	302.4					1
Brazil	1994	Jun-94	Bonds	31000.0					1
Nicaragua	Jul-94	Jul-94	Bonds	74.7	0	1	1		0
Brazil	1994	1996	Bonds	86560.0	1	1	1		0
Rwanda	1994	Dec-06	Bonds	50.8					1
Slovenia	Oct-95	Nov-95	Bonds	869.1	0	1	1		0
Nigeria	1995	Mar-96	Bonds	250.4					0
Nicaragua	Dec-96	Dec-96	Bonds	650.0	0	0	0		0
Sri Lanka	Jan-96	Feb-96	Bonds	153.6	0	1		0.000	1
Dominican Rep.	Aug-96	Nov-99	Banks loans and commercial credit	453.2	1	1	1		1
Solomon Islands	1996	Jul-04	Bonds	40.8	1	1	1		1
Gabon	1997	1999	Banks loans and commercial credit	26.3					1
Ecuador	1997	Aug-00	Bonds	696.3	0	1	1	0.245	1
Mongolia	Jan-97	Sep-01	Bonds	56.3		1	1		1
Congo, Dem. Rep.	Jul-97	Nov-05	Banks loans and commercial credit	470.0				0.625	1
Panama	Apr-98	Apr-98	Bonds	26.1	0	0			0
Russia	Jul-98	Jul-98	Bonds	4400.0	0	1			0
Ukraine	Aug-98	Aug-98	Bonds	356.9	1	1		0.115	0
Ukraine	Sep-98	Sep-98	Bonds	346.3	0	1	1	0.475	0
Venezuela	Jul-98	Jul-98	Bonds	270.0	0	0	0		1
Pakistan	Jul-98	Dec-99	Banks loans and commercial credit	623.0					1
Russia	Aug-98	Mar-99	Bonds - held by domestic residents	17600.0	1	1	1	0.475	1
Russia	Aug-98	Mar-99	Bonds - held by foreigners	12800.0	1	1	1	0.625	1
Pakistan	May-98	Dec-00	Deposit	11300.0	0	1	1		1
Pakistan	May-98	Dec-00	Bonds	79.0	0	1	1		1
Cabo Verde	Aug-98	2001	Bonds	68.7	0	1	1		0
Antigua and Barbuda	1998	Nov-04	Banks loans and commercial credit	163.8	0	1	1		1
Nicaragua	Mar-99	Mar-99	Bonds	650.0	0	0	0		0
Türkiye	Nov-99	Nov-99	Bonds	48280.0	0	0	0		0
Ecuador	Mar-99	Mar-00	Deposit	3700.0	1	1	1		1
Cabo Verde	1999	2004	Banks loans and commercial credit	9.1					1
Dominican Rep.	Jun-00	2002	Bonds	350.0	0	1	1		1
Argentina	May-01	Jun-01	Bonds	12170.0	0	1	1	-0.047	0
Argentina	Oct-01	Dec-01	Bonds	14660.0	0	1	1	0.455	0
Zimbabwe	Jan-01	Jan-01	Bonds	2770.0	0	0	0		0
Argentina	Dec-01	Feb-02	Bonds	58000.0	0	0	1	0.580	1
Côte d'Ivoire	2001	2002	Banks loans and commercial credit	139.7		1	1		1
Argentina	Dec-01	Mar-03	Deposit	42630.0	0	1	1	0.320	1

Country	Start date	End date	Instrument	Amount (mln US$)	Face value reduction	Maturity change	Coupon change	NPV loss (%)	Post-default restructuring
Cameroon	2001	Nov-04	Banks loans and commercial credit	612.8	0	0	0		1
Gabon	2001	2004	Banks loans and commercial credit	9.9					1
Argentina	Aug-02	Oct-02	Bonds	8333.1	0	1	1		0
Argentina	Aug-02	Oct-02	Banks loans and commercial credit	2750.0	0	1	1		0
Madagascar	Jan-02	Oct-02	Bonds	200.0		1			1
Montenegro	Jul-02	Jul-02	Bonds	123.5		1	1		0
Serbia	Jul-02	Jul-02	Bonds	3736.5	0	1	1		0
Slovenia	Nov-02	Nov-02	Bonds	633.3	0	1	1		0
Uruguay	Aug-02	Aug-02	Deposit	2220.0	0	1	1		1
Venezuela	Nov-02	Nov-02	Bonds	5130.0		1			0
Cameroon	2002	Jul-05	Bonds	1083.0		1			1
Paraguay	Dec-02	Jun-05	Bonds	138.1	0	1	1	0.080	1
Nicaragua	Jun-03	Jul-03	Bonds	320.0	0	1	1		0
Uruguay	Mar-03	May-03	Bonds	1620.0	0	1	0	0.233	0
Venezuela	Jan-03	Jan-03	Bonds	103.0		1			0
Venezuela	Feb-03	Feb-03	Bonds	32.0		1			0
Venezuela	Mar-03	Mar-03	Bonds	101.0		1			0
Venezuela	Apr-03	Apr-03	Bonds	406.0		1			0
Venezuela	Jun-03	Jun-03	Bonds	188.4		1			0
Venezuela	Aug-03	Aug-03	Bonds	87.0		1	1		0
Venezuela	Oct-03	Oct-03	Bonds	57.0		1			0
Venezuela	Nov-03	Nov-03	Bonds	119.0		1			0
Dominica	Jul-03	Jun-04	Bonds	32.3	1	1	1	0.485	1
Dominica	Jul-03	Jun-04	Banks loans and commercial credit	11.8	1	1	1	0.485	
Nicaragua	Aug-03	Mar-04	Bonds	4.2	0	0	0		1
Grenada	Oct-04	Nov-05	Banks loans and commercial credit	17.0	0	1	1		0
Grenada	Oct-04	Nov-05	Bonds	68.1	0	1	1	0.355	1
Argentina	Jun-04	Apr-16	Bonds	10680.0	1	1	1		1
Venezuela	Jan-05	Jan-05	Bonds	940.0		1	1		0
Zimbabwe	2006	Jan-09	Bonds	297.1					1
Zimbabwe	2006	Jan-09	Banks loans and commercial credit	6.5					1
Sudan	Jun-07	2008	Bonds	331.2					1
Nicaragua	Apr-08	Jun-08	Bonds	295.7	0	1	1	0.500	0
Argentina	Oct-08	Feb-09	Banks loans and commercial credit	5450.0	1	1	1		0
Antigua and Barbuda	Dec-08	May-10	Banks loans and commercial credit	259.0	0	1	1	0.052	1
Zimbabwe	2008	2013	Deposit	91.0		1			1
Antigua and Barbuda	2009	2010	Bonds	32.5	0	0	0		1
Angola	May-10	Dec-10	Banks loans and commercial credit	1800.0	0	1	1		1
Jamaica	Jan-10	Feb-10	Bonds	7900.0	0	1	1	0.150	0
Seychelles	2010	2010	Banks loans and commercial credit	110.0	0	1	1		0
Côte d'Ivoire	Oct-11	Mar-12	Bonds	1230.0	0	1	1	0.050	1
Greece	Oct-11	Mar-12	Bonds - guaranteed bonds	8600.0	1		1	0.564	0
Greece	Oct-11	Mar-12	Bonds - government bonds	241910.0	1	1	1	0.559	0
St. Kitts and Nevis	Jun-11	Apr-12	Bonds	135.0	1	1	1	0.650	1
Mali	Jun-11	2013	Banks loans and commercial credit	68.5					1
Argentina	Oct-12	Nov-12	Bonds	76.0	0	0	0	0.250	0
Côte d'Ivoire	2012	Dec-15	Banks loans and commercial credit	287.6					1
St. Kitts and Nevis	Apr-12	2015	Banks loans and commercial credit	672.8	0	1	1	0.650	1
Cyprus	Jun-13	Jul-13	Bonds	1331.0	0	1	0	0.470	0
Jamaica	Feb-13	Mar-13	Bonds	8796.0	0	1	1	0.115	0
St. Kitts and Nevis	Jun-13	Jul-13	Bonds	7.4	0		1		1
Grenada	Mar-13	Nov-15	Bonds - EC$ denominated government bonds	40.1	1	1	1	0.490	1
Grenada	Mar-13	2016	Banks loans and commercial credit - RBL guaranteed lc	3.2	1	1	1	0.540	
Grenada	Mar-13	2016	Bonds - T-bills held by RBL	1.2	0	1	1	0.540	
Grenada	Mar-13	2016	Banks loans and commercial credit - NHA	2.5	0	1	1	0.540	
Grenada	Mar-13	Dec-16	Banks loans and commercial credit - MNIB debt	5.7	1	1	1	0.540	
Grenada	Mar-13	2017	Bonds - T-bills Grenada bank of commerce. Original cou	2.3	0	1	1	0.540	
Grenada	Mar-13	2017	Bonds - T-bills Grenada bank of commerce. Original cou	1.9	0	1	1	0.540	
Grenada	Mar-13	2017	Bonds - Petrocaribe	34.8	0	1	1	0.540	
Grenada	Mar-13	2017	Banks loans and commercial credit - loans from Republi	2.2	0	1	1	0.540	
Grenada	Mar-13	2017	Bonds - private placement Republic bank	1.2	0	1	1	0.540	
Grenada	Mar-13	2017	Bonds - Government of Grenada 2014/2016 serial bond	4.7	0	1	1	0.540	
Argentina	May-15	Apr-16	Bonds	9400.0	0	0	0		1
Liberia	2016	May-19	Banks loans and commercial credit	10.0		1	1		1
El Salvador	Apr-17	Oct-17	Bonds	6026.5	0	1	1		1
Gambia	Jun-17	Aug-17	Bonds	42.0	0	1			1
Barbados	Jun-18	Nov-18	Bonds - B$ denominated	2747.4	0	1	1	0.300	0
Barbados	Jun-18	Nov-19	Bonds - US$ denominated	76.0	1	1	1	0.440	1
Cabo Verde	Aug-18	2021	Bonds	115.0	0	1	1		1

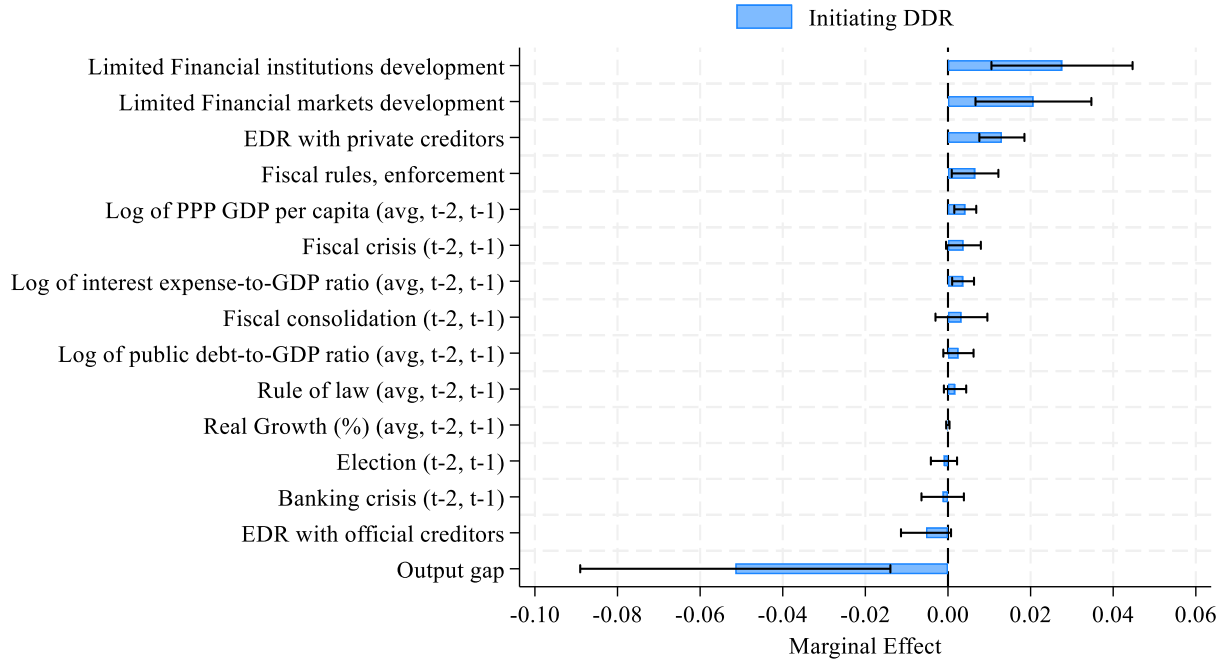
Annex III. Figures

Annex Figure AIII.1. Evolution of the Share of Public Domestic Debt Across Income Groups



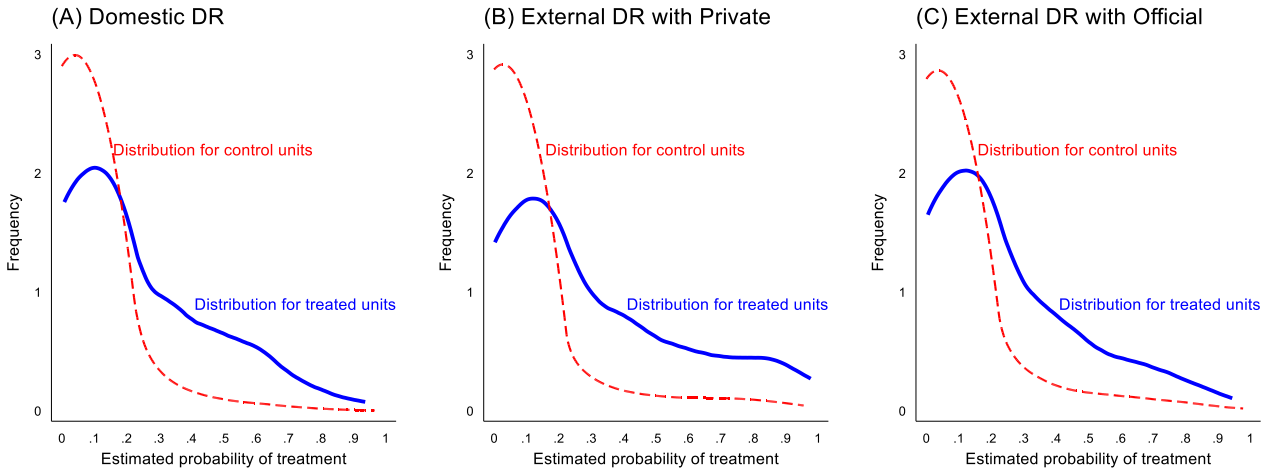
Sources: Authors' calculations.
Notes: This figure shows the evolution of the share of General Government domestic debt in total debt across different income groups.

Annex Figure AIII.2. Marginal Effects at Means, Logit Estimates



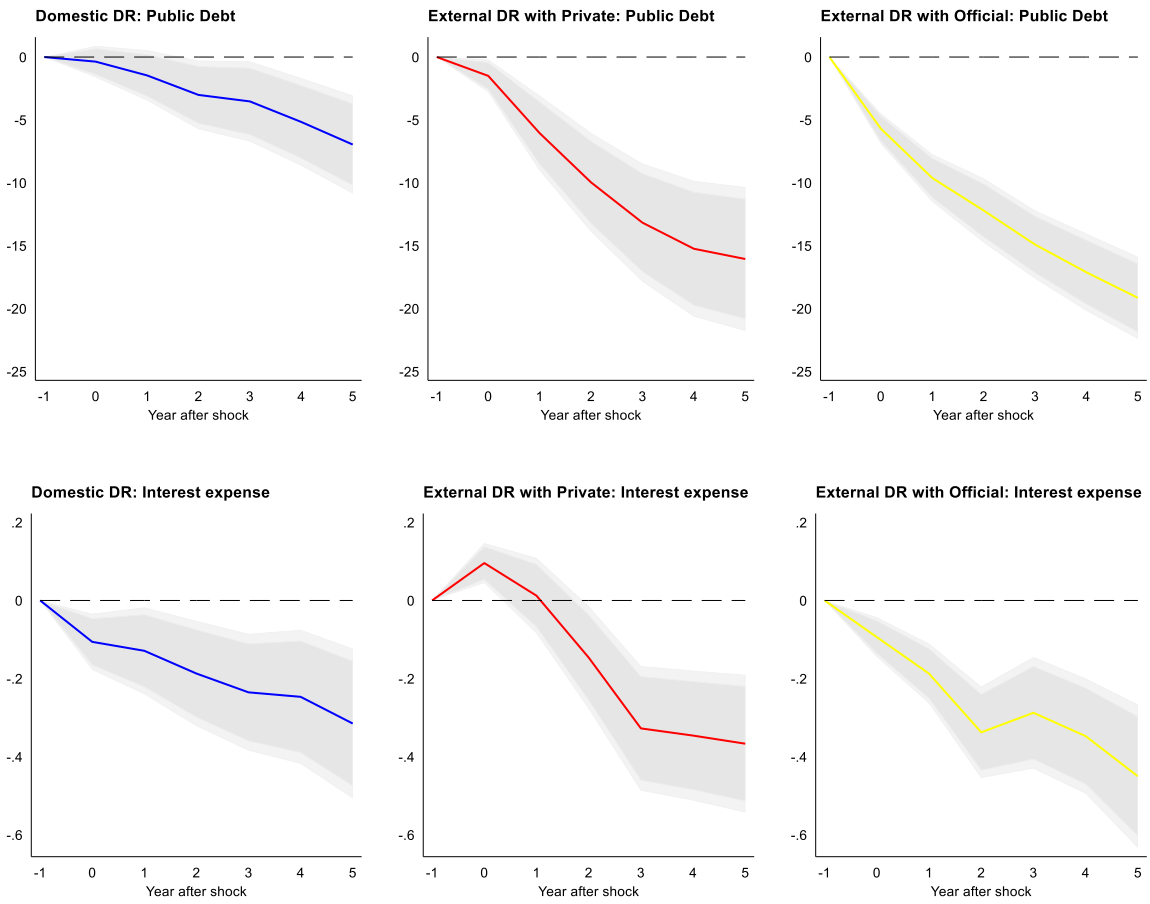
Sources: Authors' calculations.
Notes: This figure shows the marginal effects at means, i.e., the partial derivative of the predicted outcome with respect to each independent variable, evaluated at the mean of all covariates. A variable would not be significant at the 5 percent level if the confidence bands include zero.

Annex Figure AIII.3. Overlap Checks, Propensity Scores of DRs



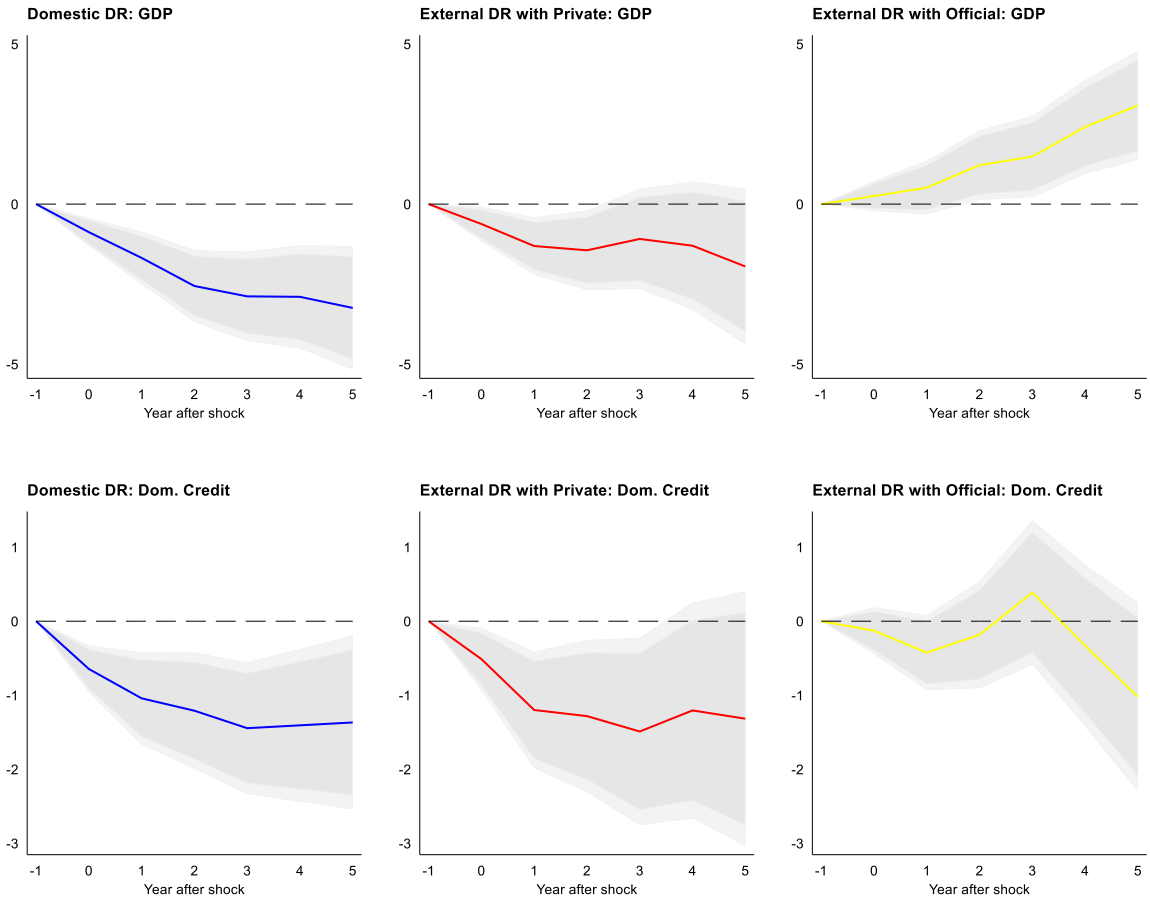
Sources: Authors' calculations.
Notes: The predicted propensity scores in (A), (B), and (C) are obtained after applying the CBPS estimator. The dependent variable equals to 1 at the start of debt restructurings, 0 in country-years observations without debt restructurings (unfolding). We use the largest set of control variables described in the data section and included with lags to reduce potential issues of endogeneity. These figures display a high probability of any type of debt restructuring for the treated units and a low probability for the control units. More importantly, they show a significant overlap between the treated and control groups. Since some observations receive a large weight, we set the maximum weight to 10 for the ATE-AIPW estimates.

Annex Figure AIII.4. Robustness: Keeping Countries with at Least One Type of DRs, Impacts of DRs on Public Debt and Interest Payments



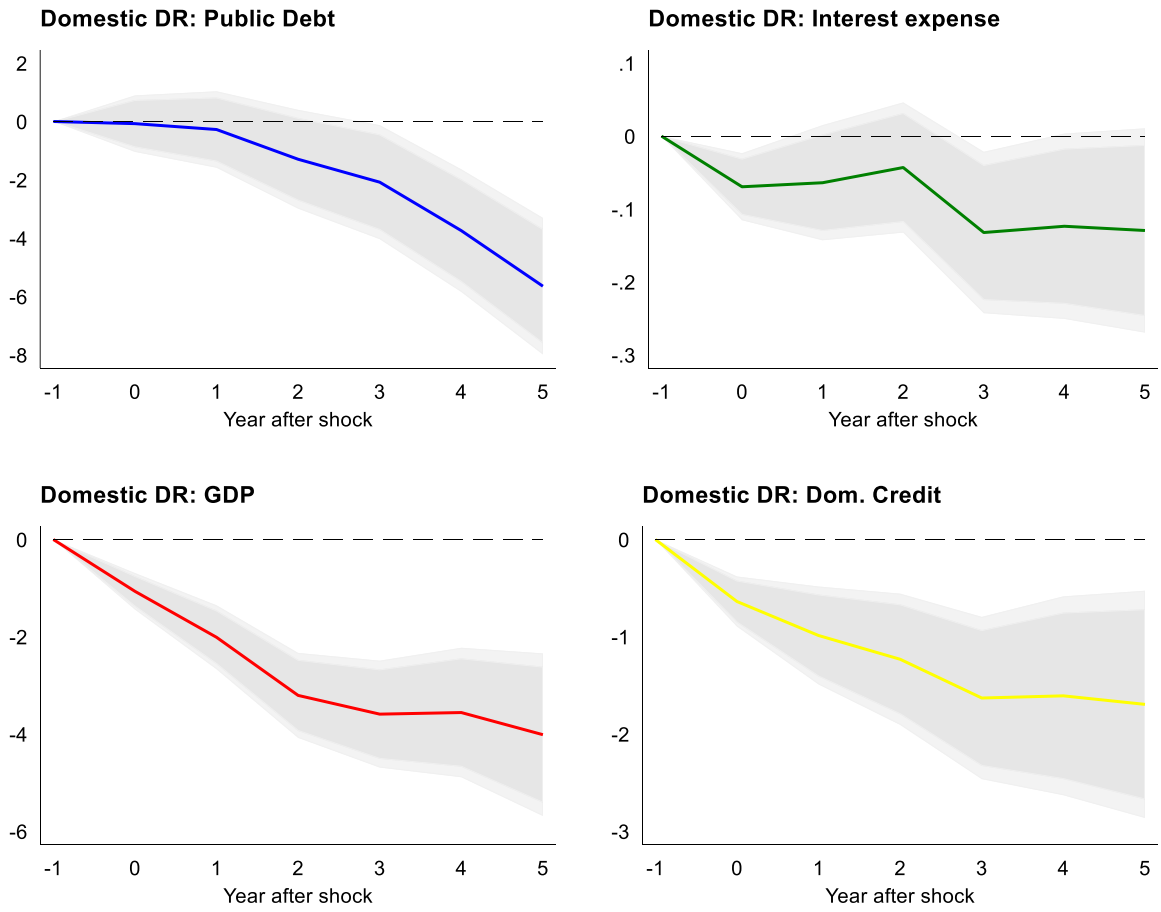
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in public debt to GDP ratio (upper panel) and interest payments to GDP ratio (lower panel). We only keep countries with at least one type of DRs in the sample.

Annex Figure AIII.5. Robustness: Keeping Countries with at Least One Type of DRs, Impacts of DRs on GDP and Domestic Credit to the Private Sector



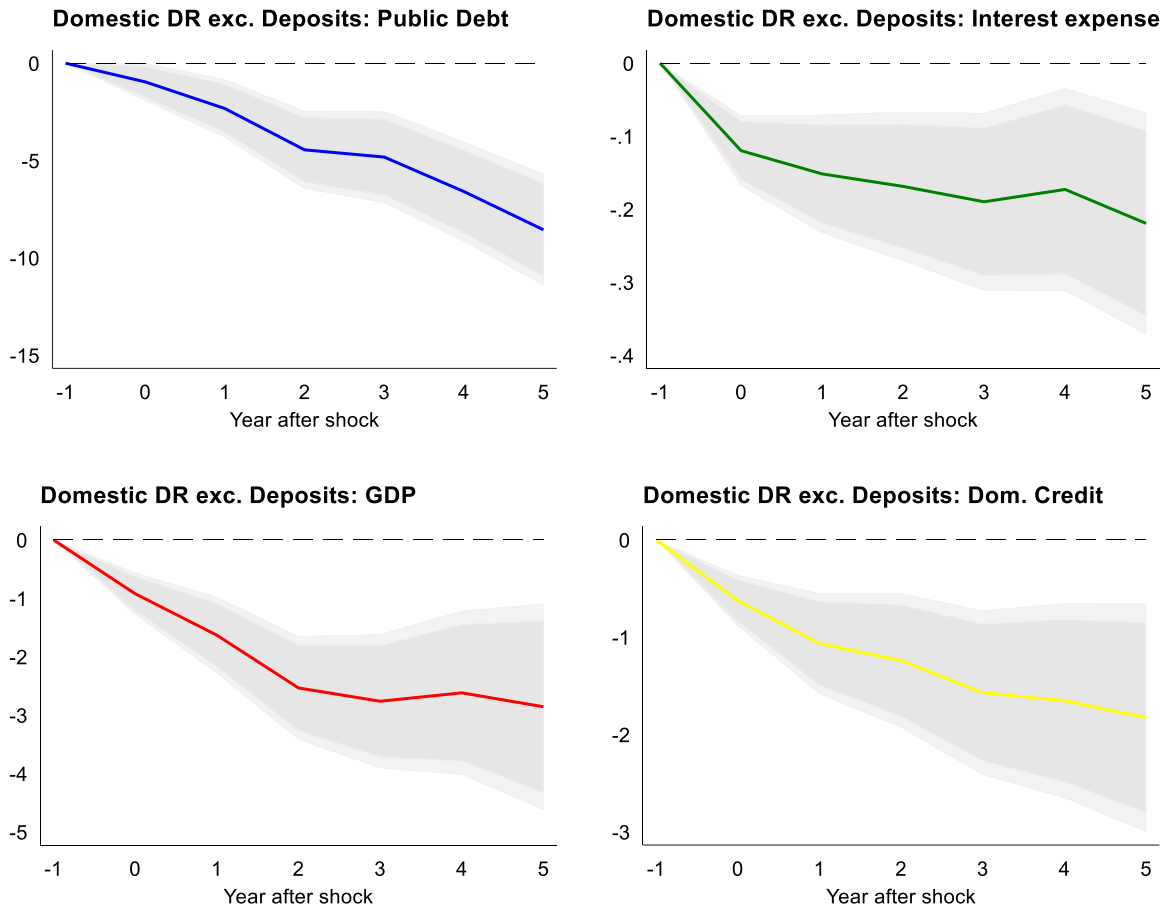
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in GDP (upper panel) and domestic credit to the private sector to GDP ratio (lower panel). We only keep countries with at least one type of DRs in the sample.

Annex Figure AIII.6. Robustness: Only DDRs with Resident Creditors, Impacts of DDRs



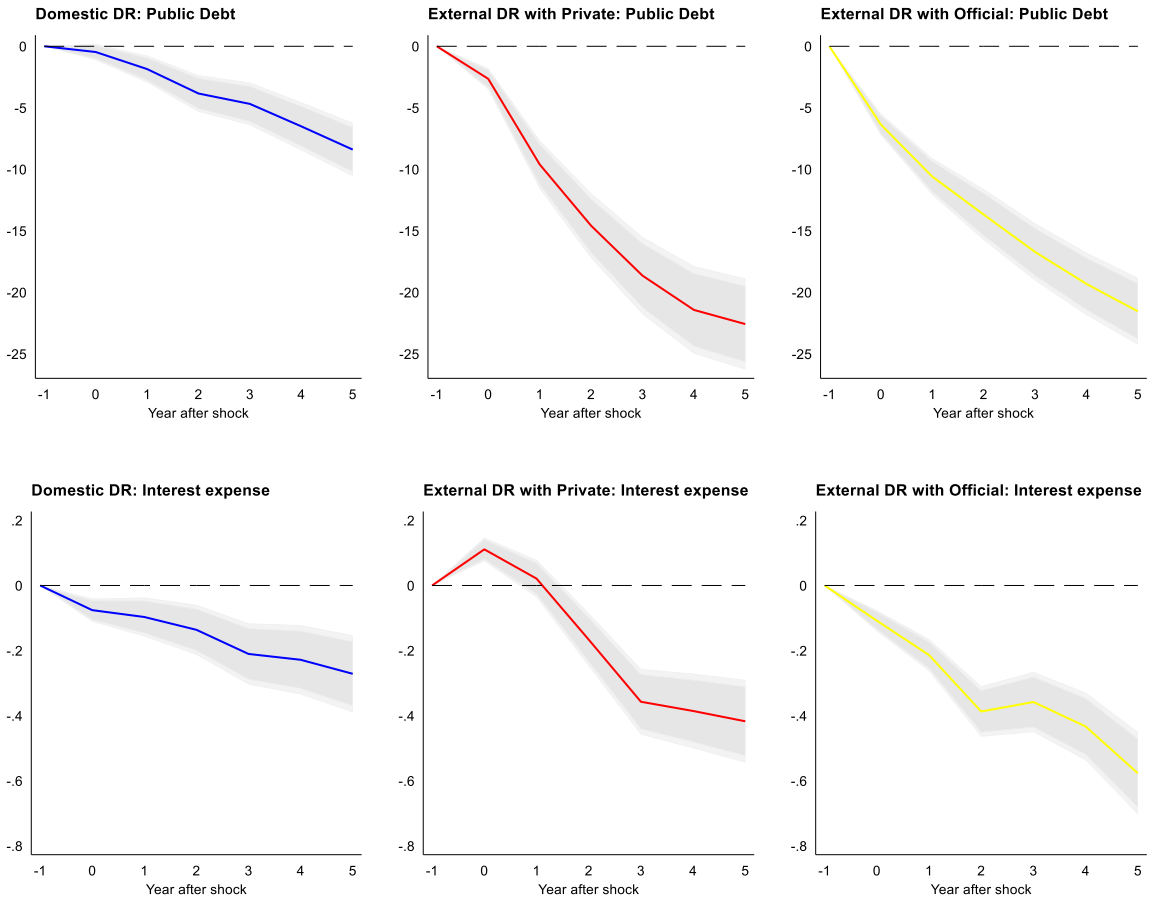
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs with Resident Creditors on the cumulative changes in Public Debt (blue), Interest Expenses (green), GDP (red) and domestic credit to the private sector to GDP ratio (yellow).

Annex Figure AIII.7. Robustness: Excluding Deposit-Only DDRs, Impacts of DDRs



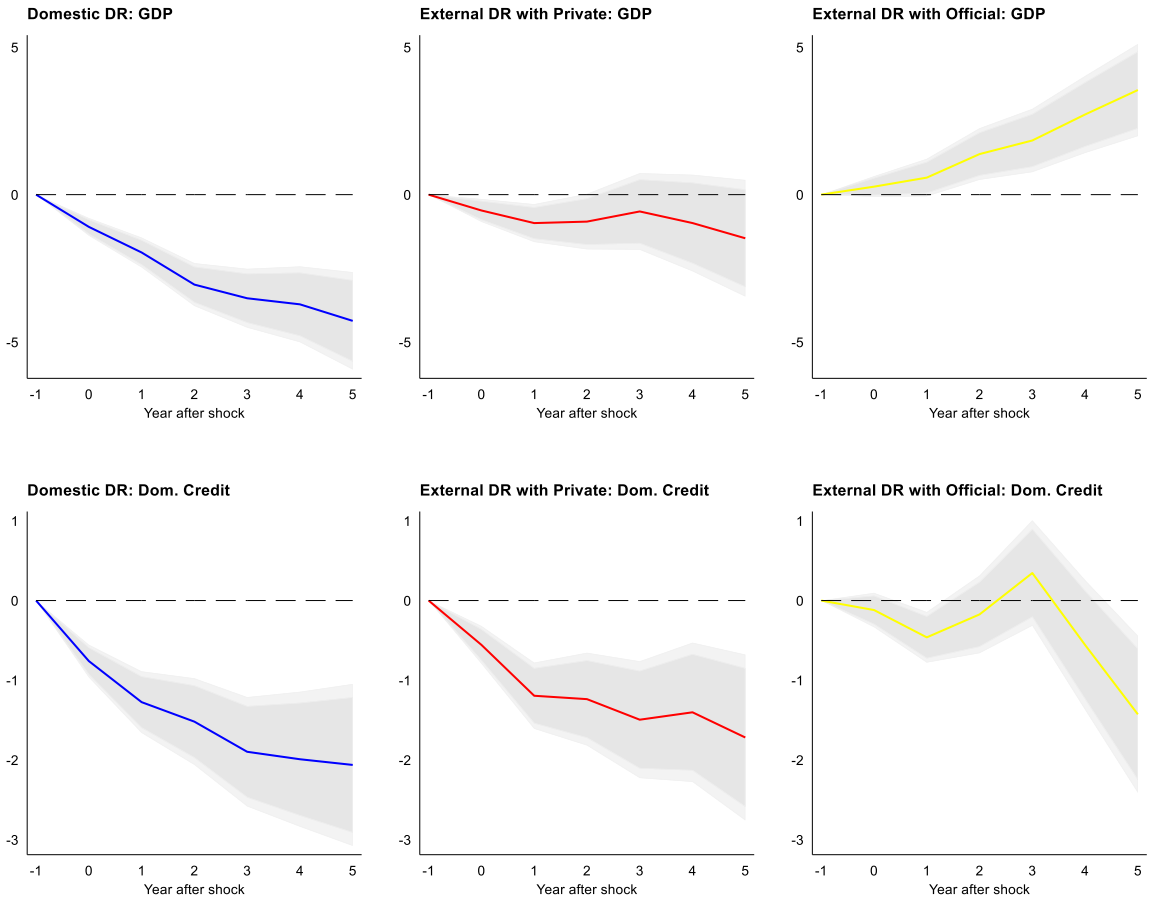
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs excluding Deposit-Only DDRs on the cumulative changes in Public Debt (blue), Interest Expenses (green), GDP (red) and domestic credit to the private sector to GDP ratio (yellow).

Annex Figure AIII.8. Robustness: Maximum Weight to 5, Impacts of DRs on Public Debt and Interest Payments



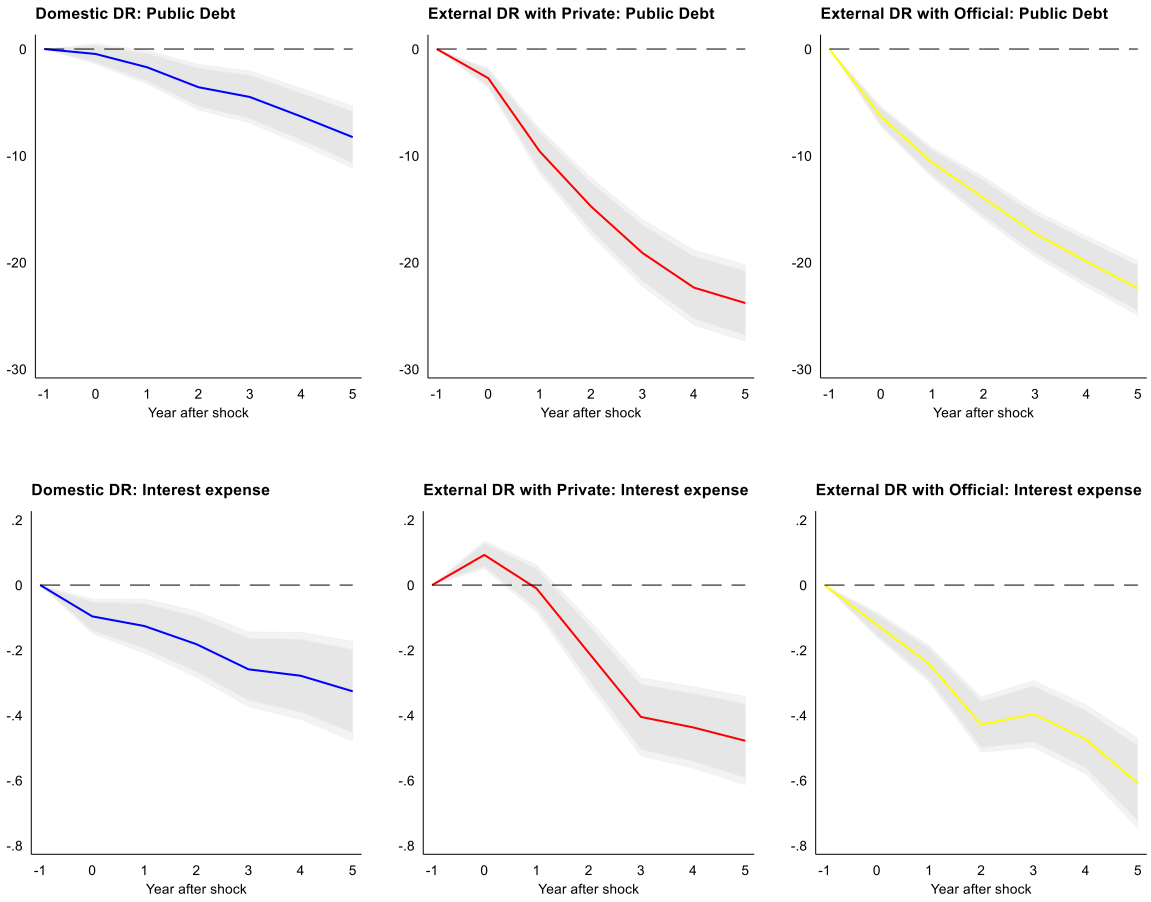
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in public debt to GDP ratio (upper panel) and interest payments to GDP ratio (lower panel). We restrict the maximum weights used in the AIPW to 5 instead of 10 in the baseline specifications.

Annex Figure AIII.9. Robustness: Maximum Weight to 5, Impacts of DRs on GDP and Domestic Credit to the Private Sector



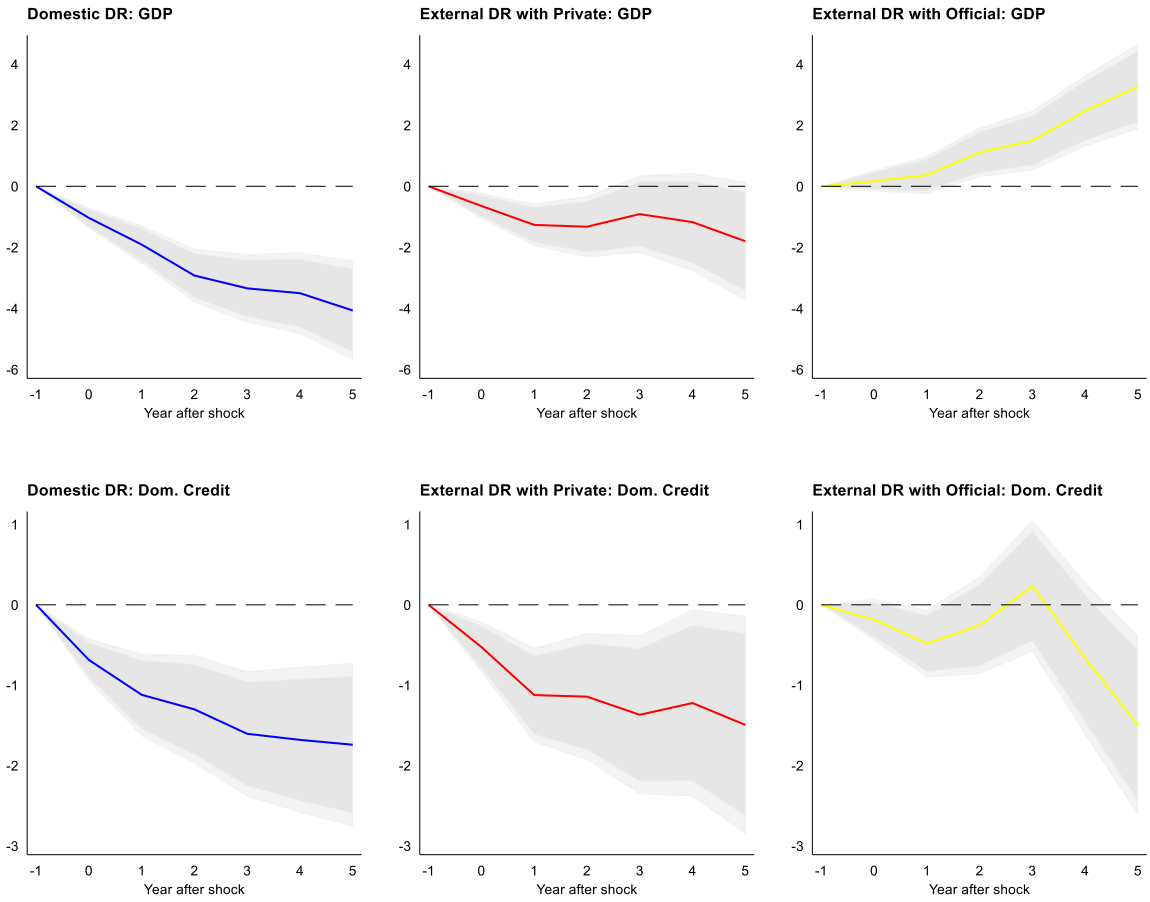
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in GDP (upper panel) and domestic credit to the private sector to GDP ratio (lower panel). We restrict the maximum weights used in the AIPW to 5 instead of 10 in the baseline specifications.

Annex Figure AIII.10. Robustness: Logit Model, Impacts of DRs on Public Debt and Interest Payments



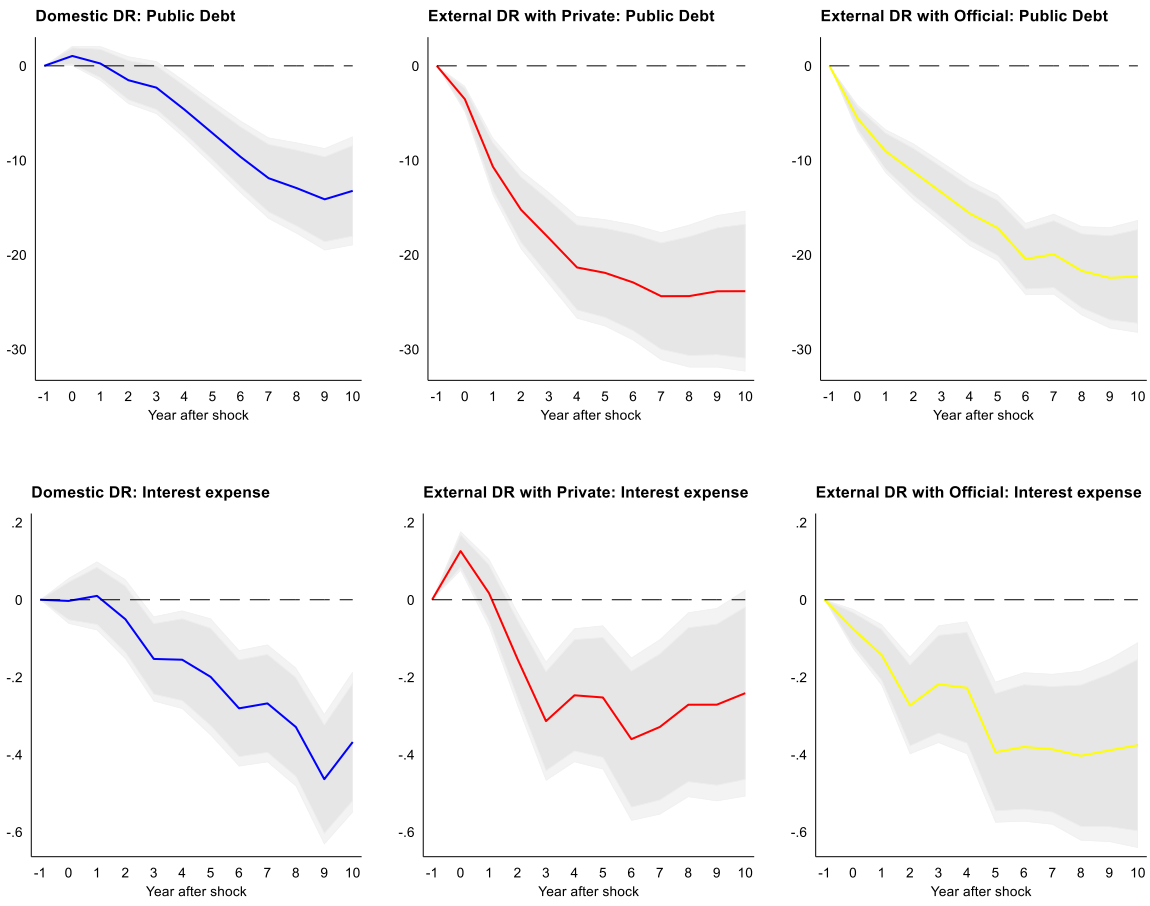
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in public debt to GDP ratio (upper panel) and interest payments to GDP ratio (lower panel). We use the logit model to predict the propensity scores instead of the CBPS.

Annex Figure AIII.11. Robustness: Logit Model, Impacts of DRs on GDP and Domestic Credit to the Private Sector



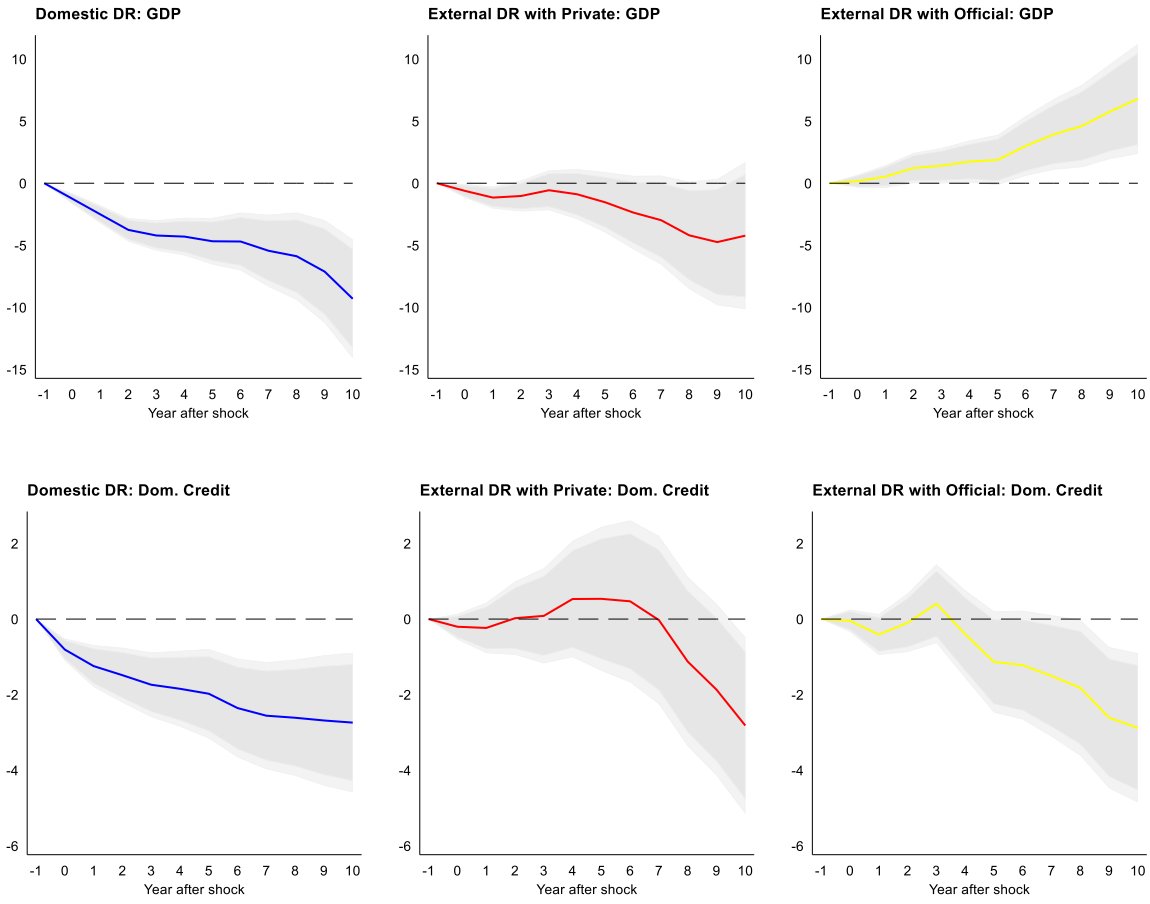
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 5-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in GDP (upper panel) and domestic credit to the private sector to GDP ratio (lower panel). We use the logit model to predict the propensity scores instead of the CBPS.

Annex Figure AIII.12. Robustness: Longer Horizon of 10 Years, Impacts of DRs on Public Debt and Interest Payments



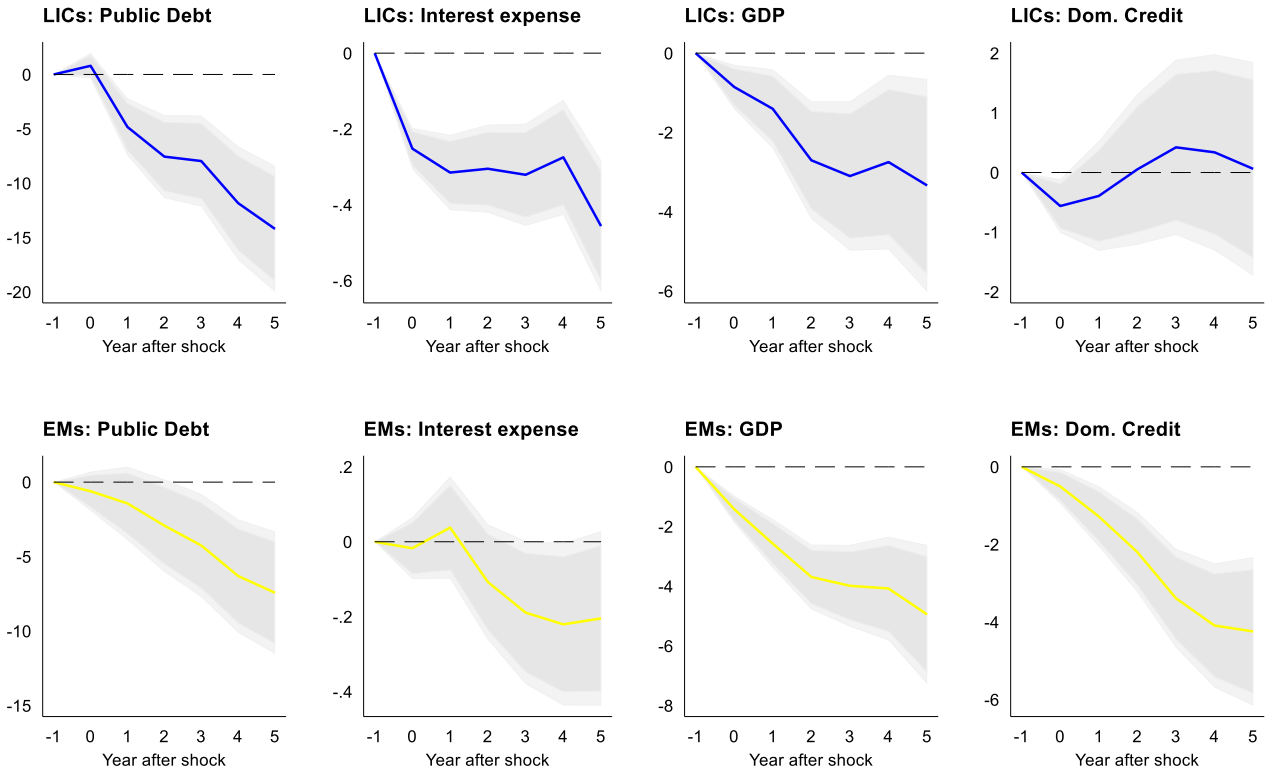
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 10-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in public debt to GDP ratio (upper panel) and interest payments to GDP ratio (lower panel).

Annex Figure AIII.13. Robustness: Longer Horizon of 10 Years, Impacts of DRs on GDP and Domestic Credit to the Private Sector



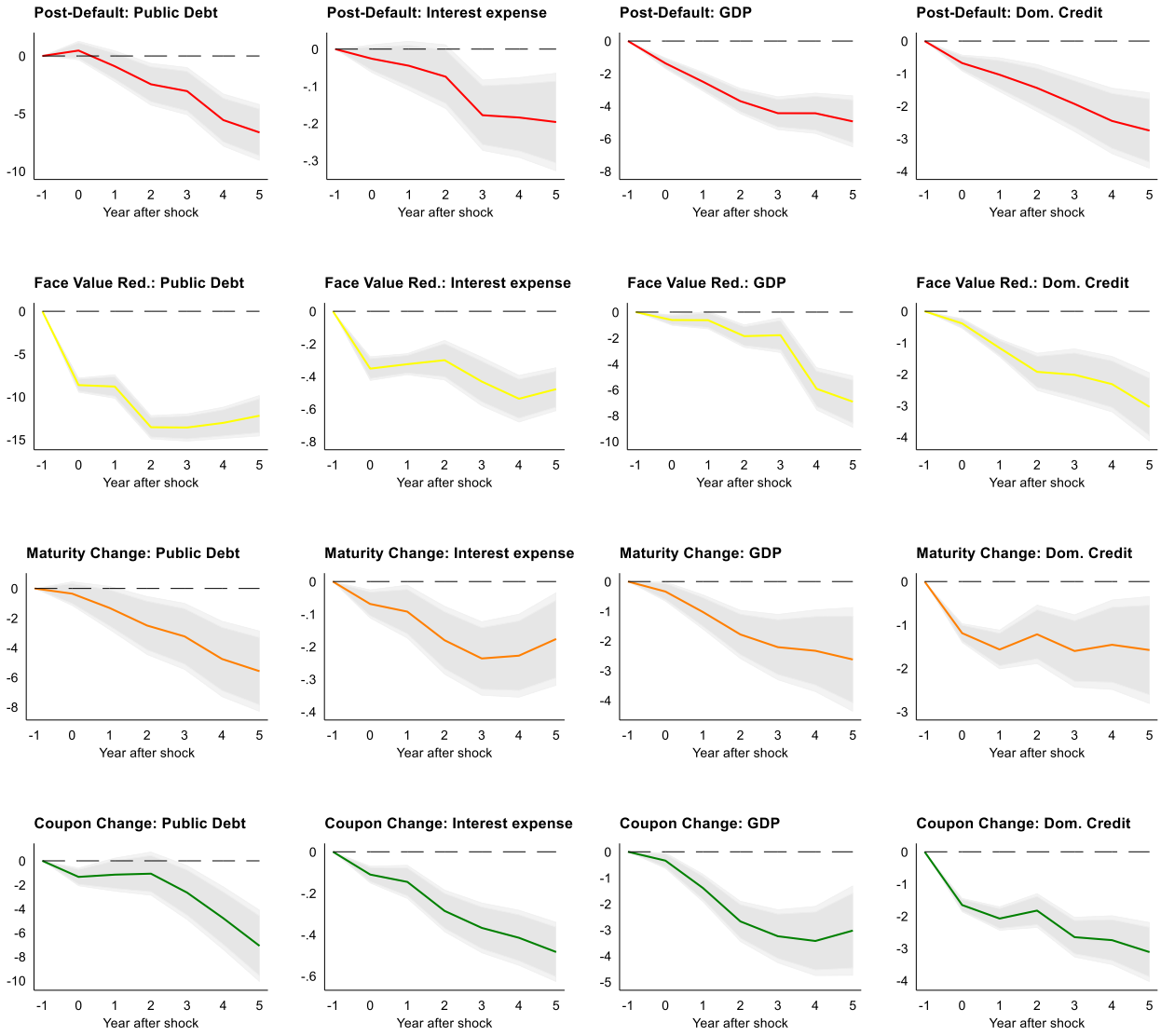
Sources: Authors' calculations.
Notes: These charts show the ATE impacts over a 10-year horizon of DDRs (blue), EDRs with private creditors (red), EDRs with official creditors (yellow) on the cumulative changes in GDP (upper panel) and domestic credit to the private sector to GDP ratio (lower panel).

Annex Figure AIII.14. Sensitivity: Impacts of DDRs by Level of Development (LICs vs. EMs)



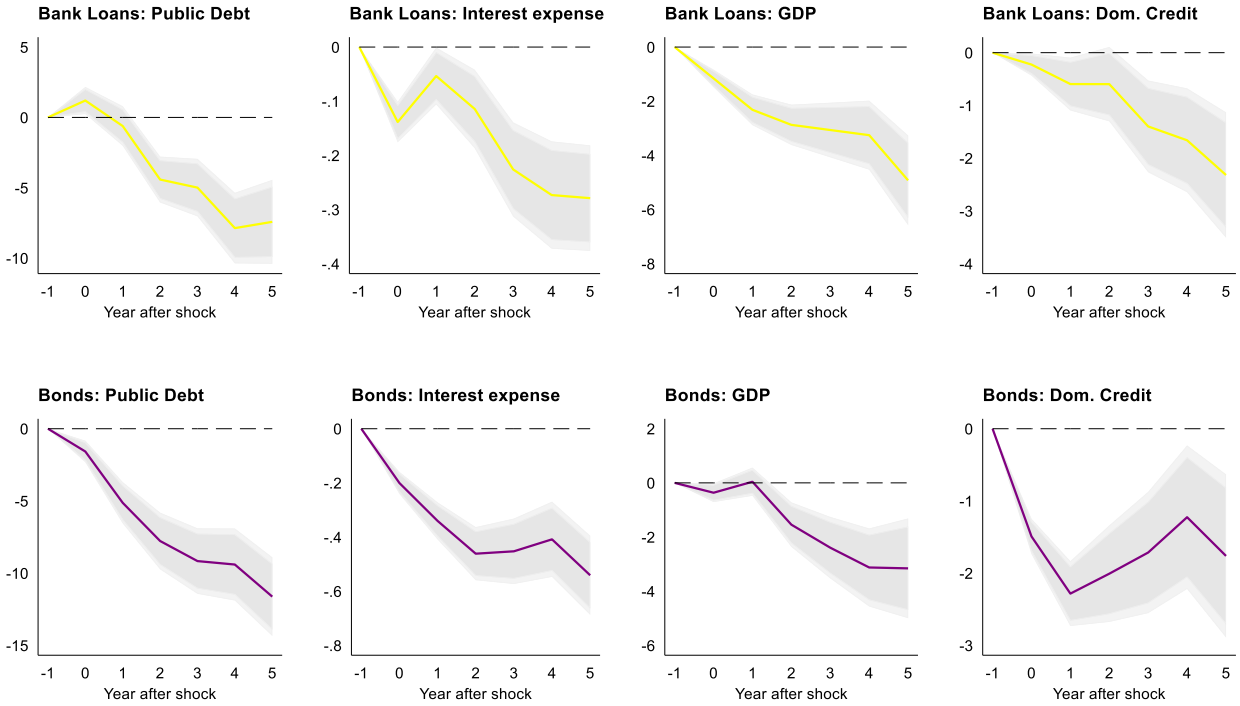
Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio in LICs (blue color) and EMs (yellow color).

Annex Figure AIII.15. Sensitivity: Impacts of DDRs by Type



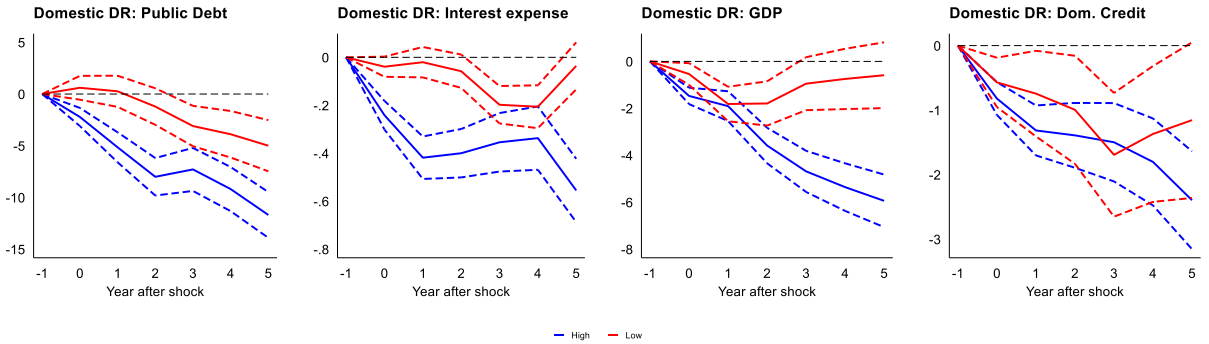
Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio by type of DDRs, including post-default DDRs (red color), face value reduction DDRs (yellow color), maturity extension DDRs (orange color), and coupon reduction DDRs (green color).

Annex Figure AIII.16. Sensitivity: Impacts of DDRs by Instruments (Bank vs. Bond DDRs)



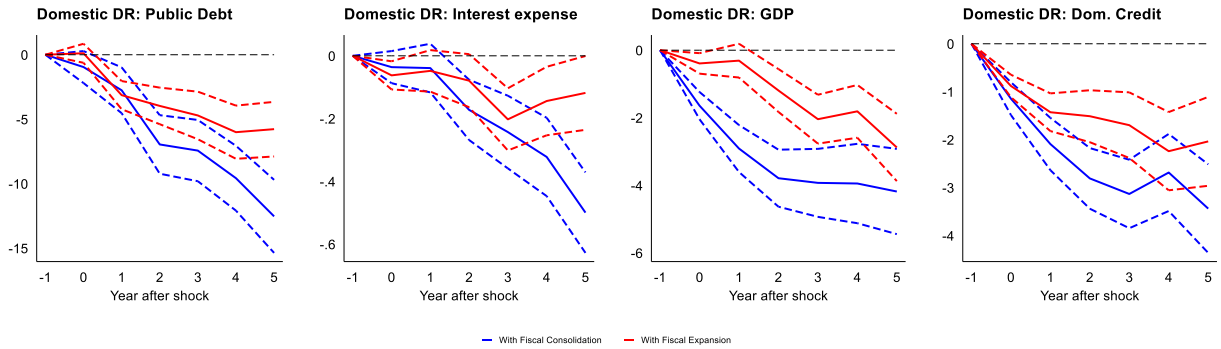
Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio by instruments, bank DDRs (yellow color), and bond DDRs (purple color).

Annex Figure AIII.17. Sensitivity: Impacts of DDRs Conditional on the Degree of Sovereign-Bank Nexus



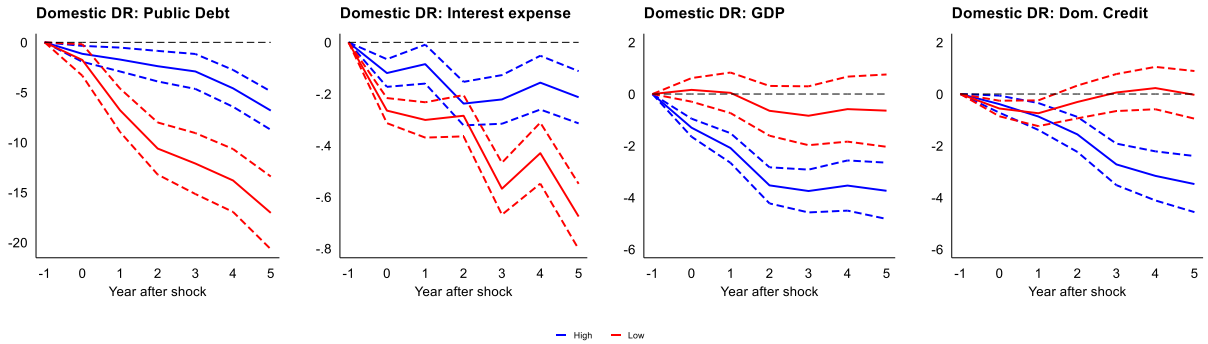
Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio within two groups—Low (red) and High (blue) degree of sovereign-bank nexus. Countries were divided into two groups—Low and High—based on whether their specific averages for these variables were below or above the median value of the respective variables at the start of DDRs. The sovereign-bank nexus ratio is defined as the share of bank loans and security holdings extended to the general government or state-owned enterprises relative to total banking sector assets.

Annex Figure AIII.18. Sensitivity: Impacts of DDRs Conditional on Fiscal Policy Stance



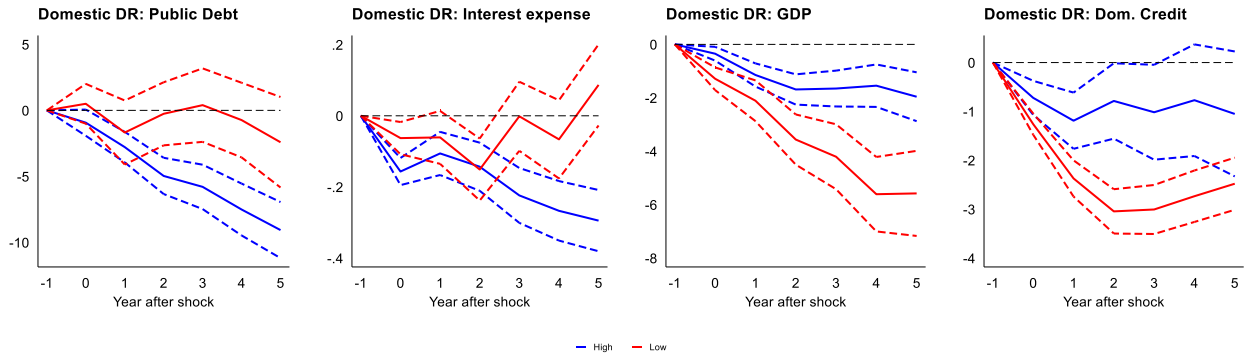
Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio within two groups—DDRs with fiscal expansion (red) and DDRs with fiscal consolidation (blue). Countries were divided into two groups—with fiscal expansion or with fiscal consolidation— based on whether they had an expansionary or contractionary fiscal policy at the start of DDRs.

Annex Figure AIII.19. Sensitivity: Impacts of DDRs Conditional on the Level of Financial Development



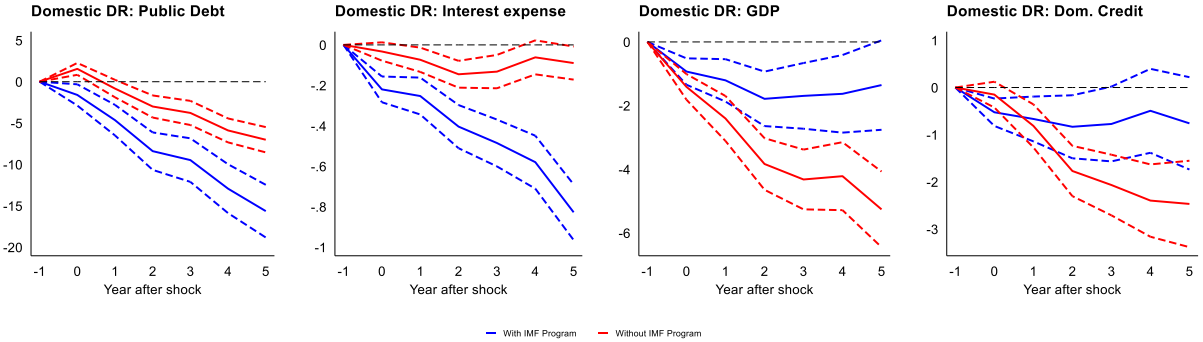
Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio within two groups—Low (red) and High (blue) financial development. Countries were divided into two groups—Low and High—based on whether their specific averages for these variables were below or above the median value of the respective variables at the start of DDRs.

Annex Figure AIII.20. Sensitivity: Impacts of DDRs Conditional on Gross International Reserves (Percent of GDP)



Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio within two groups—Low (red) and High (blue) gross international reserves as percent of GDP. Countries were divided into two groups—Low and High—based on whether their specific averages for these variables were below or above the median value of the respective variables at the start of DDRs.

Annex Figure AIII.21. Sensitivity: Impacts of DDRs Conditional on IMF-supported Programs



Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio within two groups—countries with IMF-supported programs (blue) and countries without IMF-supported programs (red). Countries were divided into two groups—with and without IMF-supported programs—based on whether they had an IMF-supported program at the start of DDRs.

Annex IV. Tables

Annex Table AIV.1. Balance Diagnostics Between the Treated and Control Groups Before and After Weighting

	(A) Unweighted				(B) CBPS - Weighted				(C) Logit - Weighted			
Variables	Treated	Control	Std-diff	Var-ratio	Treated	Control	Std-diff	Var-ratio	Treated	Control	Std-diff	Var-ratio
(I) Domestic Debt Restucturings												
Fiscal consolidation (t-2, t-1)	0.13	0.06	0.26	2.20	0.06	0.06	0.00	1.01	0.06	0.05	0.00	1.00
Banking crisis (t-2, t-1)	0.17	0.07	0.31	2.13	0.10	0.10	0.00	1.01	0.17	0.14	0.28	1.97
Fiscal crisis (t-2, t-1)	0.73	0.45	0.61	0.80	0.48	0.48	0.00	1.01	0.46	0.25	0.00	1.01
Log of PPP GDP per capita (avg, t-2, t-1)	8.80	8.83	-0.03	0.85	8.82	8.82	0.00	0.70	8.85	0.72	0.02	0.68
Output gap (t)	-0.01	0.00	-0.28	2.06	0.00	0.00	0.00	1.46	0.01	0.00	0.12	1.56
Real Growth (%) (avg, t-2, t-1)	2.54	3.75	-0.31	1.24	3.61	3.61	0.00	0.92	3.62	14.30	-0.02	1.06
Log of public debt-to-GDP ratio (avg, t-2, t-1)	4.14	3.72	0.58	1.05	3.77	3.77	0.00	1.10	3.76	0.54	0.02	1.05
Log of interest expense-to-GDP ratio (avg, t-2, t-1)	0.56	0.29	0.25	0.77	0.35	0.35	0.00	0.90	0.35	0.89	0.04	0.69
Limited Financial institutions development (t-1)	-0.26	-0.31	0.35	1.01	-0.30	-0.30	0.00	1.13	-0.31	0.02	-0.05	1.10
Limited Financial markets development (t-1)	-0.09	-0.13	0.22	0.49	-0.12	-0.12	0.00	0.78	-0.06	0.01	0.44	0.36
Rule of law (avg, t-2, t-1)	-0.57	-0.32	-0.34	1.11	-0.36	-0.36	0.00	0.83	-0.29	0.50	0.05	0.96
Election (t-2, t-1)	0.51	0.45	0.13	1.02	0.46	0.46	0.00	1.01	0.51	0.25	0.12	1.01
Enforced fiscal rules (t)	0.22	0.06	0.47	2.95	0.09	0.09	0.00	1.01	0.07	0.07	0.00	1.00
(II) External Debt Restucturings with Private Creditors												
Fiscal consolidation (t-2, t-1)	0.03	0.06	-0.12	0.59	0.05	0.05	0.00	1.00	0.03	0.06	-0.13	0.57
Banking crisis (t-2, t-1)	0.25	0.07	0.52	3.06	0.11	0.11	0.00	1.00	0.11	0.08	0.11	1.35
Fiscal crisis (t-2, t-1)	0.80	0.44	0.81	0.65	0.51	0.51	0.00	1.00	0.54	0.46	0.16	1.00
Log of PPP GDP per capita (avg, t-2, t-1)	8.42	8.86	-0.45	0.73	8.71	8.71	0.00	0.70	8.62	8.82	-0.21	0.71
Output gap (t)	-0.01	0.00	-0.24	1.43	0.00	0.00	0.00	0.95	-0.01	0.00	-0.13	0.93
Real Growth (%) (avg, t-2, t-1)	2.02	3.80	-0.47	1.19	3.70	3.70	0.00	1.12	3.53	3.68	-0.04	0.99
Log of public debt-to-GDP ratio (avg, t-2, t-1)	4.35	3.70	1.06	0.41	3.91	3.91	0.00	0.39	4.13	3.75	0.61	0.46
Log of interest expense-to-GDP ratio (avg, t-2, t-1)	0.93	0.26	0.71	0.34	0.44	0.44	0.00	0.52	0.70	0.31	0.41	0.43
Limited Financial institutions development (t-1)	-0.24	-0.31	0.52	0.79	-0.29	-0.29	0.00	0.87	-0.28	-0.30	0.16	0.93
Limited Financial markets development (t-1)	-0.08	-0.13	0.34	0.58	-0.11	-0.11	0.00	0.59	-0.10	-0.12	0.18	0.56
Rule of law (avg, t-2, t-1)	-0.79	-0.30	-0.70	0.92	-0.41	-0.41	0.00	1.04	-0.38	-0.33	-0.07	1.01
Election (t-2, t-1)	0.49	0.45	0.09	1.01	0.44	0.44	0.00	1.00	0.45	0.45	-0.01	1.00
Enforced fiscal rules (t)	0.05	0.07	-0.08	0.74	0.06	0.06	0.00	1.00	0.04	0.07	-0.12	0.62
(III) External Debt Restucturings with Official Creditors												
Fiscal consolidation (t-2, t-1)	0.00	0.06	-0.33	0.07	0.05	0.05	0.00	1.00	0.16	0.06	0.34	2.49
Banking crisis (t-2, t-1)	0.15	0.07	0.24	1.89	0.11	0.11	0.00	1.00	0.09	0.08	0.04	1.13
Fiscal crisis (t-2, t-1)	0.70	0.44	0.55	0.85	0.53	0.53	0.00	1.00	0.54	0.46	0.15	1.00
Log of PPP GDP per capita (avg, t-2, t-1)	8.08	8.88	-0.85	0.70	8.62	8.62	0.00	0.45	8.63	8.82	-0.20	0.78
Output gap (t)	-0.01	0.00	-0.29	0.98	-0.01	-0.01	0.00	0.42	-0.02	0.00	-0.48	1.01
Real Growth (%) (avg, t-2, t-1)	3.10	3.74	-0.18	0.97	3.33	3.33	0.00	0.70	3.00	3.68	-0.19	0.77
Log of public debt-to-GDP ratio (avg, t-2, t-1)	4.23	3.71	0.80	0.64	3.88	3.88	0.00	1.08	3.99	3.75	0.33	0.96
Log of interest expense-to-GDP ratio (avg, t-2, t-1)	0.58	0.28	0.29	0.54	0.38	0.38	0.00	0.80	0.50	0.30	0.20	0.53
Limited Financial institutions development (t-1)	-0.21	-0.31	0.78	0.59	-0.29	-0.29	0.00	0.95	-0.30	-0.30	0.00	1.14
Limited Financial markets development (t-1)	-0.06	-0.13	0.49	0.48	-0.11	-0.11	0.00	1.30	-0.08	-0.12	0.27	0.64
Rule of law (avg, t-2, t-1)	-0.72	-0.30	-0.63	0.70	-0.42	-0.42	0.00	0.78	-0.38	-0.33	-0.07	0.84
Election (t-2, t-1)	0.49	0.45	0.09	1.01	0.43	0.43	0.00	1.00	0.50	0.45	0.10	1.01
Enforced fiscal rules (t)	0.01	0.07	-0.31	0.17	0.07	0.07	0.00	1.00	0.19	0.07	0.37	2.38

Sources: Authors' calculations.
Notes: Treated include countries with DDRs (Panel I), EDRs with private creditors (Panel II), and EDRs with official creditors (Panel III). Panel A shows the difference in characteristics between the treated and control units in the actual (unweighted) sample. Panel B and C show these differences after randomization based on the propensity scores and weights obtained after CBPS and Logit, respectively. Rubin (2001) suggests the use of the absolute value of the standardized difference (Std-diff) as a balance measure for the first moment, where the balance is defined by absolute values below 0.25. It is also suggested the use of the ratio of treated and control variances (Var-ratio) as a balance measure for the second moment, where the balance is defined by values close to 1.0, and variables are out of balance if the variance ratio is greater than 2.0 or less than 0.5.

Annex Table AIV.2. Data Sources

Variables	Sources
Dependent Variables	
Public debt-to-GDP ratio (changes at different horizon)	Calculated based on IMF WEO
Interest payments-to-GDP ratio (changes at different horizons)	Calculated based on IMF WEO
Real GDP (changes at different horizons)	Calculated based on IMF WEO
Domestic credit to the private sector (changes at different horizons)	Calculated based on IMF WEO
Variables of Interest	
Domestic Debt Restructurings (DDRs)	Erce et al. (2022)
External Debt Restructurings (EDRs) with Private creditors	Asonuma and Trebesch (2016), Asonuma et al. (2023)
External Debt Restructurings (EDRs) with Official creditors	Horn et al. (2022)
Predictors and Control Variables	
Fiscal consolidation (t-2, t-1)	Gomez-Gonzalez et al. (2023)
Banking crisis (t-2, t-1)	Laeven and Valencia (2018, 2020)
Fiscal crisis (t-2, t-1)	Gerling et al. (2017)
Log of PPP GDP per capita (avg, t-2, t-1)	Calculated based on IMF WEO
Output gap (t)	Calculated based on IMF WEO
Real Growth (%) (avg, t-2, t-1)	Calculated based on IMF WEO
Log of public debt-to-GDP ratio (avg, t-2, t-1)	Calculated based on IMF WEO
Log of interest expense-to-GDP ratio (avg, t-2, t-1)	Calculated based on IMF WEO
Limited Financial institutions development (t-1)	Calculated based on IMF Financial Development Index
Limited Financial markets development (t-1)	Calculated based on IMF Financial Development Index
Rule of law (avg, t-2, t-1)	WB WGI Database
Election (t-2, t-1)	Gomez-Gonzalez et al. (2023)
Enforced fiscal rules (t)	IMF Fiscal Rules Database
Sovereign-Bank Nexus	Calculated based on IMF MFS
IMF-supported programs	IMF MONA
Gross international reserves	IMF WEO

Annex Table AIV.3. ATE Estimates, Impacts of DDR

Panel (A): Dependent: Public Debt to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-0.556	-1.849**	-3.630***	-4.325***	-6.073***	-7.899***
	(0.513)	(0.831)	(1.123)	(1.249)	(1.358)	(1.532)
Observation	2893	2893	2893	2893	2893	2893
# of Countries	138	138	138	138	138	138
# of DR	69	69	69	69	69	69
Panel (B): Dependent: Interest Payments to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-0.081***	-0.101**	-0.148***	-0.211***	-0.223***	-0.257***
	(0.026)	(0.042)	(0.051)	(0.059)	(0.067)	(0.075)
Observation	2856	2856	2856	2856	2856	2856
# of Countries	139	139	139	139	139	139
# of DR	71	71	71	71	71	71
Panel (C): Dependent: GDP						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-0.946***	-1.782***	-2.753***	-3.130***	-3.200***	-3.673***
	(0.187)	(0.338)	(0.459)	(0.582)	(0.702)	(0.870)
Observation	3091	3091	3091	3091	3091	3091
# of Countries	139	139	139	139	139	139
# of DR	83	83	83	83	83	83
Panel (D): Dependent: Domestic Credit to the Private Sector to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-0.697***	-1.175***	-1.396***	-1.714***	-1.805***	-1.934***
	(0.137)	(0.269)	(0.356)	(0.423)	(0.499)	(0.585)
Observation	2236	2236	2236	2236	2236	2236
# of Countries	132	132	132	132	132	132
# of DR	60	60	60	60	60	60

Sources: Authors' calculations.
Notes: ATE estimates. Robust standards errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Conditional cumulative changes of each dependent variables from the start of debt restructurings. First-stage treatment models used to predict the propensity scores are estimated using the CBPS. Second-stage outcome models are separately estimated for countries that restructure their debt and those that do not, and we predict the potential outcomes based on the characteristics of each sample after re-randomization.

Annex Table AIV.4. ATE Estimates, Impacts of EDR with Private Creditors

Panel (A): Dependent: Public Debt to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-2.128***	-8.217***	-12.793***	-16.751***	-19.120***	-20.238***
	(0.622)	(1.285)	(1.730)	(2.037)	(2.342)	(2.467)
Observation	2893	2893	2893	2893	2893	2893
# of Countries	138	138	138	138	138	138
# of DR	56	56	56	56	56	56
Panel (B): Dependent: Interest Payments to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	0.151***	0.094**	-0.062	-0.217***	-0.218***	-0.216**
	(0.026)	(0.042)	(0.057)	(0.070)	(0.079)	(0.090)
Observation	2856	2856	2856	2856	2856	2856
# of Countries	139	139	139	139	139	139
# of DR	52	52	52	52	52	52
Panel (C): Dependent: GDP						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-0.587**	-1.134***	-1.103*	-0.666	-0.944	-1.638
	(0.242)	(0.396)	(0.560)	(0.737)	(0.941)	(1.152)
Observation	3091	3091	3091	3091	3091	3091
# of Countries	139	139	139	139	139	139
# of DR	67	67	67	67	67	67
Panel (D): Dependent: Domestic Credit to the Private Sector to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-0.535***	-1.190***	-1.191***	-1.390**	-1.238*	-1.539**
	(0.181)	(0.330)	(0.442)	(0.558)	(0.643)	(0.750)
Observation	2236	2236	2236	2236	2236	2236
# of Countries	132	132	132	132	132	132
# of DR	39	39	39	39	39	39

Sources: Authors' calculations.
Notes: ATE estimates. Robust standards errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Conditional cumulative changes of each dependent variables from the start of debt restructurings. First-stage treatment models used to predict the propensity scores are estimated using the CBPS. Second-stage outcome models are separately estimated for countries that restructure their debt and those that do not, and we predict the potential outcomes based on the characteristics of each sample after re-randomization.

Annex Table AIV.5. ATE Estimates, Impacts of EDR with Official Creditors

Panel (A): Dependent: Public Debt to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-6.250***	-10.565***	-13.539***	-16.456***	-18.819***	-20.709***
	(0.592)	(0.907)	(1.218)	(1.338)	(1.471)	(1.572)
Observation	2733	2733	2733	2733	2733	2733
# of Countries	138	138	138	138	138	138
# of DR	154	154	154	154	154	154
Panel (B): Dependent: Interest Payments to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-0.087***	-0.186***	-0.339***	-0.284***	-0.337***	-0.458***
	(0.021)	(0.036)	(0.057)	(0.072)	(0.078)	(0.090)
Observation	2696	2696	2696	2696	2696	2696
# of Countries	139	139	139	139	139	139
# of DR	159	159	159	159	159	159
Panel (C): Dependent: GDP						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	0.290	0.683*	1.448***	1.757***	2.621***	3.196***
	(0.222)	(0.394)	(0.530)	(0.644)	(0.765)	(0.898)
Observation	2930	2930	2930	2930	2930	2930
# of Countries	139	139	139	139	139	139
# of DR	187	187	187	187	187	187
Panel (D): Dependent: Domestic Credit to the Private Sector to GDP ratio						
	(1)	(2)	(3)	(4)	(5)	(6)
	h=0	h=1	h=2	h=3	h=4	h=5
ATE	-0.142	-0.483**	-0.198	0.339	-0.541	-1.384**
	(0.141)	(0.230)	(0.334)	(0.456)	(0.514)	(0.586)
Observation	1994	1994	1994	1994	1994	1994
# of Countries	129	129	129	129	129	129
# of DR	140	140	140	140	140	140

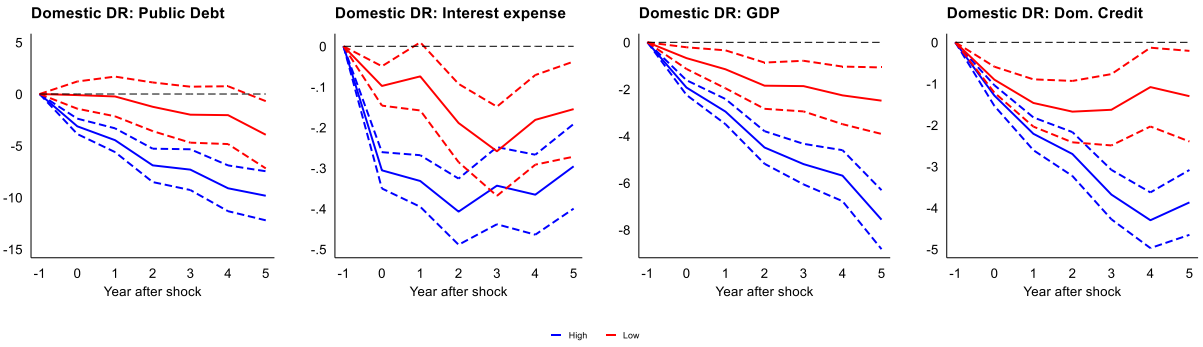
Sources: Authors' calculations.
Notes: ATE estimates. Robust standards errors in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$. Conditional cumulative changes of each dependent variables from the start of debt restructurings. First-stage treatment models used to predict the propensity scores are estimated using the CBPS. Second-stage outcome models are separately estimated for countries that restructure their debt and those that do not, and we predict the potential outcomes based on the characteristics of each sample after re-randomization.

Annex V. Conditional on the Share of Domestic Debt and Perimeter of Debt Restructured

We also investigate how the benefits and costs of DDRs vary with the share of domestic debt and the perimeter of debt restructured. We hypothesize that these factors can simultaneously amplify both the benefits and costs of restructuring, which can complicate policy decisions. Indeed, a higher share of domestic debt and a larger restructured debt are expected to yield a sharper decline in public debt and interest payments, potentially improving fiscal sustainability. However, these benefits may come at the cost of a greater contraction in domestic credit and output, particularly in the presence of a strong sovereign-bank nexus, where domestic banks hold significant amounts of government debt (Gennaioli et al., 2018).

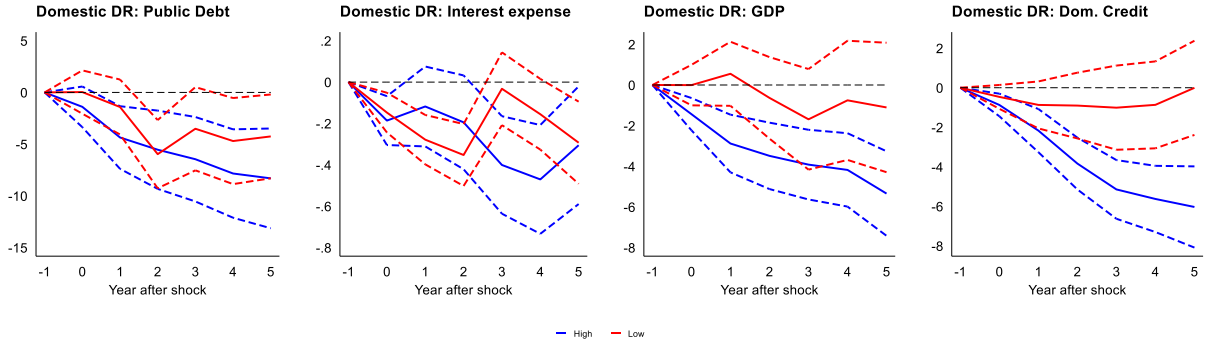
Our findings are reported in Annex Figure AV.1 and Annex Figure AV.2. They reveal that five years after DDRs, those involving a higher share of domestic debt and larger perimeter of debt restructured exhibit a more pronounced decline in public debt and interest payments. At the same time, these episodes are also associated with a steeper GDP contraction and a greater reduction in domestic credit, with few exceptions. These findings underscore the inherent trade-off in DDRs: while necessary for debt sustainability, they can impose significant short-term economic costs, particularly in economies with higher share of domestic debt and when the restructuring needed is sizeable.

Annex Figure AV.1. Sensitivity: Impacts of DDRs Conditional on the Share of Domestic Debt (Percent of GDP)



Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio within two groups—Low (red) and High (blue) share of domestic debt as percent of GDP. Countries were divided into two groups—Low and High—based on whether their specific averages for these variables were below or above the median value of the respective variables at the start of DDRs.

Annex Figure AV.2. Sensitivity: Impacts of DDRs Conditional on the Perimeter of Debt Restructured (Percent)



Sources: Authors' calculations.
Notes: These charts show the ATE impacts of DDRs on the cumulative changes in public debt to GDP ratio, interest payments to GDP ratio, GDP, and domestic credit to the private sector to GDP ratio within two groups—Low (red) and High (blue) perimeter of debt restructured in percentage. Countries were divided into two groups—Low and High—based on whether their specific averages for these variables were below or above the median value of the respective variables at the start of DDRs.

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