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Sovereign debt restructurings are associated with declines in the growth of GDP, investment, bank credit to the private sector and capital flows. Our empirical findings show that the intensity of these losses depends on two aspects: whether the restructuring preempts a default and the extent of the country's reliance on bank intermediation. Post-default restructurings are associated with worse outcomes than restructurings that take place preemptively without missing payments to creditors and going into default. Much of that difference is driven by the particularly adverse effects experienced after post-default restructurings in countries with relatively larger banking sectors.
(*JEL codes*: F34; F41; H63)

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1. Introduction

Countries where public debt is restructured experience declines in the growth of GDP, investment, bank credit to the private sector, and capital flows. Though previous studies have provided different measures of output and financial stability costs of sovereign debt restructurings, little is known about how bank intermediation influences the effects on the economy in restructurings involving external debt. This is a remarkable gap, with real world implications for countries facing the problem of how to restructure their debt. As evidenced by the well-known sovereign debt workouts in Argentina (2001–05), Ecuador (1999–2000) and Ukraine (2015), understanding the spillovers and feedback effects that a debt restructuring has through the domestic financial system can help design a restructuring to minimize the risk that it triggers financial instability. This paper contributes to that goal by showing how output and banking sector costs of debt restructurings differ depending on both whether the restructuring takes place preemptively or only after a default has occurred, and whether this happens in an economy dependent on bank intermediation.

This paper sheds light on two important dimensions of the cost of debt restructurings: whether it preempts a default and the reliance on bank intermediation. First, we classify restructuring strategies as in Asonuma and Trebesch (2016), based on whether payments were missed (post-default), were missed but only temporarily and with the consent of the foreign creditors (weakly preemptive) or whether payments continued to be made in full and on time during the negotiations (strictly preemptive). We use local projections (Jordà 2005) to quantify the overall cumulative effect (both direct and indirect) of different restructuring strategies over a long horizon, while controlling for the dynamic feedback from other variables. Our analysis is based on a sample of 76 countries over 1975–2019, covering 194 sovereign debt restructuring episodes.

Post-default restructurings are, on average, associated with the most severe and protracted declines in GDP, investment and bank credit, with cumulative contractions of 5, 10, and 13 percentage points, respectively, relative to the pre-restructuring linear trend over the first three years. These restructurings are also associated with a severe and prolonged decline in gross capital inflows, and a sharp and sustained increase in real lending interest rates. In contrast, the aftermath of strictly preemptive restructuring events features milder and shorter-lived impacts on GDP, investment, bank credit and gross capital inflows. The intensity of the dynamics following weakly preemptive restructurings falls between those of post-default and strictly preemptive restructurings. The large adverse effects on private sector credit and lending terms likely contribute to the worse outcomes in GDP and investment following post-default restructurings.

Second, we show that credit intermediation by banks, as measured by bank credit to the private sector, is a key determinant of the economic consequences of sovereign debt restructuring. To do so, we estimate the impact of the three restructuring strategies on subsamples based on whether the size of the banking sector prior to the restructuring was above or below the sample median. In this way, as in Auerbach and Gorodnichenko (2016) and Jordà and Taylor (2016), we allow the economic responses to the restructuring to vary depending on the state of the economy, which we define in terms of the use of bank credit. Post-default restructurings in more financialized countries (those with relatively

large bank intermediation) are associated with the worst outcomes for GDP, investment, and bank credit—differences of 12, 29, 22 percent, respectively in cumulative terms over three years relative to the pre-restructuring trend. Countries with relatively large bank intermediation also experience worse outcomes under preemptive restructurings than those with relatively small banks, but the difference is smaller. These results show that the benefits of preemptive restructurings are particularly important in countries where bank intermediation plays a large role.

Given that a country's decision of how to go about restructuring its debt is influenced by the economic conditions it faces (Asonuma and Trebesch 2016), Ordinary Least Squares (OLS) estimation suffers from endogeneity problems. To attenuate this issue, our baseline results follow the convention in the local projections literature and apply the Augmented Inverse Probability Weighted (AIPW) estimator (Jordà and Taylor 2016) when using the local projections. This method assigns a greater weight to observations that are less likely to be associated with an event, aiming to replicate a distribution without selection bias.

Our results, which are informing the current policy debate on debt restructuring (e.g., IMF 2020), contribute to various literature strands. First, they add to the large literature on the output costs of sovereign defaults, e.g., Sturzenegger (2004), Tomz and Wright (2007), Borensztein and Panizza (2009), De Paoli et al. (2009), Reinhart and Rogoff (2009), Levy-Yeyati and Panizza (2011), Asonuma and Trebesch (2016), and Kuvshinov and Zimmermann (2019).[1] These papers provide different measures of output costs by applying conventional panel regressions and local projection approaches. Our contribution is to show that the dynamics of output costs depends crucially on two dimensions: whether the restructuring preempts a default, and the economy's reliance on bank intermediation.

Our findings also relate to the literature on the role of financial intermediation in debt restructurings. Theoretical work explores the effects through banks' direct exposure to the sovereign (e.g., Gennaioli et al. 2014, Sosa-Padilla 2018) and also through an increase in default risk on domestic sovereign debt (e.g., Bocola 2016, Arellano et al. 2020). Recent empirical work (e.g., Erce and Mallucci 2018) shows the importance of the bank credit channel in domestic debt defaults. We show that financial intermediation also plays a prominent role when a sovereign restructures private external debt, which is typically not held by domestic banks.[2]

Finally, our findings contribute to an emerging literature that studies heterogeneity *within* restructuring strategies. On post-default restructurings, Trebesch and Zabel (2017) find that larger haircuts and more coercive defaults, i.e., "hard defaults" are associated with a sharper and more prolonged decline in output. Gordon and Guerron-Quintana (2020) theoretically explain that growth shocks are the main determinant of whether default is "hard" or "soft."[3] We contribute to this literature by showing a role of a pre-restructuring financial condition of debtor, i.e., reliance on the bank intermediation in explaining the heterogeneity in outcomes for not only for post-default strategy but also weakly preemptive strategy (with more prominent effects in post-default strategy).

[1] The theoretical literature explores endogenous output costs through trade channel (Mendoza and Yue 2012) and through banks' direct exposure (Sosa-Padilla 2018).

[2] From a theoretical perspective, Sandleris (2014) shows that, through signaling effects, a sovereign default can create a contraction in both domestic and foreign lending to the private sector even if domestic agents do not hold government bonds.

[3] See also Arellano et al. (2019) and Atolia and Feng (2020) for "partial defaults".

2. Evidence on Sovereign Debt Restructurings

2.1. *Data Description and Classification of Restructurings*

Throughout the paper, we focus only on private external debt restructurings. Our sample covers the period 1975–2019. We follow Jordà and Taylor (2016) and restrict the sample to countries that experienced at least one restructuring event. Our baseline sample has 76 countries, which are listed in the Appendix. Following previous studies (Cruces and Trebesch 2013; Asonuma and Trebesch 2016), we consider each restructuring as an independent event when there is a second restructuring within the five-year window after the start of the first restructuring event. That is, when estimating the impact of the first restructuring, we include the observations from the second restructuring that occur within the five-year window from the start of the first restructuring. This is important to capture the medium-term costs of shallow restructurings which could fail to restore debt sustainability. Our results are robust to alternative approaches for dealing with overlapping debt restructurings, such as dropping sequential restructurings.

We follow the Asonuma and Trebesch (2016) classification of private external debt restructurings:

DEFINITION 1: 'Strictly preemptive restructurings' are implemented without missing any payments.

DEFINITION 2: 'Weakly preemptive restructurings' miss some payments, but only temporarily and after the start of formal or informal negotiations with creditor representatives.

DEFINITION 3: 'Post-default restructurings' are cases where payments are missed without the agreement of creditor representatives (unilateral default).

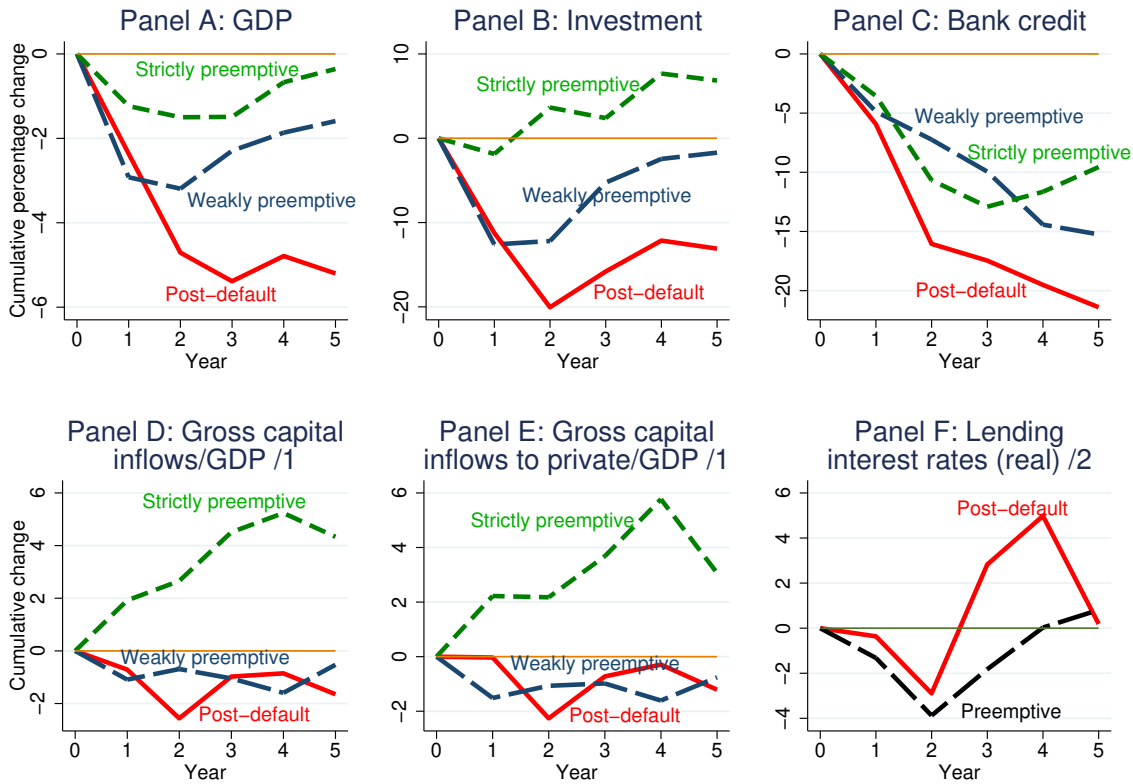
Our sample includes 194 restructurings out of which 115, 48 and 31 were post-default, weakly and strictly preemptive restructurings, respectively.[4] The average duration varies substantially across strategies: 4.9, 1.1, and 0.9 years on average for the duration of post-default, weakly preemptive, and strictly preemptive restructurings, respectively. We code the restructuring dummies at an annual frequency, setting it to unity if a restructuring either starts in the current year or continues from the previous year, and zero otherwise.

For macroeconomic variables, to secure the widest possible country coverage, we use data at an annual frequency. The data sources include the following: IMF World Economic Outlook for gross capital inflow-to-GDP ratios; IMF Country Reports for the IMF-supported program dummy; FRED for the US federal funds rate; Laeven and Valencia (2013, 2020) for the banking crisis dummy; The Paris Club for Paris Club restructuring dummy; The Freedom House (https://freedomhouse.org/) for its indices; and World Bank World Development Indicators (WDI) for the remaining variables. Sources and summary statistics for our variables are reported in Tables A1 and A2, respectively, in the Online Appendix.

[4] An example of a strictly preemptive restructuring is Uruguay (2003) and of a weakly preemptive one is Belize (2012–13).

2.2. *Evidence on GDP, Investment, Bank Credit and Capital Flows in Sovereign Debt Restructurings*

Figure 1 reports average cumulative percentage changes from the pre-crisis level ($t = 0$), adjusted for differences in country means—equivalent to a country-specific linear trend—for real GDP, investment, and private credit for the three restructurings strategies (Panels A–C).[5] It also reports the average cumulative change in the ratio of two measures of gross capital inflows to GDP, and in real lending interest rates (Panels D–F). Figure A1 in Online Appendix is analogous to Figure 1, but reports the median instead of the average values, and yields similar results.



Notes: GDP (real, constant local currency prices), investment (real, constant local currency prices), bank credit (real, constant local currency prices) are measured as a demeaned cumulative percentage change from the pre-crisis ($t = 0$) level. Capital inflows-to-GDP and real lending interest rates are measured as a demeaned cumulative change from the pre-crisis level ($t = 0$) level.
1/ Observations below 1 percent and above 99 percent of the distribution are dropped.
2/ The sample for the real lending interest rates combines observations for weakly and strictly preemptive restructurings together due to the limited number of observations with data for the latter. Observations with high inflation rates (above 50 percent) are dropped.

Figure 1: Key Variables around Debt Restructurings, Mean

Both GDP, investment and private credit experience severe losses following a post-default restructuring (red lines in Panels A, B and C). Negative values indicate the percent difference of GDP,

[5] We drop the private credit series for Algeria in the 1990s because a data reclassification led to a large swing in the series, as public enterprises commercial bank debt was shifted from credit to the economy to credit to the Government. For additional details, please refer to IMF (1994).

investment or bank credit relative to its (country-specific) pre-event dynamics. That difference remains large for several years. Smaller losses occur following weakly preemptive restructurings (blue lines in Panels A, B and C). GDP and investment growth show more resilience following a strictly preemptive restructuring (green lines in Panels A and B). In contrast, the effect on private credit is similar to that of weakly preemptive restructurings.

Gross capital inflows to the economy and to the private sector experience a large decline in post-default restructurings, but recover over the medium-term (red lines in Panels D and E). Weakly preemptive restructurings are associated with a milder decline and a quick rebound in the immediate aftermath, but eventually experience a decline comparable to the one following post-default restructurings (blue lines in Panels D and E). In contrast, there is a steady increase in flows after strictly preemptive restructurings (green lines in Panels D and E). Real lending interest rates initially contract (likely due to higher inflation) but experience an increase in the medium term following post-default restructurings (red line in Panel F), which is more muted during preemptive episodes (black line in Panel F, where weakly and strictly preemptive restructurings are combined due to data availability).

3. Local Projections

3.1. *Endogeneity of Debt Restructuring Decisions*

Countries deciding to restructure differ from others in many aspects. In fact, the preemptive vs. post-default strategy is an endogenous choice by the sovereign debtor (Asonuma and Trebesch, 2016). As a result, the coefficients obtained from a conventional OLS estimation could be driven by the characteristics of countries experiencing restructurings rather than by the effect of debt restructuring itself.

We define a particular policy strategy (e.g., post-default restructuring) and its complement as treatment and control groups, respectively. When estimating the treatment effect for a restructuring of type S, we include every observation in which there is not a type S restructuring in the control group, even if there is another type of restructuring in that country and year.[6]

We apply a probit model to estimate separate equations for the start of each type of restructuring. Following the convention in the literature (Jorda and Taylor 2016; Jorda et al. 2019), we include both *controls* and *predictors*. Controls are variables which influence restructuring, but whose dynamics are also affected by the debt restructuring. The controls are the lagged: i) GDP growth, ii) government expenditure-to-GDP ratio, iii) openness, iv) banking crisis dummy, v) bank credit-to-GDP ratio; vi) high inflation dummy, viii) nominal exchange rate depreciation dummies. Our choice of controls us supported by Table A3 in the Online Appendix. It reports differences in key macroeconomic and structural variables for the treatment and control groups in the year of the restructuring and in the previous year.

Predictors are exogenous variables that influence debt restructuring but are not influenced by debt

[6] Alternatively, in order to define the control group, we could use only non-restructuring observations excluding observations corresponding to other debt restructuring events (strictly and weakly preemptive). Dropping these from the complement sample has negligible effects on the estimation results given the large number of "non restructuring" observations.

Table 1: Predicting the Start of Debt Restructurings, Probit

Dependent Variable = Dummy Taking 1 at the Start of Debt Restructuring

	Post-default (1)	Weakly preemptive (2)	Strictly preemptive (3)
Predictors			
US federal funds rate	8.41***	5.77*	-10.28***
	(1.75)	(3.12)	(3.53)
Contagion based on restructurings 1/	4.00***	5.28***	4.73***
	(0.75)	(1.08)	(1.49)
Number of past preemptive cases	0.28**	-0.28***	-0.41***
	(0.14)	(0.10)	(0.08)
Controls			
GDP growth rates	0.31	-4.61**	-0.11
	(1.28)	(1.89)	(2.05)
Government expenditure-to-GDP ratio	0.3	-5.99*	3.75
	(1.72)	(3.07)	(3.84)
Openness	0.44	1.48	1.58**
	(0.42)	(0.94)	(0.70)
Banking crisis dummy (taking 1 during each crisis)	0.05	0.47*	-0.29
	(0.21)	(0.27)	(0.33)
Bank credit-to-GDP ratio	0.75	0.45	1.34*
	(0.63)	(0.64)	(0.76)
High inflation dummy (1 if inf. rate > 50%)	-0.42*	0.10	0.10
	(0.24)	(0.30)	(0.40)
Nominal exchange rate depreciation dummies	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
N. of observations	1,670	660	563
Chi-squared (for predictors only)	75.6***	48.9***	27.0***
p-value of Chi-squared	0.000	0.000	0.000

Notes: Robust standard errors, clustered at the country-level, are in parentheses. All explanatory variables are from one year before the start of debt restructuring. *, **, *** denote statistical significance at the 10%, 5%, and 1% level, respectively.
1/ The contagion variable of country i in year t is constructed as follows: $Contagion_{it} = \sum_k \frac{Rest_{kt}}{W_{ik}}$ where $W_{ik} = \frac{Dist_{ik}}{\sum_{k'} Dist_{ik'}}$ denotes the weight based on the distance between country i and country k, $Dist_{ik}$; $Rest_{kt}$ denotes the restructuring dummy (of any strategy) in country k in year t.

restructuring. The variables considered include the lagged: a) US federal funds rate, b) contagion variable based on restructurings by other countries in the same region weighted by geographical distance; c) number of past preemptive restructurings. The US federal funds rate and third countries' restructuring choices are independent of debtor i's restructuring choice, and past preemptive restructurings are pre-determined at time t.

The results reported in Table 1 will be used in our AIPW estimates for each of the three types of restructuring. The implied areas under the Receiver Operating Characteristic (ROC) curve, range from 0.87 to 0.95, indicating a reasonably good classification power—reported in Figure A2 in the Online Appendix. There are competing channels through which the federal funds rate can affect the probability of a restructuring through higher debt service costs and through the opportunity cost of delaying a settlement (Asonuma and Joo 2020). According to Table 1, a higher federal funds rate increases the probability of post-default and weakly preemptive restructurings but reduces the

probability of strictly preemptive restructurings. The contagion variable is associated with a higher likelihood of all three types of restructurings. Past preemptive restructurings increase the likelihood of a post-default restructuring, perhaps because shallower past restructurings failed to restore sustainability and a deeper relief is being sought. We also find that lower GDP growth and banking crises increase the probability of a weakly preemptive restructuring, while openness increases the likelihood of observing strictly preemptive strategy. Bank credit-to-GDP ratio does not influence the likelihood of either a post-default or weakly preemptive restructuring but influences only marginally that of a strictly preemptive restructuring. This supports our estimation approach of two subsamples for each restructuring strategy separated by large or small banking sector in Section 3.3.

3.2. *Augmented Inverse Probability Weighted (AIPW) Estimation*

We employ the Augmented Inverse Probability Weighted (AIPW) estimator (Jorda and Taylor, 2016) to deal with selection biases. First, we estimate the following regression model by OLS:

$$y_{it+h} - y_{it} = \alpha_i^{S,h} + \beta^{S,h} D_{it+1}^S + \mathbf{X}_{it}\boldsymbol{\beta}^{S,h} + u_{it+h}^S, \tag{1}$$

for each horizon $h = 1, 2, ..., 5$ and for each strategy S = {post-default, weakly preemptive, and strictly preemptive}, y_{it+h} denotes natural log of an outcome variable (e.g., GDP) of country i in year $t+h$, $\alpha_i^{S,h}$ denotes country fixed effects, D_{it+1}^S indicates the dummy variable taking unity if there is a type S debt restructuring in year $t+1$, $\beta^{S,h}$ is its coefficient, the vector $\mathbf{X}_{it}$ includes control variables and their coefficients are denoted as $\boldsymbol{\beta}^{S,h}$, u_{it+h}^S is the error term. After estimating (1), we obtain the conditional mean of the dependent variable $(y_{it+h} - y_{it})$ for state $j = 1, 0$, each of which indicates 'debt restructuring' and 'no debt restructuring', respectively. The estimated conditional means are denoted by $m_j^{S,h}$ for $j = 1, 0$.

Second, to obtain each observation's propensity to have a type S debt restructuring, we estimate the following probit model:

$$\Pr(D_{it+1}^S = 1 | \mathbf{X}_{it}, \mathbf{Z}_{it}) = \Phi\left(\mathbf{X}_{it}\boldsymbol{\gamma}^{S,X}, \mathbf{Z}_{it}\boldsymbol{\gamma}^{S,Z}, \gamma_i^S\right), \tag{2}$$

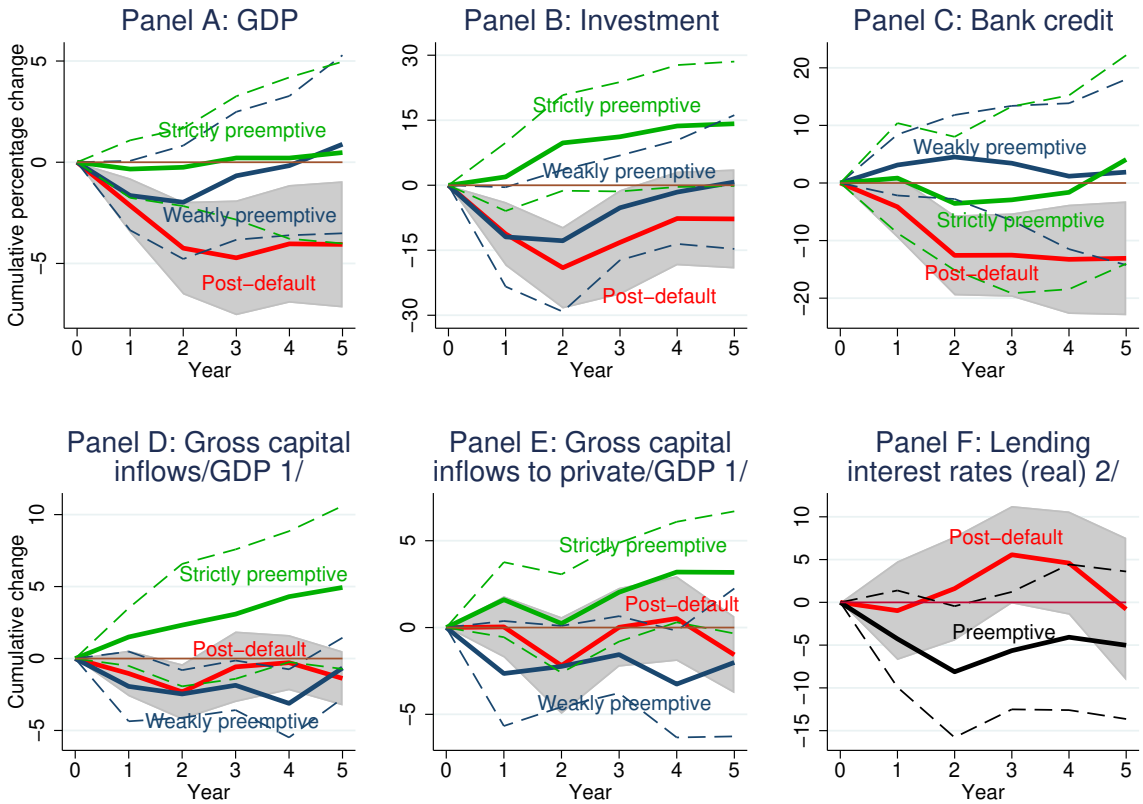
where $\mathbf{X}_{it}$ includes the same set of controls as for equation (1), $\mathbf{Z}_{it}$ includes predictors defined in Section 3.1, $\boldsymbol{\gamma}^{S,X}$ and $\boldsymbol{\gamma}^{S,Z}$ are vectors of parameters, γ_i^S's are country fixed effects. Based on the probit model, we obtain the predicted likelihood of each type of debt restructuring $\hat{p}_{it+1}^S$.

Third, using the estimated conditional means $m_j^{S,h}$ and predicted likelihood $\hat{p}_{it+1}^S$, the AIPW estimator is written as

$$\begin{aligned} \hat{\Lambda}_h^S \quad = \quad & \frac{1}{N}\sum_i \sum_t \left\{ \left[\frac{D_{it+1}^S (y_{it+h} - y_{it})}{\hat{p}_{it+1}^S} - \frac{\left(1 - D_{it+1}^S\right)(y_{it+h} - y_{it})}{1 - \hat{p}_{it+1}^S} \right] \right. \\ & \left. - \frac{D_{it+1}^S - \hat{p}_{it+1}^S}{\hat{p}_{it+1}^S\left(1 - \hat{p}_{it+1}^S\right)} \left[\left(1 - \hat{p}_{it+1}^S\right) m_1^{S,h} + \hat{p}_{it+1}^S m_0^{S,h} \right] \right\}. \end{aligned} \tag{3}$$

As described in Jorda and Taylor (2016), the first big square bracket can be seen as the inverse prob-

ability weighting (IPW) estimator. The expression in the second line is an adjustment term, which is the weighted average of the two predicted dependent variables.



Notes: The figure shows local projections of the variables (see notes to Figure 1) shown in each panel at the 1, 2, ..., 5 horizon. Gray bands and dashed lines indicate the 95 percent confidence interval.

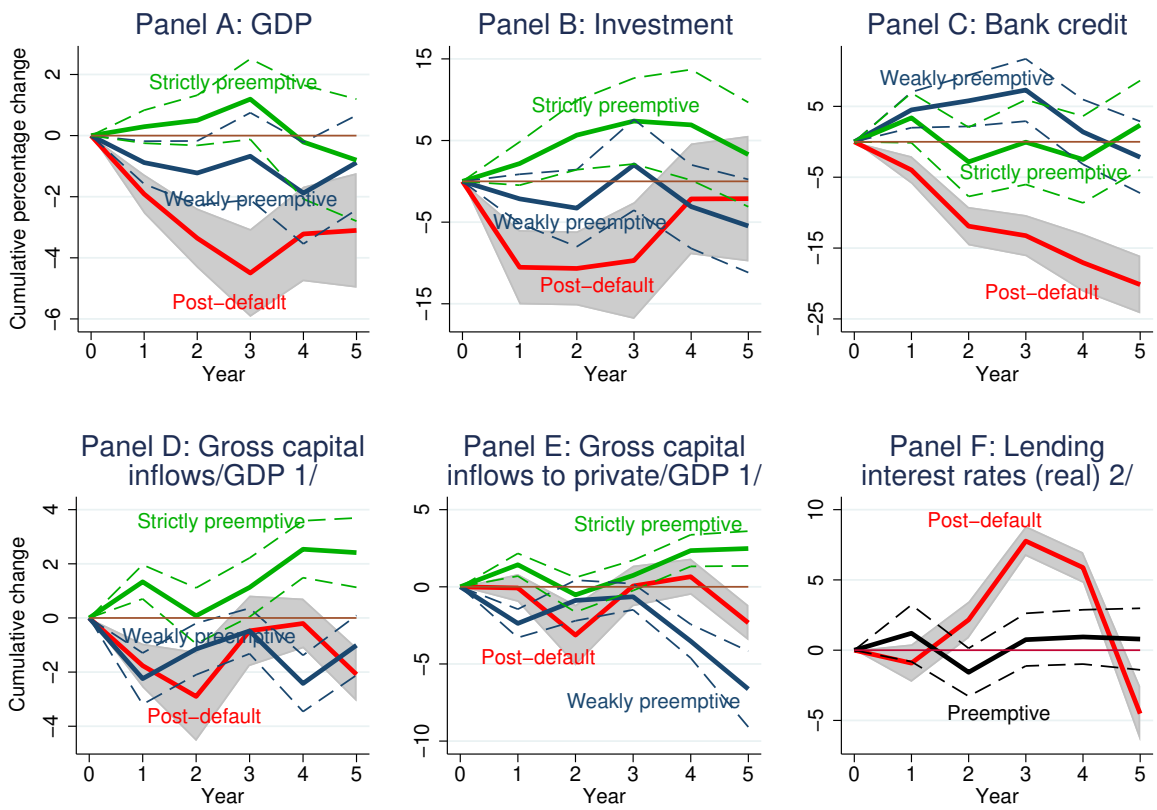
1/ Observations below 1 percent and above 99 percent of the distribution are dropped.

2/ The sample for the lending interest rates combines observations for weakly and strictly preemptive restructurings together due to the limited number of observations with data for the latter. Observations with high inflation rates (above 50 percent) are dropped.

Figure 2: Local Projections, OLS

The results of interest are easier to convey graphically. Figure 2 reports OLS results (based on Table A4 in the Online Appendix). These correspond to the regression in equation (1). Figure 3 reports the AIPW results (based on Table A5 in the Online Appendix), corresponding to equation (3). Panels A–C in these figures report the cumulative percentage changes from the pre-restructuring year ($t = 0$). Panels D–F report the cumulative percentage point changes from the pre-restructuring year ($t = 0$). When comparing the responses, one should focus both on the point estimates (which indicates the change by that date) as well as on the area implied by the local projection (for flow variables, this area conveys the cumulative effect). Our preferred AIPW estimates (Figure 3) have narrower confidence intervals than their OLS counterparts (Figure 2). A comparison of the two shows that the qualitative results are not being driven by the asymmetric weighting by the first stage regression.

We focus our discussion on the AIPW results (Figure 3). GDP, investment and credit growth broadly maintain their pace relative to their (country-specific) average following strictly preemptive



Note: See notes to Figure 2.

Figure 3: Local Projections, AIPW

restructurings (green lines in Panels A–C). In contrast, post-default restructurings experience severe and prolonged adverse effects (red lines in Panels A–C), while weakly-preemptive restructurings (blue lines in Panels A–C) tend to fall between strictly and post-default restructurings for GDP and investment, except for credit.

Gross capital inflows experience an increase following strictly preemptive restructurings (green lines in Panels D–E) while weakly preemptive and post-default restructurings are both associated with sizable declines at least over part of the projection horizon (blue and red lines in Panels D–E). Finally, real interest rates remain broadly stable, albeit with large error bands, following preemptive restructurings but experience a large increase following post-default restructurings (Panel F).

We check the robustness of the results along several dimensions. Figure A3 in the Online Appendix reports the AIPW estimates for alternative measure of macro variables: a cumulative percentage change for investment (credit) from the pre-restructuring year divided by pre-restructuring GDP. The results for investment are similar to our baseline. The scale gets compressed (because investment and private credit are measured as a percentage of the initial GDP as opposed to the percent change from their own starting levels).The results on credit become more mixed, with strictly preemptive restructurings experiencing a decline similar to post-default restructurings (while credit remains resilient for weakly preemptive restructurings). The results on credit are noisy in part because of very

different responses depending on whether the banking sector is relatively large or small, a distinction which will be the focus of the next section.[7]

Figures A4 and A5 in the Online Appendix consider private external debt restructurings with official external debt (Paris Club) restructurings or IMF-supported programs. The results are similar to our baseline because a majority of restructurings are associated with official external debt restructurings or IMF-supported programs. Figure A6 in the Online Appendix is analogous to Figure 3 but drops sequential restructurings that take place within five years of an initial restructuring. The stylized results remain robust, but weakly preemptive restructurings perform worse under some of these alternatives in Figure A6.

Lastly, Figures A7–A9 in the Online Appendix report the AIPW estimates with additional controls (probit regression results in Table A6 in the Online Appendix). These estimates (orange solid lines for post-default case) are compared with our baseline specification with a reduced sample (orange dashed lines) and our baseline results with the full sample (red dashed lines). The results are similar. While including the additional controls significantly reduces sample size (it covers only 60 percent of the full sample), it does not improve the fit of our probit regressions significantly.

3.3. *Role of Credit-Investment Channel*

To shed further light on the role that financial intermediation has on determining the costs of sovereign debt restructurings, we compare the post-restructuring performance of countries with large versus small banking sectors.

We measure financial intermediation by comparing countries' bank credit to the private sector as a share of GDP in the year prior to the restructuring with the sample median among all restructuring observations. The implied threshold (21 percent of GDP) turns out to classify half of post-restructuring and half of preemptive restructurings as having a large banking sector (although this needed not be the case). This threshold may strike the reader as low. But one should bear in mind that many developing countries do have small banking sectors even today, but particularly so in the past, e.g., less than 20 percent for Mexico in the early 1980s and around 24 percent of GDP for Argentina in 2000.

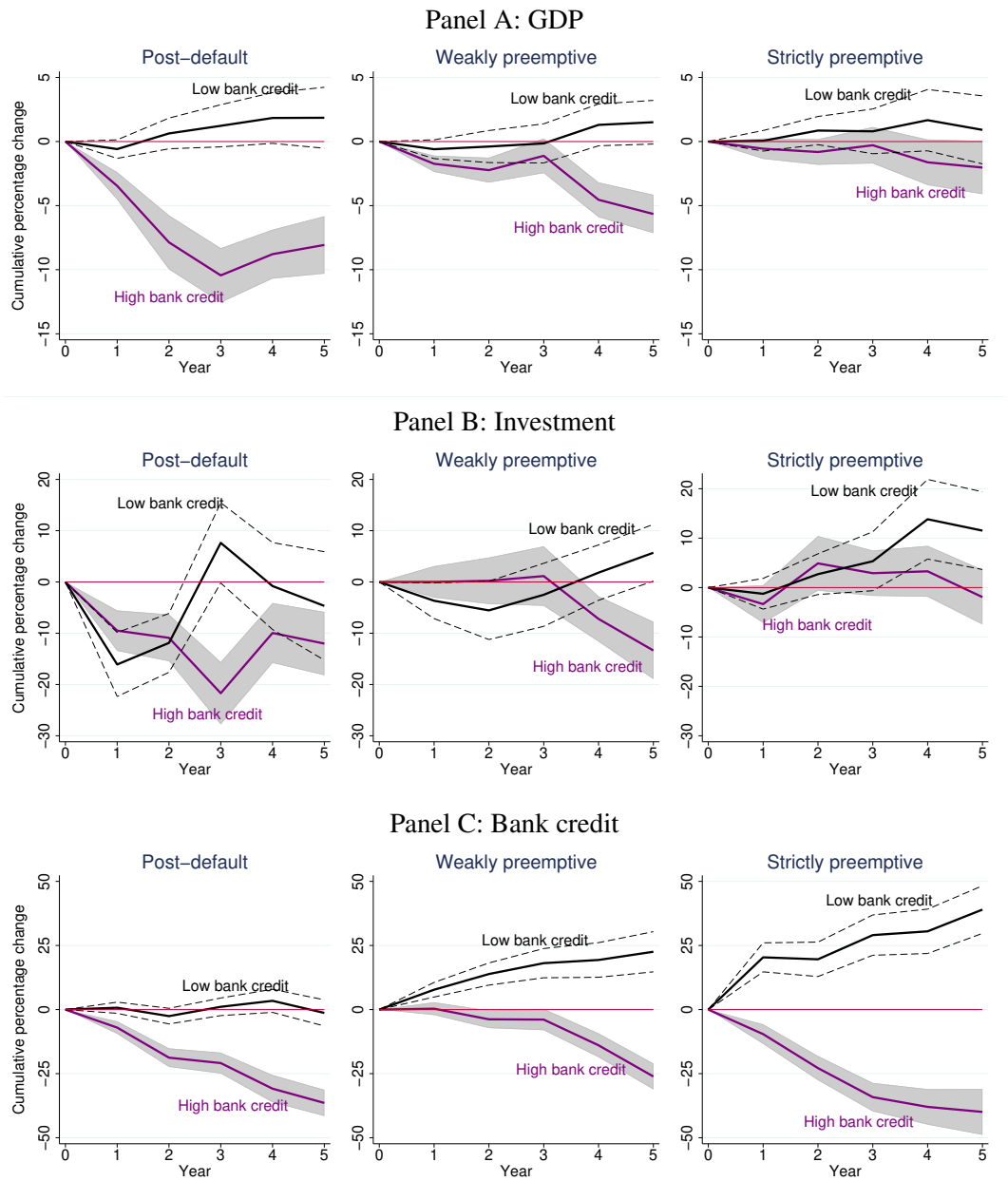
To estimate whether having a large or small banking system affects the impact of implementing different restructuring strategies, we follow Jordà and Taylor (2016) and Auerbach and Gorodnichenko (2016) and estimate the following local projection equation:

$$y_{it+h} - y_{it} = \delta_i^{S,h} + \Gamma^{BC,h} D_{it}^{BC} D_{it+1}^{S} + \Gamma^{NonBC,h}(1 - D_{it}^{BC}) D_{it+1}^{S} + \mathbf{X}_{it}\mathbf{\Gamma}^{S,h} + e_{it+h}^{S}, \tag{4}$$

where D_{it}^{BC} is a dummy variable taking unity if country i's banking sector is large in year t and zero otherwise. That dummy is interacted with the restructuring dummy D_{it+1}^{S}, and $\Gamma^{BC,h}$ and $\Gamma^{NonBC,h}$ are the coefficients of interest to be estimated. The coefficient $\Gamma^{BC,h}$ captures the impact of a restructuring (for instance post-default) in year $t+1$ when the banking sector in country i in year t is relatively large. The third term interacts $(1 - D_{it}^{BC})$ with D_{it+1}^{S}. In this setting, $\Gamma^{NonBC,h}$ reflects the impact of the restructuring that occurred in year $t+1$ when the banking sector in country i in year t is relatively

[7] A large decline in credit in absolute terms may correspond to a smaller decline when measured relative to the initial credit stock.

small. Finally, $\mathbf{X}_{it}$ is the same vector of regressors defined in Section 3.1.



Notes: Restructuring episodes are divided into two groups based on bank credit to the private sector as a share of GDP in the year prior to the restructuring. Those which are above (below) the median among all restructuring observations (post-default and preemptive) are classified as relatively large (small) banking sectors. The cutoff is the median for all restructuring episodes (both post-default and preemptive). Panels show local projections for cumulative changes. Gray bands and dashed lines denote the 95 percent confidence interval.

Figure 4: GDP, Investment, Bank Credit around Debt Restructurings, by Bank Credit, AIPW

As in our baseline AIPW estimation, we estimate the likelihood of restructurings, both where the banking sector is large and small, separately for each restructuring strategy—reported in Table A7 in the Online Appendix. There are six sets of estimates for each dependent variable (large vs. small banks subsample for each of the three types of restructuring). Using equation (3), we estimate average treatment effects with the predicted dependent variable obtained from equation (4).

Figure 4 reports the AIPW estimates (based on results in Table A8 in the Online Appendix). Our results point to a key role for financial intermediation. Countries that rely heavily on bank credit experience significant declines in GDP growth following restructurings (purple lines in Panel A). This is true for all three types of restructurings, and the decline is the most pronounced for post-default restructurings and the least pronounced for strictly preemptive restructurings. In contrast, countries that rely less on bank credit show more resilience in GDP (black lines in Panel A) across all three types of restructurings.

The results on investment show a large cumulative loss following post-default and weakly preemptive restructurings in countries with large banking sectors (since investment is a flow, the cumulative loss is approximated by the area implied by the local projection). The difference between high and low reliance on bank financing is more muted for weakly preemptive restructurings than for post-default. Investment remains resilient following strictly preemptive restructurings, regardless of whether the banking sector is large or small. The results on credit point to large declines across all three types of restructuring when countries rely heavily on bank intermediation. When the banking sector is relatively small, credit remains resilient following post-default restructurings, and expands following preemptive restructurings.

Figure A10 in the Online Appendix reports OLS estimates (based on results in Table A9 in the Online Appendix). They are qualitatively similar to our baseline results.

The results are also robust to alternative definitions of large bank intermediation. To account for financial deepening over time, Figure A11 in the Online Appendix reports results using a time-varying classification threshold for financial intermediation. We first compute the mean bank credit as a share of GDP for each year using all sample including non-restructuring observations (e.g., 24 and 37 percent of GDP in 1998 and 2014, respectively). We then calculate a deviation from the mean bank credit-to-GDP ratio for each restructuring observation (e.g., -16 percent for Ukraine 1999 and 9 percent of GDP for Ukraine 2015 episodes, respectively). Finally, we divide our observations into two subsamples, above and below the median of the computed deviations, which yields similar results to our baseline.

4. Conclusion

In this paper, we shed new light on two important dimensions of the costs of sovereign debt restructurings: whether the restructuring preempts a default and the extent of the country's reliance on bank intermediation.

The policy implications of some of our results have already percolated to the policy debate on how to best resolve sovereign debt crises (e.g., IMF 2020). When designing a debt restructuring strategy, it is crucial to understand the potential spillover and feedback channels that the restructuring can have on the domestic financial system, a point where the literature on restructuring external debt was largely silent. Our key finding suggests that countries that succeed in a restructuring without missing payments to creditors are largely able to avoid, or at least mitigate, the output costs associated with restructuring. This is particularly true for economies with high reliance on bank credit intermediation.

Going forward, as the domestic banking sector develops, the benefits of preemptive restructurings should become even more pronounced.

Our findings also have implications for the design of official lending programs. They suggest that long-run costs can be attenuated if official financing and creditor cooperation allow countries to restructure without missing payments. Our analysis highlights the costs that countries can face for trying to delay adjustment until a default becomes inevitable.

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Appendix: Sample Countries

The dataset includes only countries that experienced debt restructurings. Among them, 62 countries experienced 115 episodes of post-default debt restructuring in 1975–2019:

> Albania, Algeria, Argentina, Barbados, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Cameroon, Congo, Dem. Rep. (Zaire), Congo, Rep., Costa Rica, Cote d'Ivoire, Croatia, Cuba, Dominican Rep., Ecuador, Ethiopia, Gabon, The Gambia, Grenada, Guinea, Guyana, Honduras, Iraq, Jamaica, Jordan, Kenya, Liberia, Macedonia, Madagascar, Malawi, Mauritania, Moldova, Morocco, Mozambique, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, The Philippines, Poland, Romania, Russia, Sao Tome and Principe, Senegal, Serbia and Montenegro, Seychelles, Sierra Leone, Slovenia, Sudan, Tanzania, Togo, Turkey, Uganda, Venezuela, Vietnam, Yemen, Rep. of, and Zambia.

25 countries experienced 48 episodes of weakly preemptive debt restructuring:

> Argentina, Belize, Brazil, Chile, Dominica, Ecuador, Grenada, Jamaica, Malawi, Mexico, Morocco, Niger, Panama, Peru, The Philippines, Romania, Senegal, South Africa, Saint Kitts and Nevis, Trinidad and Tobago, Turkey, Ukraine, Uruguay, Venezuela, and Yugoslavia

17 countries experienced 31 episodes of strictly preemptive debt restructuring:

> Algeria, Chad, Chile, Dominican Rep., Greece, Jamaica, Mexico, Moldova, Mongolia, Mozambique, Nicaragua, Pakistan, Peru, South Africa, Ukraine, Uruguay, and Yugoslavia.

Due to the availability of data on controls and predictors, not all of these countries are used in the regression analysis. Online Appendix reports the list of countries covered in baseline AIPW estimation.

Online Appendix to "Costs of Sovereign Defaults: Restructuring Strategies and Financial Intermediation"

TAMON ASONUMA, MARCOS CHAMON, AITOR ERCE, AND AKIRA SASAHARA

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Sample Countries

The dataset includes only countries that experienced debt restructurings. Among them, 62 countries experienced 115 episodes of post-default debt restructuring in 1975–2019:

> Albania, Algeria, Argentina, Barbados, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Cameroon, Congo, Dem. Rep. (Zaire), Congo, Rep., Costa Rica, Cote d'Ivoire, Croatia, Cuba, Dominican Rep., Ecuador, Ethiopia, Gabon, The Gambia, Grenada, Guinea, Guyana, Honduras, Iraq, Jamaica, Jordan, Kenya, Liberia, Macedonia, Madagascar, Malawi, Mauritania, Moldova, Morocco, Mozambique, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, The Philippines, Poland, Romania, Russia, Sao Tome and Principe, Senegal, Serbia and Montenegro, Seychelles, Sierra Leone, Slovenia, Sudan, Tanzania, Togo, Turkey, Uganda, Venezuela, Vietnam, Yemen, Rep. of, and Zambia

25 countries experienced 48 episodes of weakly preemptive debt restructuring:

> Argentina, Belize, Brazil, Chile, Dominica, Ecuador, Grenada, Jamaica, Malawi, Mexico, Morocco, Niger, Panama, Peru, The Philippines, Romania, Senegal, South Africa, St. Kitts and Nevis, Trinidad and Tobago, Turkey, Ukraine, Uruguay, Venezuela, and Yugoslavia

17 countries experienced 31 episodes of strictly preemptive debt restructuring:

> Algeria, Chad, Chile, Dominican Rep., Greece, Jamaica, Mexico, Moldova, Mongolia, Mozambique, Nicaragua, Pakistan, Peru, South Africa, Ukraine, Uruguay, and Yugoslavia

Due to the availability of data on explanatory variables and predictor variables, not all of these countries are used in the regression analysis.

The countries that are included in the baseline AIPW estimation are as follows. 38 countries experienced 58 episodes of post-default debt restructuring in 1975–2019:

> Albania, Argentina, Barbados, Bolivia, Brazil, Cameroon, Rep. of Congo, Costa Rica, Cote d'Ivoire, Dominican Republic, Ecuador, Gabon, The Gambia, Guinea, Guyana, Jamaica, Jordan, Kenya, Madagascar, Malawi, Mauritania, Moldova, Morocco, Mozambique, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, The Philippines, Senegal, Seychelles, Sierra Leone, Sudan, Togo, Turkey, and Venezuela

19 countries experienced 34 episodes of weakly preemptive debt restructuring:

> Albania, Belize, Brazil, Chile, Ecuador, Jamaica, Malawi, Mexico, Morocco, Niger, Panama, Peru, The Philippines, Senegal, South Africa, Turkey, Ukraine, Uruguay, and Venezuela

15 countries experienced 23 episodes of strictly preemptive debt restructuring:

> Albania, Algeria, Chad, Chile, Dominican Republic, Jamaica, Mexico, Moldova, Mongolia, Mozambique, Pakistan, Peru, South Africa, Ukraine, and Uruguay

Data Sources

IMF World Economic Outlook for the gross capital inflows-to-GDP ratios; IMF Country Reports for the IMF-supported program dummy; FRED for the US Federal Fund rate; Laeven and Valencia (2013, 2020) for the banking crisis dummy; Paris Club for Paris Club restructuring dummy; The Freedom House (https://freedomhouse.org/) for the freedom house indices; and World Bank World Development Indicators (WDI) for the remaining variables.

Table A1: Data Sources

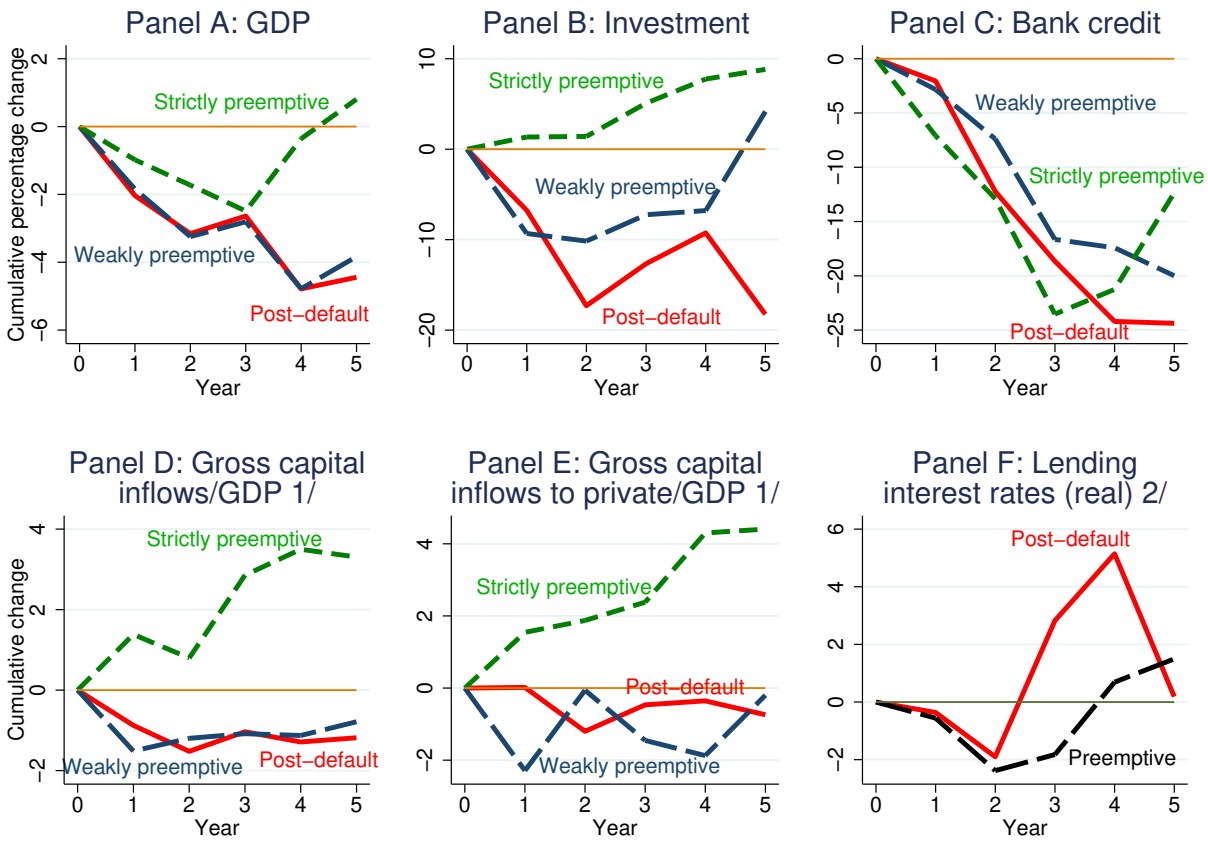
Variable (definition, unit)	Source
GDP (constant 2010 US dollars)	WB WDI
Investment (gross capital formation, % of GDP)	WB WDI
Bank credit (domestic credit to private sector by banks, % of GDP)	WB WDI
Gross capital inflows (total nonofficial inflows, % of GDP)	IMF WEO
Gross capital inflows to the private sector (% of GDP)	Calculated based on the following
Total nonofficial inflows (% of GDP)	IMF WEO
Debt portfolio inflows (% of GDP)	IMF WEO
Other inflows to official sector (% of GDP)	IMF WEO
Real lending interest rates (%)	Calculated based on the following
Nominal lending interest rates (%)	WB WDI
Inflation, GDP deflator (annual %)	WB WDI
General government final consumption expenditure (% of GDP)	WB WDI
Openness (imports and exports, % of GDP)	Calculated based on the following
Imports of goods and services (% of GDP)	WB WDI
Exports of goods and services (% of GDP)	WB WDI
Banking crisis dummy (taking unity during each crisis)	Laeven and Valencia (2013, 2020)
Official exchange rate (LCU per US dollars, period average)	WB WDI
External debt stocks, total (DOD, current US dollars)	WB WDI
Terms of trade (net barter terms of trade index (2000 = 100)	WB WDI
Freedom house index, civil liberty (1=best; 7 = worst)	Freedom House
Freedom house index, political rights (1=best; 7 = worst)	Freedom House
Paris Club dummy	Paris Club
IMF-supported program dummy	IMF WEO
Effective federal funds rate (%)	Federal Reserve Bank of St. Louis

Table A2: Summary Statistics

	Obs.	Mean	Std. Dev.	Min	Max
Dependent variables					
$[\ln(GDP_{it+1}) - \ln(GDP_{it})] \times 100$	1,188	3.40	4.94	-27.51	33.28
$[\ln(\text{Investment}_{it+1}) - \ln(\text{Investment}_{it})] \times 100$ 1/	1,186	4.12	26.06	-291.83	222.77
$[\ln(\text{Bank credit}_{it+1}) - \ln(\text{Bank credit}_{it})] \times 100$	1,188	5.51	17.04	-95.71	65.39
$(GCI_{it+1} - GCI_{it})/GDP_{it} \times 100$	1,002	0.08	10.56	-119.45	110.82
$(GCI_{it+1}^{Private} - GCI_{it}^{Private})/GDP_{it} \times 100$	897	-0.05	12.61	-122.48	165.86
$(\text{Real lending rate}_{it+1} - \text{Real lending rate}_{it}) \times 100$	613	-0.14	8.53	-38.95	44.75
Baseline control variables					
GDP growth rates	1,222	0.04	0.05	-0.28	0.33
Government expenditure-to-GDP ratio	1,222	0.15	0.07	0.01	0.61
Openness	1,222	0.73	0.38	0.09	2.75
Banking crisis dummy	1,222	0.06	0.24	0	1
Bank credit-to-GDP ratio	1,222	0.23	0.18	0.02	0.90
High inflation dummy (1 if inflation > 50%)	1,222	0.04	0.20	0	1
Exch. rate dep. dummy (less than 5th)	1,222	0.09	0.29	0	1
Exch. rate dep. dummy (between 5th and 25th)	1,222	0.27	0.44	0	1
Exch. rate dep. dummy (between 25th and 50th)	1,222	0.18	0.38	0	1
Exch. rate dep. dummy (between 50th and 75th)	1,222	0.23	0.42	0	1
Exch. rate dep. dummy (between 75th and 95th)	1,222	0.19	0.39	0	1
Additional control variables					
External debt-to-GDP ratio	1,126	0.66	0.59	0	5.67
Terms of trade (rate of change)	907	0.01	0.17	-0.62	3.49
Freedom house index, civil liberty	1,200	4.11	1.64	1	7
Freedom house index, political rights	1,200	4.30	1.99	1	7
Paris Club dummy	1,222	0.12	0.32	0	1
Dummy $1\{\text{year} < 1990\}$	1,222	0.33	0.47	0	1
Predictors					
Federal funds rate	1,222	0.05	0.04	0.00	0.16
Contagion based on restructurings	1,222	0.05	0.09	0	0.88
Number of past preemptive cases	1,222	0.29	0.83	0	5

Notes: The table shows summary statistics of variables for the observations included in the baseline AIPW estimations.

1/ A large negative minimum value and a large positive maximum value of the rates of changes in investment are due to the fact that these are continuous time compounded growth rates.



Notes: GDP (real), investment (real), bank credit (real) are measured as a demeaned cumulative percentage change from the pre-crisis ($t = 0$) level. Capital inflows-to-GDP and lending interest rates are measured as a demeaned cumulative change from the pre-crisis ($t = 0$) level.

1/ Observations below 1 percent and above 99 percent of distribution are dropped.

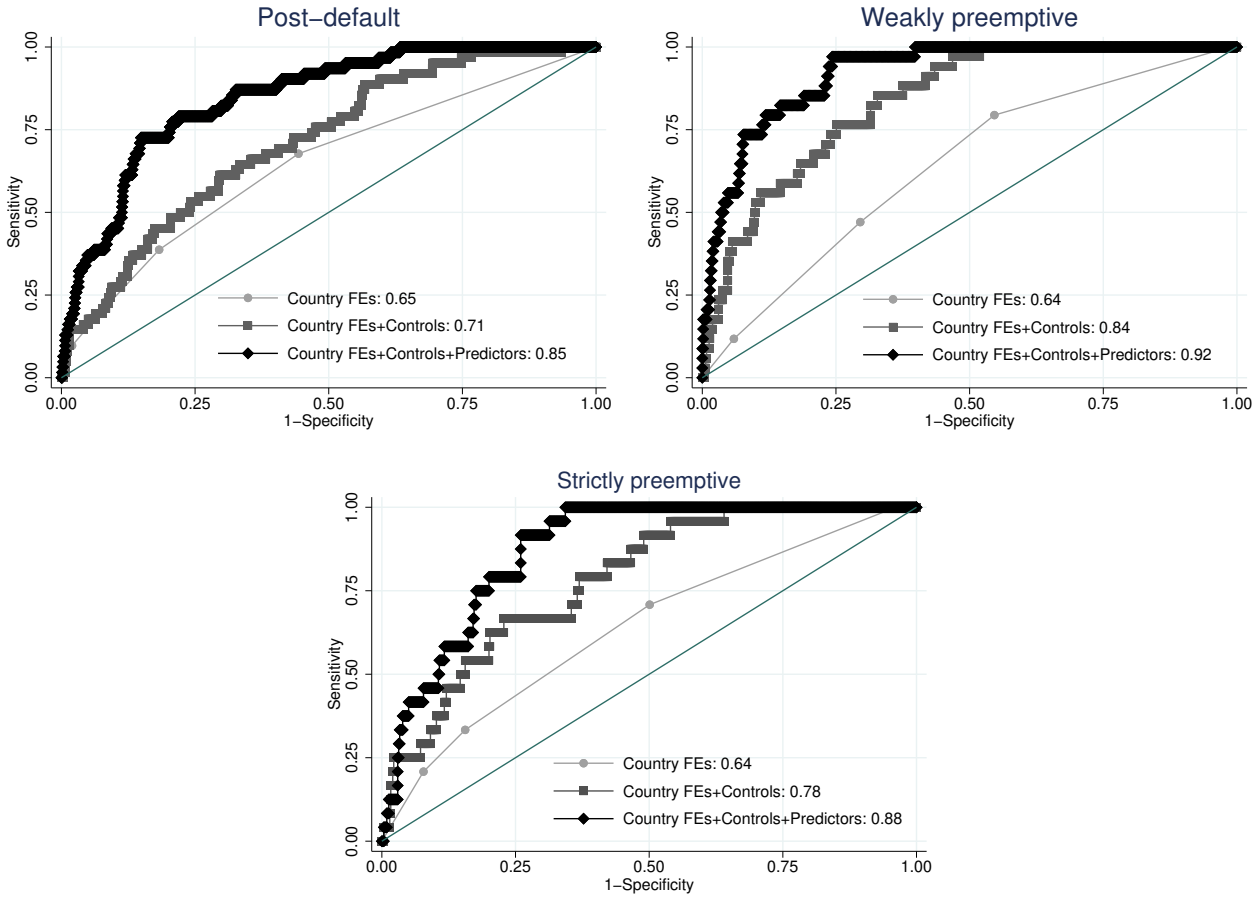
2/ Weakly and strictly preemptive restructurings are combined due to the limited number of observations with lending rate data for the latter. Observations with high inflation rate (above 50 percent) are dropped.

Figure A1: Key Variables around Debt Restructurings, Median

Table A3: Regression of Restructuring Strategies on Control Variables

	GDP growth rates	Govern. expend-iture (% of GDP)	Open-ness (trade % of GDP)	Banking crisis dummy	Bank credit	Log of inflation rates	Nominal exchange rates (% change)
Post-default	-0.03***	1.07	-2.78	0.07*	1.12	0.47***	0.06*
	(0.01)	(0.71)	(2.84)	(0.04)	(1.43)	(0.15)	(0.03)
Weakly preemptive	-0.03***	-0.26	-4.04	0.27***	-0.01	0.67***	0.06*
	(0.01)	(0.75)	(2.64)	(0.09)	(2.75)	(0.19)	(0.03)
Strictly preemptive	-0.01*	1.29	0.91	0.09	0.59	0.22	0.05
	(0.01)	(1.00)	(2.62)	(0.08)	(2.38)	(0.22)	(0.03)
Constant	0.03***	14.97***	69.69***	0.06***	26.76***	2.26***	0.06***
	(0.00)	(0.03)	(0.10)	(0.00)	(0.06)	(0.01)	(0.00)
Observations	3,181	2,832	3,046	3,700	2,966	3,028	3,234
Countries	74	69	71	74	73	74	74
R-squared	0.012	0.003	0.001	0.017	0.000	0.009	0.002

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors, clustered at the country-level, are in parentheses.



Notes: Each panel shows the area under the ROC curve. The area under the ROC ranges from 0.50 (regressors have no classification power when differentiating the start of debt restructurings from other observations) and 1 (perfect classification power).

Figure A2: Classification Power of the Probit Regression Regressors, ROC Curves

Table A4: OLS Estimation Results

	Panel A: GDP					Panel B: Investment				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Post-default	-2.14***	-4.24***	-4.72***	-4.03***	-4.06**	-11.2***	-19.0***	-13.2**	-7.67	-7.77
	(0.69)	(1.17)	(1.45)	(1.48)	(1.59)	(3.76)	(4.81)	(6.16)	(5.52)	(5.84)
Observations	2369	2297	2231	2165	2099	2367	2295	2229	2163	2097
Countries	66	66	66	66	66	66	66	66	66	66
Episodes	59	59	58	57	56	59	59	58	57	56
Weakly preemptive	-1.64*	-1.98	-0.67	-0.17	0.89	-11.9**	-12.8	-5.20	-1.58	0.74
	(0.87)	(1.43)	(1.61)	(1.76)	(2.24)	(5.85)	(8.34)	(6.16)	(6.10)	(7.87)
Observations	2369	2297	2231	2165	2099	2367	2295	2229	2163	2097
Countries	66	66	66	66	66	66	66	66	66	66
Episodes	34	33	33	33	32	34	33	33	33	32
Strictly preemptive	-0.34	-0.25	0.21	0.21	0.48	1.93	9.77*	11.2*	13.7*	14.2*
	(0.73)	(0.98)	(1.56)	(2.03)	(2.29)	(4.01)	(5.63)	(6.43)	(7.17)	(7.32)
Observations	2369	2297	2231	2165	2099	2367	2295	2229	2163	2097
Countries	66	66	66	66	66	66	66	66	66	66
Episodes	23	23	21	21	21	23	23	21	21	21
	Panel C: Bank credit					Panel D: Gross capital inflows/GDP				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Post-default	-4.14	-12.6***	-12.5***	-13.3***	-13.1***	-1.04	-2.32**	-0.58	-0.29	-1.38
	(2.74)	(3.55)	(3.69)	(4.84)	(5.05)	(0.81)	(0.98)	(1.25)	(0.98)	(0.96)
Observations	2369	2297	2231	2165	2099	2019	1955	1892	1824	1756
Countries	66	66	66	66	66	66	66	66	64	64
Episodes	59	59	58	57	56	59	59	59	58	57
Weakly preemptive	3.13	4.52	3.43	1.18	1.88	-1.94	-2.46***	-1.86**	-3.12***	-0.66
	(2.70)	(3.72)	(5.08)	(6.46)	(8.23)	(1.24)	(0.84)	(0.88)	(1.21)	(1.07)
Observations	2369	2297	2231	2165	2099	2019	1955	1892	1824	1756
Countries	66	66	66	66	66	66	66	66	64	64
Episodes	34	33	33	33	32	34	33	32	33	32
Strictly preemptive	0.85	-3.55	-2.93	-1.62	4.08	1.50	2.32	3.09	4.30*	4.94*
	(4.87)	(5.91)	(8.28)	(8.58)	(9.24)	(1.02)	(2.17)	(2.29)	(2.32)	(2.89)
Observations	2369	2297	2231	2165	2099	2019	1955	1892	1824	1756
Countries	66	66	66	66	66	66	66	66	64	64
Episodes	23	23	21	21	21	20	20	19	18	17
	Panel E: Gross capital inflows to private/GDP					Panel F: Lending interest rates 1/				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Post-default	0.04	-2.19	0.02	0.52	-1.57	-0.97	1.61	5.57	4.59	-0.80
	(0.90)	(1.42)	(1.16)	(1.25)	(1.13)	(2.95)	(3.11)	(2.91)	(3.08)	(4.26)
Observations	1835	1756	1688	1621	1551	1332	1272	1217	1164	1108
Countries	66	66	66	64	64	56	56	56	56	56
Episodes	56	57	53	54	50	24	23	24	24	23
Weakly preemptive	-2.65*	-2.24*	-1.56	-3.26**	-2.01	-4.26	-8.12	-5.64	-4.08	-5.01
	(1.54)	(1.19)	(1.13)	(1.57)	(2.17)	(2.89)	(3.92)	(3.50)	(4.34)	(4.40)
Observations	1835	1756	1688	1621	1551	1332	1272	1217	1164	1108
Countries	66	66	66	64	64	56	56	56	56	56
Episodes	33	32	30	28	27	28	27	28	26	26
Strictly preemptive	1.60	0.23	2.04	3.20**	3.18*					
	(1.10)	(1.44)	(1.45)	(1.48)	(1.79)					
Observations	1835	1756	1688	1621	1551					
Countries	66	66	66	64	64					
Episodes	20	19	18	17	16					

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors, clustered at the country-level, are in parentheses.

1/ The 'weekly preemptive' row reports results for 'weakly and strictly preemptive' combined for the lending interest rates.

Table A5: AIPW Estimation Results

	Panel A: GDP					Panel B: Investment				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Post-default	-1.91***	-3.36***	-4.50***	-3.22***	-3.10***	-10.5***	-10.7***	-9.70***	-2.15	-2.12
	(0.33)	(0.50)	(0.73)	(0.79)	(0.96)	(2.32)	(2.32)	(3.65)	(3.46)	(3.93)
Observations	1619	1576	1534	1495	1456	1616	1573	1531	1492	1453
Countries	38	38	38	38	38	38	38	38	38	38
Episodes	58	58	57	56	55	58	58	57	56	55
Weakly preemptive	-0.88**	-1.22**	-0.67	-1.88**	-0.88	-2.14	-3.28	2.02	-3.10	-5.47**
	(0.36)	(0.53)	(0.73)	(0.85)	(0.79)	(1.54)	(2.41)	(2.84)	(2.61)	(2.91)
Observations	653	638	626	608	588	653	638	626	608	588
Countries	19	19	19	19	19	19	19	19	19	19
Episodes	34	33	33	33	32	34	33	33	33	32
Strictly preemptive	0.29	0.50	1.19*	-0.21	-0.80	2.18	5.66***	7.39***	6.92**	3.28
	(0.28)	(0.42)	(0.67)	(0.95)	(1.02)	(1.35)	(2.16)	(2.68)	(3.46)	(3.26)
Observations	554	538	523	508	492	554	538	523	508	492
Countries	15	15	15	15	15	15	15	15	15	15
Episodes	23	23	21	21	21	23	23	21	21	21

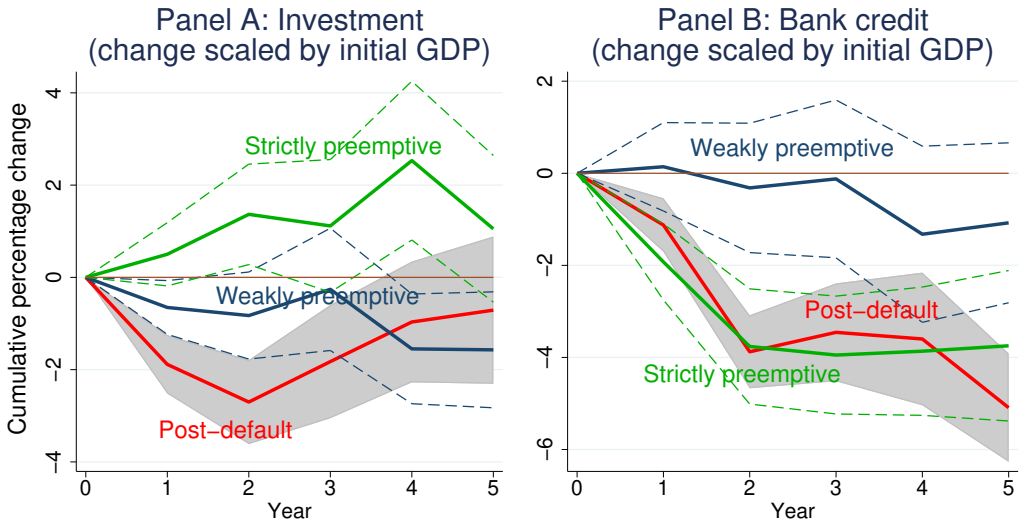
	Panel C: Bank credit					Panel D: Gross capital inflows/GDP				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Post-default	-3.98***	-11.9***	-13.2***	-17.1***	-20.1***	-1.76***	-2.90***	-0.48	-0.20	-2.09***
	(0.99)	(1.38)	(1.48)	(2.09)	(2.08)	(0.41)	(0.84)	(0.66)	(0.47)	(0.51)
Observations	1619	1576	1534	1495	1456	1378	1343	1309	1271	1229
Countries	38	38	38	38	38	38	38	38	38	38
Episodes	58	58	57	56	55	58	58	58	58	56
Weakly preemptive	4.50***	5.79***	7.30***	1.39	-2.18	-2.24***	-1.15**	-0.48	-2.42***	-1.01*
	(1.28)	(1.84)	(2.24)	(2.33)	(2.58)	(0.48)	(0.48)	(0.43)	(0.53)	(0.56)
Observations	653	638	626	608	588	560	547	532	515	498
Countries	19	19	19	19	19	19	19	19	19	19
Episodes	34	33	33	33	32	34	33	32	33	32
Strictly preemptive	3.38*	-2.83	-0.05	-2.50	2.35	1.33***	0.08	1.13**	2.54***	2.41***
	(1.79)	(2.49)	(3.05)	(3.12)	(3.21)	(0.32)	(0.53)	(0.56)	(0.54)	(0.65)
Observations	554	538	523	508	492	459	448	431	414	399
Countries	15	15	15	15	15	15	15	15	15	15
Episodes	23	23	21	21	21	19	19	18	17	16

	Panel E: Gross capital inflows to private/GDP					Panel F: Lending interest rates 1/				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Post-default	-0.08	-3.13***	0.05	0.66	-2.33***	-0.92	2.16***	7.77***	5.88***	-4.51***
	(0.46)	(1.01)	(0.67)	(0.60)	(0.58)	(0.68)	(0.67)	(0.55)	(0.56)	(1.00)
Observations	1214	1170	1125	1085	1042	730	702	670	640	611
Countries	38	38	38	38	38	31	31	31	31	31
Episodes	55	56	52	54	49	17	16	17	17	16
Weakly preemptive	-2.37***	-0.88	-0.64	-3.52***	-6.63***	1.20	-1.57*	0.75	0.94	0.79
	(0.47)	(0.67)	(0.43)	(0.56)	(1.25)	(1.03)	(0.87)	(0.96)	(0.99)	(1.12)
Observations	507	490	472	453	432	539	517	496	477	458
Countries	19	19	19	19	19	22	22	22	22	22
Episodes	33	32	30	28	27	24	23	24	22	22
Strictly preemptive	1.43***	-0.52	0.74	2.35***	2.48***					
	(0.37)	(0.57)	(0.50)	(0.52)	(0.57)					
Observations	420	404	387	367	351					
Countries	15	15	15	15	15					
Episodes	19	18	17	16	15					

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors, clustered at the country-level, are in parentheses.

1/ The 'weekly preemptive' row reports results for 'weakly and strictly preemptive' combined for the lending interest rates.

Figure A3 is analogous to Figure 3 but reports changes in investment and credit as a ratio to pre-restructuring GDP.

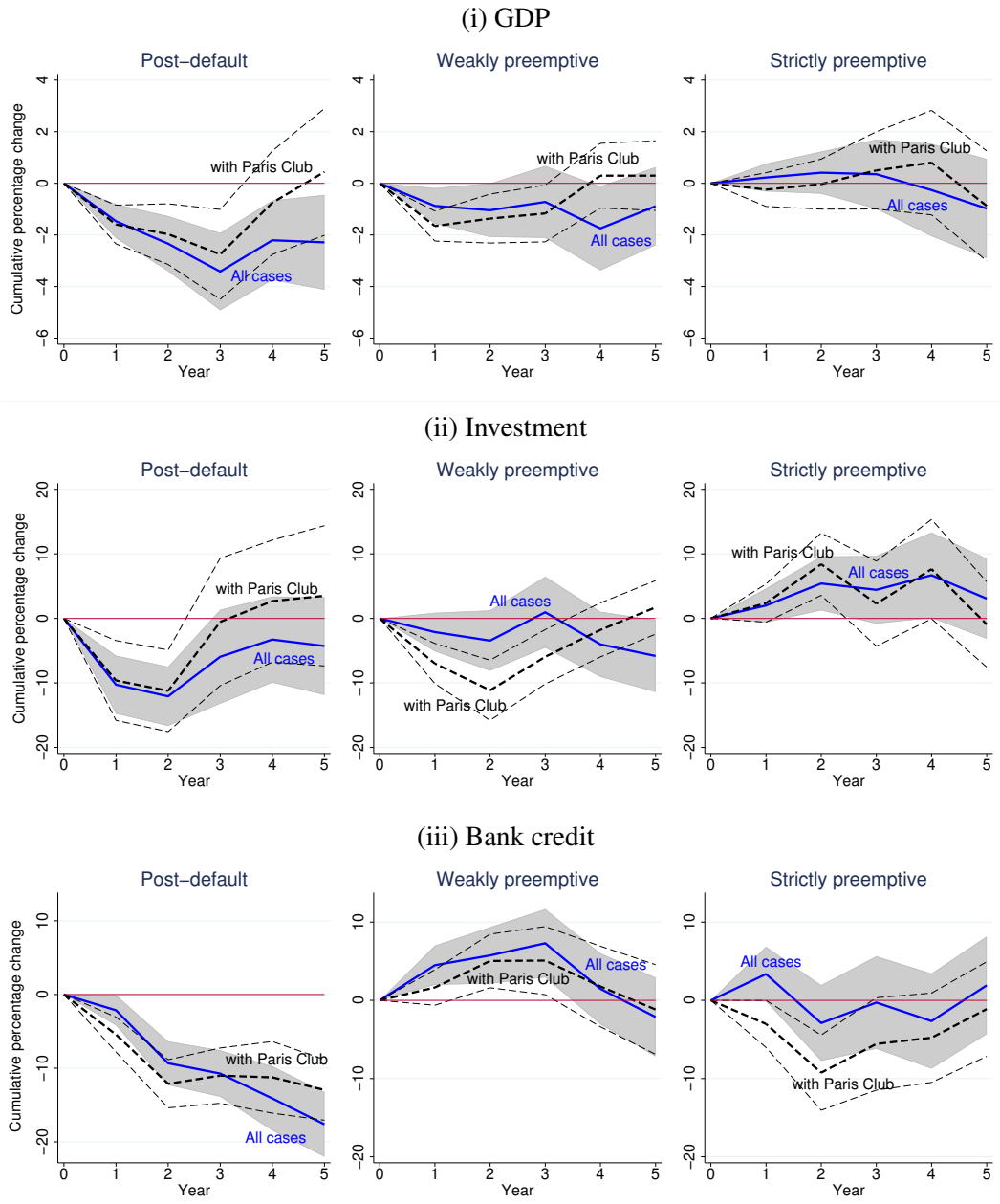


Notes: In Panels A and B, investment (real) and bank credit (real) are measured as a demeaned cumulative percentage change from the pre-crisis (t=0) level divided by pre-crisis GDP.

1/ Observations below 1 percent and above 99 percent of distribution are dropped.

Figure A3: AIPW Estimation Results Based on Different Measures

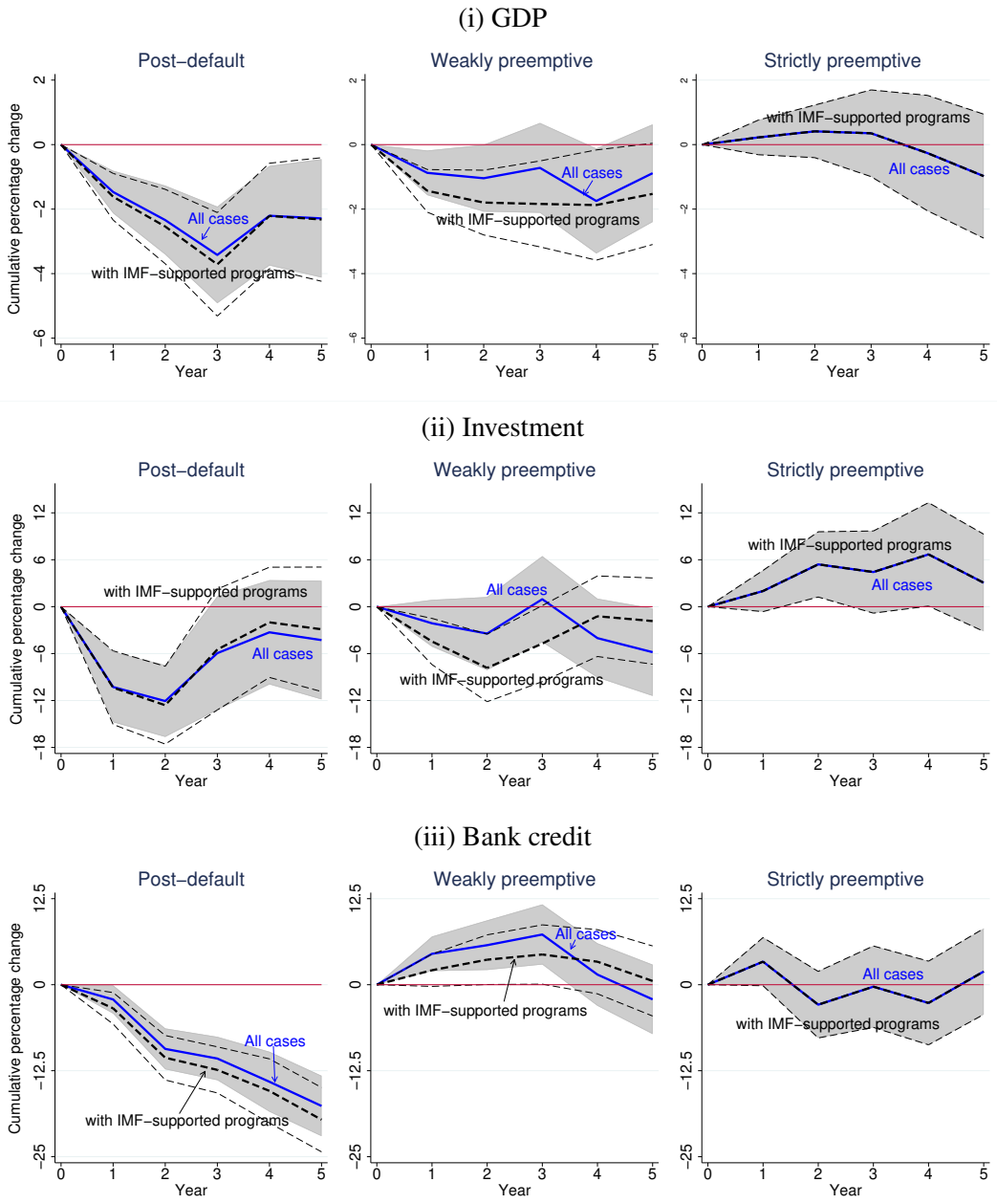
Figure A4 reports AIPW estimates for GDP, investment and credit for three types of restructuring strategies with an official external debt restructuring (the black dash lines). These estimates are compared to baseline AIPW estimates (Figure 3) for GDP, investment and credit for three types of restructuring strategies (the blue solid lines).



Notes: Each panel local projections of key macroeconomic variables. The bands and dashed lines indicate the 95 percent confidence intervals.

Figure A4: Private External Debt Restructurings with Official External Debt (Paris Club) Restructurings

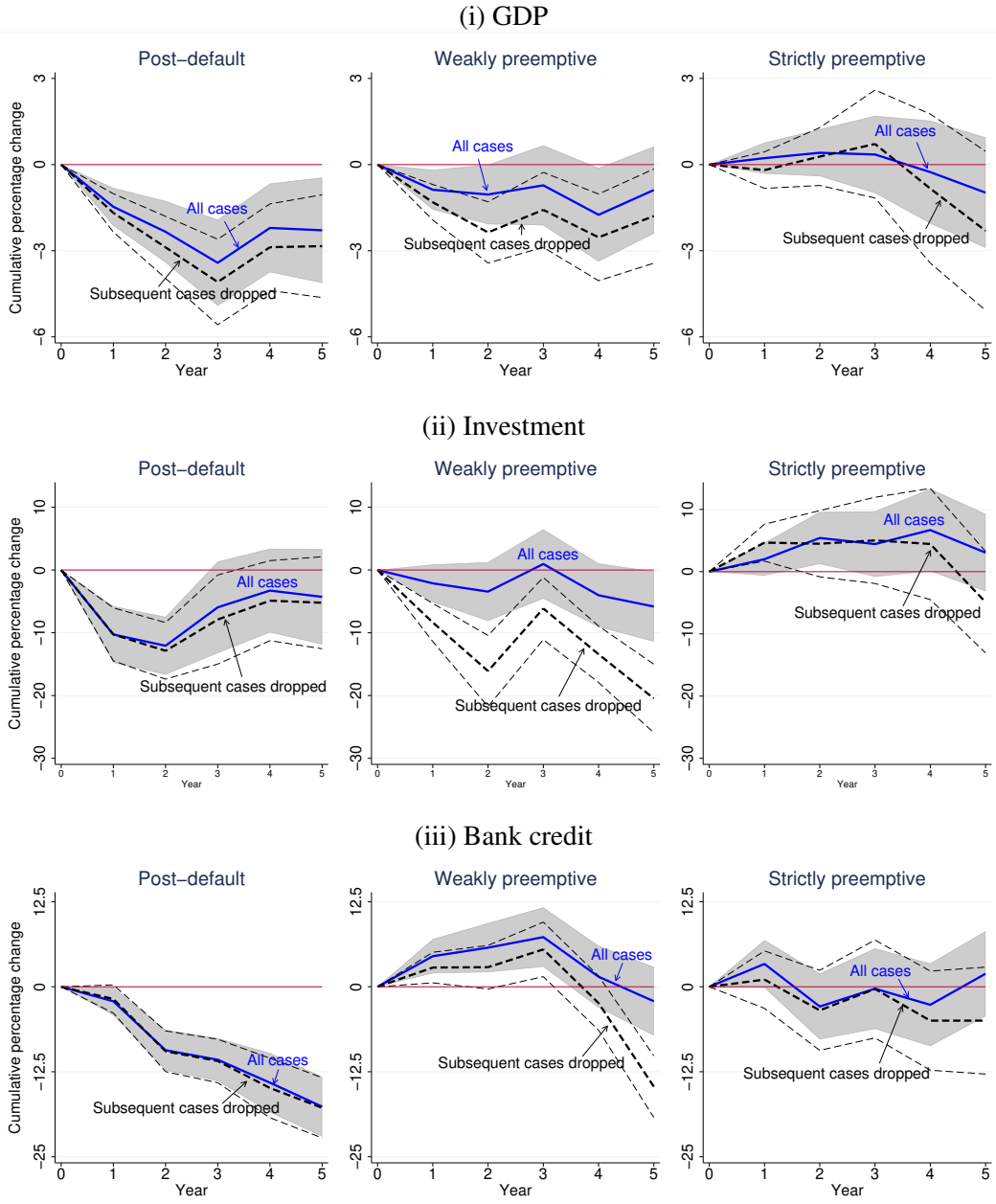
Figure A5 reports AIPW estimates for GDP, investment and credit for three types of restructuring strategies with an IMF-supported program (the black dash lines). These estimates are compared to baseline AIPW estimates (Figure 3) for GDP, investment and credit for three types of restructuring strategies (the blue solid lines).



Notes: Each panel local projections of key macroeconomic variables. The bands and dashed lines indicate the 95 percent confidence intervals.

Figure A5: Private External Debt Restructurings with IMF-Supported Programs

Figure A6 reports AIPW estimates for GDP, investment and credit for three types of restructuring strategies where sequential restructurings that take place within five years of an initial restructuring are dropped (the black dashed lines). These estimates are compared to baseline AIPW estimates (Figure 3) for GDP, investment and credit for three types of restructuring strategies (the blue solid lines).



Notes: Each panel local projections of key macroeconomic variables. The bands and dashed lines indicate the 95 percent confidence intervals.

Figure A6: Non-sequential Restructuring Episodes

We apply an AIPW estimation with the augmented set of controls; (i) external debt-to-GDP ratio, (ii) the terms of trade, (iii) freedom house index for civil liberty, (iv) freedom house index for political rights, (v) a Paris Club debt restructuring dummy, (vi) a pre-1990 dummy.

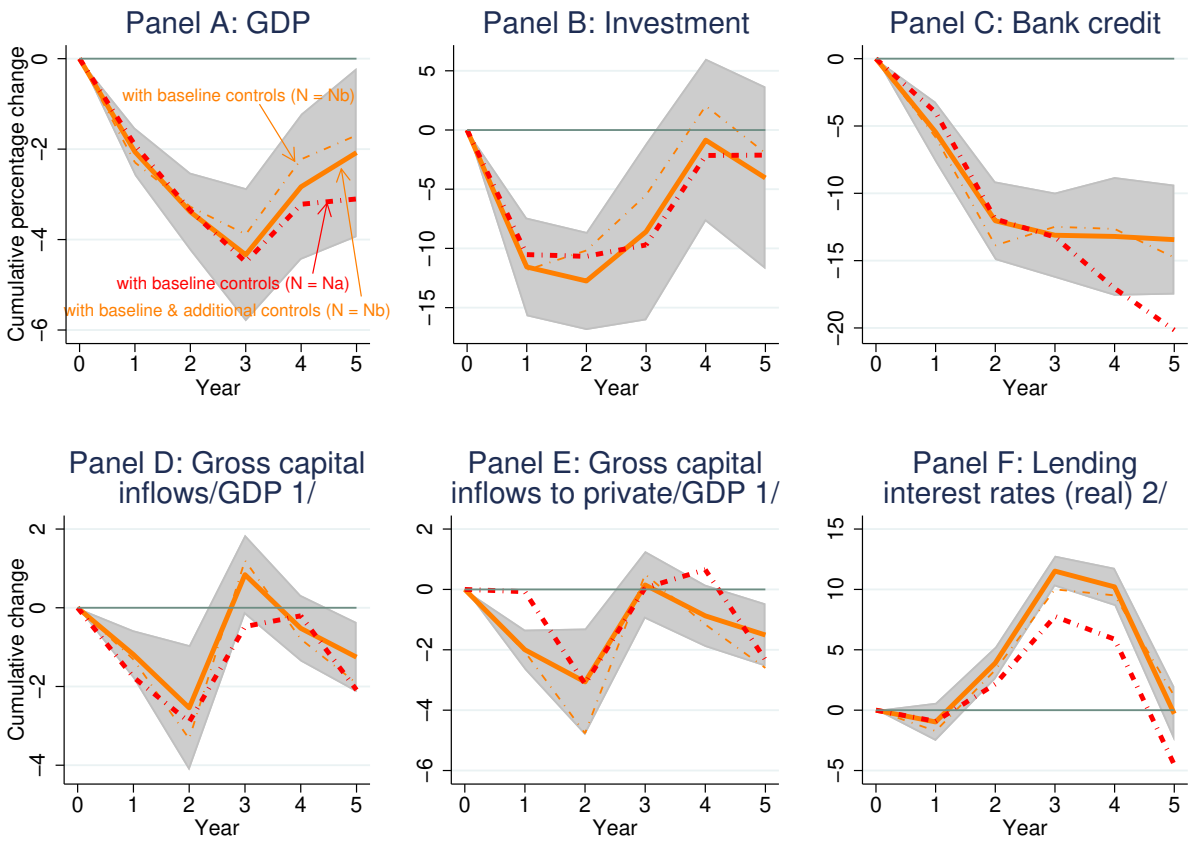
Table A6 reports probit regression results for three specifications: (i) baseline specification with baseline controls and full sample (columns 1, 4, and 7), (ii) baseline specification with baseline controls and a reduced sample (columns 2, 5, 8) and (iii) a specification with both baseline controls and the augmented set of controls and a reduced sample (columns 3, 6, 9).

Table A6: Probit Regressions with Additional Controls

	Post-default			Weakly preemptive			Strictly preemptive		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Predictors									
Federal funds rate	8.41***	8.38***	3.30	5.77*	5.42	9.56	-10.28***	-22.88***	-29.52***
	(1.75)	(2.10)	(2.60)	(3.12)	(4.22)	(6.18)	(3.53)	(6.52)	(9.57)
Contagion based on restructurings	4.00***	3.65***	1.29*	5.28***	4.82***	3.50	4.73***	0.70	-5.12
	(0.75)	(0.86)	(0.76)	(1.08)	(1.57)	(2.46)	(1.49)	(3.16)	(4.95)
Number of past preemptive cases	0.28**	0.30	0.36*	-0.28***	-0.61***	-0.71***	-0.41***	-1.51***	-2.12***
	(0.14)	(0.20)	(0.20)	(0.10)	(0.21)	(0.24)	(0.08)	(0.33)	(0.58)
Controls									
GDP growth rate/100	0.31	0.64	0.22	-4.61**	-2.88	-3.80	-0.11	-6.98*	-11.14**
	(1.28)	(1.77)	(1.78)	(1.89)	(2.80)	(3.09)	(2.05)	(3.64)	(4.93)
Government expenditure-to-GDP ratio	0.30	0.55	-0.80	-5.99*	-2.87	-6.04	3.75	0.99	-0.88
	(1.72)	(2.15)	(2.17)	(3.07)	(3.77)	(5.25)	(3.84)	(7.69)	(9.67)
Openness	0.44	-0.60	-0.28	1.48	-0.32	-1.20	1.58**	3.09**	4.09**
	(0.42)	(0.62)	(0.63)	(0.94)	(1.56)	(1.72)	(0.70)	(1.30)	(1.66)
Banking crisis dummy	0.05	0.10	0.23	0.47*	0.01	-0.15	-0.29	-0.92	-0.70
	(0.21)	(0.24)	(0.24)	(0.27)	(0.44)	(0.46)	(0.33)	(0.57)	(0.79)
Bank credit-to-GDP ratio	0.75	0.64	0.74	0.45	-2.49	-2.07	1.34*	2.71**	4.91**
	(0.63)	(0.67)	(0.65)	(0.64)	(2.01)	(1.30)	(0.76)	(1.24)	(2.17)
High inflation dummy (1 if inflation >%)	-0.42*	-0.21	-0.18	0.10	-0.72	-0.73	0.10	0.88	0.86
	(0.24)	(0.31)	(0.32)	(0.30)	(0.58)	(0.74)	(0.40)	(0.56)	(0.95)
External debt-to-GDP ratio			0.09			-0.53			1.18**
			(0.28)			(0.80)			(0.58)
Terms of trade (rate of change)			-0.10			5.07***			1.91
			(0.45)			(1.25)			(1.31)
Freedom house index, civil liberty			0.23*			-0.11			-0.06
			(0.13)			(0.23)			(0.38)
Freedom house index, political rights			-0.06			-0.20			0.52*
			(0.09)			(0.25)			(0.31)
Paris Club debt restructuring dummy			0.08			0.33			1.30**
			(0.18)			(0.31)			(0.59)
Pre-1990 dummy			0.99***			0.26			-0.83
			(0.28)			(0.81)			(1.34)
Observations	1,670	1,030	1,030	660	332	332	563	298	298
Chi-squared for predictors	75.59	54.82	6.74	48.85	50.53	16.02	26.98	25.86	14.61
p-value of Chi-squared	0.000	0.000	0.080	0.000	0.000	0.001	0.000	0.000	0.002

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors, clustered at the country-level, are in parentheses. All regressions include constant terms. All variables are lagged.

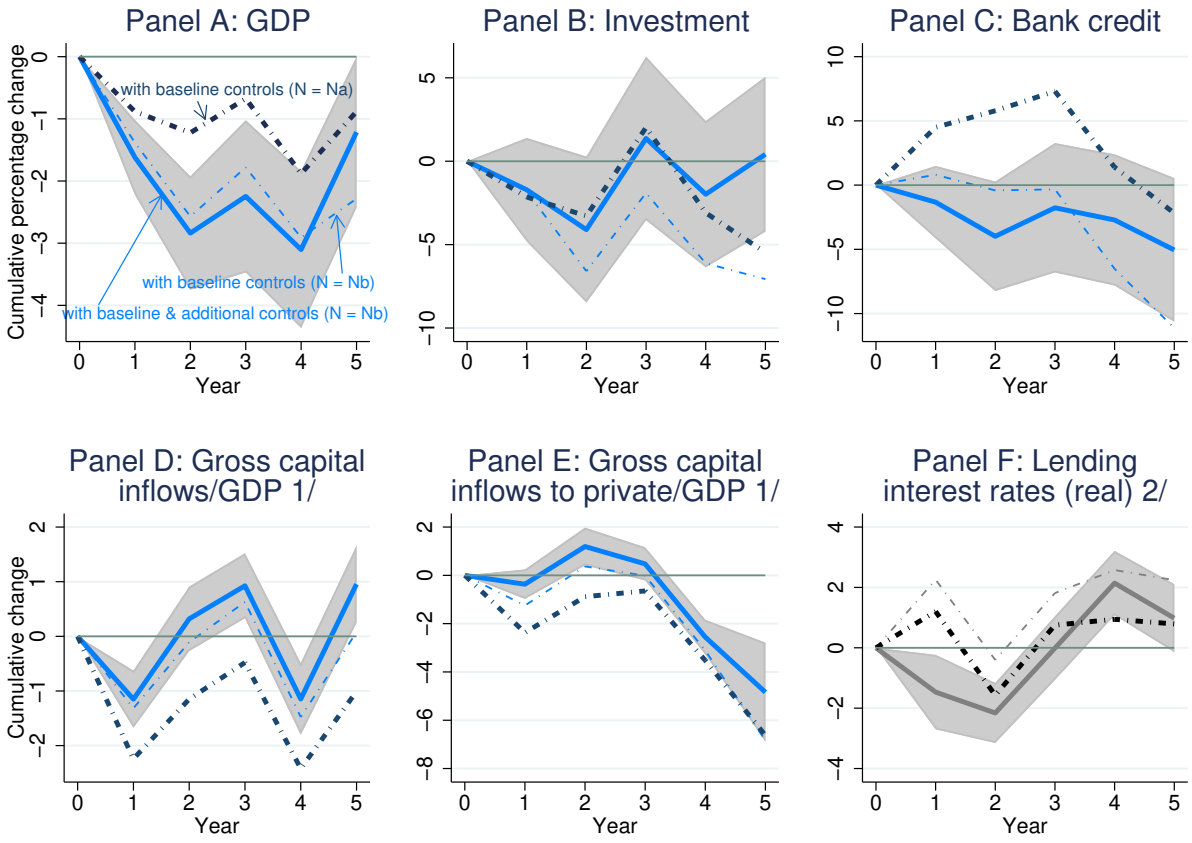
Figure A7 reports AIPW estimates for GDP, investment, credit, gross capital inflows and lending interest rates for post-default restructuring strategy with a specification with an additional set of controls and a reduced sample (the orange solid lines). These estimates are compared to (i) baseline AIPW estimates (Figure 3) obtained from a specification with baseline controls and full sample (the red dashed lines), and (ii) AIPW estimates obtained from a specification with baseline controls and a reduced sample (the orange dashed lines).



Notes: The solid lines indicate local projections with the baseline and additional controls. The dashed lines indicate local projections with the baseline controls only. The two local projections on the same panel are estimated using the same sample. The additional controls include external debt-to-GDP ratio, the terms of trade (rate of change), freedom house index (civil liberty), freedom house index (political rights), a Paris Club restructuring dummy, and a dummy taking unity for the period prior to 1990. The bands indicate the 95 percent confidence intervals.

Figure A7: AIPW with Additional Controls, Post-default

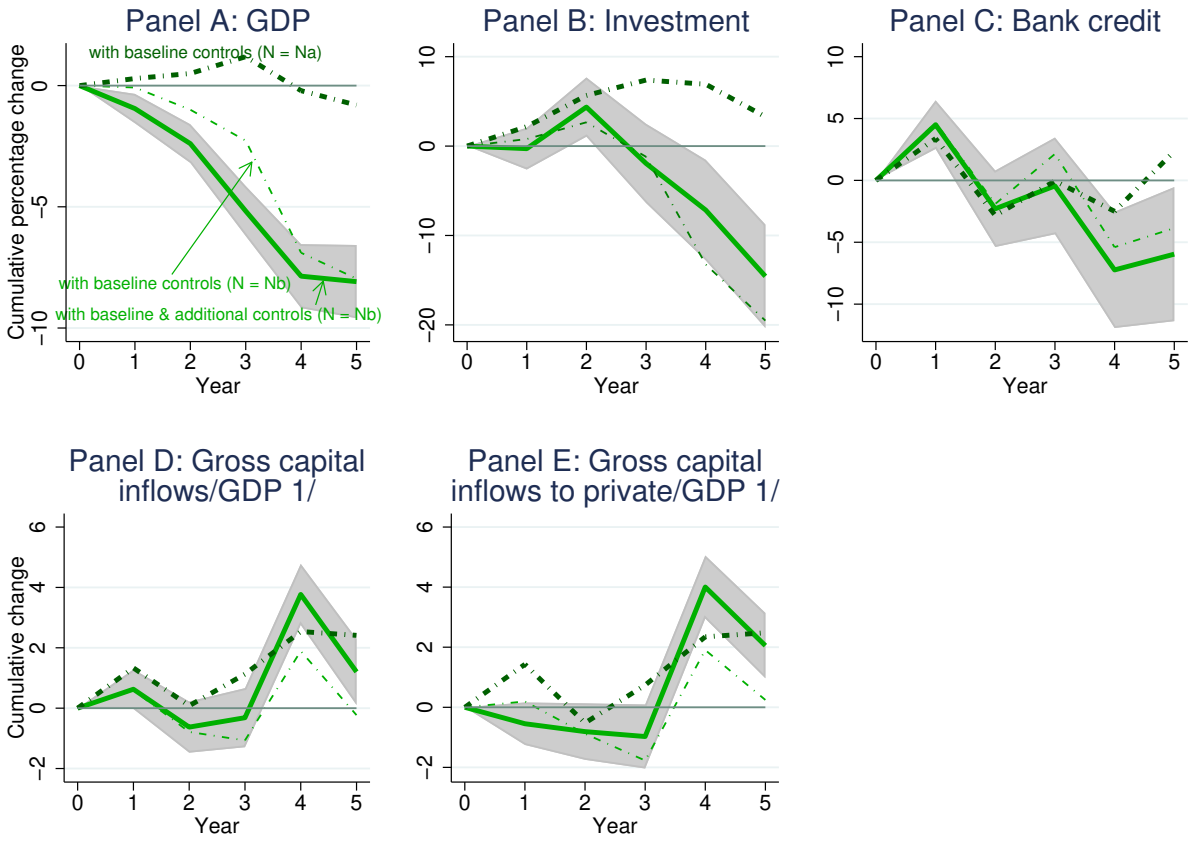
Figure A8 reports the same sets of AIPW estimates as for Figure A7, replacing the post-default dummy with the weakly preemptive dummy. The blue solid lines show AIPW estimates with an additional set of controls and a reduced sample. The dark blue dashed lines show baseline AIPW estimates (Figure 3) obtained from a specification with baseline controls full sample. The blue dashed lines show AIPW estimates obtained from a specification with baseline controls and a reduced sample.



Notes: The solid lines indicate local projections with the baseline and additional controls. The dashed lines indicate local projections with the baseline controls only. The two local projections on the same panel are estimated using the same sample. The additional controls include external debt-to-GDP ratio, the terms of trade (rate of change), freedom house index (civil liberty), freedom house index (political rights), a Paris Club restructuring dummy, and a dummy taking unity for the period prior to 1990. The bands indicate the 95 percent confidence intervals.
2/ Panel F shows the results for weakly preemptive and strictly preemptive cases combined.

Figure A8: AIPW with Additional Controls, Weakly Preemptive

Figure A9 reports the same sets of AIPW estimates as for Figure A7, replacing the post-default dummy with the strictly preemptive dummy. The green solid lines show AIPW estimates with an additional set of controls and a reduced sample. The dark green dashed lines show baseline AIPW estimates (Figure 3) obtained from a specification with baseline controls full sample. The green dashed lines show AIPW estimates obtained from a specification with baseline controls and a reduced sample.



Notes: The solid lines indicate local projections with the baseline and additional controls. The dashed lines indicate local projections with the baseline controls only. The two local projections on the same panel are estimated using the same sample. The additional controls include external debt-to-GDP ratio, the terms of trade (rate of change), freedom house index (civil liberty), freedom house index (political rights), a Paris Club restructuring dummy, and a dummy taking unity for the period prior to 1990. The bands indicate the 95 percent confidence intervals.

Figure A9: AIPW with Additional Controls, Strictly Preemptive

Table A7: Predicting the Start of Debt Restructurings by Bank Credit, Probit

	Post-default		Weakly preemptive		Strictly preemptive	
Bank credit-to-GDP ratio in the pre-crisis year	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Predictors						
Federal funds rates	3.94	12.44***	-2.04	15.29**	-4.77	-7.14
	(2.69)	(3.00)	(5.19)	(6.17)	(5.15)	(7.47)
Contagion variable based on restructurings	4.07***	3.88***	5.84***	6.75***	5.05***	1.02
	(0.99)	(1.31)	(1.72)	(2.57)	(1.61)	(3.56)
Past number of preemptive cases	0.19	0.47	-0.28*	-0.17	-0.28**	-0.47**
	(0.15)	(0.30)	(0.16)	(0.21)	(0.13)	(0.19)
Controls						
GDP growth rates	-1.37	1.90	-7.75**	-0.23	4.23	-2.81
	(1.38)	(2.05)	(3.48)	(3.85)	(3.85)	(3.63)
Government expenditure-to-GDP ratio	1.77	-2.17	-11.01	3.29	4.67	-0.72
	(1.89)	(2.75)	(6.74)	(9.05)	(3.43)	(6.70)
Openness	0.20	0.56	2.08	0.16	-0.09	2.61*
	(0.51)	(0.55)	(1.30)	(2.27)	(1.08)	(1.39)
Banking crisis dummy	-0.08	0.36	0.71	0.20	-0.13	-0.03
	(0.30)	(0.31)	(0.48)	(0.45)	(0.50)	(0.67)
High inflation dummy (1 if inflation >50%)	-0.72*	-0.57	0.06	0.19	-0.87*	0.47
	(0.40)	(0.52)	(0.62)	(0.59)	(0.52)	(0.72)
Observations	1,143	902	463	317	350	291
Chi-squared for predictors	27.64	32.60	16.66	19.03	14.40	6.85
p-value of Chi-squared	0.000	0.000	0.000	0.000	0.002	0.077

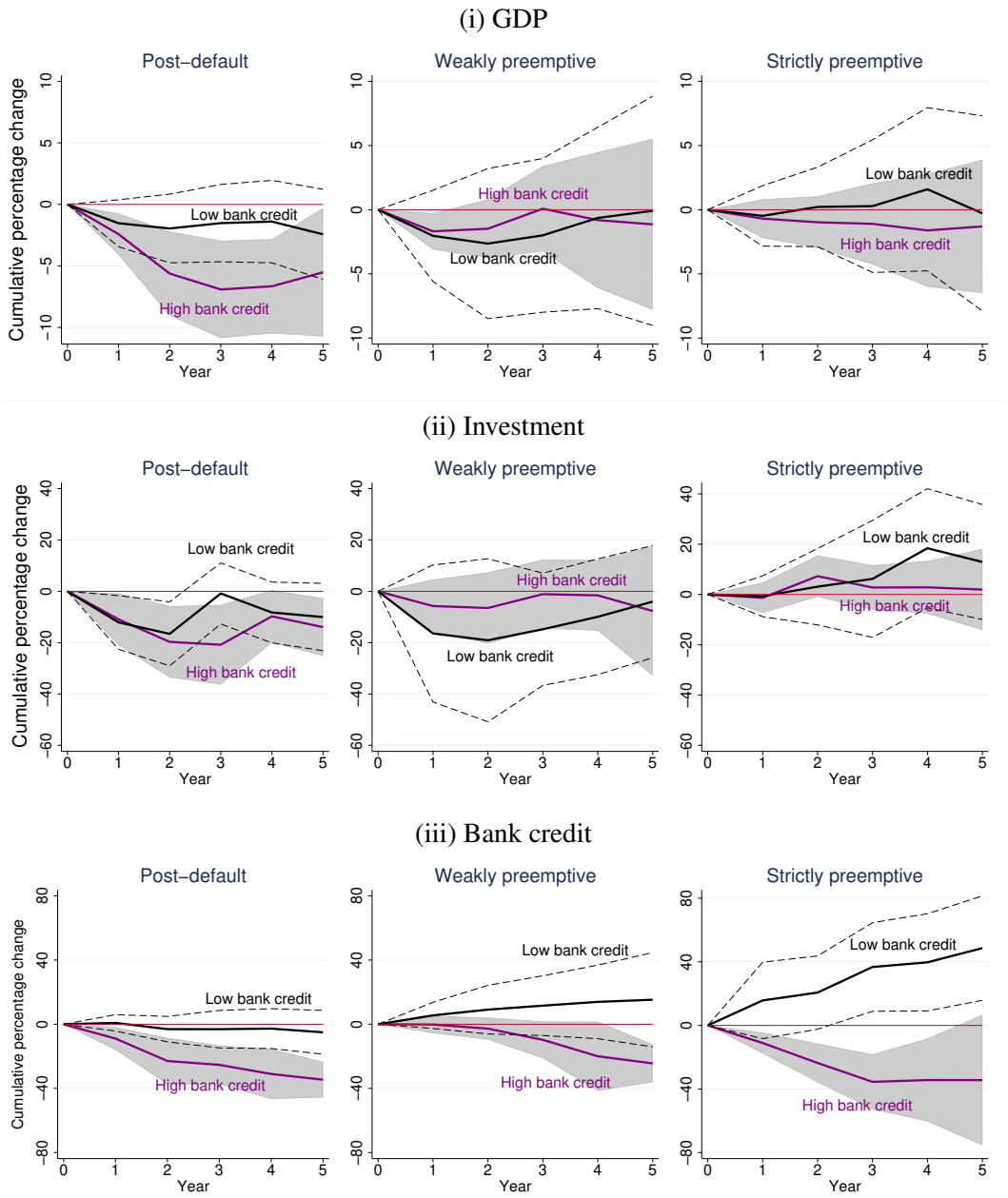
Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors, clustered at the country-level, are in parentheses. All regressions include constant terms. All variables are lagged.

Table A8: GDP, Investment, Bank Credit around Debt Restructurings, by Bank Credit, AIPW

	Panel A: GDP					Panel B: Investment					Panel C: Bank credit				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Post-default,	-3.46***	-7.86***	-10.4***	-8.79***	-8.07***	-9.50***	-10.9***	-21.7***	-9.95***	-12.0***	-7.02***	-18.7***	-20.9***	-30.8***	-36.4***
High bank credit	(0.55)	(1.08)	(1.08)	(0.97)	(1.14)	(2.01)	(2.33)	(3.11)	(2.98)	(3.16)	(1.25)	(1.85)	(2.07)	(2.72)	(2.61)
Observations	1142	1117	1092	1067	1041	1096	1070	1045	1020	994	1052	1024	998	972	944
Countries	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
Episodes	37	36	35	35	34	36	34	34	34	33	29	29	28	28	27
Post-default,	-0.5875973	0.63	1.23	1.84*	1.86	-16.1***	-11.9***	7.63*	-0.80	-4.67	0.73	-2.55	1.09	3.42	-1.30
Low bank credit	(0.37)	(0.61)	(0.84)	(1.01)	(1.21)	(3.18)	(2.93)	(4.00)	(4.33)	(5.39)	(1.11)	(1.55)	(1.75)	(2.30)	(2.60)
Observations	902	882	860	838	816	879	858	836	814	792	870	848	824	800	778
Countries	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Episodes	33	33	33	33	33	30	30	30	30	30	32	32	32	31	31
Weakly preemptive,	-1.74***	-2.23***	-1.11	-4.54***	-5.65***	0.01	0.23	1.15	-7.21***	-13.4***	0.35	-3.78**	-3.90*	-13.9***	-26.1***
High bank credit	(0.32)	(0.50)	(0.69)	(0.69)	(0.76)	(1.57)	(2.31)	(2.96)	(2.26)	(2.86)	(1.27)	(1.76)	(2.12)	(2.38)	(2.59)
Observations	462	452	442	431	420	459	448	438	427	416	452	441	430	418	407
Countries	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Episodes	17	17	17	17	16	17	17	17	17	16	16	16	16	16	15
Weakly preemptive,	-0.60	-0.39	-0.15	1.30	1.51*	-3.66**	-5.54*	-2.50	1.82	5.70**	7.75***	13.9***	18.1***	19.4***	22.6***
Low bank credit	(0.37)	(0.64)	(0.78)	(0.83)	(0.87)	(1.77)	(2.90)	(3.14)	(2.75)	(2.82)	(1.46)	(2.20)	(2.91)	(3.44)	(4.00)
Observations	317	310	304	295	285	317	310	303	294	285	310	302	295	285	275
Countries	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Episodes	18	18	18	18	18	18	18	18	18	18	18	17	17	17	17
Strictly preemptive,	-0.56	-0.82	-0.29	-1.62*	-2.03**	-3.35*	4.90*	2.91	3.29	-1.93	-9.57***	-22.8***	-34.2***	-38.0***	-39.9***
High bank credit	(0.41)	(0.51)	(0.72)	(0.91)	(1.06)	(1.94)	(2.82)	(2.34)	(2.63)	(2.83)	(1.95)	(2.41)	(2.83)	(3.53)	(4.56)
Observations	350	344	338	329	318	346	340	333	324	314	306	298	291	283	270
Countries	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Episodes	18	18	18	17	17	17	17	17	16	16	14	14	13	13	13
Strictly preemptive,	0.06	0.86	0.80	1.67	0.91	-1.26	2.71	5.32*	13.8***	11.5***	20.4***	19.6***	29.1***	30.5***	39.0***
Low bank credit	(0.41)	(0.56)	(0.89)	(1.22)	(1.35)	(1.58)	(2.10)	(3.04)	(4.11)	(4.01)	(2.89)	(3.43)	(4.01)	(4.41)	(4.74)
Observations	291	285	277	269	261	289	281	272	264	256	288	282	274	266	258
Countries	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Episodes	9	9	9	8	8	9	9	9	8	8	9	9	8	8	8

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors, clustered at the country-level, are in parentheses.

Figure A10 is analogous to Figure 4 but reports OLS results instead of our preferred AIPW estimates.



Notes: Restructuring episodes are divided into two groups based on bank credit to private sector as a share of GDP in the year prior to the restructuring. Those which are above (below) the median among all restructuring observations (post-default and preemptive) are classified as relatively large (small) banking sectors. The cutoff is the median for all restructuring episodes (both post-default and preemptive). Panels show local projections for cumulative changes. Gray bands and dashed lines denote the 95 percent confidence interval.

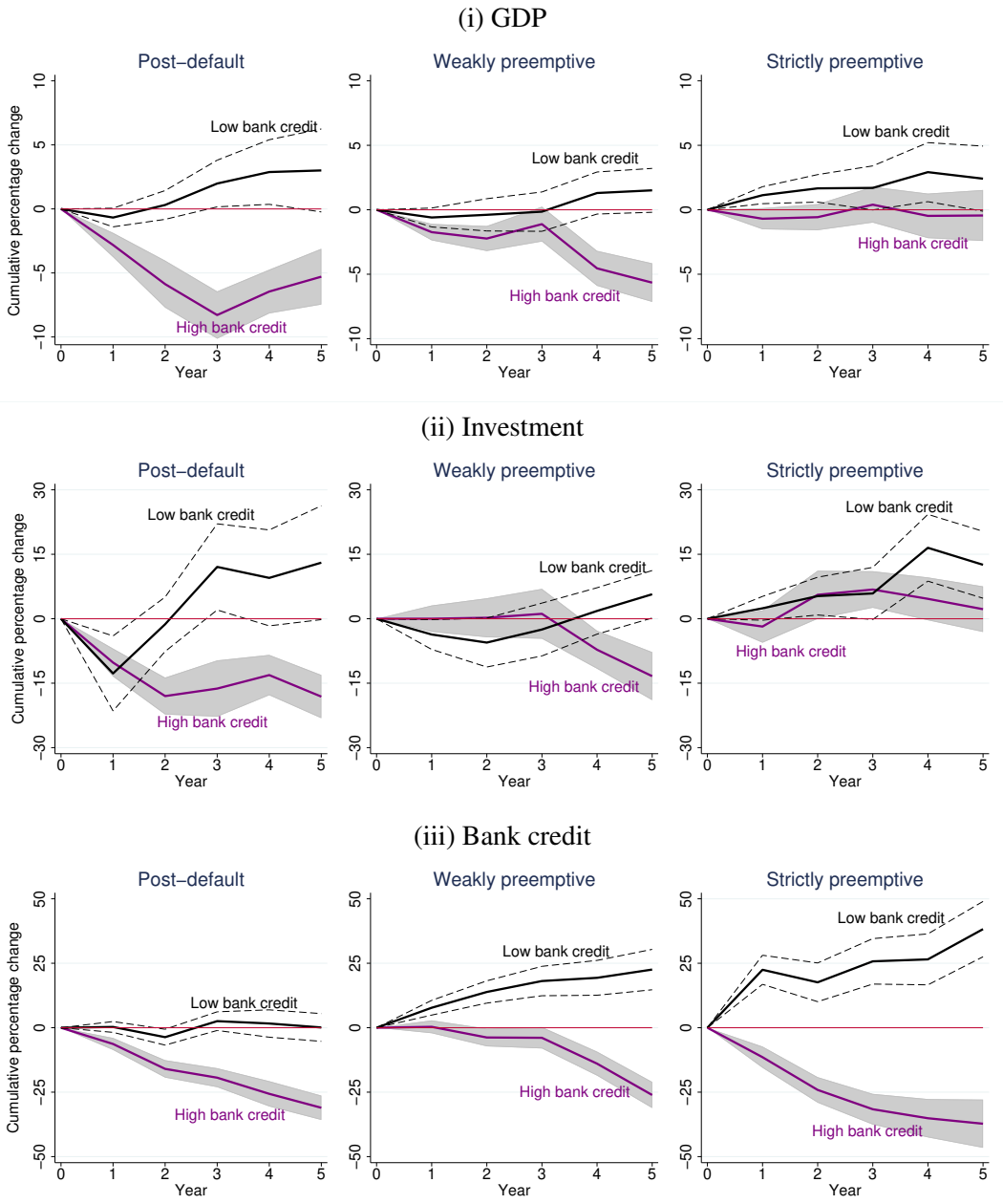
Figure A10: GDP, Investment, Bank Credit around Debt Restructurings, by Bank Credit, OLS

Table A9: GDP, Investment, Bank Credit around Debt Restructurings, by Bank Credit, OLS

	Panel A: GDP					Panel B: Investment					Panel C: Bank credit				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Post-default,	-2.42***	-5.62***	-6.91***	-6.65***	-5.52**	-10.9**	-19.7***	-20.8***	-9.75*	-13.9**	-8.92**	-22.9***	-25.3***	-31.0***	-34.5***
High bank credit	(0.85)	(1.74)	(2.02)	(1.95)	(2.66)	(5.16)	(7.08)	(7.92)	(5.22)	(5.73)	(3.60)	(7.35)	(6.15)	(7.96)	(5.64)
Observations	2582	2518	2453	2388	2322	2504	2437	2371	2306	2240	2382	2313	2246	2179	2112
Countries	69	69	69	69	69	69	69	69	69	68	66	66	66	66	66
Episodes	37	36	35	35	34	36	34	34	34	33	29	29	28	28	27
Post-default,	-1.53	-1.96	-1.52	-1.40	-2.43	-12.1**	-16.6***	-0.84	-8.24	-10.02	0.86	-3.04	-3.07	-2.71	-5.02
Low bank credit	(0.97)	(1.42)	(1.60)	(1.71)	(1.87)	(5.33)	(6.36)	(6.06)	(6.05)	(6.69)	(2.60)	(4.04)	(5.96)	(6.33)	(6.96)
Observations	2582	2518	2453	2388	2322	2504	2437	2371	2306	2240	2382	2313	2246	2179	2112
Countries	69	69	69	69	69	69	69	69	69	68	66	66	66	66	66
Episodes	33	33	33	33	33	30	30	30	30	30	32	32	32	31	31
Weakly preemptive,	-1.68**	-1.48	0.08	-0.81	-1.14	-5.74	-6.49	-1.10	-1.58	-7.65	-0.17	-2.73	-9.73*	-19.9*	-24.4***
High bank credit	(0.72)	(1.16)	(1.70)	(2.70)	(3.40)	(5.26)	(7.06)	(6.82)	(7.00)	(12.9)	(2.76)	(3.50)	(5.84)	(11.0)	(6.01)
Observations	2582	2518	2453	2388	2322	2504	2437	2371	2306	2240	2382	2313	2246	2179	2112
Countries	69	69	69	69	69	69	69	69	69	68	66	66	66	66	66
Episodes	17	17	17	17	16	17	17	17	17	16	16	16	16	16	15
Weakly preemptive,	-2.03	-2.64	-1.99	-0.64	-0.09	-16.4	-19.1	-14.8	-9.92	-4.01	5.52	9.12	11.6	14.0	15.3
Low bank credit	(1.81)	(2.98)	(3.06)	(3.60)	(4.55)	(13.6)	(16.2)	(11.2)	(11.5)	(11.1)	(4.16)	(7.73)	(9.50)	(11.7)	(15.0)
Observations	2582	2518	2453	2388	2322	2504	2437	2371	2306	2240	2382	2313	2246	2179	2112
Countries	69	69	69	69	69	69	69	69	69	68	66	66	66	66	66
Episodes	18	18	18	18	18	18	18	18	18	18	18	17	17	17	17
Strictly preemptive,	-0.69	-0.98	-1.10	-1.61	-1.30	-1.34	7.27*	2.75	2.82	1.94	-11.1***	-23.6***	-35.5***	-34.4***	-34.4
High bank credit	(0.77)	(1.03)	(1.61)	(2.24)	(2.65)	(3.06)	(4.18)	(4.51)	(5.33)	(8.22)	(3.33)	(6.21)	(8.79)	(13.3)	(21.0)
Observations	2582	2518	2453	2388	2322	2504	2437	2371	2306	2240	2382	2313	2246	2179	2112
Countries	69	69	69	69	69	69	69	69	69	68	66	66	66	66	66
Episodes	18	18	18	17	17	17	17	17	16	16	14	14	13	13	13
Strictly preemptive,	-0.48	0.22	0.28	1.60	-0.28	-0.71	3.09	6.19	18.4	12.9	15.7	20.6*	36.7***	39.7**	48.6***
Low bank credit	(1.20)	(1.58)	(2.64)	(3.24)	(3.88)	(4.15)	(7.75)	(11.9)	(12.1)	(11.7)	(12.3)	(11.8)	(14.2)	(15.6)	(16.8)
Observations	2582	2518	2453	2388	2322	2504	2437	2371	2306	2240	2382	2313	2246	2179	2112
Countries	69	69	69	69	69	69	69	69	69	68	66	66	66	66	66
Episodes	9	9	9	8	8	9	9	9	8	8	9	9	8	8	8

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Robust standard errors, clustered at the country-level, are in parentheses.

Figure A11 is analogous to Figure 4 except for the use of a time-varying threshold to distinguish high vs low bank credit.



Notes: Each panel local projections of key macroeconomic variables. The bands and dashed lines indicate the 95 percent confidence intervals.

Figure A11: GDP, Investment, Bank Credit around Debt Restructurings, by Bank Credit, Time-varying Threshold of High and Low Bank Credit, AIPW