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Trade Dynamics in Sovereign Debt Crises

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ABSTRACT: Sovereign debt restructurings can have large impacts on trade, with a significant compression of imports and a more ambiguous effect on exports. We show that the magnitude of that impact depends on whether restructurings preempt a default or take place after payments have been missed, with the latter associated with longer and deeper crises. Import compression is significantly higher following post-default restructurings, which also tend to be associated with higher exports relative to preemptive restructurings. This is consistent with the need for a larger external adjustment following a default. We also show how the effect varies across types of goods, and a larger impact when initial aggregate domestic demand in the debtor's economy is high.

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WORKING PAPERS

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Contents

1. Introduction

When debtor countries default or restructure their external sovereign debt, they experience a significant decline in output and domestic demand, and a large exchange rate depreciation relative to their pre-crisis trend. All of these channels impact international trade, beyond the effect the restructuring may have on trade finance.[1] All of these effects go in the direction of compressing imports. But the effect on exports is more ambiguous, as negative impacts on finance and other negative shocks may be partly offset by exchange rate depreciation in the aftermath of the debt crisis and producers shifting from domestic market to external markets given the weakness in domestic demand. The net result of these different channels differs across sovereign debt crises. Some crises are deeper and more protracted, leading to larger adverse impacts (e.g., larger decline in output and domestic demand, and a larger exchange rate depreciation) in the economy than others. Our paper quantifies these different impacts across different groups of goods in a sample covering 194 restructurings with private external creditors spanning 76 countries over 1975−2019.

We apply Local Projections with the Augmented Inverse Probability Weighted (AIPW) method proposed by Jordá and Taylor (2016) to attenuate bias selection and quantify a cumulative effect that takes into account the direct as well as the indirect effect through other macroeconomic variables. Our estimates consider two different types of debt restructurings as in Asonuma and Trebesch (2016) based on whether a default has taken place (payments have been missed) or whether the restructuring takes place preemptive (or payments are missed temporarily with the consent of creditors). Asonuma and Trebesch (2016) show that post-default restructurings that account around 60 percent of total restructuring episodes, take longer to resolve (5 years on average) and are associated with deeper economic losses. Asonuma et al. (2024) estimate a 6 percent decline in output relative to the pre-crisis trend following post-default restructurings compared to a fairly limited impact following a preemptive restructuring.[2] We explore that result to use the post-default vs preemptive nature of the restructuring as an ex ante proxy for how deep and prolonged its economic costs will be. This proxy is particularly well suited for local projection estimates, since the type of restructuring (whether payments have already been missed) is known at the outset of the crises. We then estimate the impact on both exports and imports, as well as their sub-groups such as manufactured or primary commodity goods, and purpose of goods such as capital, intermediate or consumption goods.

We extend our analysis by applying the AIPW estimation on two subsamples which are differentiated by whether domestic aggregate demand relative to GDP in the year prior to the start of debt restructurings is higher than the median for debt restructuring episodes. With this approach proposed by Auerbach and Gorodnichenko (2016) and Jordá and Taylor (2016), we quantify not only how trade dynamics are affected by different trade drivers originated by a sovereign debt restructuring, but also on how the debtor country's economic reliance on trade influences amplifications channel of these drivers on trade dynamics.

Our results show three main findings. First, imports experience a large compression following a post-default restructuring (15 percent decline in the ratio to GDP, or about 2 percentage points of GDP), but remain broadly

[1] Mendoza and Yue (2012) theoretically explain a sharp contraction of intermediate goods imports due to trade financing channel in sovereign default.

[2] For output costs of sovereign defaults, see also Sturzenegger (2004), Tomz and Wright (2007), Borensztein and Panizza (2009), De Paoli et al. (2009), Reinhart and Rogoff (2009), Levy-Yeyati and Panizza (2011), and Kuvshinov and Zimmermann (2019), and Caselli et al. (forthcoming).

stable following a preemptive restructuring.[3] The impact on exports tends to be smaller in magnitude, with post-default restructurings experiencing a small increase (of 0.4 percentage points of GDP) while preemptive restructurings experience a decline (of about 1.5 percentage points of GDP). This pattern suggests that substitution from producing for domestic to external markets can offset the larger negative supply shocks associated with post-default restructurings, which may also require a larger response in net exports to restore an equilibrium after a deeper crisis. Second, imports of manufactured goods and primary commodities experience similar declines following a debt restructuring. These declines are largely driven by capital goods and intermediate goods for manufactured goods and by consumption goods and intermediate goods for primary commodities. In contrast, the response of exports is more pronounced for manufactured goods, which shows a sharper differential impact across post-default and preemptive restructurings. That differential effect is strongest among capital goods. However, the effects and differences across goods become more muted when measured as a percentage of GDP, pointing to a large response from a relatively small base driving the export results. Finally, the import compression is stronger when domestic aggregate demand is initially high.

Our findings contribute to the empirical cross-country literature on trade costs of sovereign defaults (e.g., Rose 2005, Kohlscheen and Stephen 2008; Manasse and Roubini 2009; Borenstein and Panizza 2009; Martinez and Sandleris 2011; Zymek 2012; Kuvshinov and Zimmermann 2018; Serfaty 2021; Essers et al. 2025).[4,5] Rose (2005) show that debt renegotiation with official creditors are associated with a significant decline in the debtors' total trade. Kuvshinov and Zimmermann (2018) find that restructuring privately held debt leads to a significant decline in net exports. Serfaty (2021) shows that sovereign defaults over 1815−2019 are associated with a decline in trade, especially in imports. Our paper contributes to the literature by sharpening the focus on the differential impact on imports vs exports, across types of goods, and highlighting how that effect varies depending on whether or not the restructuring involved missed payments (i.e., a default).

Our findings also relate to the industry and firm-level literature on trade collapses following sovereign defaults. At an industry-level, Zymek (2012) shows that exports in more financially dependent industries suffer a more severe decline. At the firm-level, Gopinath and Neiman (2014) show that a decline in imports following Argentina's 2001 default is largely driven by firm-level changes in the product mix of imports and supplier countries, and Hébert and Schreger (2017) show that Argentine exporting firms suffer more severely by increases in the probability of sovereign default than would be initially expected. We fill a gap in the literature by showing different impacts between exports of manufactured goods and primary commodity goods in much a larger sample of 194 sovereign debt restructurings in 76 countries with different impacts between post-default and preemptive restructurings.

Our paper also contributes to a growing literature on key drivers of trade responses during crises. Recent studies (e.g., Behrens et al. 2013; Eaton et al. 2016; Hummels and Yong Lee 2018; Benguria and Taylor 2020; Bricongne et al. 2025) both empirically and theoretically explore trade drivers during the Global Financial Crisis (GFC). Among these studies, both Behrens et al. (2013), Eaton et al. (2016) and Hummels and Lee (2018) show that a decline in domestic aggregate demand plays a key role in the decline in imports during the GFC. Our finding fills a gap in the literature by showing not only how trade is affected by country-specific crises (e.g.,

[3] Throughout our analysis, we apply two measures of imports and exports such as growth rate and level of cumulative change of imports-to-GDP ratio (exports-to-GDP ratio) from the year before start of debt restructurings. The latter measure provides smaller effects in magnitude largely due to share of imports (exports) in GDP in pre-restructuring year.

[4] See also trade declines driven by default risks in non-debt crisis periods in Andreasen et al. (2025).

[5] For theoretical strand of literature on trade costs, see Mendoza and Yue (2012), Gu (2019), Serfaty (2021), and Andreasen et al. (2025),

debt restructuring events) that shocks are originated in the country rather than externally, but also on how the economy's reliance on trade interacts with responses of these trade drivers.

Lastly, our empirical results also contribute to a growing literature on heterogeneity within sovereign defaults and restructurings. On the theoretical strand, Arellano et al. (2023) show that debtors partially default with different intensity, and this results in no debt reduction due to arrear accumulation and continued borrowing. On the empirical strand, Trebesch and Zabel (2017) show that a default with higher haircuts and high degree of debtors' coerciveness ("hard default") is associated with protracted decline in GDP.[6] Asonuma, et al. (2024) show *within* restructuring strategies (e.g., post-default), countries with higher reliance on bank intermediation experience severe declines in GDP, investment and bank credit. This paper shows that an interaction between types of goods and the size of domestic aggregate demand plays a role in determining trade dynamics following different types of debt restructuring strategies.

2. Sovereign Debt Restructurings and Trade Data

2.1. Classification of Sovereign Debt Restructurings

We focus on restructurings of external privately held sovereign debt, using the Asonuma and Trebesch (2016) classification that distinguishes two types of restructurings based on whether or not payments have been missed:

- 'Preemptive restructurings" are implemented when there are no missed payments or payments are missed only temporarily and after the start of negotiations with creditor committees.

- 'Post-default restructurings' take place after a default event where payments have been missed without the agreement of creditors.

Our sample includes 194 restructurings episodes spanning 76 countries over 1975−2019 of which 115 and 79 were post-default and preemptive restructurings respectively. Appendix A1 lists the countries covered in our sample. Asonuma and Trebesch (2016) define the start of debt restructuring as the earlier of two events: the month in which a default occurs or the month when a distressed restructuring is publicly announced. For preemptive debt restructurings, the year that debtor countries announce debt restructuring is always the start of debt restructurings (start of estimation horizon in our analysis $t = 1$).

Most post-default events involve a default at the start of the restructuring or in the same year (106 episodes, accounting for 92 percent of post-default restructurings). But there are a few cases where a restructuring is first announced and a default (payments missed) only occurs in subsequent years. Our baseline sample drops those hybrid cases, focusing only on post-default episodes where the default happens in the year of start of the restructuring. Henceforth, any reference to post-default corresponds to the latter unless noted otherwise. Our robustness checks also consider two alternative classifications including hybrid episodes, one where the start year is based on the initial restructuring and another based on the year of the default. Appendix B provides the details of restructuring episodes covered in each classification and the corresponding analysis.

[6] Gordon and Guerron-Quintana (2019) theoretically show a lager (smaller) GDP growth shock is associated with a "hard (soft) default".

Each episode is considered as a separate event when there are multiple restructurings because they may involve different debt instruments. As a result, there is an overlap in some debt restructuring events. Appendix C discusses alternative ways to handle these cases and the robustness of our results. One approach relies on the "initial strategy," meaning that only the first restructuring episode is considered, while any subsequent restructuring occurring within five years of the first is excluded. Another approach focuses on the "worst strategy" among overlapping episodes. For example, classifying the case as a post-default restructuring if an initial preemptive restructuring is followed by a post-default one.

2.2. Trade Data and Classification of Types of Goods

Our annual trade dataset is from UNCTAD, and follows its production groups and composition classification:

- 'Manufactured goods' are (i) chemicals and related products, (ii) manufactured goods excluding pearls, precious and semi-precious stones and non-ferrous metals, (iii) machinery and transport equipment, (iv) miscellaneous manufactured articles.
- 'Primary commodity goods' are (i) food and live animals, (ii) beverages and tobacco; (iii) crude materials, inedible, except fuels, (iv) mineral fuels, lubricants and related materials, (v) animal and vegetable oils, fats and waxes, (vi) non-ferrous metals.
- 'Other goods' are all remaining goods other than manufactured goods and primary commodity goods.

Details of products are provided in Appendix A3. Due to a small share of other goods in aggregate imports and exports (around 2 percent), our analysis mainly focuses on both manufactured goods and primary commodity goods.

Both manufactured and primary commodity goods are further distinguished by subcomponents such as:

- 'Capital goods': machinery and transport equipment.
- 'Intermediate goods': crude materials, mineral, and fuels, metals, iron, steel, cement, and all the products, including "parts" in the descriptions.
- 'Consumption goods': food, beverages, tobacco, chemicals, textiles, furniture, footwear, office equipment, etc.) products.

Manufactured goods can be classified among the three subgroups above, whereas primary commodities only include intermediate and consumption goods. We do not have subcomponents to classify the residual category of other goods.

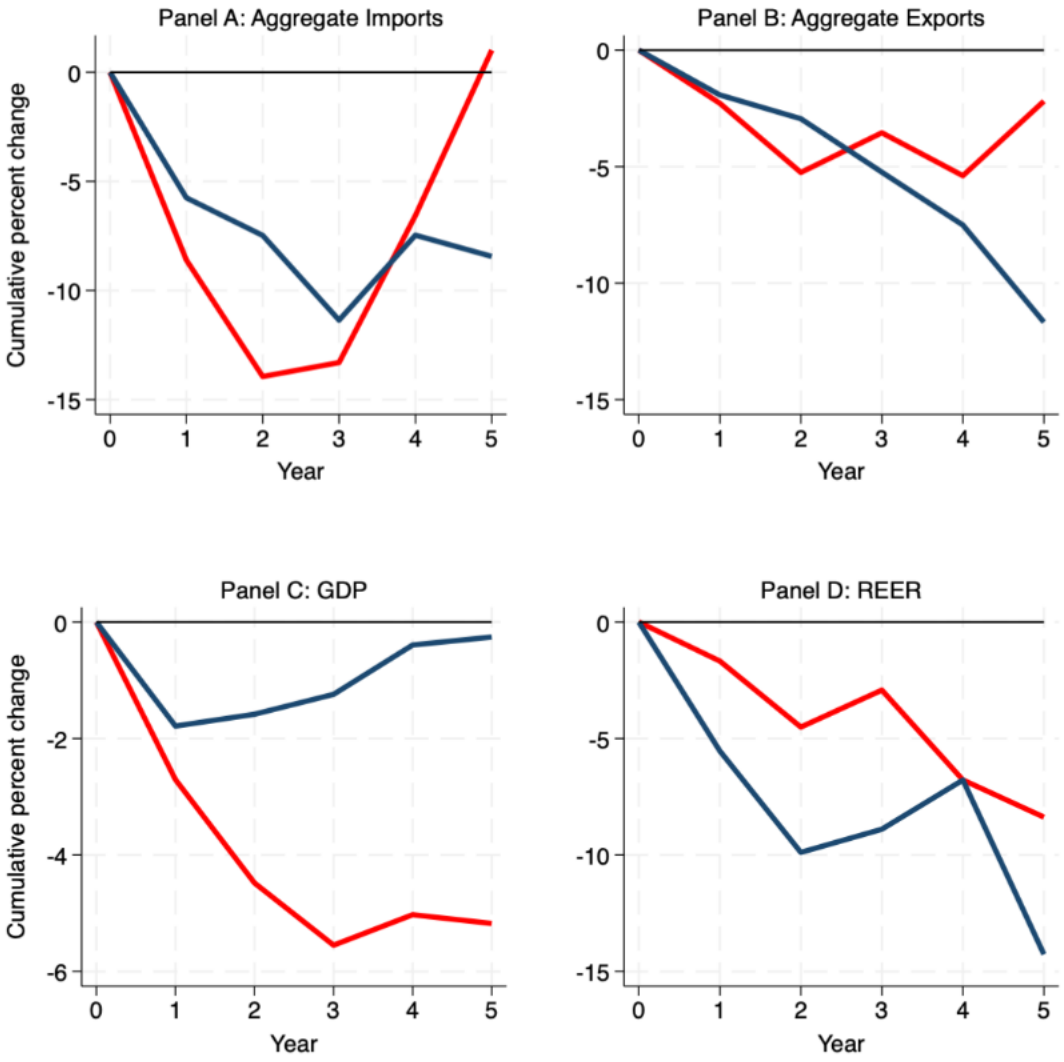
Macroeconomic variables other than trade are also at an annual frequency and mostly from the World Bank World Development Indicators (WDI). For remaining variables, the banking crisis variable (binary) is from Laeven and Valencia (2013, 2020) and the US federal fund rate is from FRED. The Freedom House indices are from the Freedom Houses and real effective exchange rate (REER) is from Darvas (2012, 2021).

3. Stylized Facts: Ordinary Least Square Local Projection Estimation

We start by presenting stylized facts based on both sample means and Ordinary Least Square (OLS) estimation. We report the averages of cumulative percentage changes from the level in the pre-restructuring year ($t = 0$, one year before the start of debt restructuring) for aggregate imports and exports, GDP and REER

in Figure 1. The series are adjusted for differences in country means in that difference (equivalent to a country-specific linear trend in levels) for the sample period. Both aggregate imports and exports are measured as a share of GDP. Debt restructurings happen at $t = 1$. Figure E1 in Appendix E reports the medians of cumulative percent changes and is identical to Figure 1. Figures E2−E3 in Appendix E reports the means and medians on dynamics of macroeconomic variables in the three years prior to the restructurings.

Figure 1. Trade and Macroeconomic Variables around Debt Restructuring, Mean



Notes: Aggregate imports (real) and aggregate exports (real) are the averages of demeaned cumulative percent changes of total imports-to-GDP ratio and total exports-to-GDP ratio from the level in the year before the start of debt restructurings (t = 0). GDP (real) and REER (index) are the averages of demeaned cumulative percent changes from the level in the year before the start of debt restructurings (t = 0). Red and blue lines are post-default and preemptive debt restructurings, respectively. Observations below 1 percentile and above 99 percentiles are dropped.

Both aggregate imports and GDP (measured relative to pre-crisis trend) experience a severe decline after post-default restructurings (red lines in Panels A and C), while the decline is much milder following preemptive restructurings (blue lines in Panels A and C), especially for GDP. Aggregate exports decline in the first 2 years

after post-default restructurings but stabilize afterwards, whereas the decline continues in the case of preemptive restructurings (red vs blue line in Panel B). REER experiences a severe decline over 5 years in both post-default restructurings and preemptive restructurings, which is sharper in the first two years after preemptive restructurings.

We employ the Local Projection approach introduced by Jordà (2005) to estimate the total cumulative impact of an event over a horizon after the sovereign debt crisis events. Both exports and imports are influenced not only directly but also indirectly through the effects on macroeconomic variables (GDP, REER) which are originally driven by the debtors' debt restructuring choice.

We estimate two separate regressions for post-default and preemptive debt restructurings. Control variables are defined as those that influence the debtors' choice of debt restructurings on the one hand, and also are influenced by the occurrence of debt restructurings on the other hand. The baseline Local Projection specification follows Asonuma et al. (2024) and includes as controls: (i) GDP growth, (ii) government expenditure-to-GDP ratio, (iii) trade openness (exports + imports / GDP ratio), (iv) banking crisis dummy, (v) bank credit-to-GDP ratio, (vi) high inflation dummy (above 50 percent), (vii) domestic aggregate demand-to-GDP ratio, (viii) terms of trade, and (ix) REER. The set of controls (i)–(vi) is the same as in Asonuma et al. (2024), while controls (vii)–(ix) are among the main drivers of trade dynamics used in the literature. Table A3 in Appendix A2 reports summary statistics of the controls. Table F1 in Appendix F shows differences in macroeconomic variables for both treatment and control groups in the year of the start of the debt restructuring and in the one year before and results justify our selection of controls.

Our baseline model specification follows closely Jordà and Taylor (2016), Jordà et al. (2016), and Kuvshinov and Zimmermann (2018). We explore two measures of trade, growth rate and level of cumulative change in exports (imports)-to-GDP ratio from the pre-restructuring year (year t) to year $t + h$ (measured in percent and percentage points, respectively) as follows[7]:

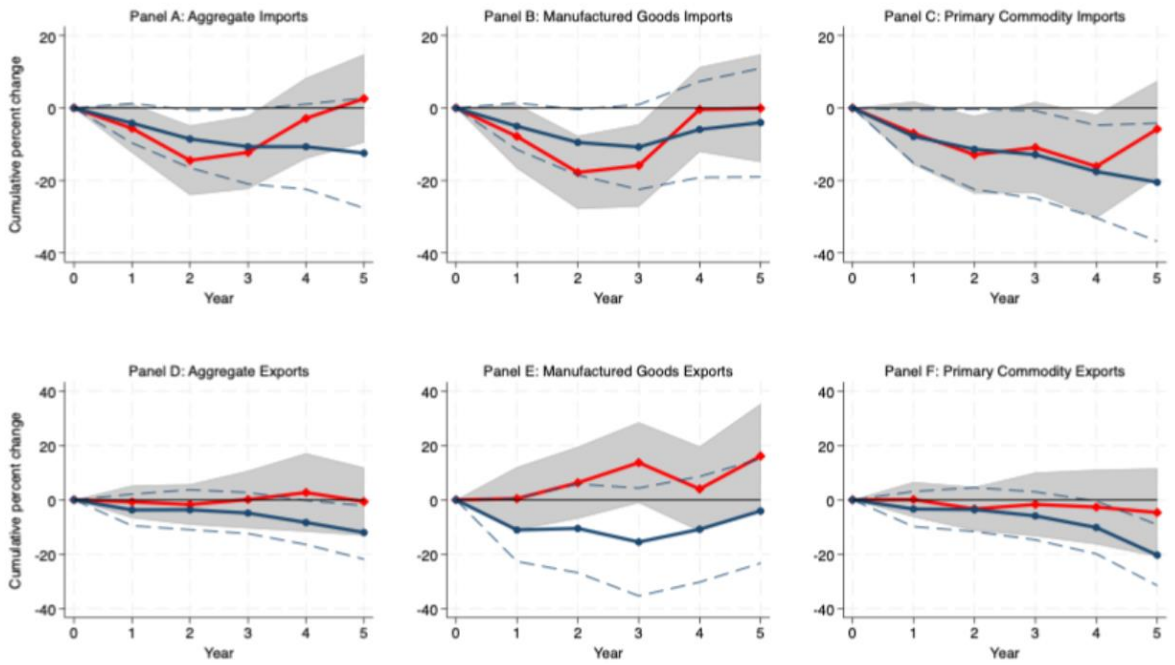
$$\log(y_{i,t+h}) - \log(y_{i,t}) = \alpha_i^{S,h} + \beta^{S,h} D_{i,t+1}^{S} + X_{i,t}\beta^{S,h} + \mu_{i,t+h}^{S} \quad (1)$$

$$y_{i,t+h} - y_{i,t} = \alpha_i^{S,h} + \beta^{S,h} D_{i,t+1}^{S} + X_{i,t}\beta^{S,h} + \mu_{i,t+h}^{S} \quad (2)$$

where for each horizon $h = 1,2,..,5$, and for each strategy, $S = \{postdefault, preemptive\}$, $\log(y_{i,t+h})$ and $y_{i,t+h}$ denote log and level of exports- and imports-to-GDP ratio of country i in year $t + h$, respectively. $\alpha_i^{S,h}$ denotes country fixed effects. $\boldsymbol{D_{i,t+1}^{S}}$ indicates the dummy variable taking unity if there is a type S debt restructuring in year t+1, and $\beta^{S,h}$ is its coefficient. The vector including control variables is denoted by $\boldsymbol{X_{i,t}}$. Their coefficients are denoted as $\boldsymbol{\beta^{S,h}}$. The error term is denoted by $\mu_{i,t+h}^{S}$. The conditional mean of the dependent variable is denoted by $m_j^{S,h}$ for state j = 1, 0 corresponding to 'restructuring" and "no restructuring', respectively.

[7] For example, when exports decline from 10 percent of GDP to 8 percent of GDP, the growth rate of the cumulative change in exports-to-GDP ratio is -20 percent, while the change in the level of exports-to-GDP corresponds to -2 percentage points.

Figure 2. Local Projection, OLS, Growth Rate of Cumulative Change



Notes: The figure shows OLS local projections based on results in Table G2 in Appendix G. Year 1 is the restructuring year. The dependent variable is the growth rate of cumulative change of imports (exports)-to-GDP ratio (aggregate, manufactured goods, primary commodity). The effects of post-default (red lines) and preemptive restructurings (blue lines) are estimated simultaneously by including all the dummies in one regression equation. The restructuring samples across all panels are balanced to examine the effects of the same restructuring episodes. The gray bands and dashed lines indicate the 95 percent confidence intervals. Observations below the 1 percentile and above the 99 percentiles are dropped.

For ease of illustration, we report the results graphically in Figure 2. These results can also be found in Tables G1−G3 of Appendix G. Each point in Figures 2 and G1−G2 shows the estimated cumulative change from the pre-restructuring year (t = 0) and associated confidence interval at a specific horizon for each restructuring strategy (e.g., the point for Year 1 is based on the estimation with h = 1).

Tables G1−G3 of Appendix G report three sets of statistics. One of them is the conventional *t*-tests which show whether the estimated coefficients are significantly different from zero. The other two sets of statistics compare coefficients obtained from different regressions, one based on bootstrap estimation and the other on a Clogg et al (1995) statistic.[8] These tests allow us to compare whether the difference between the point estimate for post-default and the point estimate for preemptive restructurings is significantly different from zero.

Before analyzing the impact on trade, we check that OLS estimation for macroeconomic variables (GDP and REER, reported in Figure G1 in Appendix G) is consistent with the stylized facts in Figure 1.

Aggregate, manufactured goods, and primary commodity imports all experience a sharp decline following a post-default restructuring (red lines in Panels A−C in Figure 2). Negative values indicate the cumulative percent

[8] The bootstrapped results are constructed by resampling the original data, computing the difference in the point estimates in that bootstrapped sample, and reporting the confidence interval for that difference based on the corresponding percentile across 1000 draws. See Horowitz (2019) for an application of the bootstrap method.

change of imports-to-GDP ratio compared to its country-specific pre-restructuring level. Please note that since Equation 1 estimates a log change, the decline in aggregate imports is not a sum of the decline in manufactured and primary commodities imports, but instead a weighted average of the decline of those two subcomponents.[9] The magnitude of that initial decline is similar across both groups of goods following a post-default restructuring. In contrast, imports experience a moderate and gradual but not statistically significant decline following preemptive restructurings (blue lines in Panels A−C in Figure 2). When we measure the change as a percentage of GDP in Figure G2 in Appendix G, the results are similar, though the magnitude of the decline is smaller since a large decline in the imports-to-GDP ratio only amounts to a few percentage points of GDP given how closed these economies are on average. Adding the results for the subcomponents in Figure G2 can be more directly mapped into the aggregate result.

Exports remain broadly stable (Panel D in Figure 2), with a smaller decline for post-default restructurings. The confidence intervals are sufficiently wide that most of the changes are not statistically significant except for a small decline among preemptive restructurings at the very end of the estimation horizon. The effect is more pronounced for manufactured exports (Panel E in Figure 2), which point to a larger increase for post-default restructurings and a larger decline for preemptive restructurings, albeit not statistically significant. The results for primary commodity exports (Panel F in Figure 2) largely mirror the ones for aggregate exports. When we measure by the level of cumulative change (Figure G2 in Appendix G), the results for aggregate exports are similar to those in Figure 2, but the difference between manufactured and primary commodity exports is muted, with wide confidence intervals.

Figures E4−E5 in Appendix E report sample average and median of cumulative changes since the year before the start of debt restructurings, respectively. Figures E6−E7 in Appendix E report sample average and median of cumulative changes including pre-restructuring years, respectively. Figures E4−E5 are similar to Figure 2.

4. Augmented Inverse Probability Weighted (AIPW) Estimation

4.1. Probit Regression on Debt Restructurings

A debtor's decision to restructure its debt is affected by the economic conditions that it faces, with restructurings being associated with negative shocks (and those negative starting conditions can then be worsened by the restructuring itself). In order to attenuate that bias, we apply the augmented inverse probability weighted (AIPW) estimation. The main difference between the AIPW estimation and OLS is to assign different weights across observations such as lower ones on observations that are more likely to be associated with a restructuring and higher ones to those that are less likely. With different weights assigned, we obtain a distribution of observations that is less biased from selection on observables (Altonji et al., 2005).

Those weights are obtained by a first stage probit regression based on data in the year of the start of the restructuring and in the previous year. The probit regression specification includes both controls and predictors following the previous studies on AIPW estimation (Jordá and Taylor, 2016; Jordá et al., 2019). Predictors are

[9] Due to a small share of other goods in aggregate imports and exports (reported in Table A4 in Appendix A3), growth rate of cumulative change of aggregate imports (exports) is almost identical to a weighted average of growth rate of cumulative change of manufactured and primary commodity imports (exports).

defined as a variable which satisfies exclusive restrictions (reported in a last section of Table 1) and influence debtors' debt restructuring choice but is not influenced by their debt restructuring choice. Our choice of predictors is the same as in Asonuma et al. (2024): (i) the US federal funds rate; (ii) a contagion measure constructed from the debt restructuring dummies of other debtor countries, weighted by the geographical distances between each debtor country and the others; (iii) the number of past preemptive restructuring choice. Both the US federal funds rate and the other debtor countries' debt restructurings are orthogonal to the debtor country *i*'s debt restructuring choice in year *t*. Past preemptive restructurings are pre-determined in year *t*.

We estimate two equations for the start of post-default and preemptive debt restructuring by a probit model:

$$Pr\left(D^{S}_{i,t+1} = 1 | \boldsymbol{X_{i,t}}, \boldsymbol{Z_{i,t}}\right) = \Phi\left(\boldsymbol{X_{i,t}}\boldsymbol{\gamma^{S,X}}, \boldsymbol{Z_{i,t}}\boldsymbol{\gamma^{S,Z}}, \gamma_i^S\right) \tag{3}$$

where for each $S = \{postdefault, preemptive\}$, $\boldsymbol{X_{i,t}}$ is the same set of controls used for equations (1) and (2) and $\boldsymbol{Z_{i,t}}$ is the set of predictors defined above. $\boldsymbol{\gamma^{S,X}}$ and $\boldsymbol{\gamma^{S,Z}}$ are the coefficients, and γ_i^S denotes country fixed effects. Estimating the regression leads to the predicted likelihood of each type of debt restructuring S, $\hat{p}^{S}_{i,t+1}$.

Table 1 shows the probit regression results. As expected, predictors play an important role in explaining the two types of debt restructurings. When the US federal funds rate is high, debtors are more willing to take a post-default restructuring, but less willing to take a preemptive restructuring. Restructurings are also associated with restructuring events in other countries in the same region. Debtors experiencing preemptive restructuring in the past are less willing to take preemptive restructuring in the current year. Similarly, controls also play a limited role predicting two types of debt restructurings.

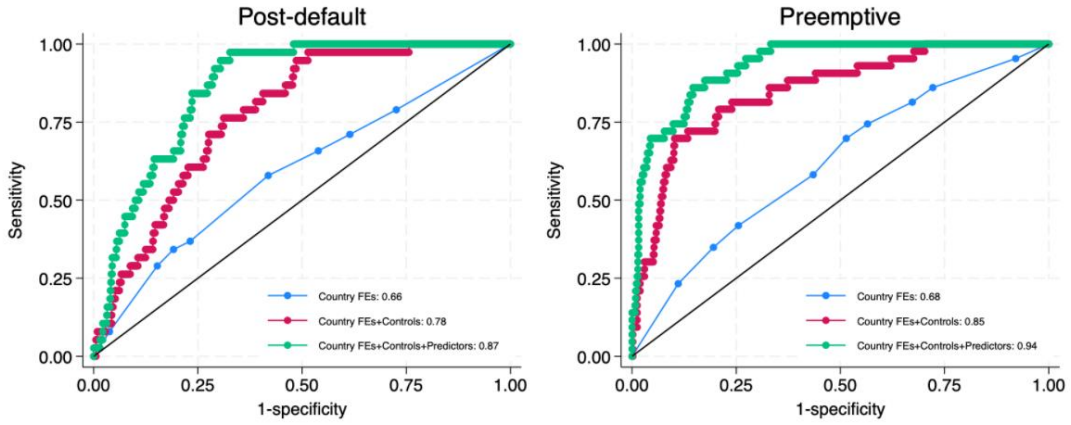
Panel (I) in Figure 3 shows the Receiver Operating Characteristic (ROC) for two restructuring strategies obtained from the probit regression. The implied areas under the ROC curve are 0.86 and 0.94 both of which indicate a fairly good classification power. There is a difference in the areas under the ROC curve for probit regression with and without predictors, 0.87 vs. 0.79 (post-default) and 0.94 vs. 0.85 (preemptive). This shows that predictors significantly help improve the classification power of both restructuring strategies. Panel (II) of Figure 3 shows the kernel density probability estimates for the two restructuring strategies. Density estimates of predicted probability of debt restructuring are more equally distributed for the treatment group, showing weights (i.e., inverse predicted probability) are assigned more equally across predicted probabilities. Columns 3−5 in Table 1 report the probit regression results and Panels (I) and (II) in Figure B1 in Appendix B1 show the ROC and the kernel density probability estimates for three alternative classifications such as (a) post-default episodes based on default year, (b) post-default episodes including those after the start of the restructuring, and (c) all debt restructuring episodes.

Table 1. Probit Regression on the Start of Debt Restructurings

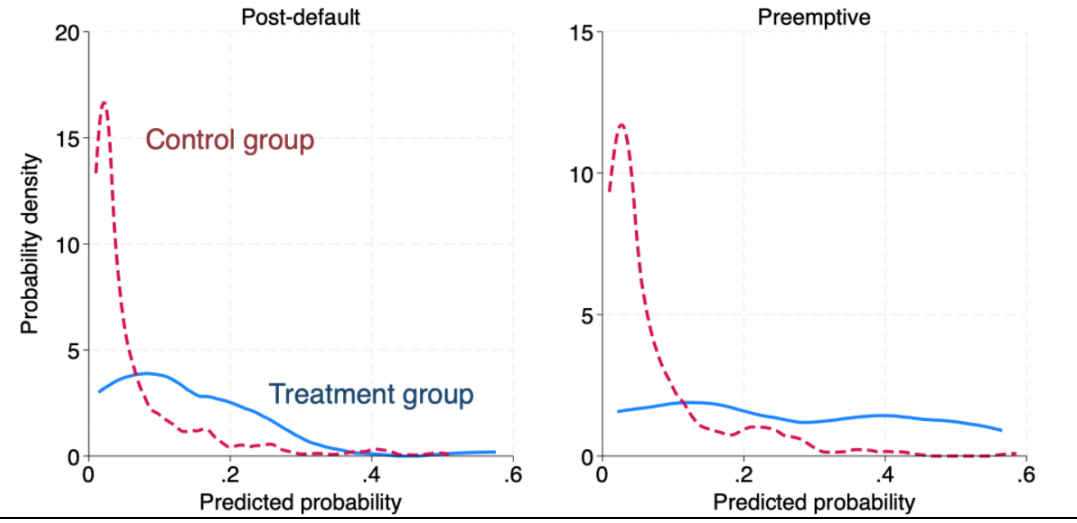
	Baseline Classification (1)-(2)		Alternative Classification (3)-(5)		
	(1)	(2)	(3)	(4)	(5)
	Post-default	Preemptive	Post-default (inc. Hybrid) (Default year)	Post-default (inc. Hybrid) (Start of restructuring)	All restructuring
Predictors					
US federal funds rate	5.442*	-3.351	4.527	2.006	4.967
	(3.152)	(4.742)	(3.076)	(2.543)	(3.054)
Contagion based on restructurings	4.224***	5.417***	4.409***	4.487***	4.057***
	(1.102)	(1.693)	(1.053)	(0.880)	(1.049)
Number of past preemptive cases	-0.157	-0.838***	-0.004	-0.474***	-0.003
	(0.284)	(0.189)	(0.252)	(0.118)	(0.262)
Controls					
GDP growth rate/100	1.626	-4.414*	1.602	-1.124	1.837
	(2.186)	(2.526)	(2.073)	(1.551)	(2.121)
Government expenditure-to-GDP ratio	0.249	0.009	0.900	1.065	0.642
	(2.447)	(4.919)	(2.396)	(2.067)	(2.414)
Trade openness	0.031	0.987	0.204	0.363	0.214
	(0.555)	(0.992)	(0.547)	(0.475)	(0.552)
Banking crisis dummy	0.280	-0.484	0.372	0.023	0.261
	(0.278)	(0.363)	(0.257)	(0.211)	(0.265)
Bank credit-to-GDP ratio	0.771	0.501	0.382	0.460	0.575
	(0.833)	(1.121)	(0.782)	(0.640)	(0.773)
High inflation dummy (1 if inflation >50%)	0.012	-0.248	-0.223	-0.032	-0.009
	(0.552)	(0.558)	(0.488)	(0.345)	(0.486)
Domestic aggregate demand-to-GDP ratio	-0.392	-1.290	-0.095	-0.750	-0.447
	(1.303)	(1.980)	(1.206)	(1.037)	(1.265)
Terms of trade	0.007	0.022**	0.006	0.010*	0.007
	(0.007)	(0.011)	(0.007)	(0.005)	(0.007)
Real effective exchange rates	0.000	-0.002	0.002	0.001	0.003
	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)
Observations	945	601	973	1279	972
χ-squared for predictors	24.974	36.489	26.281	61.292	24.105
p-value of χ-squared	0.000	0.000	0.000	0.000	0.000
Area under ROC curve	0.871	0.935	0.865	0.883	0.864

Figure 3. Receiver Operating Characteristic (ROC) Curve and Kernel Density Estimates

(I) Receiver Operating Characteristic (ROC) Curve



(II) Kernel Density Estimates



4.2. Augmented Inverse Probability Weighted (AIPW) Estimation

We follow the AIPW estimation in Jordá and Taylor (2016). First, we apply OLS on our baseline model specification (equations 1 and 2) to obtain the estimated conditional means $m_j^{S,h}$. Second, we apply the probit regression model (equation 3) to obtain the predicted likelihood of each debt restructuring strategy $\hat{p}_{i,t+1}^{S}$. Third, we define the AIPW estimator using both estimated conditional means and predicted likelihood.

$$\Lambda_h^S = \frac{1}{N}\sum_i\sum_t \left\{\left[\frac{D_{i,t+1}^S\left(y_{i,t+h} - y_{i,t}\right)}{\hat{p}_{i,t+1}^S} - \frac{\left(1 - D_{i,t+1}^S\right)\left(y_{i,t+h} - y_{i,t}\right)}{1 - \hat{p}_{i,t+1}^S}\right]\right\} - \frac{D_{i,t+1}^S - \hat{p}_{i,t+1}^S}{\hat{p}_{i,t+1}^S\left(1 - \hat{p}_{i,t+1}^S\right)}\left[\left(1 - \hat{p}_{i,t+1}^S\right)m_1^{S,h} + \hat{p}_{i,t+1}^S m_0^{S,h}\right] \quad (4)$$

where the first square bracket inside a summation term is the inverse probability weighting (IPW) estimation and the second term inside the summation term is the weighted average of the two predicted dependent variables.

Figures 4 and Figure H1 in Appendix H visually report the AIPW results for the regressions in Table 2 and Tables H1−H2 in Appendix H. Each point shows the estimated coefficient and associated confidence interval at a specific horizon for each restructuring strategy, reporting the cumulative change from the pre-restructuring year (t = 0).

Before turning to the discussion of trade, we confirm the results for GDP and REER under AIPW, which is reported in Figure H1 in Appendix H. The estimates confirm a much higher decline in GDP following post-default restructurings. But the results on the REER show more difference between the two types of restructuring compared to the summary statistics and OLS plots. The AIPW estimates point to a persistent and deep decline in the REER following post-default restructurings. In contrast, preemptive restructurings experience a large initial impact, but then the REER recovers, with the effect mostly vanishing by the fifth year.

Aggregate imports, as well manufactured goods and primary commodity imports all experience a sharp decline following a post-default restructuring (red lines in Panels I-A−I-C), with a 10-15 percent decline in aggregate imports-to-GDP ratio by year 3. The initial declines by year 3 are of comparable magnitude for manufactured and primary commodity imports, but the former tends to recover by year 4. Both a sharp decline in GDP and a large REER depreciation following post-default restructurings negatively influence imports through a sharp contraction in import demand and through a sharp increase in import price (in local currency terms), respectively. In contrast, imports remain stable following preemptive restructurings (blue lines in Panels I-A−I-C), with aggregate imports and manufactured imports even experiencing a modest increase by the end of the estimation horizon) with a 7 percent increase in the aggregate imports-to-GDP ratio. That difference in response between post-default and preemptive restructurings is statistically significant under the Clogg et al (1995), but not statistically significant under bootstrapping approach. When the change in imports is measured as a percentage change of GDP (Panel II) the results are qualitatively similar. The import compression following post-default restructurings is about 2 percentage points of GDP by year 2.

Aggregate exports remain relatively stable following a post-default restructuring, but eventually experience a small but significant increase of about 11 percent by year 4 when measured as a percent change from their initial GDP ratio (red line in Panel I-D). That is driven by a more pronounced increase in manufactured exports (red line in Panel I-E) while primary commodity exports remain broadly stable (red line in Panel I-F). The results suggest the negative impacts on the economy (e.g. sharp decline in GDP) can be more than compensated by the adjustment in the REER, and a shift in production from the domestic to the external sector to the extent that relocation is possible. In contrast, aggregate exports experience a small but significant decline of about 5 percent following preemptive restructurings, which is driven mostly by manufactured exports (blue lines in Panels I-D and I-E). Differences between post-default and preemptive restructurings are statistically significant for all three export measures over most or the entire horizon under the Clogg et al. (1995) statistical test but not statistically significant under bootstrapping approach. When we measure exports as a percentage change of GDP (Panel II), the effect of post-default restructurings becomes much more muted and largely not statistically significant. Preemptive restructurings continue to be associated with a significant decline in exports of about 1.7 percentage points of GDP (blue line in Panel II-D), which is mostly driven by primary commodity exports (blue line in Panel II-F). Both measures are informative, and together suggest that the results in Panel I are being driven by relatively closed economies, which experienced large percent changes from a relatively low base of

exports. And that on balance, the results are more robust for imports than exports, due to the competing channels affecting the net impact on the latter.

We apply several sets of robustness checks to our baseline results. First, Figure B4 in Appendix B1 reports the AIPW estimation results when we use the full sample of post-default restructurings, including the hybrid cases where the default only occurs after the start of the restructuring. The results are similar to our baseline results of strictly post-default restructurings. Second, Figure B7 in Appendix B2 reports AIPW estimation results when we keep the same sample of post-default restructurings and preemptive restructurings, but treat the default year as the start of debt restructurings. Third, Figures C1–C2 in Appendix C report the AIPW estimates based on two alternative approaches for taking overlapping debt restructurings into consideration as discussed in Section 2.1. Both figures are similar to our baseline results. Lastly, when we use a median regression, the results are also similar to our baseline results as shown in Figure II in Appendix I.

Figure 4. Local Projection, AIPW

(I) Growth Rate of Cumulative Change

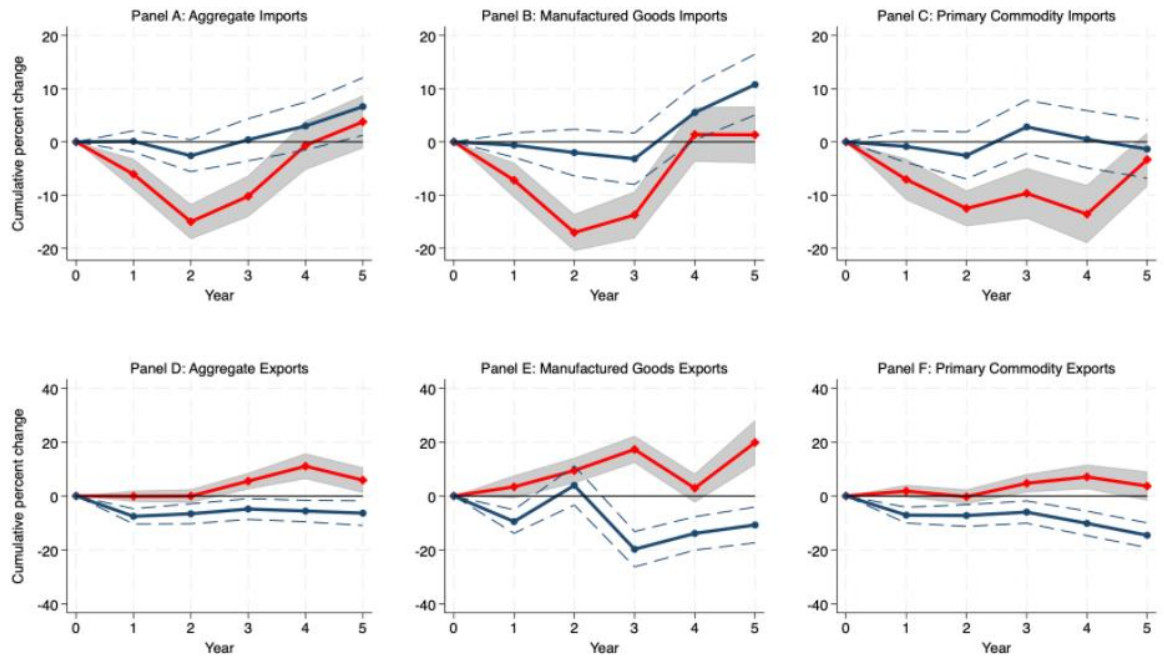
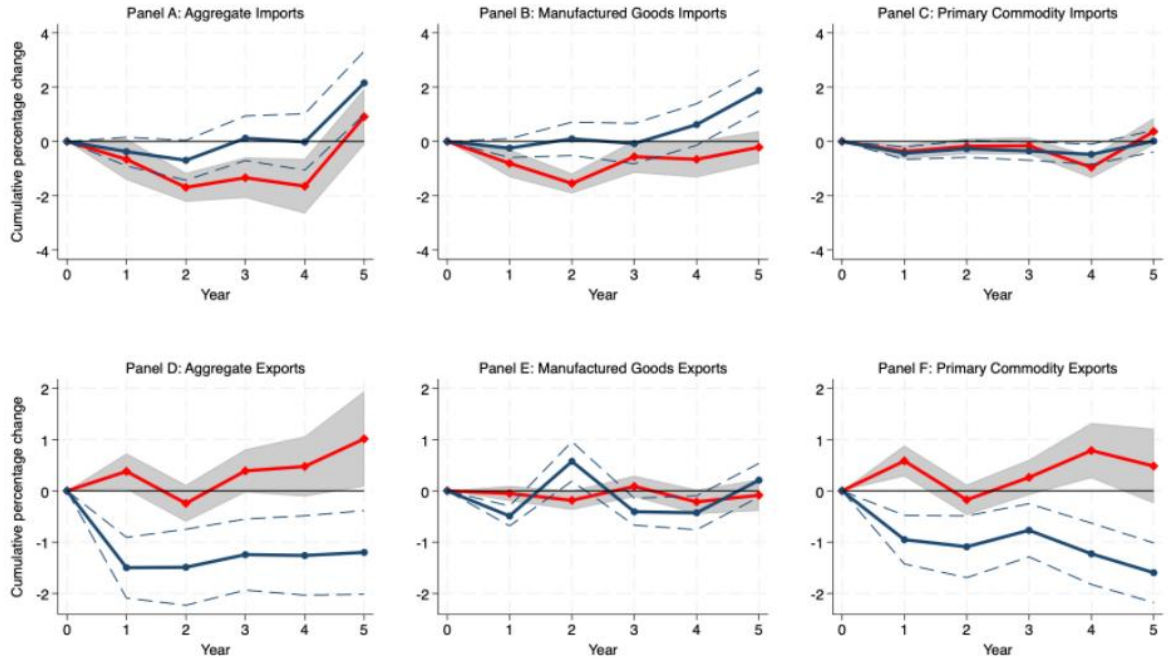


Figure 4. Local Projection, AIPW (concluded)
(II) Level of Cumulative Change



Notes: The figure shows AIPW local projection estimates based on results in Table 2 and H2 in Appendix H. Year 1 is the restructuring year. The dependent variable for Panel (I) is the growth rate of cumulative change of imports (exports)-to-GDP ratio (aggregate, manufactured goods, primary commodity). The dependent variable for Panel (II) is the level of cumulative change of imports (exports)-to-GDP ratio (aggregate, manufactured goods, primary commodity) for Panel (II). The effects of post-default (red lines) and preemptive restructurings (blue lines) are estimated simultaneously by including all the dummies in one regression equation. The restructuring samples across all panels are balanced to examine the effects of the same restructuring episodes. The gray bands and dashed lines indicate the 95 percent confidence intervals. Observations below the 1 percentile and above the 99 percentile are dropped.

Table 2. AIPW Estimation Results, Growth Rate of Cumulative Change

(I) Imports

Panel A: $[\log(Aggregate\ Imports_{t+h}/GDP_{t+h}) - \log(Aggregate\ Imports_t/GDP_t)] \times 100$

	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\hat{\Lambda}_h^{\text{Post-default}}$	-6.07***	-15.01***	-10.22***	-0.65	3.78
	(1.48)	(1.68)	(1.98)	(2.35)	(2.54)
Observations / Countries / Episodes	481 / 20 / 25	455 / 18 / 21	438 / 19 / 23	419 / 18 / 21	404 / 18 / 21
$\hat{\Lambda}_h^{\text{Preemptive}}$	0.1	-2.59*	0.4	2.99	6.64**
	(1.02)	(1.53)	(2.02)	(2.29)	(2.77)
Observations / Countries / Episodes	357 / 18 / 33	344 / 17 / 32	324 / 16 / 33	305 / 16 / 32	295 / 14 / 29
Differences between the estimated coefficients $\hat{\Lambda}_h^{\text{Post-default}} - \hat{\Lambda}_h^{\text{Preemptive}}$					
bootstrap 95% CI	[-15.92 4.91]	[-24.72 3.81]	[-25.28 6.69]	[-20.95 17.91]	[-21.78 23.06]
Clogg et al.'s z	-3.44***	-5.46***	-3.75***	-1.11	-0.76

Panel B: $[\log(Manufactured\ Goods\ Imports_{t+h}/GDP_{t+h}) - \log(Manufactured\ Goods\ Imports_t/GDP_t)] \times 100$

	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\hat{\Lambda}_h^{\text{Post-default}}$	-7.21***	-17.04***	-13.73***	1.39	1.33
	(1.69)	(1.77)	(2.24)	(2.61)	(2.72)
Observations / Countries / Episodes	480 / 20 / 25	454 / 18 / 21	438 / 19 / 23	421 / 18 / 21	407 / 18 / 21
$\hat{\Lambda}_h^{\text{Preemptive}}$	-0.61	-2.01	-3.17	5.51**	10.77***
	(1.17)	(2.24)	(2.46)	(2.62)	(2.91)
Observations / Countries / Episodes	358 / 18 / 33	345 / 17 / 33	327 / 16 / 33	308 / 16 / 32	297 / 14 / 29
Differences between the estimated coefficients $\hat{\Lambda}_h^{\text{Post-default}} - \hat{\Lambda}_h^{\text{Preemptive}}$					
bootstrap 95% CI	[-19.66 5.53]	[-31.68 3.3]	[-29.46 8.35]	[-25.63 18.73]	[-29.57 17.54]
Clogg et al.'s z	-3.21***	-5.27***	-3.17***	-1.12	-2.37**

Panel C: $[\log(Primary\ Commodity\ Imports_{t+h}/GDP_{t+h}) - \log(Primary\ Commodity\ Imports_t/GDP_t)] \times 100$

	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\hat{\Lambda}_h^{\text{Post-default}}$	-7.05***	-12.51***	-9.68***	-13.58***	-3.31
	(1.98)	(1.72)	(2.42)	(2.79)	(2.59)
Observations / Countries / Episodes	487 / 20 / 25	462 / 18 / 21	443 / 19 / 23	424 / 18 / 22	403 / 18 / 21
$\hat{\Lambda}_h^{\text{Preemptive}}$	-0.87	-2.55	2.81	0.5	-1.36
	(1.53)	(2.25)	(2.55)	(2.74)	(2.79)
Observations / Countries / Episodes	359 / 18 / 33	347 / 17 / 34	326 / 16 / 33	309 / 16 / 32	292 / 14 / 29
Differences between the estimated coefficients $\hat{\Lambda}_h^{\text{Post-default}} - \hat{\Lambda}_h^{\text{Preemptive}}$					
bootstrap 95% CI	[-19.59 11.31]	[-26.73 9.32]	[-32.9 8.36]	[-32.54 10.96]	[-20.11 24.11]
Clogg et al.'s z	-2.47**	-3.52***	-3.56***	-3.6***	-0.51

Table 2. AIPW Estimation Results, Growth Rate of Cumulative Change (concluded)

(II) Exports

Panel D: $[\log(Aggregate\ Exports_{t+h}/GDP_{t+h}) - \log(Aggregate\ Exports_t/GDP_t)] \times 100$

	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\hat{\Lambda}_h^{\text{Post-default}}$	-0.12	-0.05	5.5***	11.04***	5.86**
	(1.06)	(1.27)	(1.56)	(2.42)	(2.41)
Observations / Countries / Episodes	591 / 20 / 26	560 / 18 / 21	537 / 19 / 22	517 / 18 / 22	496 / 18 / 22
$\hat{\Lambda}_h^{\text{Preemptive}}$	-7.57***	-6.62***	-4.86**	-5.59***	-6.38***
	(1.44)	(1.89)	(1.97)	(2.03)	(2.33)
Observations / Countries / Episodes	365 / 17 / 34	350 / 17 / 34	331 / 16 / 33	313 / 16 / 32	298 / 14 / 30
Differences between the estimated coefficients $\hat{\Lambda}_h^{\text{Post-default}} - \hat{\Lambda}_h^{\text{Preemptive}}$					
bootstrap 95% CI	[-4.16 19.3]	[-7.59 20.64]	[-4.55 26.91]	[-6.82 34.91]	[-9.58 32.03]
Clogg et al.'s z	4.16***	2.88***	4.13***	5.27***	3.66***

Panel E: $[\log(Manufactured\ Goods\ Exports_{t+h}/GDP_{t+h}) - \log(Manufactured\ Goods\ Exports_t/GDP_t)] \times 100$

	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\hat{\Lambda}_h^{\text{Post-default}}$	3.39	9.44***	17.26***	2.9	19.84***
	(2.15)	(2.4)	(2.57)	(2.74)	(4.24)
Observations / Countries / Episodes	589 / 20 / 26	558 / 18 / 21	537 / 19 / 22	514 / 18 / 21	495 / 18 / 22
$\hat{\Lambda}_h^{\text{Preemptive}}$	-9.51***	3.91	-19.77***	-13.9***	-10.76***
	(2.22)	(3.71)	(3.34)	(3.16)	(3.38)
Observations / Countries / Episodes	361 / 17 / 33	349 / 17 / 34	329 / 16 / 32	311 / 16 / 31	296 / 14 / 29
Differences between the estimated coefficients $\hat{\Lambda}_h^{\text{Post-default}} - \hat{\Lambda}_h^{\text{Preemptive}}$					
bootstrap 95% CI	[-7.61 34.46]	[-20.34 38.88]	[5.68 63.01]**	[-10 41.83]	[-8.1 57.18]
Clogg et al.'s z	4.17***	1.25	8.79***	4.02***	5.65***

Panel F: $[\log(Primary\ Commodity\ Exports_{t+h}/GDP_{t+h}) - \log(Primary\ Commodity\ Exports_t/GDP_t)] \times 100$

	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\hat{\Lambda}_h^{\text{Post-default}}$	1.79	-0.3	4.71***	7.09***	3.66
	(1.18)	(1.38)	(1.73)	(2.31)	(2.76)
Observations / Countries / Episodes	591 / 20 / 25	560 / 18 / 21	539 / 19 / 22	520 / 18 / 22	498 / 18 / 22
$\hat{\Lambda}_h^{\text{Preemptive}}$	-7.11***	-7.27***	-5.99***	-10.17***	-14.6***
	(1.5)	(2.05)	(2.11)	(2.32)	(2.34)
Observations / Countries / Episodes	365 / 17 / 34	351 / 17 / 34	334 / 16 / 33	315 / 16 / 32	299 / 14 / 30
Differences between the estimated coefficients $\hat{\Lambda}_h^{\text{Post-default}} - \hat{\Lambda}_h^{\text{Preemptive}}$					
bootstrap 95% CI	[-3.45 19.91]	[-6.56 20.34]	[-2.73 26.93]	[-3.25 35.9]	[-3.41 38.33]
Clogg et al.'s z	4.66***	2.82***	3.92***	5.27***	5.05***

Notes: The table shows AIPW estimation results. h = 1 is the restructuring year. All regressions include the control variables shown in Table 1. The effects of the two restructurings (post-default, preemptive) are estimated separately by estimating AIPW for each type. The restructuring observations of the other types of debt restructurings are dropped from the estimation so that the control group includes only non-restructuring observations. The restructuring samples in all panels are balanced (across panels) to examine the effect of the same restructuring episodes. The 95% confidence intervals are constructed by bootstrap, resampling the sample used for the corresponding AIPW 1000 times using Stata's *bsample code*, computing many point estimates, and reporting the corresponding percentiles based on the distribution of the estimates. Out of the 1000 iterations, a few iterations led to no estimates due to either perfect prediction in the first stage or insufficient observations. As a result, the confidence intervals are based on 962 and 992 sets of coefficients for GDP and investment, respectively, for post-default. The other variables are based on 1000 sets of coefficients.
* indicate statistical significance at the 10% level. ** indicate statistical significance at the 5% level. *** indicate statistical significance at the 1% level.

4.3. Subcomponents of Manufactured and Primary Commodity Goods Exports/Imports

Our next set of results considers further disaggregation of goods, and is reported in Figure 5 (based on the regression results from Table H3 in Appendix H). The first set of panels shows the larger compression in manufactured goods imports (percent change) following a post-default restructuring is mostly driven by the decline in capital goods and to a smaller extent by intermediate goods, while imports of consumption goods remain more stable (red lines in Panels B-i−iii in section (I), respectively). Manufactured goods imports remain stable following preemptive restructurings, except for a dip in intermediate goods (blue lines in Panel B, B-i, B-iii in section (I)), with the bulk of the increase in manufactured good imports towards the end of the estimation horizon being driven by capital good imports (blue line in Panel B-i in section (I)). The decline in primary commodity imports following post-default restructurings (red lines in Panel C in section (I), the same with panel C in Figure 4) is driven by both intermediate and consumption goods, while imports of all sub-groups remain more stable following preemptive restructuring (blue lines in panel C in section (I)). The results are broadly similar when measured as a percentage change in GDP terms (Figure H2 in Appendix H).

The second set of panels covers the same categories but for exports. The increase in manufactured goods exports following post-default restructurings is driven by capital goods (red line in Panel E-I in section (II)). In contrast, all groups of goods show a comparable decline following preemptive restructurings (blue lines in Panels E-i−iii). Primary commodity exports following a post-default restructuring remain stable despite a temporary increase in primary consumption good exports (red line in Panel F-iii in section (II)). Primary commodity exports experience a small decline following preemptive restructurings, driven by intermediate good exports (blue line in Panels F-ii in section (II)). When the change in exports is measured as a percentage change in GDP terms (Figure H2 in Appendix H), the impact of post-default restructurings becomes fairly muted, and the only clear pattern involves a significant decline in primary commodity exports (about 1 percentage point of GDP) driven by intermediate goods following preemptive restructurings.

Figure 5. AIPW Estimation on Subcomponents of Manufactured Goods and Primary Commodity Goods, Growth Rate of Cumulative Change

(I) Imports

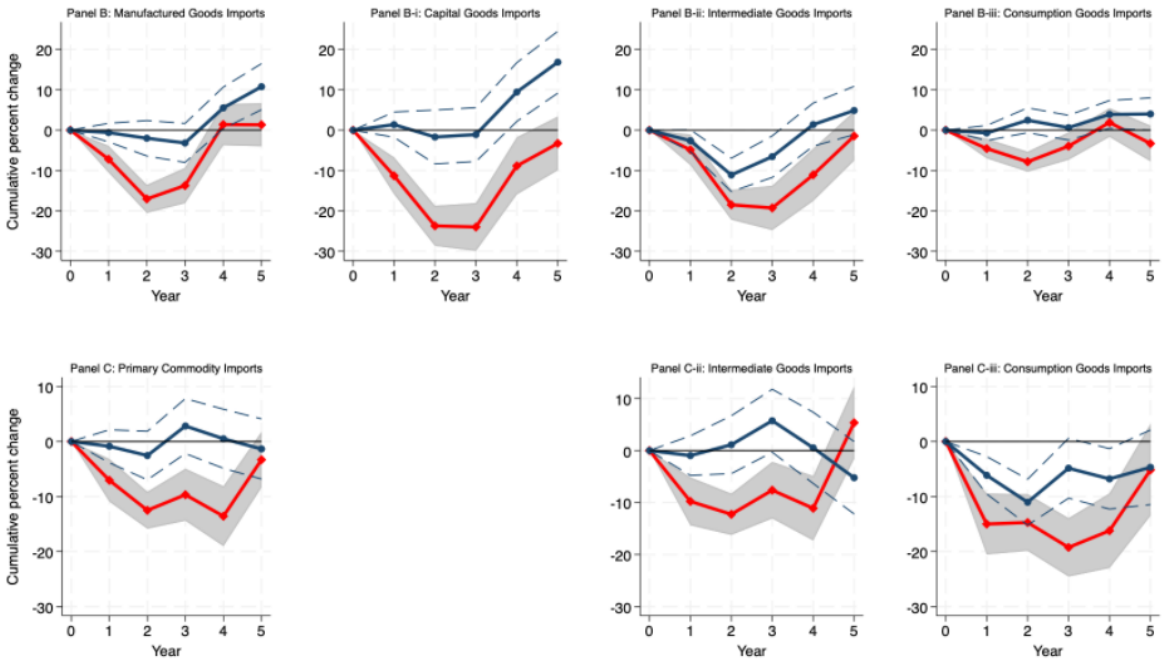
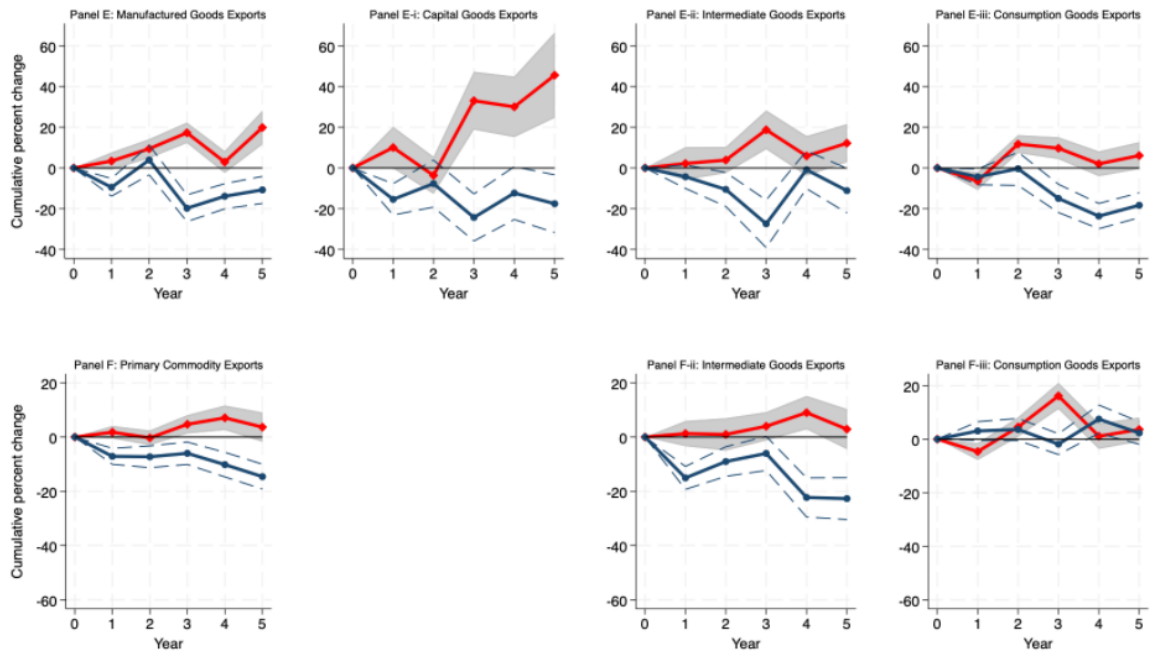


Figure 5. AIPW Estimation on Subcomponents of Manufactured Goods and Primary Commodity Goods, Growth Rate of Cumulative Change (concluded)

(II) Exports



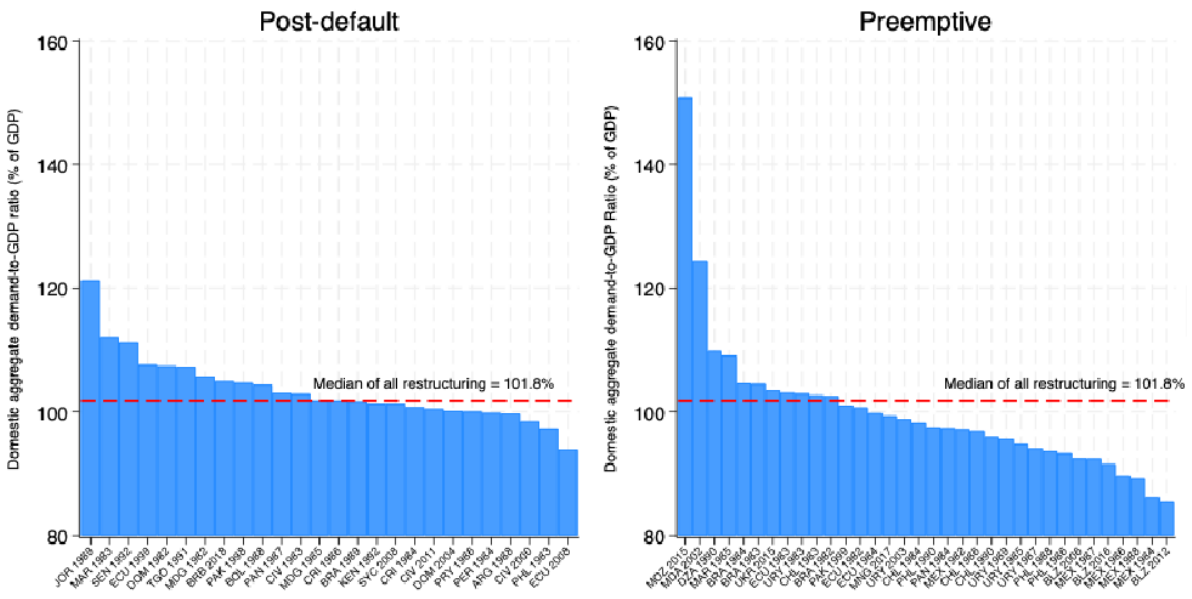
Notes: The figure shows AIPW local projection on growth rate of cumulative change, based on results in Table H1 in Appendix H. Year 1 is the restructuring year. See notes for Figure 4.

4.4. Role of Domestic Aggregate Demand

The impact of a restructuring on trade flows likely depends on an economy's initial reliance on trade. The trade literature shows the role of aggregate demand shocks and durables investment efficiency shocks on trade dynamics (Behrens et al. 2013; Eaton et al. 2016; Hummels and Yong Lee 2018). An economy's reliance on trade can affect not only how much it stands to lose from the costs associated with a restructuring, but also the scope for adjustment in its aftermath (e.g. more open economies may find it easier to shift towards exports, whereas more closed ones may find the needed import compression particularly painful starting from a lower base).

Domestic aggregate demand is defined as the sum of consumption, investment and government spending or equivalently, GDP minus net exports. Figure 6 reports the distribution of domestic aggregate demand-to-GDP ratio in the year prior to the debt restructuring for the two types of restructurings. The sample median of domestic aggregate demand of all restructuring observations is 102 percent of GDP (shown in red dashed lines in Figure 6). That threshold classifies half of post-default restructurings and one third of preemptive restructurings as starting from a high domestic aggregate demand. The threshold of 102 percent of GDP remains robust when we compute the sample median based on the three-year average of domestic aggregate demand-to-GDP prior to the debt restructuring.

Figure 6. Domestic Aggregate Demand-to-GDP ratio in Pre-restructuring Year



As in Jordá and Taylor (2016) and Auerbach and Gorodnichenko (2016) we apply the following regression specification which interact restructuring strategies with dummy variable, in this case high vs low domestic aggregate demand:

$$\log(y_{i,t+h}) - \log(y_{i.t}) = \delta_i^{S,h} + \Gamma^{DAD,h} D_{i,t}^{DAD} D_{i,t+1}^{S} + \Gamma^{NON-DAD,h}(1 - D_{i,t}^{DAD,h}) D_{i,t+1}^{S} + X_{i,t}^{\Gamma^{S,h}} + e_{i,t+h}^{S} \quad (5)$$

$$y_{i,t+h} - y_{i.t} = \delta_i^{S,h} + \Gamma_{\{DAD,h} D_{i,t}^{DAD} D_{i,t+1}^{S} + \Gamma^{NON-DAD,h}(1 - D_{i,t}^{DAD,h}) D_{i,t+1}^{S} + X_{i,t}^{\Gamma^{S,h}} + e_{i,t+h}^{S} \quad (6)$$

where $D_{i,t}^{DAD}$ is a dummy variable taking unity if country i's domestic aggregate demand-to-GDP ratio is high in year t and zero otherwise. On the second term, we interact the dummy variable with the restructuring dummy $D_{i,t+1}^{S}$ (used in equations 1 and 2) and $\Gamma^{DAD,h}$ is the coefficient. The estimated coefficient$\Gamma^{DAD,h}$ reflects the impact of a restructuring strategy *S* when domestic aggregate demand-to-GDP ratio of debtor country i in year t is high. On a third term, we interact $(1 - D_{i,t}^{DAD,h})$ with the restructuring dummy$D_{i,t+1}^{S}$ and $\Gamma^{Non\_DAD,h}$ is the coefficient. The estimated coefficient $\Gamma^{Non\_DAD,h}$ reflects the impact of a restructuring strategy *S* when domestic aggregate demand-to-GDP ratio of debtor country i in year t is low. The four term is the same set of controls as in equations (1) and (2). We also include the country-specific fixed effects $\delta_i^{S,h}$.

We follow the same procedure as in our baseline AIPW estimation: first, we apply OLS on our baseline model specification (equations 5−6) to obtain the estimated conditional means. Second, we apply probit regression model (equation 3) to obtain the predicted likelihood of each debt restructuring strategy under high and low aggregate demand share—reported in Table H5 in Appendix H. Third, we define the AIPW estimator using both estimated conditional means and predicted likelihood.

Figure 7 reports AIPW local projection results for the percent change in the ratio which are based on Table 3 and Table H6 in Appendix H (which also report tests for the statistical significance of the differences between restructuring strategies). Debtor countries with high domestic aggregate demand-to-GDP which absorb a high share of imports, experience a larger contraction in imports (purple lines in Panel I). The decline is stronger for post-default restructurings, though preemptive restructurings with high domestic demand also experience a decline but of a smaller magnitude. The difference in import compression between high vs low domestic demand is driven mainly by both manufactured goods and primary commodities in the case of post-default restructurings and by primary commodities in the case of preemptive restructurings. That difference in response between debtor countries with high and low aggregate demand-to-GDP for two subsamples of post-default and preemptive restructurings is statistically significant for most estimation horizons (except years 3 and 5 for preemptive restructurings) under the Clogg et al (1995) statistical tests, but not statistically significant under bootstrapping approach. In addition, the difference in response between post-default and preemptive restructurings for both debt countries with high and low aggregate demand-to-GDP is statistically significant for most estimation horizons (except year 1 for countries with high aggregate demand-to-GDP, and years 1 and3 for countries with low aggregate demand-to-GDP) under the Clogg et al (1995) but not statistically significant under bootstrapping approach. The effects are broadly qualitatively similar when the change in imports is measured as a percentage of GDP (Figure H3 in Appendix H), but with a more pronounced increase in manufacturing imports following preemptive restructurings with high domestic aggregate demand.

In the case of exports (Panel II of Figure 7), the increase experienced following post-default restructurings documented earlier is driven by the low domestic demand subsample (black line) whereas countries with high domestic demand actually experience a decline in exports following a post-default restructuring. In contrast, preemptive restructurings continue to show more stable exports in their aftermath. The differences between the high vs low domestic demand subsamples are driven mostly by manufactured goods exports (Panel II-B) whereas primary commodities show a more similar response in the initial aftermath. However, the difference in the latter does become pronounced towards the end of the estimation horizon for post-default restructurings. That difference in response between debtor countries with high and low aggregate demand-to-GDP for two subsamples of post-default and preemptive restructurings is statistically significant for most estimation horizons (except years 2, 4 and 5 for preemptive restructurings) under the Clogg et al (1995), but not statistically significant under the bootstrapping approach. In addition, the difference in response between post-default and preemptive restructurings for both debt countries with high and low aggregate demand-to-GDP is statistically significant for most estimation horizons (except years 1 and 5 for countries with high aggregate demand-to-GDP, and years 1−2 for countries with low aggregate demand-to-GDP) under the Clogg et al (1995), but not statistically significant by bootstrapping approach. The effects are qualitatively similar when the change in exports is measured as a percentage of GDP (Figure H3 in Appendix H).

Figure G5 in Appendix G reports OLS estimation results based on results in Table G6 in Appendix G). OLS estimation results are similar to baseline AIPW estimation results.

Figure 7. AIPW Estimation with High and Low Domestic Aggregate Demand-to-GDP ratio, Growth Rate of Cumulative Change

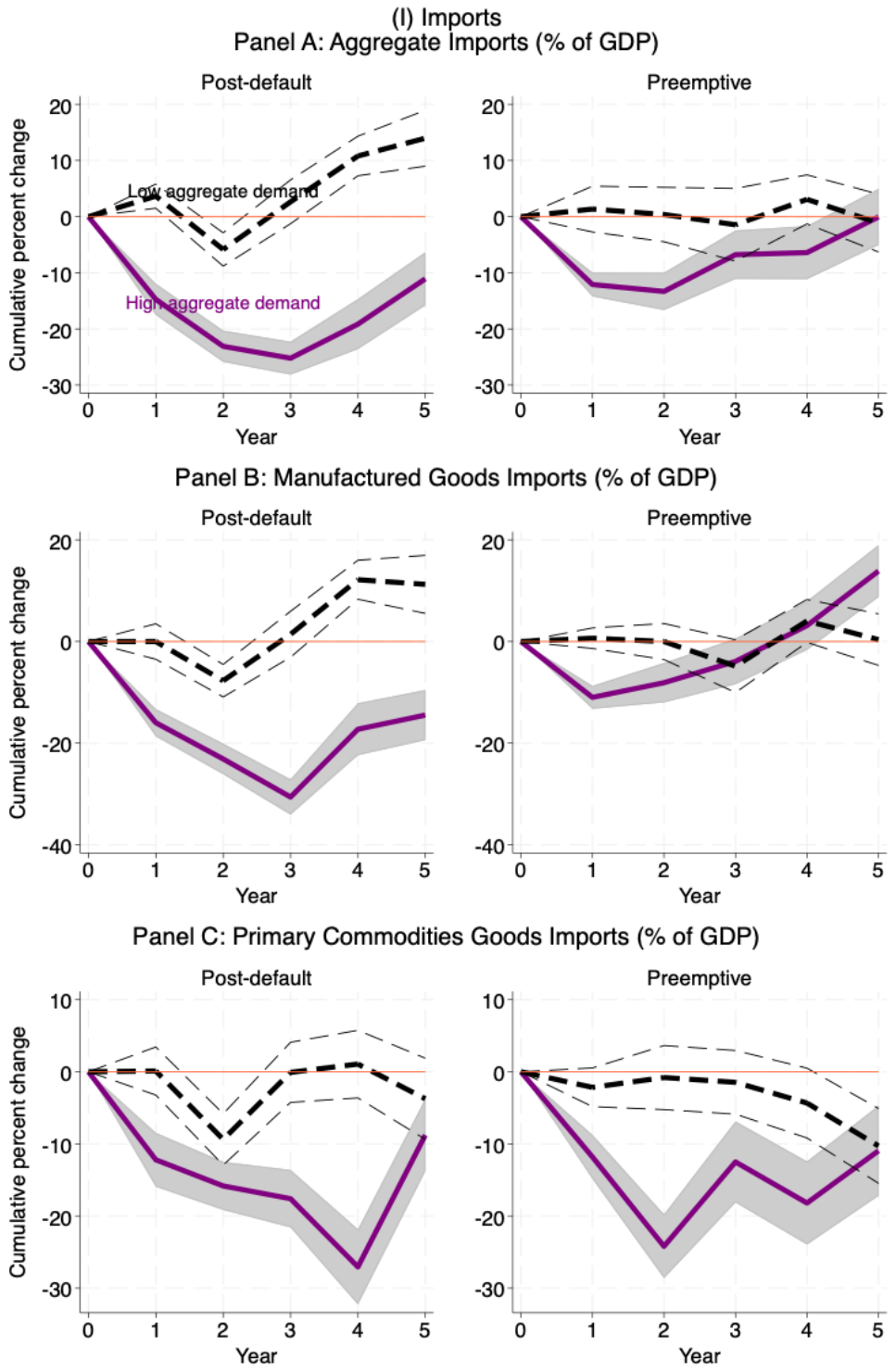
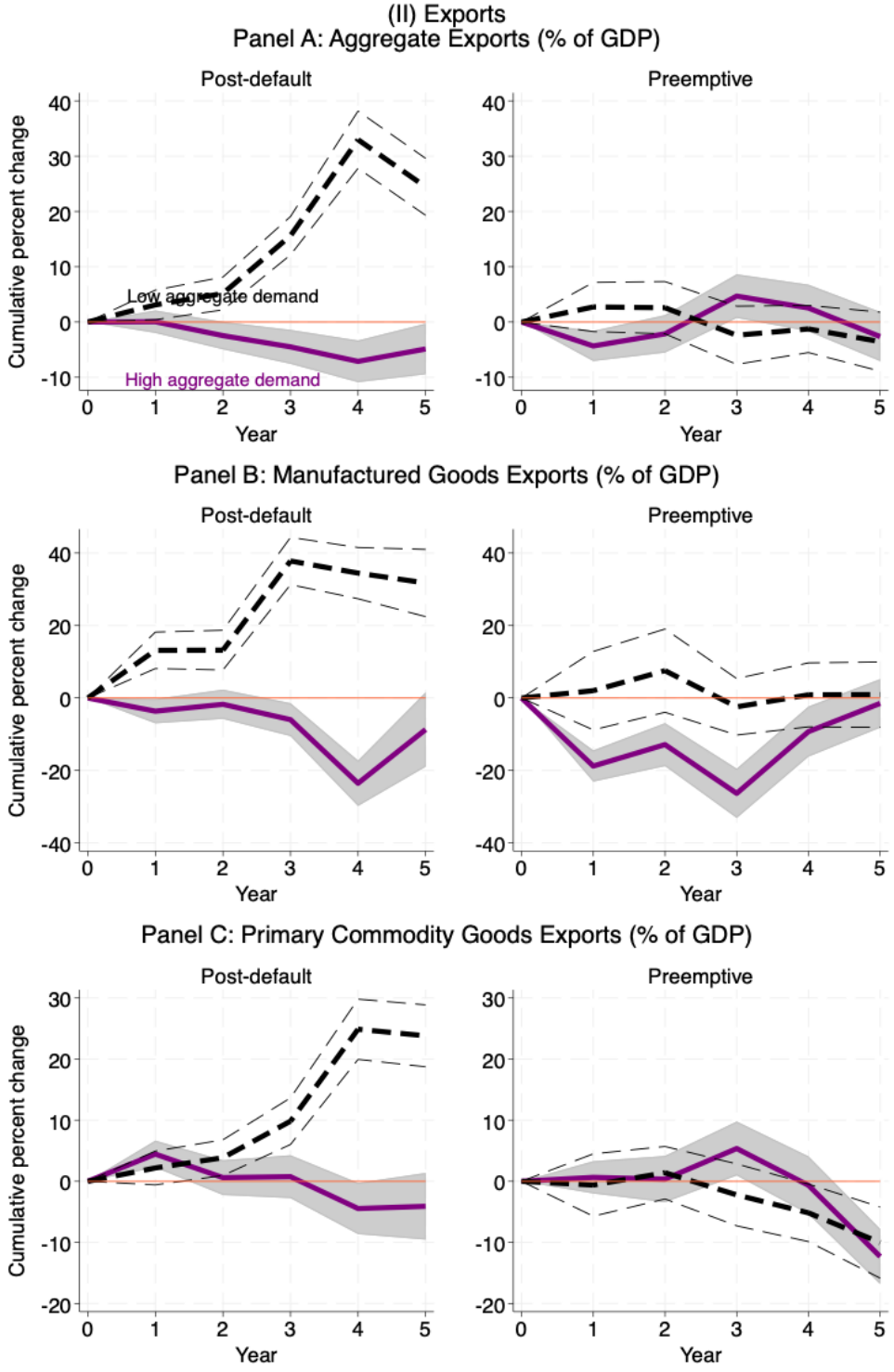


Figure 7. AIPW Estimation with High and Low Domestic Aggregate Demand-to-GDP ratio, Growth Rate of Cumulative Change (concluded)



Notes: The figure shows AIPW local projection with high (purple line) and low (black line) aggregate demand-to-GDP ratio on growth rate of cumulative change, based on results in Tables 3 and H5 in Appendix H. Year 1 is the restructuring year. The effects of two restructurings are estimated simultaneously by including all the dummies in one regression equation. The gray bands and dashed lines indicate the 95 percent confidence intervals. Observations below the 1 percentile and above the 99 percentile are dropped.

Table 3. AIPW Estimation Results with High and Low Domestic Aggregate Demand-to-GDP ratio, Growth Rate of Cumulative Change

(I) Imports

Panel A: $[\log(Aggregate\ Imports_{t+h}/GDP_{t+h}) - \log(Aggregate\ Imports_t/GDP_t)] \times 100$

	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\hat{\Lambda}^{\text{Post-default}}_{h,High\ aggregate\ demand-to-GDP}$	-14.74***	-23.1***	-25.21***	-19.15***	-11.07***
	(1.42)	(1.42)	(1.5)	(2.27)	(2.42)
Observations / Countries / Episodes	465 / 14 / 18	439 / 12 / 14	424 / 13 / 15	403 / 11 / 13	388 / 12 / 12
$\hat{\Lambda}^{\text{Post-default}}_{h,Low\ aggregate\ demand-to-GDP}$	3.65***	-5.85***	2.64	10.8***	13.96***
	(1.1)	(1.51)	(1.99)	(1.8)	(2.54)
Observations / Countries / Episodes	388 / 12 / 13	369 / 11 / 12	359 / 12 / 13	345 / 12 / 13	333 / 12 / 13
$\hat{\Lambda}^{\text{Preemptive}}_{h,High\ aggregate\ demand-to-GDP}$	-12.09***	-13.32***	-6.78***	-6.4***	-0.05
	(1.09)	(1.69)	(2.2)	(2.42)	(2.56)
Observations / Countries / Episodes	183 / 12 / 17	180 / 12 / 16	171 / 12 / 17	166 / 12 / 17	161 / 11 / 15
$\hat{\Lambda}^{\text{Preemptive}}_{h,Low\ aggregate\ demand-to-GDP}$	1.34	0.38	-1.45	3.07	-1.14
	(2.08)	(2.47)	(3.3)	(2.23)	(2.63)
Observations / Countries / Episodes	416 / 14 / 27	400 / 13 / 27	382 / 11 / 26	367 / 12 / 26	354 / 12 / 25
Differences between the estimated coefficients					
[bootstrap 95% CI], Clogg et al.'s z					
$\hat{\Lambda}^{\text{Post-default}}_{h,High} - \hat{\Lambda}^{\text{Post-default}}_{h,Low}$	[-44.17 6.53]	[-46.06 23.51]	[-60.05 25.97]	[-56.57 19.44]	[-62.93 29.31]
	-10.24***	-8.3***	-11.18***	-10.34***	-7.14***
$\hat{\Lambda}^{\text{Preemptive}}_{h,High} - \hat{\Lambda}^{\text{Preemptive}}_{h,Low}$	[-53.75 35.07]	[-69.09 53.33]	[-99.06 97.96]	[-132.33 93.11]	[-142.03 114.07]
	-5.73***	-4.57***	-1.34	-2.88***	0.3
$\hat{\Lambda}^{\text{Post-default}}_{h,High} - \hat{\Lambda}^{\text{Preemptive}}_{h,High}$	[-42.61 45.74]	[-73.83 44.05]	[-124.02 69.96]	[-104.18 109.16]	[-121.43 125.2]
	-1.48	-4.42***	-6.93***	-3.84***	-3.13***
$\hat{\Lambda}^{\text{Post-default}}_{h,Low} - \hat{\Lambda}^{\text{Preemptive}}_{h,Low}$	[-23.04 22.54]	[-37.83 23.63]	[-41.26 28.53]	[-26.95 36.72]	[-21.8 47.27]
	0.98	-2.15**	1.06	2.7***	4.13***

Table 3. AIPW Estimation Results with High and Low Domestic Aggregate Demand-to-GDP ratio, Growth Rate of Cumulative Change (concluded)

(II) Exports

Panel A: $[\log(Aggregate\,Exports_{t+h}/GDP_{t+h}) - \log(Aggregate\,Exports_t/GDP_t)] \times 100$

	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\hat{\Lambda}^{\text{Post-default}}_{h,High\,aggregate\,demand-to-GDP}$	0.05	-2.46*	-4.51***	-7.13***	-4.88**
	(1.04)	(1.27)	(1.57)	(1.93)	(2.34)
Observations / Countries / Episodes	461 / 14 / 19	433 / 12 / 14	416 / 12 / 14	397 / 11 / 14	382 / 12 / 14
$\hat{\Lambda}^{\text{Post-default}}_{h,Low\,aggregate\,demand-to-GDP}$	3.09**	4.56***	15.62***	33***	24.46***
	(1.36)	(1.51)	(1.77)	(2.64)	(2.63)
Observations / Countries / Episodes	391 / 12 / 13	373 / 11 / 12	362 / 12 / 13	349 / 12 / 13	340 / 12 / 13
$\hat{\Lambda}^{\text{Preemptive}}_{h,High\,aggregate\,demand-to-GDP}$	-4.35***	-2.03	4.68**	2.53	-2.64
	(1.39)	(1.77)	(2.02)	(2.15)	(2.27)
Observations / Countries / Episodes	199 / 12 / 17	194 / 12 / 17	187 / 12 / 17	181 / 12 / 17	175 / 11 / 15
$\hat{\Lambda}^{\text{Preemptive}}_{h,Low\,aggregate\,demand-to-GDP}$	2.72	2.58	-2.41	-1.26	-3.56
	(2.27)	(2.41)	(2.69)	(2.17)	(2.73)
Observations / Countries / Episodes	425 / 13 / 28	410 / 13 / 28	393 / 11 / 26	375 / 12 / 26	361 / 12 / 26
Differences between the estimated coefficients					
[bootstrap 95% CI], Clogg et al.'s z					
$\hat{\Lambda}^{\text{Post-default}}_{h,High} - \hat{\Lambda}^{\text{Post-default}}_{h,Low}$	[-20.5 24.03]	[-27.82 19.18]	[-43.3 10.98]	[-73.08 7.92]	[-69.37 15.08]
	-1.78*	-3.56***	-8.51***	-12.26***	-8.34***
$\hat{\Lambda}^{\text{Preemptive}}_{h,High} - \hat{\Lambda}^{\text{Preemptive}}_{h,Low}$	[-60.97 97.33]	[-83.03 70.2]	[-84.64 91.58]	[-104.87 117.61]	[-101.12 108.58]
	-2.65***	-1.54	2.11**	1.24	0.26
$\hat{\Lambda}^{\text{Post-default}}_{h,High} - \hat{\Lambda}^{\text{Preemptive}}_{h,High}$	[-87.76 61.44]	[-63.68 74.81]	[-97.23 64.31]	[-131.04 95.98]	[-106.5 95.62]
	2.53**	-0.2	-3.6***	-3.34***	-0.69
$\hat{\Lambda}^{\text{Post-default}}_{h,Low} - \hat{\Lambda}^{\text{Preemptive}}_{h,Low}$	[-22.94 20.94]	[-24.92 24.89]	[-12.21 40.79]	[-9.93 65.99]	[-12.21 59.91]
	0.14	0.7	5.6***	10.01***	7.4***

5. Conclusion

Sovereign debt restructurings have large adverse impacts on GDP, aggregate demand, exchange rates, and trade. We show that imports (relative to GDP) suffer a large compression following a post-default restructuring but remain broadly stable following a preemptive restructuring. Our finding also suggests that the import compression is stronger when domestic aggregate demand is initially high. The results on exports are more complicated given competing effects, such as disruption in activity and finance on the one hand, and the real exchange rate depreciation and shift from the repressed domestic to the external markets on the other hand. We find that on balance post-default restructurings tend to be associated with an increase in exports as a percent increase from the initial ratio to GDP, though that effect becomes much smaller when measured in percentage terms of GDP. That is consistent with a large response but from a relatively low base, since many of the economies experiencing a restructuring had relatively small trade to begin with.

An important implication from our findings is that how a debtor country handles its sovereign debt crisis can have significant implications for its trade. The large swing in net imports following a restructuring can provide a proxy for its welfare impact, which is consistent with the estimated output costs in the literature. While a deeper and more protracted debt crisis can lead to an improvement in the trade balance, that tends to come at the cost of higher import compression and exports that are supported by a large real depreciation. In contrast, milder crises, proxied in this paper by a preemptive restructuring, tend to lead to lower net exports which is consistent

with a milder crisis forcing a smaller external adjustment to resolve the crisis. While a simplistic mercantilist view would suggest higher net exports to be a desirable outcome, our results suggest they can be the result of deeper and more protracted crises (and ultimately driven by the need for a large adjustment that comes through demand compression and depreciation). By restructuring preemptively, countries may attenuate an impact that may otherwise require a welfare costly forced external adjustment.

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