After the Panic: Are Financial Crises Demand or Supply Shocks? Evidence from International Trade*

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Abstract

Are financial crises a negative shock to aggregate demand or a negative shock to aggregate supply? This is a fundamental question for both macroeconomics researchers and those involved in real-time policymaking, and in both cases the question has become much more urgent in the aftermath of the recent financial crisis. Arguments for monetary and fiscal stimulus usually interpret such events as demand-side shortfalls. Conversely, arguments for tax cuts and structural reform often proceed from supply-side frictions. Resolving the question requires models capable of admitting both mechanisms, and empirical tests that can tell them apart. We develop a simple small open economy model, where a country is subject to deleveraging shocks that impose binding credit constraints on households and/or firms. These financial crisis events leave distinct statistical signatures in the time series record, and they divide sharply between each type of shock. Household deleveraging shocks are mainly demand shocks, contract imports, leave exports largely unchanged, and depreciate the real exchange rate. Firm deleveraging shocks are mainly supply shocks, contract exports, leave imports largely unchanged, and appreciate the real exchange rate. To test these predictions, we compile the largest possible crossed dataset of 200+ years of trade flows and almost 200 financial crises in a wide sample of countries. Empirical analysis reveals a clear picture: after a financial crisis event we find the dominant pattern to be that imports contract, exports hold steady or even rise, and the real exchange rate depreciates. On the basis of this macro-level evidence, financial crises are a negative shock to demand.

Keywords: financial crises, deleveraging, imports, exports, local projections.
JEL classification codes: E44, F32, F36, F41, F44, G01, N10, N20.

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What is the link between financial crises and trade collapses, and what can macroeconomists learn from it? In this paper we look to the past, exploring evidence from 200 years of international trade and price data to answer this question. Our historical long-run approach is unique, differs from existing studies, and offers new insights for research.

In particular, we ask a novel and very general question: *are financial crises, on average, associated with a negative shock to aggregate demand or to aggregate supply*? This is an important question to answer, because it can help guide better policy responses to future financial crises. Arguably, had we known more in 2008, and known what was to blame for the Great Recession, we might have had more effective policy responses. In real time, clarity was lacking: many sided with a demand shock explanation, but others argued the problem was on the supply side. Yet there were few evidence-based arguments based on similar events in the past. History can shed new light to cut through the intellectual and political fog.

We first develop a simple small open economy model. The home country is subject to deleveraging shocks. The new theoretical contribution is that these shocks can impose binding credit constraints either on households or on firms, or both. We build on Eggertsson and Krugman (2012)—in which households adjust deleveraging shocks—by adding an analogous shock to firms and extending the framework to an open economy setting with a nontradable sector and an endogenous real exchange rate. In the simulations of the model, we treat financial crisis events as household or firm deleveraging shocks, and ask what statistical signatures each kind of event would leave in the empirical time series record.

The answers are clear and divide sharply between each type of shock. Household deleveraging shocks, setting aside second-order equilibrium effects, are pure demand shocks; these tend to contract imports, leave exports largely unchanged, and depreciate the real exchange rate. Firm deleveraging shocks, setting aside second-order equilibrium effects, are pure supply shocks; these tend to contract exports, leave imports largely unchanged, and appreciate the real exchange rate. These clear contrasts in the model predictions help us take the model to the data.

We then present our empirical evidence. The rationale for a long time frame is that financial crises are relatively rare events. To say anything meaningful from a statistical standpoint, we must expand our data across countries, and back in time, as recent research has shown (Reinhart and Rogoff, 2009, 2011a; Schularick and Taylor, 2012). Our analysis therefore centers on a substantial effort to assemble a new large historical dataset. In particular we extend and then match two types of datasets, historical bilateral data on trade flows, and country-specific data on macroeconomic aggregates and financial crisis dates. With that done, we can look over a universe of almost 200 financial crises, and use empirical methods to get a clearer picture of how financial distress typically affects trade.

What does history show? When we look at the long-run trade and price data, match them with established financial crisis timings, and trace out the high frequency responses, do we find that financial crises exhibit the symptoms of demand shocks or supply shocks?

Very clearly, after a financial crisis event we see statistical evidence strongly in favor of the demand-side view: on impact, imports contract, exports hold steady or even rise, and the real exchange rate depreciates. All effects are statistically significant, and especially so in the bilateral data where the sample size exceeds 150,000 country pair-year observations for trade flows and real exchange rates. The effects persist out to a five-year horizon.

An important caveat is that to test these claims at the micro-level would need extensive firm and household level data for every country and year going back to the early nineteenth century. Of course, such data do not exist, and are scarce even in advanced economies after WW2. Thus our macro-level diagnostic tests may provide the best answer to the question at this time, given data constraints and the challenges of analyzing historically rare events.

Our results form part of an emerging view that household debt and deleveraging cycles play a highly influential role in economic fluctuations (Jorda, Schularick, and Taylor, 2013; Mian, Sufi, and Verner, 2017), but one novel contribution here is to bring evidence on international adjustment into the debate as an extra tool for validation.

We also dig deeper than just a single aggregate response. In both theory and empirics, we further distinguish between trade in final goods and trade in intermediate inputs. In our model, household deleveraging shocks reduce the demand for imported final goods. In addition, households demand fewer nontraded goods, causing firms to import fewer intermediate inputs. In the case of firm deleveraging shocks, which limit production, imports of intermediate inputs fall, whereas imports of final goods are largely stable. We construct data on trade by product type for the post-WW2 period, and find that financial crises depress imports of both final and intermediate goods: further evidence consistent with our demand-side view of crises.

Our results are stable across developed and developing countries, although the decline in imports is deeper following financial crises in the latter. We also ask whether financial crises in different eras have had different consequences. The answer is no; while we lose some precision in pre-WW2 estimates, in part due to a smaller sample size, qualitatively the response of trade flows and prices is fairly stable across different eras.

In addition, we allow for the possibility that financial crises are endogenous to macroeconomic conditions. We use inverse propensity-score weighting to address the problem of bias arising from selection on observables. Following Jordà, Schularick, and Taylor (2011) we use pre-crisis credit growth as a predictor of financial crises in our first stage. Reassuringly, all of our results remain unchanged. We also acknowledge that economies

are exposed to various types of crises, not just financial ones. Consequently, we extend our dataset with the dates of currency and inflation crises, stock-market crises, and external and domestic sovereign debt crises, relying on the dates from Reinhart and Rogoff (2011a). Our results are robust to jointly controlling for all these other kinds of crises.

Gaps in our knowledge exposed by the crisis have encouraged a return to economic history to evaluate broad questions using a larger universe of data and gain better evidence on how crises affect the macroeconomy. In this paper, we find that clearly, over a long sweep of history, the dominant effects of a financial crisis correspond to the theoretical predictions of a demand shock, not a supply shock, judged by the responses of trade flows and real exchange rates.

Contribution to the Literature Our focus on trade takes off from an emerging literature following the 2008 financial crisis. A wave of studies attests to the interest in the study of the repercussion of financial crises for exports and imports in an open economy. Most of this work seeks to establish the reasons behind the observed collapse of international trade. Some have focused on direct financial effects on certain sectors or firms (Chor and Manova, 2012; Amiti and Weinstein, 2011; Iacovone and Zavacka, 2009; Abiad, Mishra, and Topalova, 2014).[1]

Another idea is that trade in inputs is subject to greater fixed costs of shipments; fixed costs induce periodic ordering, but wait-and-see can postpone trades when a supply shock hits the input importer (Alessandria, Kaboski, and Midrigan, 2010). Also, some of the trade collapse could be a composition effect, since trade is dominated by durable goods and intermediate inputs, which are much more cyclical than GDP itself (Levchenko, Lewis, and Tesar, 2010; Eaton, Kortum, Neiman, and Romalis, 2016; Behrens, Corcos, and Mion, 2013; Bussière, Callegari, Ghironi, Sestieri, and Yamano, 2013). Finally, increases in uncertainty, often associated with financial crisis events, may trigger a disproportionate decline in imports relative to domestic activity due to the interplay between the fixed costs of trade and the option value of waiting to place an order for shipment (Novy and Taylor, Forthcoming).[2]

[1] Two papers examine the response of trade flows to crises over recent decades. Iacovone and Zavacka (2009) study the response of exports to credit conditions in 23 crises episodes during 1980–2006. Abiad, Mishra, and Topalova (2014) study the impact of both financial and sovereign debt crises during 1970–2009 on imports and exports, finding that crises primarily depress imports. Our approach builds on but differs substantially from this work. The main difference is our goal. Our findings and our model work together to answer the key question in our paper: are financial crises demand or supply shocks? We also expand the time horizon fivefold: as noted, we study only large financial crises which are rare events. In addition, we focus not only on international trade flows but also on prices to distinguish the demand versus supply shock explanations.

[2] These and other explanations are gathered in Baldwin (2009). Further empirical work includes Freund

These and other explanations may not be mutually exclusive. Our contribution is to develop a simple model that admits both demand and supply shocks, with clear, distinct predictions for the responses of international trade flows and prices under each type of shock. We depart from standard trade models by adapting recent intertemporal models of deleveraging shocks to an open economy setting. Our model's predictions can be told apart very cleanly upon examining the data. Our interest is not the economic response to a single crisis episode but in the average response to nearly 200 episodes over two centuries.

We also contribute to a literature documenting the causes and consequences of financial crises (Reinhart, 2010; Reinhart and Rogoff, 2011a; Schularick and Taylor, 2012; Jordà, Schularick, and Taylor, 2011). In the same spirit we look to the past record from many crisis episodes over decades or centuries. Past works examined the impact of crises on several macroeconomic outcomes, such as GDP and unemployment, but not on international trade and prices as we do. Much of this literature focuses on documenting the consequences, not causes, of financial crises. Work that does ask for causes (such as Schularick and Taylor, 2012) points to the role of credit, but does not seek to answer whether these events should be understood as demand or supply shocks.

Finally, our work meshes with a growing literature on the recent Great Recession. In particular, Mian, Rao, and Sufi (2013) find a large contraction in household spending in the U.S. as a consequence of declining housing net worth; Mian and Sufi (2014) establish that this led in turn to a large decline in employment; Mian, Sufi, and Verner (2017) provide global evidence of the same character. These and other findings from recent data echo the demand-side view that our long-run historical evidence strongly supports.

I. A Crisis-Deleveraging Model: Demand, Supply, and Trade Shocks

We study a small open economy and introduce borrowing limits into both the firm and household side of the economy. This is guided by our desire to understand whether the macroeconomic effects of financial crises can be best understood as demand or supply shocks. In the case of households, this apparatus exactly mirrors the approach of Eggertsson and Krugman (2012).[3] We add the same apparatus to the firm side of the model to make our modeling of the two shocks conceptually as simple and symmetric as possible.

Formally, we will describe a sticky-wage economy populated by patient and impatient households. These households derive utility from the consumption of an import good and

(2009) who examines the response of trade to global downturns; and Bems, Johnson, and Yi (2011) who study the role of vertical linkages in amplifying the trade collapse.

[3]In related work Benigno and Romei (2014) study how debt deleveraging in one country spreads to the rest of the world economy.

a nontraded good. Firms in the economy produce a nontraded good sold locally and an export good sold abroad. They produce using labor and imported inputs and must borrow to finance a share of their production cost in advance. Both impatient households and firms face exogenous, binding borrowing limits, and we study the impact on the economy of sudden declines in the amount that households or firms can borrow.[4]

A. Households

We assume that households maximize lifetime utility

$$U = E_0 \sum_{t=0}^{\infty} (\beta^i)^t \cdot \left(log(C^i_{Mt}) + \alpha_N \cdot log(C^i_{Nt}) - \frac{{N^i}_t^{1+\phi}}{1+\phi} \right),$$

subject to a budget constraint discussed below, with $i \epsilon \{B, S\}$ indexing borrowers and savers and time preference parameters such that $\beta^s > \beta^b$. We denote by C^i_M and C^i_N a household's consumption of the import good and the nontraded good, respectively. The household budget constraint supposes that they receive income as a wage for labor supplied to local firms in the nontraded and export sectors. In addition, patient households (only) own and receive firm profits.[5]

The economy faces an exogenous world price of the import good, P_M, and an endogenously determined price of the nontraded good, P_N. Households borrow from, or lend to, the rest of the world at an exogenous real interest rate r, subject to limits.

We assume that the impatient households' budget constraint is given by

$$P_{Mt} \cdot C^b_{Mt} + P_{N\,t} \cdot C^b_{N\,t} - D^b_t = w_t \cdot N^b_t - (1 + r_{t-1}) \cdot D^b_{t-1},$$

and the binding borrowing constraint we impose on the impatient households is

$$(1 + r_t) \cdot D^b_t \leq \overline{D}.$$

Similarly, we assume that the patient households' budget constraint is

$$P_{Mt} \cdot C^s_{Mt} + P_{N\,t} \cdot C^s_{N\,t} - D^s_t = w_t \cdot N^s_t + \frac{\pi_{Xt}}{\chi} + \frac{\pi_{N\,t}}{\chi} - (1 + r_{t-1}) \cdot D^s_{t-1},$$

where χ and $1 - \chi$ denote the fraction of patient and impatient households in the economy.

[4] An additional mechanisms through which financial crises could impact trade flows is through a tightening in trade finance. Amiti and Weinstein (2011) and Paravisini, Rappoport, Schnabl, and Wolfenzon (2014) find evidence of falling exports due to a decline in trade finance during a crisis.

[5] We assume patient households receive profits for simplicity, as in Martinez and Philippon (2014).

B. Production

We assume that in both the export and the nontraded sectors there is a continuum of firms of measure one that produce output using labor and imported inputs. Firms in the export sector sell their goods to the rest of the world at the exogenous world price P_X, while firms in the nontraded sector sell their good domestically at a price P_N determined in equilibrium. Inputs are traded at the exogenous world price P_I.

In each sector, firms must borrow a fraction λ of their cost to finance production. Firms borrow from the rest of the world at an exogenous real interest rate r, subject to limits.

We assume that in each sector $S \epsilon \{N, X\}$ the firms' budget constraint is given by

$$\widehat{\pi}_{S\,t} + \delta_{S\,t} = \delta_{S\,t-1} \cdot (1 + r_{t-1}) + \pi_{S\,t}\,,$$

where $\delta_{S\,t}$ is the amount borrowed in period t, $\pi_{S\,t}$ denotes profits paid to households, and $\widehat{\pi}_{S\,t}$ denotes profits excluding the financing cost (revenue minus production cost). When simulating a firm deleveraging shock, we impose a binding limit $\overline{\delta}_S$ on the amount firms can borrow and that will be tightened suddenly by the shock.

Firms have the following generalized CES production function:

$$q_{S\,t} = \left(\theta \cdot l_{S\,t}^{\rho} + (1-\theta) \cdot i_{S\,t}^{\rho}\right)^{\frac{\epsilon}{\rho}}\,,$$

with $\epsilon < 1$, which implies decreasing returns to scale.[6] Firms' production cost is then given by $C_{S\,t}(q_{S\,t}, w_t, P_I) = (\theta^{\sigma} \cdot w_t^{1-\sigma} + (1-\theta)^{\sigma} \cdot P_I^{1-\sigma})^{\frac{1}{1-\sigma}} \cdot q_{S\,t}^{1/\epsilon}$, with $\sigma = \frac{1}{(1-\rho)}$.

In the absence of a binding borrowing constraint, firms—which are price takers—will optimally produce at an output level

$$q_{S\,t} = \left(\epsilon \cdot p_{S\,t} / \left(\theta^{\sigma} \cdot w_t^{1-\sigma} + (1-\theta)^{\sigma} \cdot P_I^{1-\sigma}\right)^{\frac{1}{1-\sigma}}\right)^{\epsilon/1-\epsilon},$$

while borrowing as necessary. However, at times when the borrowing constraint is present and binding the firms will be restricted in the amount that they can produce. Firms then borrow $\lambda \cdot C_{S\,t} = \overline{\delta}_S$ each period. This, in turn, implies that firms can only produce

$$q_{S\,t} = \left(\overline{\delta}_S / \left(\lambda \cdot \left(\theta^{\sigma} \cdot w_t^{1-\sigma} + (1-\theta)^{\sigma} \cdot P_I^{1-\sigma}\right)^{\frac{1}{1-\sigma}}\right)\right)^{\epsilon}.$$

[6] Imposing decreasing returns to scale in the production function will allow both quantities and prices to respond to shocks.

C. Equilibrium

In equilibrium the nontraded goods market clears, determining its price P_N, where the condition for demand equals supply is:

$$\chi \cdot c^s_{N\,t} + (1-\chi) \cdot c^b_{N\,t} = q_{N\,t}\,.$$

Finally, we assume wages evolve according to the following Phillips curve,

$$w_t = w_{t-1} \cdot (1 + \kappa \cdot (N_t - N_{ss}))\ .$$

This assumption follows Martinez and Philippon (2014). We denote by N_{ss} the steady state level of aggregate hours. The parameter κ regulates the speed of adjustment of wages, which is proportional to the deviation of aggregate hours from steady state. Wages are sticky, but in the limit $\kappa \to \infty$ the economy converges to one with flexible wages. Under sticky wages, shocks can lead to an excess supply of labor (unemployment) in which the equilibrium is demand-determined. Following Martinez and Philippon (2014) we ration the labor market uniformly between the patient and impatient households.

D. Simulations

The aim of the model is to simulate the responses of the economy to deleveraging shocks to households and firms. The calibration of the model, extensions, and robustness are discussed in Appendix A.

Demand shock We interpret a decline in the borrowing limit for impatient households as a *demand shock*.[7] All else equal, such households consume less, given a reduced ability to borrow. On impact, they reduce consumption as they borrow a now lower amount but still repay a higher amount borrowed in the previous period. This reduces demand for both the imported final good and the nontraded good, leading to lower aggregate demand. In response, the price of the nontraded good falls. Firms in the nontraded sector adjust production, lowering their demand for the intermediate input. Lower demand for both the imported final good and the intermediate input leads to lower imports. Exports vary only due to general equilibrium effects, as world demand is unchanged.

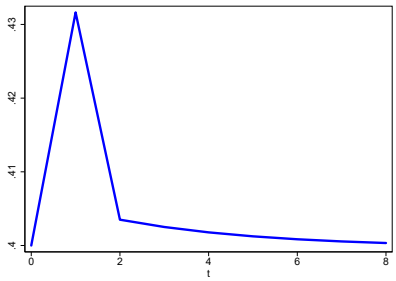
We simulate the response to two types of shocks to impatient households' borrowing limit. Figure 1 graphs the adjustment of exports, imports of the final good, the intermediate input, and total imports, the trade balance, and the price of the nontraded good in response

[7] When simulating this household deleveraging shock, we allow firms to borrow freely.

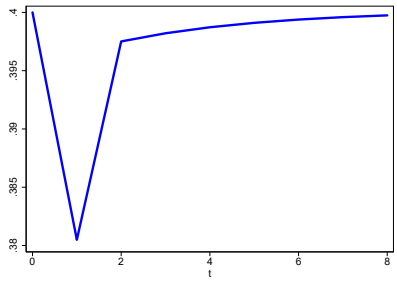
Figure 1: *Adjustment in Response to a Household Deleveraging Shock.*

This figure describes the adjustment of the trade balance, exports, imports, and the price of the nontraded good to a 20 percent permanent reduction in impatient households' borrowing limit $\overline{D}$. The shock occurs in period $t = 1$.

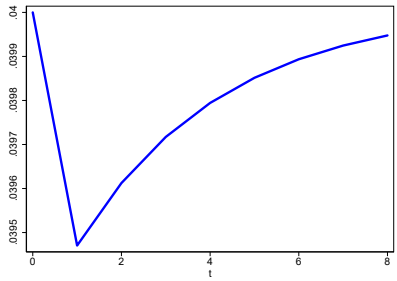
(a) *Exports / GDP*



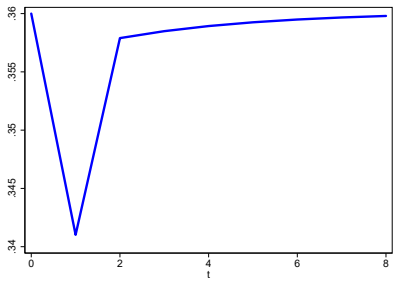
(b) *Imports / GDP*



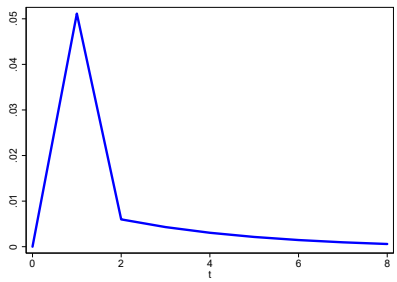
(c) *Imports of Inputs / GDP*



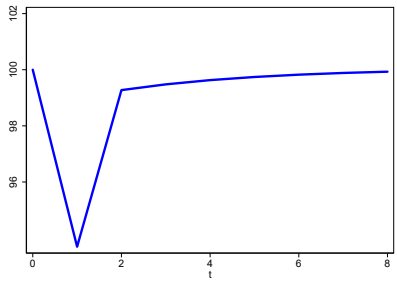
(d) *Imports of Final Goods / GDP*



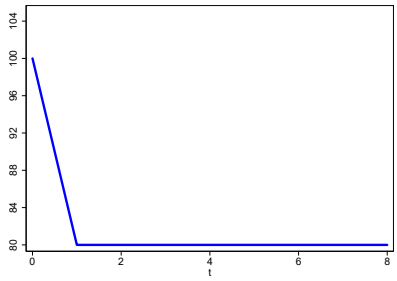
(e) *Trade Balance / GDP*



(f) *Price of Nontraded Good*



(g) *Households' Borrowing Limit*



to each of these shocks. The first shock, is an unanticipated permanent decline in the borrowing limit. Given the fall in GDP, the ratio of exports to GDP rises while imports to GDP fall, as imports fall further than GDP. Imports of both the final good and the intermediate input fall. The trade balance rises in response to the decline in imports. The price of the nontraded good falls.

Supply shock In turn, we interpret a decline in the borrowing limit for firms as a *supply shock*. All else equal, firms must produce less output from less input, given a reduced ability to borrow. The immediate impact is to reduce the production of both the export good and the nontraded good, as firms in both sectors face a tighter borrowing constraint. Exports fall directly due to the shock. Further, the price of the nontraded good rises due to a decline in supply. A lower amount of credit to produce leads to a lower demand for the imported input by both the export and the nontraded sectors. The shock also lowers wages and firm profits in both sectors. This leads to lower income to both patient and impatient households. Patient households are able to smooth the impact of the shock over time, with a minor decline in demand, but impatient households cannot borrow and translate their lower income fully into lower consumption. The ratio of imports of final goods to GDP rises as the fall in GDP is larger than the fall in imports. Total imports to GDP rise, as the rise in final goods to GDP dominates the decline in imported inputs to GDP.

Figure 2 illustrates the economy's adjustment in response to this type of shock, where, as before, we simulate an unanticipated permanent decline in firms' borrowing limit.

II. Data: Trade and Financial Crises over Two Centuries

The dataset used in this paper includes 69 developed and developing countries and covers the period 1816–2014. We combine bilateral trade flows between all country pairs with data on financial crises, GDP, and bilateral real exchange rates. Further details on these data are provided in Appendix B.

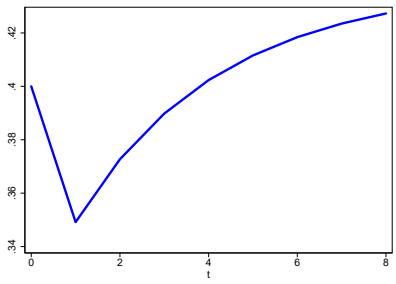
Financial Crises Dates We rely on data on the dates of financial (i.e., banking) crises compiled by Reinhart and Rogoff (2011a). They define banking crises as episodes where bank runs lead to the public sector assuming control of financial institutions, and/or episodes of large-scale financial assistance from the government to financial institutions. These data are available for 70 countries.[8,9] Reinhart and Rogoff (2011a) mark financial crisis dates using dummy variables at an annual frequency. We identify the first year of

[8] We exclude Taiwan from our sample due to a lack of recent trade and GDP data.
[9] Table A.2 reports the list of countries and the financial crises start dates.

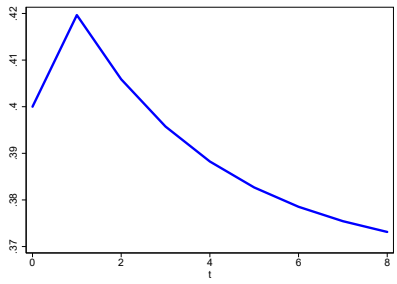
Figure 2: *Adjustment in Response to a Firm Deleveraging Shock.*

This figure describes the adjustment of the trade balance, exports, imports, and the price of the nontraded good to a 20 percent permanent reduction in firms' borrowing limit $\overline{\delta}$. The shock occurs in period $t = 1$.

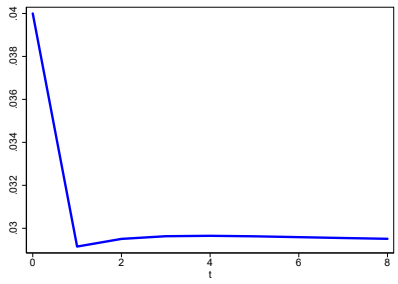
(a) *Exports / GDP*



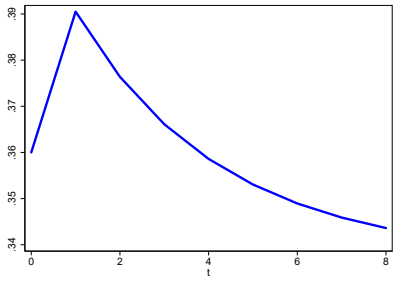
(b) *Imports / GDP*



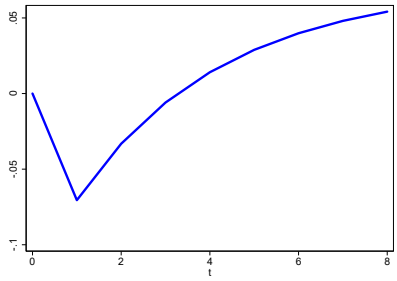
(c) *Imports of Inputs / GDP*



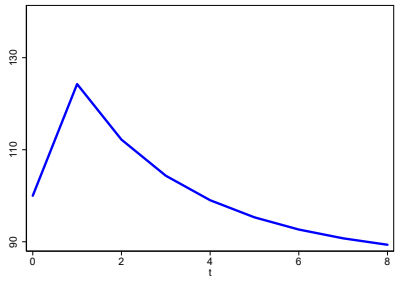
(d) *Imports of Final Goods / GDP*



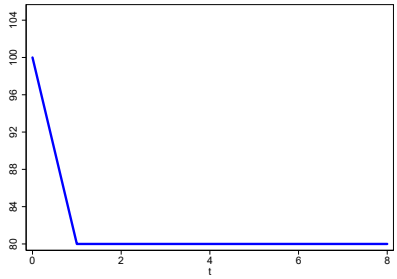
(e) *Trade Balance / GDP*



(f) *Price of Nontraded Good*



(g) *Firms' Borrowing Limit*



a crisis as the relevant shock event. We exclude crises adjacent to major world wars, or around which we lack trade data. We thus can analyze a maximum of 195 crisis episodes in our historical window. In this sample, 77 crises take place in advanced countries and 118 in developing economies; 108 crises occur in the post-WW2 period and 87 in the pre-WW2 era.[10] The distribution of the number of crisis episodes by country is such that the median country faces 3 crisis episodes during the full sample window 1816–2014. At the extremes, the country at the 10th percentile faces a single financial crisis episode, while the country at the 90th percentile faces 6 crises over the two centuries.

Trade Flows Bilateral trade data were obtained from the newly available CEPII TRADHIST database (Fouquin and Hugot, 2016) for the pre-WW2 period and entirely from the IMF's *Direction of Trade Statistics* for the post-WW2 period. Trade figures are reported in nominal U.S. dollars, which we deflate using the U.S. GDP deflator. We also assemble a second dataset on country-level total exports, total imports, GDP, and financial crises over the same period and sample of countries to provide more aggregate evidence on the response of trade following crises. Finally, we also assemble a dataset of bilateral trade flows by product type spanning the period 1962–2014. These data are restricted to the post-WW2 period as product-level data are not systematically available for earlier decades.

GDP and Real Exchange Rates Our historical GDP series are assembled from various sources. Whenever possible we obtain real GDP series from Glick and Taylor (2010) and from Maddison (1995, 2001). In recent years, we use the World Bank's *World Development Indicators* database. To fill in gaps in the early years in our sample we also use Barro and Ursua (2008) and Mitchell (1992, 1993, 1995). Finally, we also construct measures of bilateral real exchange rates. We obtain nominal exchange rates from the IMF's *International Financial Statistics* for the post-1950 period and from Global Financial Data for the pre-WW2 period. We obtain series on price levels from Reinhart and Rogoff (2011a) for most of our sample, and from the IMF's *World Economic Outlook* for very recent years.

III. Response of Total Trade Flows to Financial Crises

Our first empirical exercise examines the evolution of countries' aggregate exports and imports following financial crises in our historical 1816–2014 panel. Reinhart and Rogoff (2009), Jorda, Schularick, and Taylor (2013), and others, have documented the deep impact of

[10] We consider the following set of 14 countries to be advanced economies: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Japan, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom and the United States.

crisis episodes on various outcomes such as output, unemployment, government debt, and the pace of recovery. With the same historical perspective, we will focus on international trade.

Formally, let $\ln T_{it}$ denote a trade flow, which will be either total exports (X_{it}) or total imports (M_{it}) for country i in year t, measured in real constant dollars. In the same units we also measure GDP, denoted Y_{it}. Imposing a benchmark unit trade elasticity (i.e., homotheticity, as in standard gravity models) with respect to country GDP, we study the size-normalized trade flow $\ln\left[\frac{T_{i,t}}{Y_{i,t}}\right]$. We are interested in the dynamic response of this object, in the aftermath of a financial crisis event in country i. Thus, we denote by $Crisis_{it}$ the dummy variable which indicates the start of a financial crisis event. We then trace out the response of the normalized trade flow from time t to time $t+h$ across all episodes, using the local projection method of Jordà (2005) and estimating the series of regressions for each horizon h

$$\ln\left[\frac{T_{i,t+h}}{Y_{i,t+h}}\right] - \ln\left[\frac{T_{i,t}}{Y_{i,t}}\right] = \alpha_i^h + \beta_t^h + \gamma^h Crisis_{it} + e_{it}\,, \tag{1}$$

where α_i^h are country fixed effects and β_t^h are year fixed effects. The coefficient of interest is γ^h which denotes the response at horizon h to a financial crisis. These coefficients show how, controlling for pure GDP scaling effects, the financial crisis shock affects trade volumes. The estimation is by OLS with standard errors clustered by country and year, and all time-invariant country characteristics (e.g., certain geographical factors) are absorbed in the fixed effects.

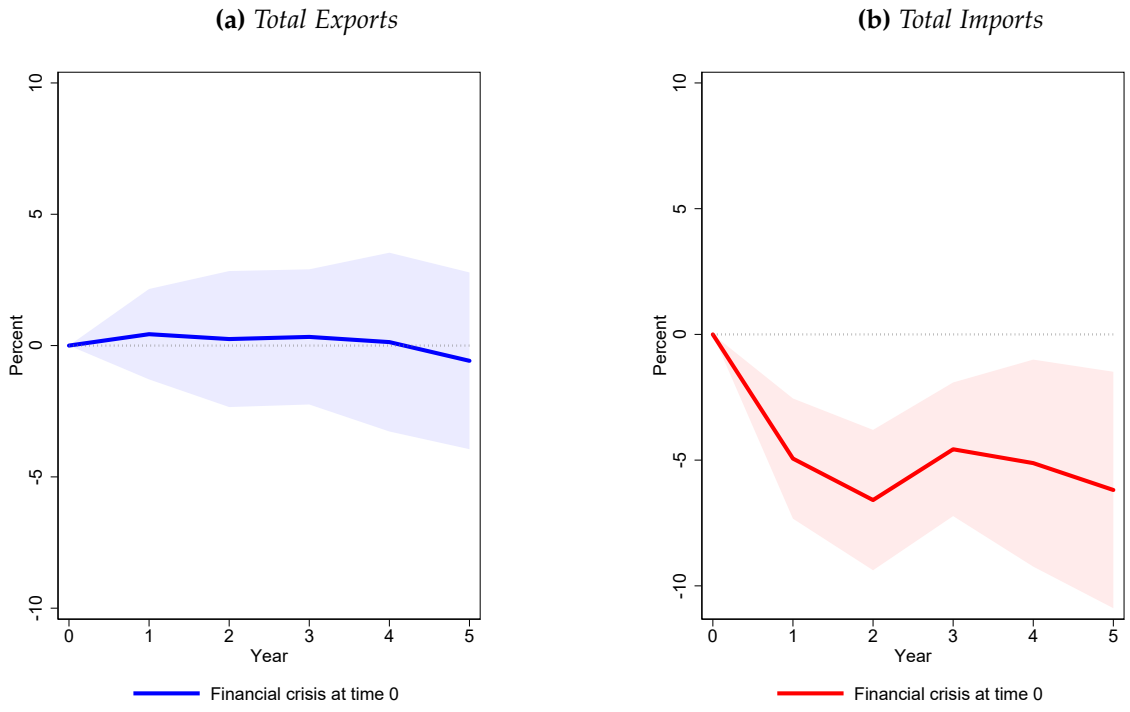
Figure 3 and Appendix Table A.3 show our estimates for the full sample. We find that on impact a financial crisis is associated with a *decrease* in GDP-normalized imports (-4.9% change).[11] But we find that on impact a financial crisis is associated with a (not statistically significant) *increase* in normalized exports. The effects on imports remain of a similar magnitude and statistically significant even out to the horizon $h = 5$ years (-6.2% change), while the effect on exports remain not statistically different from zero.

Studies of the "trade collapse" during the recent Great Recession document similar patterns and are motivated by the very large fall in trade in comparison to output. Because the 2008 event was a *global* crisis hitting many countries simultaneously, and because a country's exports are other countries' imports, it is difficult to tell apart in this recent episode whether the crisis depressed imports, exports, or both. Our empirical strategy *can* make this distinction, and the results show clearly that crises lower imports. A second message that emerges is that large declines in imports relative to GDP are the norm

[11] Strictly, the units of the estimated coefficients are log points, but for simplicity we refer to them using the % sign from here onwards as this is a close approximation.

Figure 3: *Local projections: response of total trade in goods to financial crisis*

This figure shows the response of the level of total GDP-normalized exports ($\ln X_i - \ln Y_i$) and imports ($\ln M_i - \ln Y_i$) to financial crisis in country i. See text.



Notes: Shaded regions indicate 95% confidence intervals.

historically. Finally, the historical record indicates that financial crises disrupt trade flows for many years. In Appendix C.2 we extend these results considering various subsamples.

These results appear inconsistent with the supply-side view of financial crises, but more consistent with the demand-side view. However, up to now our examination of total trade flows does not take into account events in countries' trading partners. In the next section we extend this approach to consider bilateral trade flows, sharpening our identification.

IV. Response of Bilateral Trade Flows to Financial Crises

In this section we take our empirical work to the most granular level possible. We now consider all country pairs, in all years, and look at the post-crisis response of exports, imports, and also the real exchange rate, for every given pair-year observation. Not only will this greatly expand the number of observations, it will also allow us to more exactly control for the incidence of financial crises potentially affecting one or both trading partners in any given observation. As a starting point, we treat crises as exogenous events. Later we

will address reverse causality, that is, the concern that financial crisis episodes might be a "nonrandom treatment" which is endogenous to macroeconomic conditions.[12]

In new notation for this setting, we now denote by T_{eit} the trade flow from exporter country e to importer country i in year t, and we denote by Y_{et} and Y_{it} the GDP level in each country, all measured in real constant dollars. We construct the size-normalized trade flow given by $\ln(T_{eit}/[Y_{et}Y_{it}])$, imposing a unit trade elasticity (homotheticity) with respect to exporter and importer GDP (again, as in standard gravity models).

We are interested in studying the response of this normalized trade flow following a financial crisis event in either country e or country i, or both. We denote by $Crisis_{et}$ and $Crisis_{it}$ the dummy variables indicating the start of a financial crisis event in countries e and i. We estimate the response of the normalized trade flow from time t to time $t+h$ across all episodes.

As before, we use the local projection method of Jordà (2005), where now we are estimating the series of regressions for each horizon h

$$\ln\left[\frac{T_{ei,t+h}}{Y_{e,t+h}Y_{i,t+h}}\right] - \ln\left[\frac{T_{eit}}{Y_{et}Y_{it}}\right] = \alpha_{ei}^h + \beta_t^h + \gamma_e^h Crisis_{et} + \gamma_i^h Crisis_{it} + \Xi^h \boldsymbol{X}_{eit} + e_{eit}\,, \qquad (2)$$

where α_{ei}^h are country-pair fixed effects and β_t^h are year fixed effects. We also allow for additional controls $\boldsymbol{X}_{eit}$.

Here, the coefficients of interest γ_e^h and γ_i^h denote the responses at horizon h to a financial crisis in the exporter and importer country, respectively. These coefficients will show how, controlling for GDP scaling effects, the financial crisis shock impacts trade flows between country pairs. We once again estimate these series of equations by OLS with standard errors clustered by exporter-year and importer-year using multiway clustering. Time-invariant pair characteristics (e.g., distance or other geographical factors) are absorbed in the fixed effects.

The full sample estimates are shown in panel (a) of Figure 4 and in Appendix Table A.6. In our preferred specification we include as additional controls $\boldsymbol{X}_{eit}$ two lags of the dependent variable and the change between $t+h$ and t in the bilateral real exchange rate ($\ln RER_{ei,t+h} - \ln RER_{ei,t}$). In the Appendix (see Table A.20 and panel (a) of Figure A.21 we show that very similar results are obtained when we ignore these additional controls.

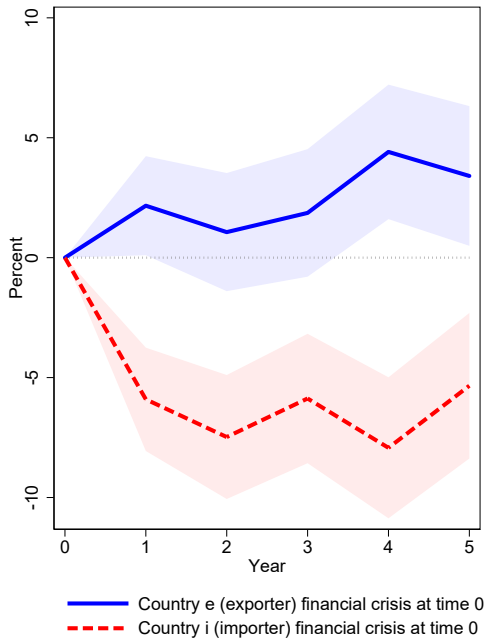
With about 200,000 observations we can obtain fairly good precision in the estimates. We find that on impact a financial crisis is associated with an *increase* in the normalized trade

[12]Note that our empirical strategy in this section, comparing bilateral trade flows and real exchange rates across country pairs, minimizes the possibility that the results are driven by contagion of crises across countries (either through trade or through other mechanisms). Later, when addressing reverse causality, we further limit this concern.

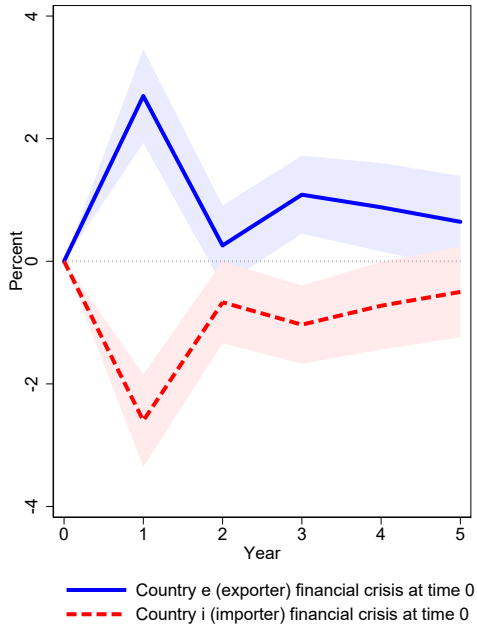
Figure 4: *Local projections: response of bilateral trade and RER to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. See text.

(a) *Bilateral Trade (exports from e sold as imports to i)*



(b) *Bilateral RER (importer i CPI / exporter e CPI)*



Notes: Shaded regions indicate 95% confidence intervals.

flow, +2.2% change, when the financial crisis event takes place in the exporter country. But we find that on impact a financial crisis is associated with a *decrease* in the normalized trade flow, -5.9% change, when the financial crisis event takes place in the importer country. The effects remain of a similar magnitude and are statistically significant even out to the horizon $h = 5$ years, where the effects are +3.4% and -5.3%.

Like our previous results, these patterns are clearly inconsistent with the supply-side view of financial crises, but quite consistent with the demand-side view of financial crises.

Next we turn to our model's predictions for the response of the real exchange rate. We are now estimating the series of regressions for each horizon h

$$\ln RER_{ei,t+h} - \ln RER_{ei,t} = \alpha_{ei}^h + \beta_t^h + \gamma_e^h Crisis_{et} + \gamma_i^h Crisis_{it} + \Xi^h \boldsymbol{X}_{eit} + e_{eit}\,, \qquad (3)$$

where again α_{ei}^h are country pair fixed effects and β_t^h are year fixed effects. The coefficients of interest γ_e^h and γ_i^h now show the post-crisis response of the real exchange rate between each country pair, where RER is defined as the importer's price level relative to the exporter's,

both measured in a common currency. The estimation is again by OLS with standard errors clustered by exporter-year and importer-year.

The full sample estimates are shown in panel (b) of Figure 4 and in Appendix Table A.7. In our preferred specification we include two lags of the dependent variable but omitting these controls results in similar results as we show in the Appendix (see Table A.21 and panel (b) of Figure A.21).

On impact a financial crisis is associated with an *appreciation* in the real exchange rate, +2.7% change, when the financial crisis event takes place in the exporter country. But on impact a financial crisis is associated with a *depreciation* in the real exchange rate, -2.6% change, when the financial crisis event takes place in the importer country. Even at horizon $h = 4$ years, the effects are +0.9% and -0.7% and statistically significant.

Again, based on our model, the patterns are clearly inconsistent with the supply-side view, but quite consistent with the demand-side view of financial crises.

In Appendix D.2 we show that our results are fundamentally similar in different time periods within our long historical sample We also find similar results across developing and developed countries, with a larger drop in normalized imports following a crisis among the latter.

Trade in Final Goods versus Trade in Intermediate Inputs. Our model predicts sharply different responses for both trade in final goods and trade in intermediate inputs depending on whether a financial crisis is a deleveraging shock to households or firms. Recall our model predicts a decline in imports of final goods to GDP and imports of intermediate goods to GDP following a household deleveraging shock. In contrast, a firm deleveraging shock induces an increase in imports of final goods to GDP and a fall in imports of intermediate inputs to GDP.

We have assembled data on bilateral trade flows by product type for the post-1962 period, which is described in Section II. We estimate equation 2 using each component of bilateral trade flows as the dependent variable. The results are shown in Appendix Figures A.22 and A.23 and Appendix Table A.24 . Both trade in final goods and trade in intermediate inputs fall in response to a crisis in the importing country, and rise following a crisis in the exporter.

These patterns are consistent with the model's predictions for a demand shock, and inconsistent with the predictions for a supply shock.

Robustness. Finally, we show in Appendices D and E our results are robust to i) controlling for other types of crises and sudden stops, ii) accounting for the endogeneity of financial crises using inverse probability weighting, iii) controlling for changes in TFP, iv)

controlling for changes in multilateral resistance terms and v) different clustering of standard errors. In addition we explore and rule out the existence of confounding pre-existing trends.

V. Conclusions

We develop a simple model of a country subject to "financial crisis" deleveraging shocks that impose tighter borrowing limits on households and/or firms. These shocks leave distinct statistical signatures in the time series record for each type of shock.

Household deleveraging shocks are mainly demand shocks, contract imports, leave exports largely unchanged, and depreciate the real exchange rate. Firm deleveraging shocks are mainly supply shocks, contract exports, leave imports largely unchanged, and appreciate the real exchange rate. These patterns will hold in a variety of models with households and/or firms subject to financial frictions of this kind, so the lesson is more general.

Taking the model to the data, we compiled a crossed dataset of 200+ years of trade flows and financial crises in a large sample of countries. We use empirical methods to see how financial distress affects trade and relative prices. Very clearly, after a financial crisis event, imports contract, exports hold steady or rise, and the real exchange rate depreciates. The effects are statistically significant: this pattern is the rule, not the exception.

Based on both price and quantity evidence a robust interpretation emerges: on average financial crises are not, for the most part, a supply shock, but rather a negative shock to demand.

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Online Appendices

After the Panic:
Are Financial Crises Demand or Supply Shocks?
Evidence from International Trade

Felipe Benguria and Alan M. Taylor

A. Simulations

A. Calibration

A first set of parameters is chosen directly based on the literature. Following Eggertsson and Krugman (2012) and Martin and Philippon (2017) we assume half the households are constrained ($\chi = 0.5$). We assign a value 0.04 to the real interest rate, and set the discount factor of patient households such that $\beta^s = 1/(1+r)$. We set the slope of the Phillips curve $\kappa = 0.1$ and the inverse elasticity of labor supply ϕ is set to 1 as in Monacelli (2009). We assume the fraction of firms' cost that must be financed before production takes place λ is set to $1/3$. We assume values for the parameters of the production function $\rho = 0.5$, $\theta = 0.7$, and $\epsilon = 0.5$, and we verify that simulation results do not change significantly as these parameters vary.

The remaining parameters are the price of the export good (P_X), the price of the import good (P_M), the price of the imported input (P_I), the relative weight of the nontraded good in the utility function (α_N), and the borrowing limit for impatient households ($\overline{D}$). These parameters are set to target the following conditions in the initial steady-state. First, we set the trade balance equal to zero, the share of inputs in total imports equal to either 10% or 40%, and the price of the import good and the export good equal.[13] Second, we set the employment share of the nontraded sector to either 60% or 80% of employment.[14] Third, we set the debt to income ratio of impatient households equal to one, an assumption which follows Eggertsson and Krugman (2012).

Finally, in each sector the borrowing limit for firms ($\overline{\delta}_S$) is set to be just below the optimal amount borrowed in the unrestricted steady state.

In our simulations, we assume a decline of equal magnitude (in %) in household or firm's borrowing limits. An alternative approach would have been to calibrate the change in these borrowing limits to match changes in certain ratios (such as the ratio of household debt or firm debt to GDP) observed during crises, but we do not have systematic evidence in this regard.

[13] While we do not have accurate historical data informing an average value of the share of imported inputs in total imports over our sample period, we believe these two values represent a reasonable range.

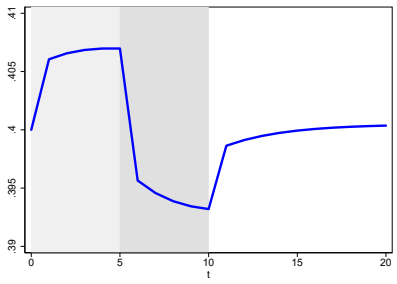
[14] Again, we do not have historical data describing the size of the nontradable sector, so we use a reasonable range of parameters.

B. Temporary Shocks

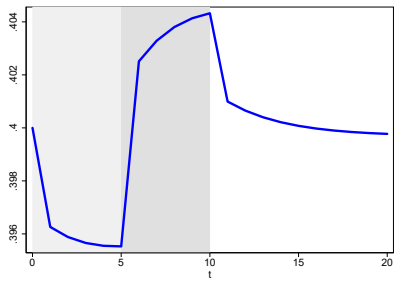
Figure A.1: *Adjustment in Response to a Household Deleveraging Shock.*

This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in impatient households' borrowing limit $\overline{D}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing limit in the first five periods (marked by the lighter shaded area) and a 4 percent increase in the following five periods (marked by the darker shaded area).

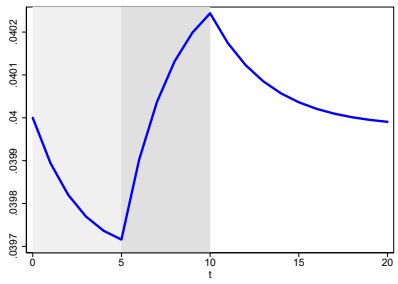
(a) *Exports / GDP*



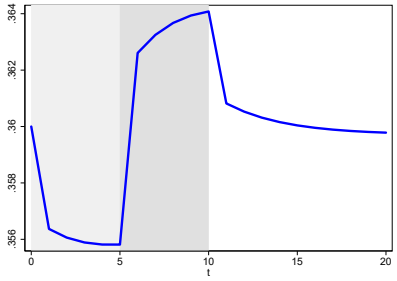
(b) *Imports / GDP*



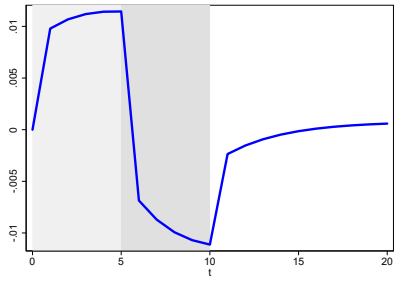
(c) *Imports of Inputs / GDP*



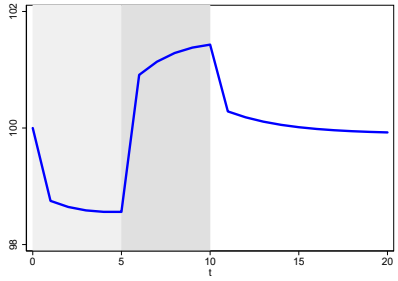
(d) *Imports of Final Goods / GDP*



(e) *Trade Balance / GDP*



(f) *Price of Nontraded Good*



(g) *Households' Borrowing Limit*

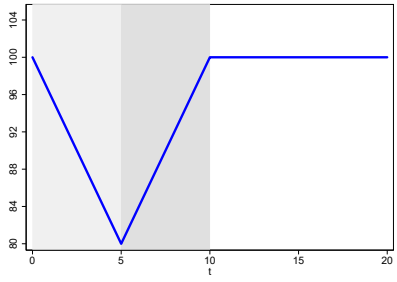
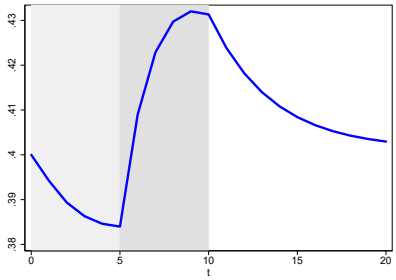


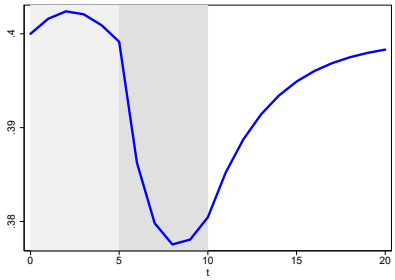
Figure A.2: *Adjustment in Response to a Firm Deleveraging Shock.*

This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in firms' borrowing limit $\overline{\delta}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing limit in the first five periods (marked by the lighter shaded area) and a 4 percent increase in the following five periods (marked by the darker shaded area).

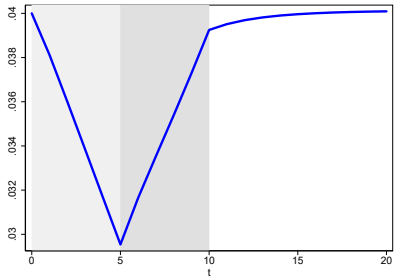
(a) *Exports / GDP*



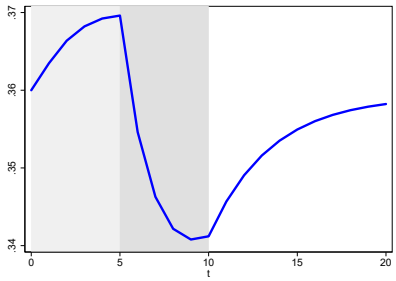
(b) *Imports / GDP*



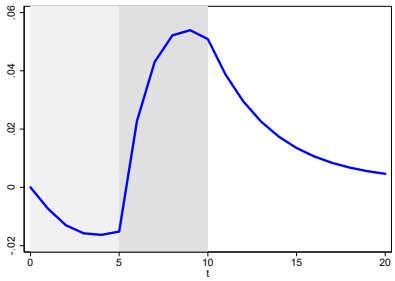
(c) *Imports of Inputs / GDP*



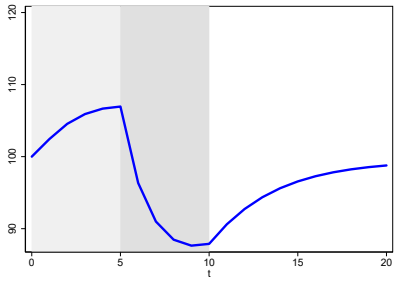
(d) *Imports of Final Goods / GDP*



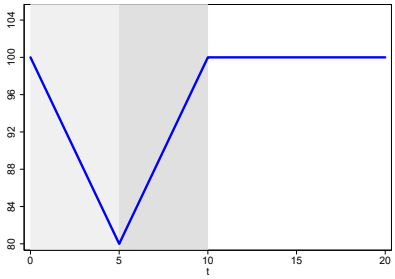
(e) *Trade Balance / GDP*



(f) *Price of Nontraded Good*



(g) *Firms' Borrowing Limit*



C. Sensitivity Analysis

We analyze the following additional simulations varying two important steady-state ratios used to calibrate the model's parameters: the share of imported intermediate inputs in total imports and the size (employment share) of the nontradable sector.

1. Figures 1 and 2 in Main Text and Appendix Figures A.1 and A.2:
    - Share of Imported Intermediate Inputs in Total Imports = 0.1
    - Employment Share of the Nontradable Sector = 0.6
2. Figures A.3 and A.4:
    - Share of Imported Intermediate Inputs in Total Imports = 0.1
    - Employment Share of the Nontradable Sector = 0.8
3. Figures A.5 and A.6:
    - Share of Imported Intermediate Inputs in Total Imports = 0.4
    - Employment Share of the Nontradable Sector = 0.6
4. Figures A.7 and A.8:
    - Share of Imported Intermediate Inputs in Total Imports = 0.4
    - Employment Share of the Nontradable Sector = 0.8

Discussion:

Consider first the case of the permanent shocks. When the size of the nontradable sector increases relative to the benchmark level in the main text (see Figures A.3 and A.4) there are no changes in the patterns observed.When the share of imported intermediate inputs in total imports increases relative to the benchmark level (see Figures A.5 and A.6) the response to the household deleveraging shock is very similar. In the case of the response to the firm deleveraging shock we see one difference: the ratio of imports to GDP falls in response to the shock (while it increases in the baseline case in the main text). It is still the case under both parametrizations that the ratio of imports of final goods to GDP rises, while the ratio of imports of intermediate inputs to GDP falls. The larger calibrated steady state share of imports of intermediate inputs to GDP leads to the decline in total imports to GDP. Importantly, this decline in imports to GDP is substantially *smaller* than the decline in

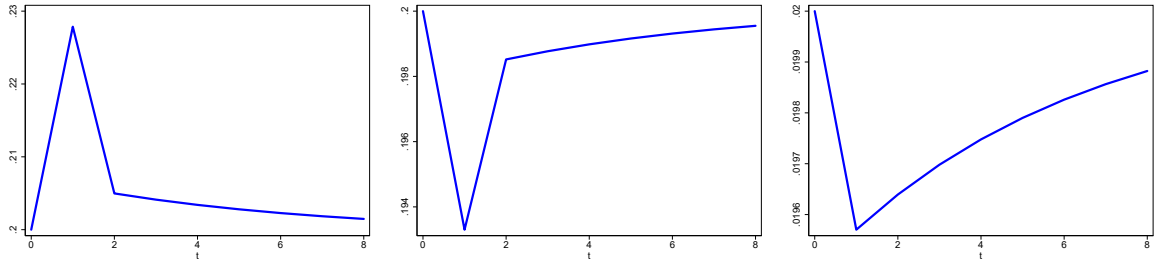
exports to GDP. In consequences, in *all* scenarios, the trade balance to GDP ratio declines in response to the firm deleveraging shock.

In the case of the temporary shocks, again we find no relevant differences between the baseline case in the main text and the simulations with alternative parameters in the response to the household deleveraging shock. In the case of the firm deleveraging shock, increasing the steady-state share of imported intermediate inputs in total imports or the share of the nontradable sector leads to a decline in the ratio of imports to GDP during the period when the borrowing limit falls. Once again, a key point is that in all cases the decline in imports to GDP is *smaller* than the decline in exports to GDP and consequently the trade balance to GDP ratio declines in response to the firm deleveraging shock in *all* scenarios.

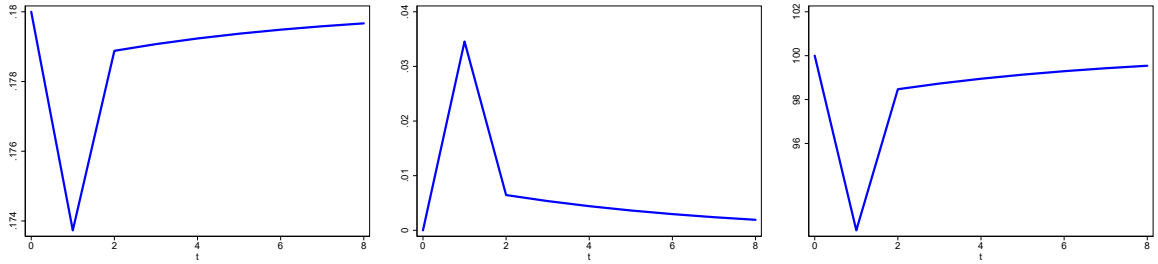
Figure A.3: *Adjustment in Response to a Household Deleveraging Shock.*

Panel A: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a 20 percent permanent reduction in impatient households' borrowing limit $\overline{D}$. The shock occurs in period t = 1.

(a) *Exports / GDP* **(b)** *Imports / GDP* **(c)** *Imports of Inputs / GDP*

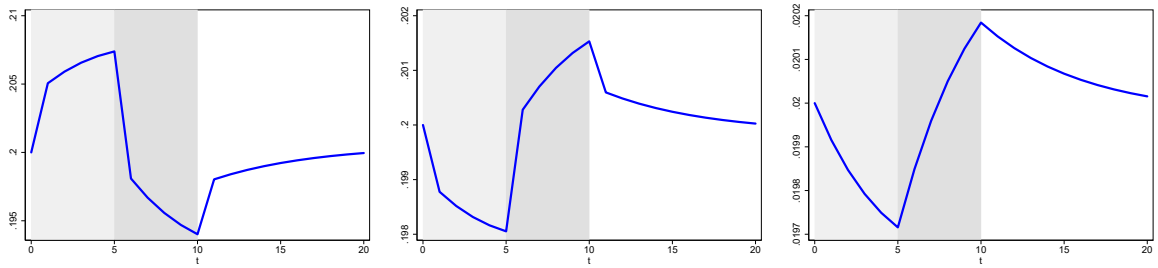


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



Panel B: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in impatient households' borrowing limit $\overline{D}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing limit in the first five periods (marked by the lighter shaded area) and a 4 percent increase in the following five periods (marked by the darker shaded area).

(g) *Exports / GDP* **(h)** *Imports / GDP* **(i)** *Imports of Inputs / GDP*



(j) *Imports of Final Goods / GDP* **(k)** *Trade Balance / GDP* **(l)** *Price of Nontraded Good*

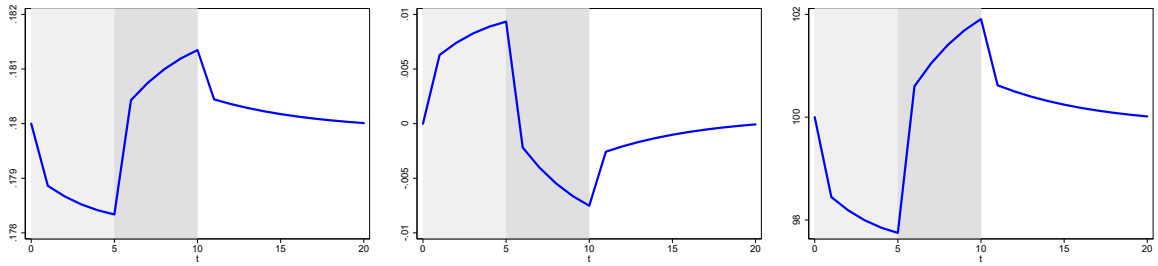
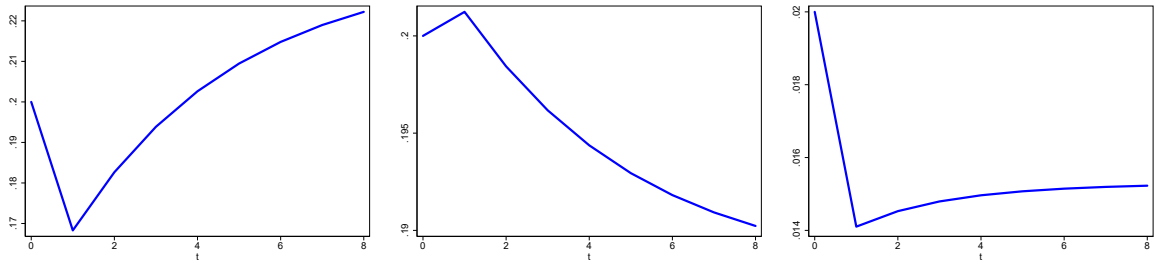


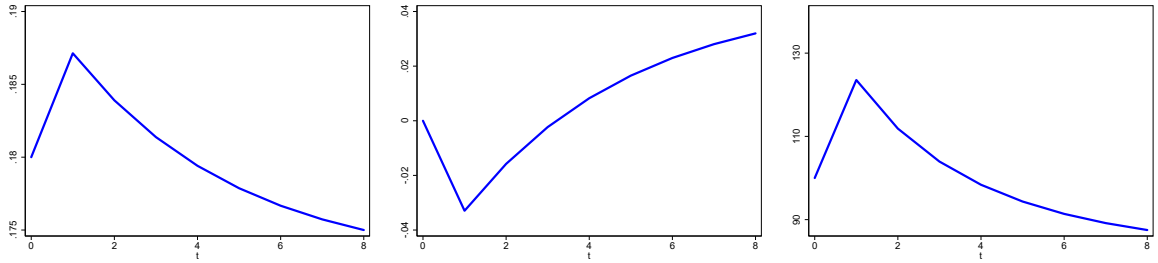
Figure A.4: *Adjustment in Response to a Firm Deleveraging Shock.*

Panel A: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a 20 percent permanent reduction in firms' borrowing limit $\overline{\delta}$. The shock occurs in period t = 1.

(a) *Exports / GDP* **(b)** *Imports / GDP* **(c)** *Imports of Inputs / GDP*

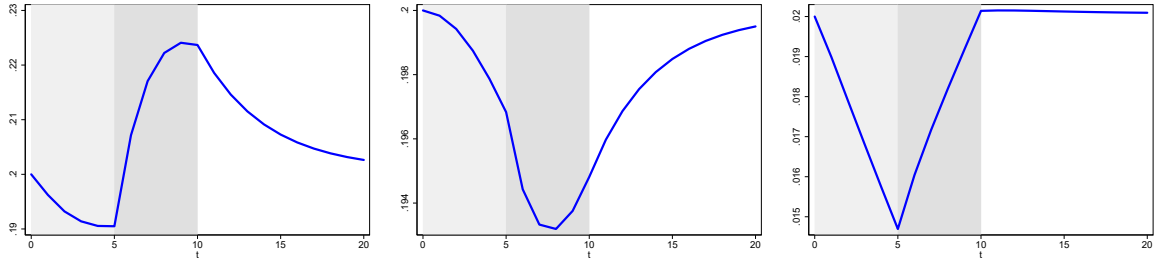


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



Panel B: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in firms' borrowing limit $\overline{\delta}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing limit in the first five periods (marked by the lighter shaded area) and a 4 percent increase in the following five periods (marked by the darker shaded area).

(g) *Exports / GDP* **(h)** *Imports / GDP* **(i)** *Imports of Inputs / GDP*



(j) *Imports of Final Goods / GDP* **(k)** *Trade Balance / GDP* **(l)** *Price of Nontraded Good*

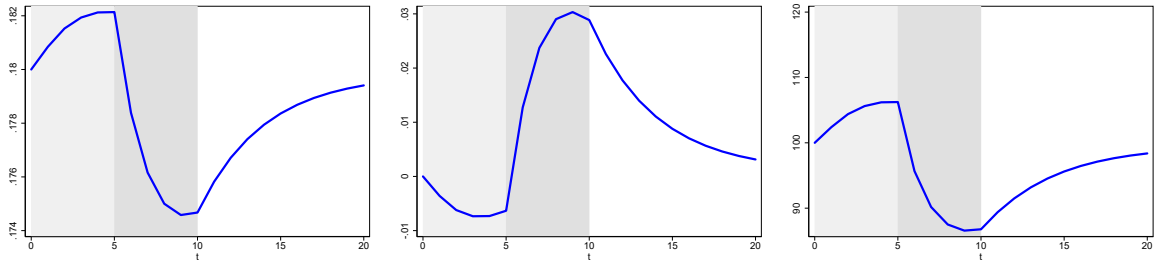
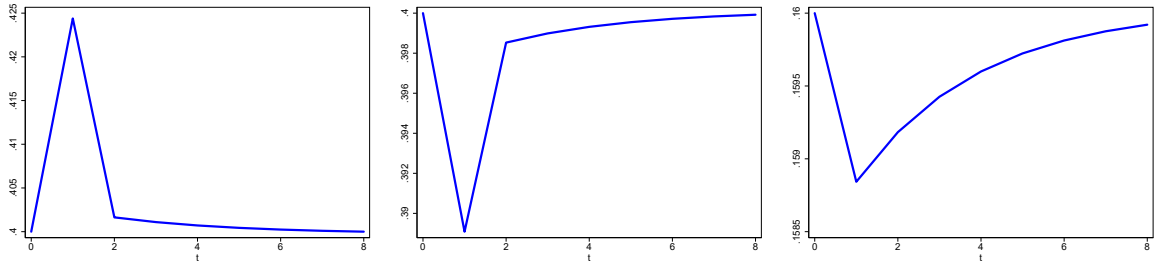


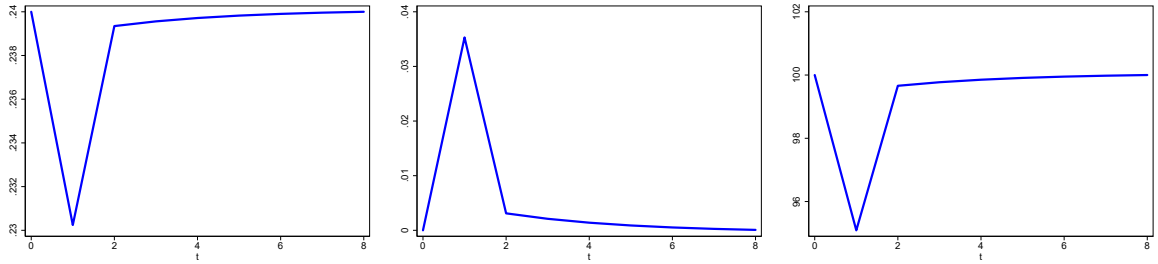
Figure A.5: *Adjustment in Response to a Household Deleveraging Shock.*

Panel A: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a 20 percent permanent reduction in impatient households' borrowing limit $\overline{D}$. The shock occurs in period t = 1.

(a) *Exports / GDP* **(b)** *Imports / GDP* **(c)** *Imports of Inputs / GDP*

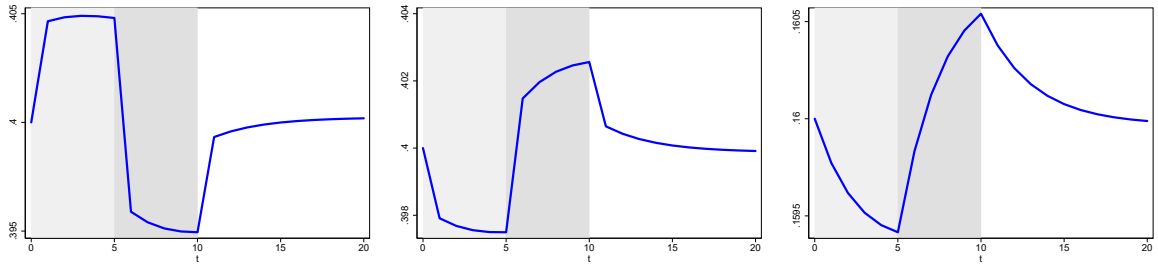


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



Panel B: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in impatient households' borrowing limit $\overline{D}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing limit in the first five periods (marked by the lighter shaded area) and a 4 percent increase in the following five periods (marked by the darker shaded area).

(g) *Exports / GDP* **(h)** *Imports / GDP* **(i)** *Imports of Inputs / GDP*



(j) *Imports of Final Goods / GDP* **(k)** *Trade Balance / GDP* **(l)** *Price of Nontraded Good*

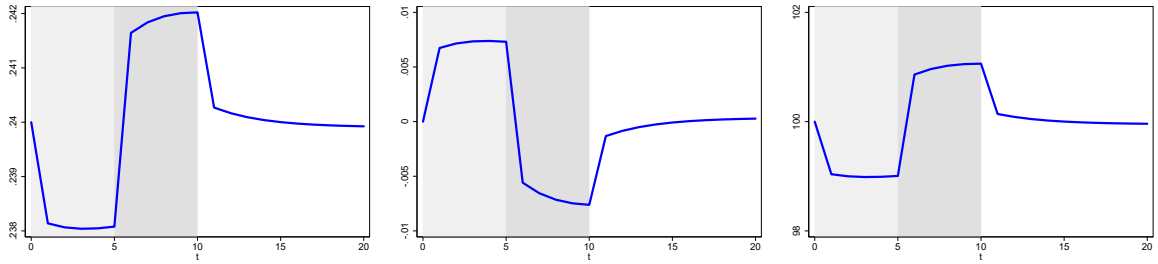
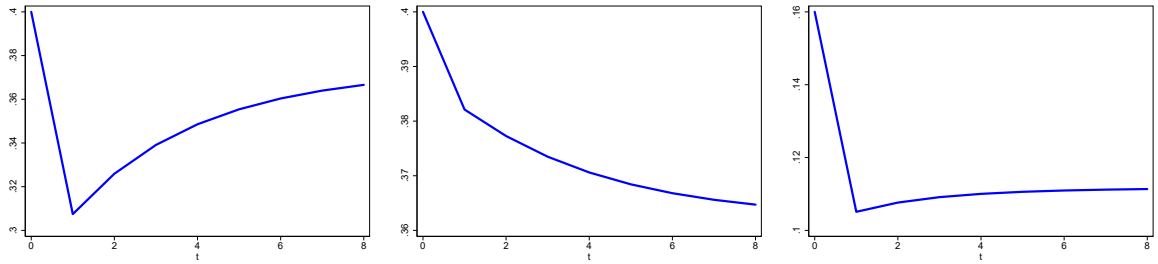


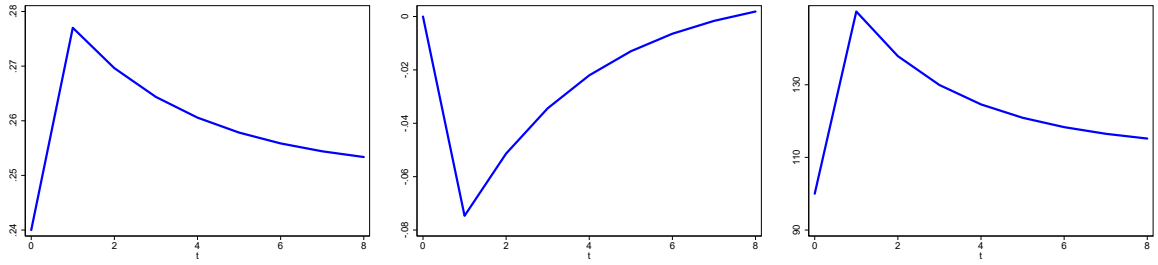
Figure A.6: *Adjustment in Response to a Firm Deleveraging Shock.*

Panel A: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a 20 percent permanent reduction in firms' borrowing limit $\overline{\delta}$. The shock occurs in period t = 1.

(a) *Exports / GDP* **(b)** *Imports / GDP* **(c)** *Imports of Inputs / GDP*

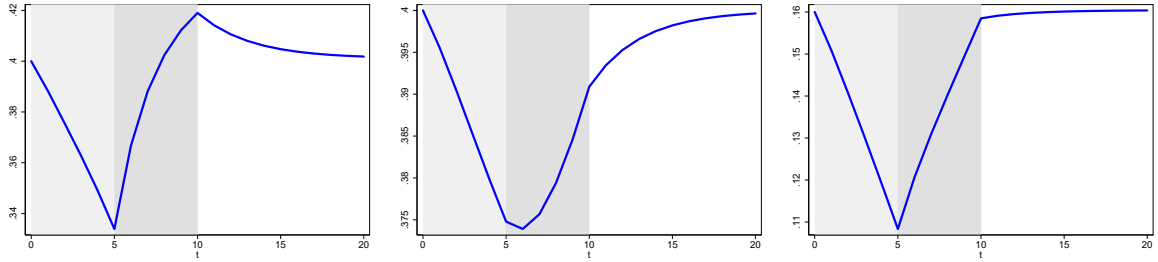


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



Panel B: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in firms' borrowing limit $\overline{\delta}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing limit in the first five periods (marked by the lighter shaded area) and a 4 percent increase in the following five periods (marked by the darker shaded area).

(g) *Exports / GDP* **(h)** *Imports / GDP* **(i)** *Imports of Inputs / GDP*



(j) *Imports of Final Goods / GDP* **(k)** *Trade Balance / GDP* **(l)** *Price of Nontraded Good*

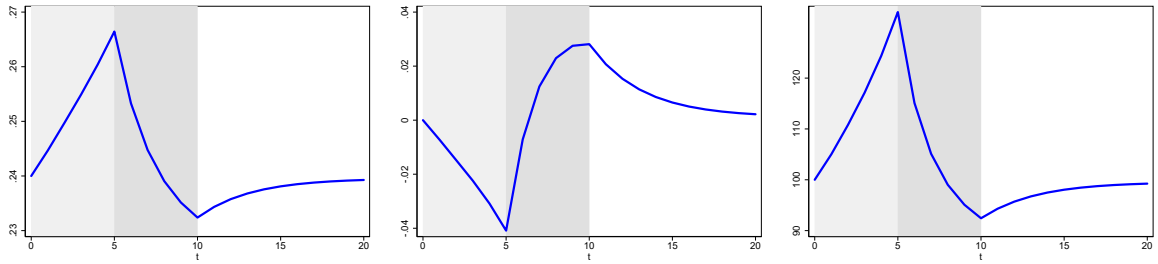
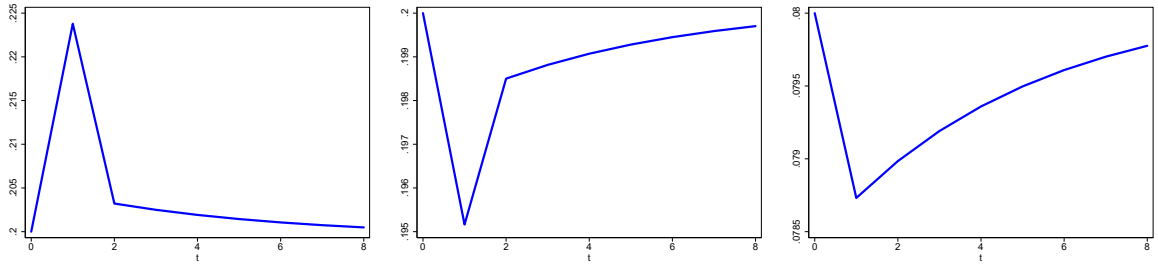


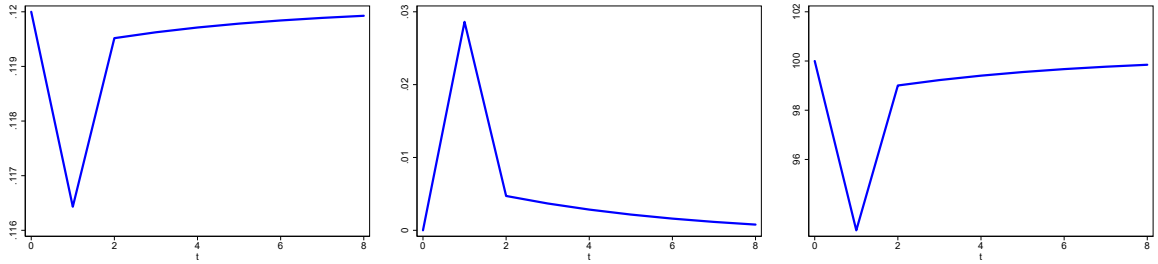
Figure A.7: *Adjustment in Response to a Household Deleveraging Shock.*

Panel A: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a 20 percent permanent reduction in impatient households' borrowing limit $\overline{D}$. The shock occurs in period t = 1.

(a) *Exports / GDP* **(b)** *Imports / GDP* **(c)** *Imports of Inputs / GDP*

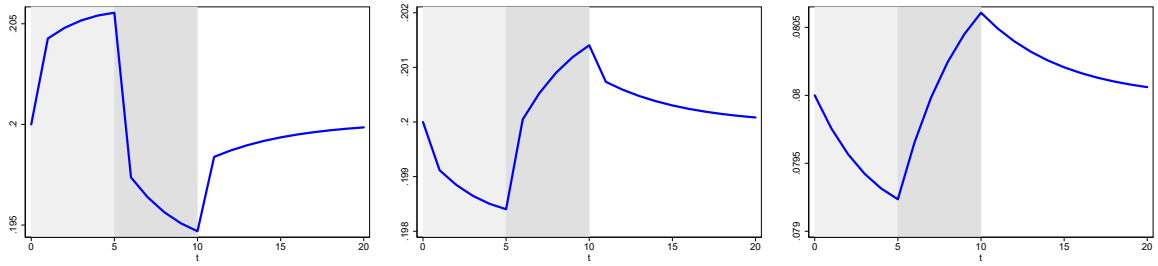


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



Panel B: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in impatient households' borrowing limit $\overline{D}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing limit in the first five periods (marked by the lighter shaded area) and a 4 percent increase in the following five periods (marked by the darker shaded area).

(g) *Exports / GDP* **(h)** *Imports / GDP* **(i)** *Imports of Inputs / GDP*



(j) *Imports of Final Goods / GDP* **(k)** *Trade Balance / GDP* **(l)** *Price of Nontraded Good*

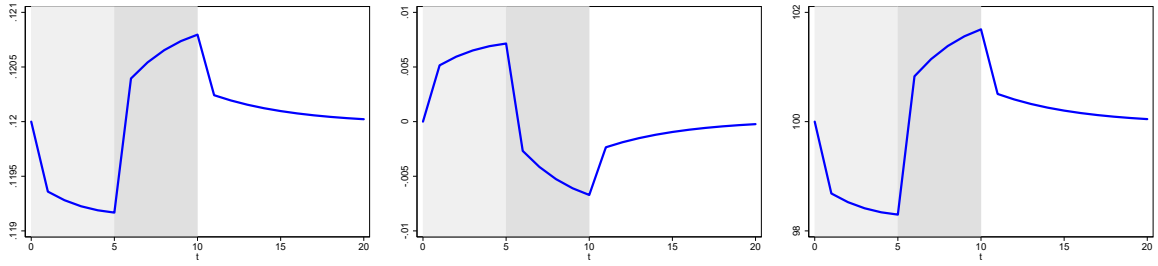
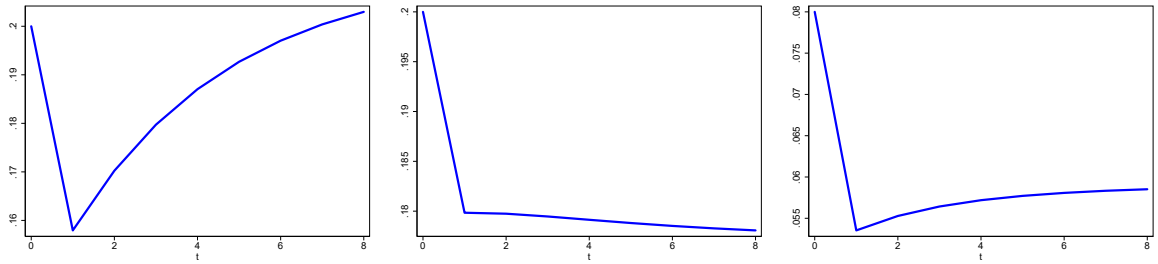


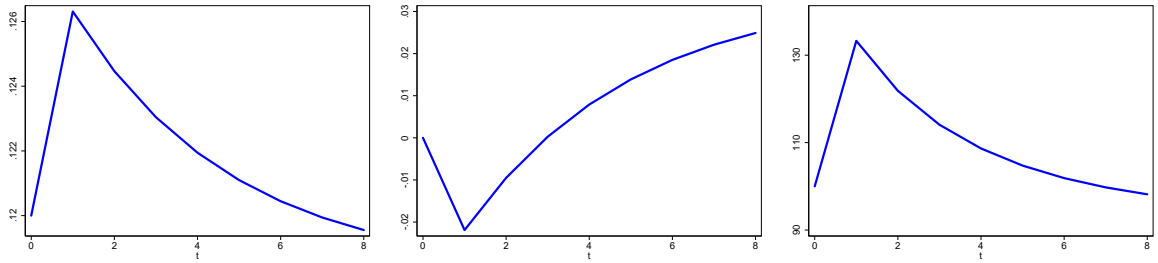
Figure A.8: *Adjustment in Response to a Firm Deleveraging Shock.*

Panel A: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a 20 percent permanent reduction in firms' borrowing limit $\overline{\delta}$. The shock occurs in period t = 1.

(a) *Exports / GDP* **(b)** *Imports / GDP* **(c)** *Imports of Inputs / GDP*

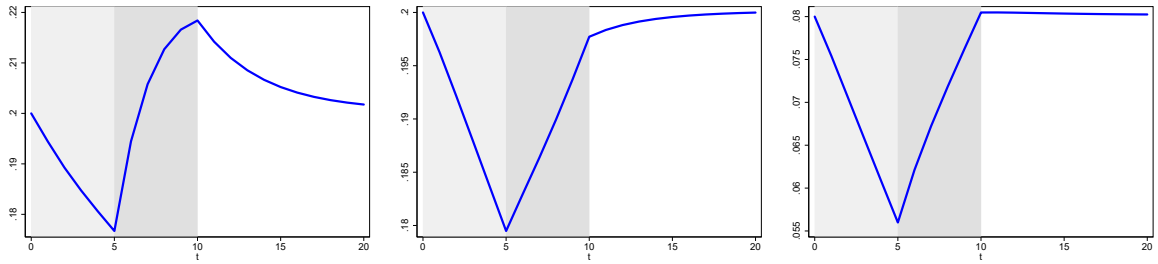


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*

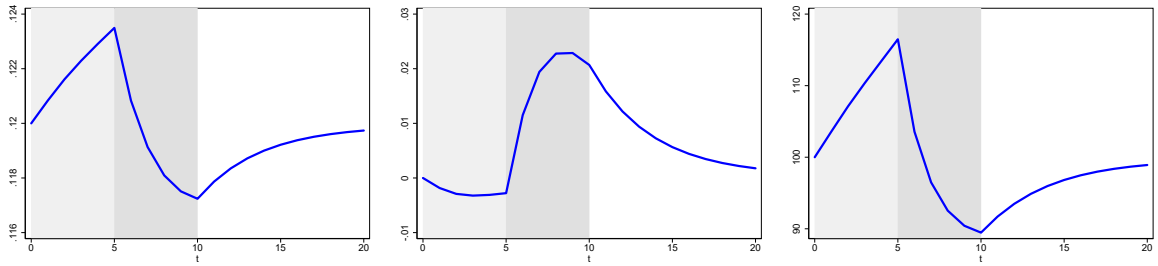


Panel B: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in firms' borrowing limit $\overline{\delta}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing limit in the first five periods (marked by the lighter shaded area) and a 4 percent increase in the following five periods (marked by the darker shaded area).

(g) *Exports / GDP* **(h)** *Imports / GDP* **(i)** *Imports of Inputs / GDP*



(j) *Imports of Final Goods / GDP* **(k)** *Trade Balance / GDP* **(l)** *Price of Nontraded Good*



B. Data: Trade and Financial Crises

A. Data Sources

Trade in Final Goods and Intermediate Inputs We construct a dataset of bilateral trade flows by product type spanning the period 1962–2014. These data are restricted to the post-WW2 period as product-level data are not systematically available for earlier decades. Broadly, our procedure involves obtaining data by product, by year, and by exporter-importer pair from the United Nations' COMTRADE database and assigning each individual product into final goods, intermediate inputs, or capital goods categories. The coding of products into these aggregate groups is standard and follows Hummels, Ishii, and Yi (2001).[15] We exclude from our data fuels, which at times represent a relevant share of world trade, and a small set of unmatched products.

B. Descriptive Statistics

Table A.1 shows the mean and standard deviation of the exports to GDP and imports to GDP ratio across countries for different time periods in our sample.

Table A.1: *Summary Statistics for Trade Flows.*

	All			Advanced			Developing		
	Mean	St. Dev.	N	Mean	St. Dev.	N	Mean	St. Dev.	N
Post WW2									
Exports to GDP	0.25	0.20	4393	0.24	0.15	924	0.25	0.21	3469
Imports to GDP	0.27	0.23	4383	0.25	0.14	924	0.28	0.25	3459
Interwar									
Exports to GDP	0.17	0.08	424	0.17	0.07	176	0.17	0.08	248
Imports to GDP	0.19	0.11	420	0.20	0.10	176	0.18	0.11	244
Pre WW1									
Exports to GDP	0.16	0.15	1610	0.18	0.17	906	0.14	0.11	704
Imports to GDP	0.20	0.18	1600	0.22	0.21	889	0.16	0.10	711

Notes: The data on trade flows are obtained from CEPII TRADHIST database for the pre-WW2 period and from the IMF's *Direction of Trade Statistics* for the post-WW2 period.

[15] We match SITC revision 1 product codes in COMTRADE to BEC codes used by Hummels, Ishii, and Yi (2001) using a concordance obtained from the United Nations' Statistics Division.

C. List and Frequency of Financial Crises

Table A.2: *List of financial crises.*

This table lists all financial crisis episodes in our dataset. See text.

Country	Crisis years
Algeria	1990
Angola	1992
Argentina	1890, 1931, 1980, 1989, 1995, 2001
Australia	1828, 1843, 1893, 1931, 1989
Austria	1924, 1929, 2008
Belgium	1848, 1870, 1925, 1931, 2008
Bolivia	1986, 1994
Brazil	1890, 1897, 1923, 1963, 1985, 1990, 1994
Canada	1873, 1906, 1923, 1983
Central African Republic	1976, 1988
Chile	1890, 1899, 1907, 1926, 1976, 1982
China	1897, 1923, 1931, 1992
Colombia	1982, 1998
Costa Rica	1987, 1994
Denmark	1857, 1877, 1885, 1902, 1907, 1931, 1987, 2008
Dominican Republic	1996, 2003
Ecuador	1981, 1998
Egypt	1981, 1990
El Salvador	1989
Finland	1931, 1991
France	1881, 1889, 1907, 1930, 1994, 2008
Germany	1880, 1891, 1901, 1925, 1931, 1977, 2008
Ghana	1982, 1997
Greece	1931, 1991, 2008
Guatemala	1990, 2001, 2006
Honduras	1999
Hungary	1931, 1991, 2008
India	1993
Indonesia	1992
Ireland	2007
Italy	1866, 1887, 1891, 1907, 1930, 1990
Japan	1901, 1907, 1923, 1927, 1992
Kenya	1985
Korea	1983, 1997
Malaysia	1985, 1997

Notes: The data on financial crisis dates are obtained from Reinhart and Rogoff (2011).

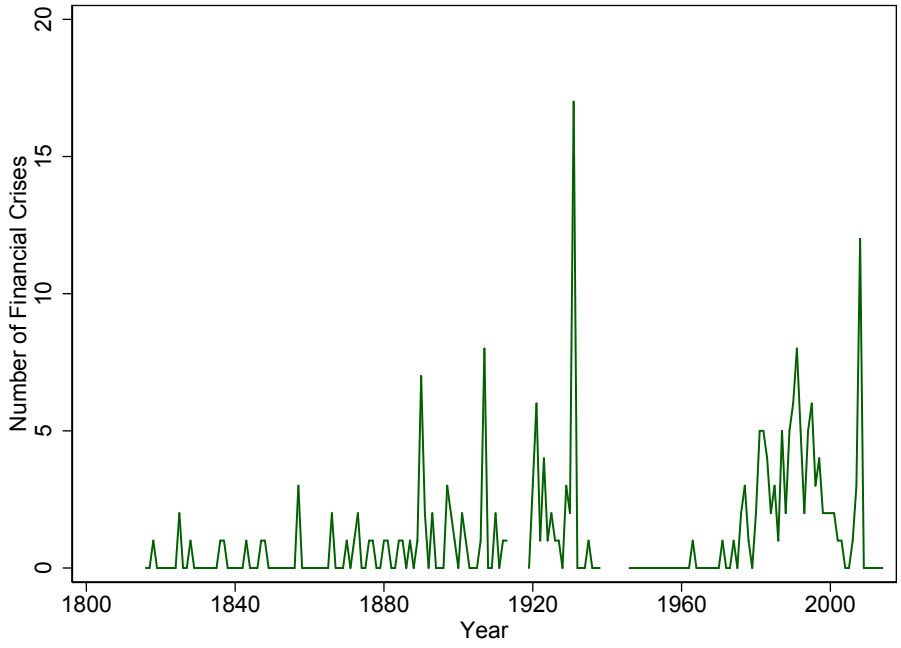
Table A.2: *List of financial crises, CONTINUED.*

Country	Crisis years
Mexico	1907, 1929, 1981, 1994
Morocco	1983
Myanmar	1996
Netherlands	1897, 2008
New Zealand	1890, 1987
Nicaragua	1987, 2000
Nigeria	1992
Norway	1898, 1931, 1987
Panama	1988
Paraguay	1995
Peru	1872, 1983, 1999
Philippines	1981, 1997
Poland	1931, 1991
Portugal	1890, 1931, 2008
Romania	1931, 1990
Russia	1995, 2008
Singapore	1982
South Africa	1977, 1989
Spain	1931, 1977, 2008
Sri Lanka	1989
Sweden	1876, 1907, 1922, 1931, 1991
Switzerland	1931, 2008
Thailand	1980, 1996
Tunisia	1991
Turkey	1931, 1982, 1991, 2000
United Kingdom	1825, 1837, 1847, 1857, 1866, 1890, 1974, 1984, 1991, 1995, 2007
United States	1818, 1825, 1836, 1857, 1873, 1884, 1890, 1907, 1929, 1984, 2007
Uruguay	1893, 1898, 1971, 1981, 2002
Venezuela	1978, 1993
Zambia	1995
Zimbabwe	1995

Notes: The data on financial crisis dates are obtained from Reinhart and Rogoff (2011).

Figure A.9: *Frequency of financial crises*

This figure shows the number of financial crises per year. See text.



Notes: The data on financial crisis dates are obtained from Reinhart and Rogoff (2011).

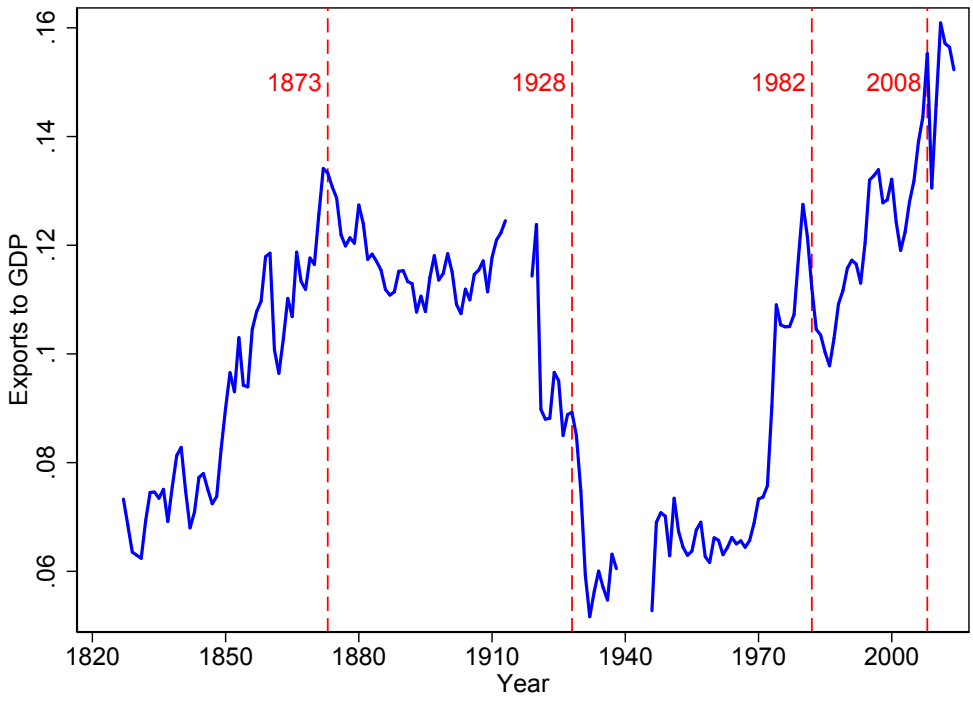
D. World Trade and Major Crises

To motivate our analysis, we note that what was witnessed after the global financial crisis in 2008 was nothing new, especially not the so-called Great Trade Collapse, meaning the fall in trade volumes relative to GDP.

Figure A.10 shows the trajectory of world exports/GDP after all the major global financial crises between 1827 and the present. We aggregate total exports and GDP over this period for a constant set of countries. This limits our world-trade figure to 10 countries with continuously available trade and GDP data over the 1827–2014 period. We exclude years of world wars in which trade or GDP data are missing for many countries. Figure A.11 shows the results are very similar based on a broader group of 20 countries over the period 1868–2014.

Figure A.10: *World Trade and Major Crises.*

This figure is constructed aggregating exports and GDP for a constant sample of the following 10 countries: Australia, Chile, Denmark, Spain, France, United Kingdom, Netherlands, Portugal, Sweden, and the United States. Vertical dashed lines indicate the starting year of four major world financial crises: the Panic of 1873 episode, the 1930s Great Depression episode, the 1980s LDC Sovereign-Financial Crises episode, and the 2008 Great Recession episode.



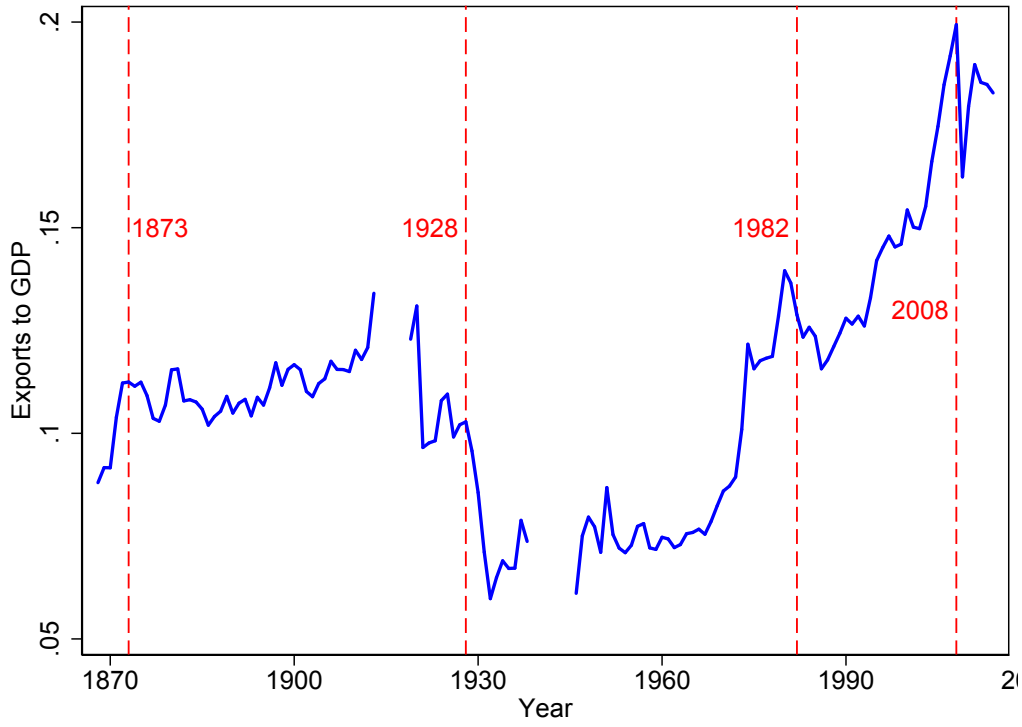
From this graph, the trade collapse following the recent 2008–2009 financial crisis is unsurprising. Our figure also shows, with vertical dashed lines, the starting dates of the Panic of 1873 episode, the 1930s Great Depression episode, the 1980s LDC Sovereign-Financial Crises episode, and the 2008 Great Recession episode. Similar declines in world trade can be seen to have occurred after each of these crisis events. Two years following the start of the Great Recession in 2008, world exports to GDP in our data had fallen by 0.93 percentage points. This is a similar decline to that in the early 1980s, when the trade to GDP fell ratio fell by 0.86 percentage points. The impact of the Great Depression, however, was almost twice as large, with a 1.45 percentage point fall in world trade to GDP.

However, the recovery of trade after the recent "trade collapse" was faster — compared to output — than that seen in previous episodes. Five years following the start of the Great Recession the exports-to-GDP ratio was 0.1 percentage points higher than in the year prior to the start of the crisis, while in the 1980s debt crisis and the Panic of 1873 it was still one percentage point lower. The Great Depression stands out in this regard. Due perhaps to rising protectionist measures adopted by the U.S. and other countries during this period (and other rising frictions, such as the collapse of the gold standard) exports-to-GDP were still more than 3 percentage points lower than in the year prior to the start of the crisis.

This figure nicely motivates our study by revealing an enduring link between crisis events and trade outcomes. What is obscured in this figure, however, is the uneven impact of financial crises on imports and exports, and the correlation between those shocks and the location of the underlying financial frictions. Our empirical analysis in sections III and IV focuses on those issues with a granular empirical analysis.

Figure A.11: *World Trade and Major Crises.*

This figure is constructed aggregating exports and GDP for a constant sample of the following 20 countries: Australia, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Spain, Finland, France, the United Kingdom, Greece, Italy, Japan, Netherlands, Norway, Portugal, Sweden, and the United States. Vertical dashed lines indicate the starting year of four major world financial crises: the Panic of 1873 episode, the 1930s Great Depression episode, the 1980s LDC Sovereign-Financial Crises episode, and the 2008 Great Recession episode.



C. Total Trade

A. Table Corresponding to Figure 3 in Main Text

Table A.3 shows the coefficients from the estimation of equation 1.

Table A.3: *Local projections: response of total exports and imports to financial crisis*

This table shows the response of the level of total GDP-normalized exports or imports $\ln T_i - \ln Y_i$ to financial crisis in country i (in year 0). See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	0.4	0.2	0.3	0.1	-0.6
	(0.9)	(1.3)	(1.3)	(1.7)	(1.7)
N	6419	6273	6127	5981	5838
Total imports	-4.9**	-6.6**	-4.6**	-5.1*	-6.2*
	(1.2)	(1.4)	(1.4)	(2.1)	(2.4)
N	6395	6248	6100	5953	5811

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

B. Additional Results

Here we discuss additional results regarding the response of total exports and total imports to financial crises splitting the sample by subperiods and between developed and developing countries. We also examine the impact of financial crises at various percentiles of the distribution of the dependent variable.

Different Time Periods. If we exclude the Great Recession, as in Figure A.12a, the results are similar to those for the full sample. In the post-WW2 sample (shown in A.12b), which includes 55% of the crisis episodes, the decline in imports relative to GDP is even larger than in the full sample. On impact, the normalized trade flow declines -5.9% at a two-year horizon in the full sample and -8.9% in the post-WW2 era. In both cases, normalized exports rise but the impact is not statistically significant. Our estimates for the pre-WW2 period (in Figure A.12c) are blurrier. Imports still fall relative to GDP (-4.1% change) on impact, but recover faster than in the full sample baseline. Normalized exports climb susbtantially over time. In both cases, standard errors are wider, due perhaps primarily to the smaller sample size. The estimated coefficients corresponding to Figure A.12 are shown in Table A.4.

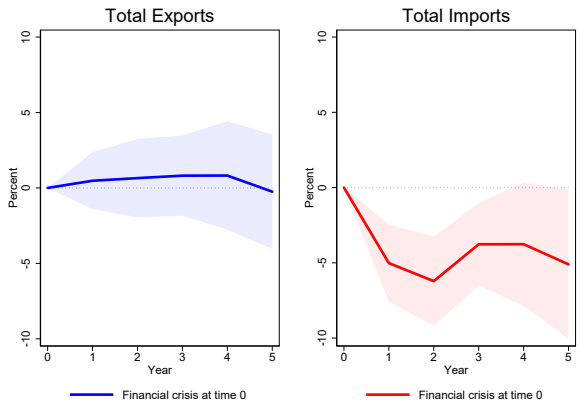
Advanced vs. Developing Economies. We also examine the response of exports and imports in developed and developing countries separately, as shown in Figures A.13a and A.13b, respectively. (The estimated coefficients corresponding to Figure A.13 are shown in Table A.5.) We denominate 14 countries in our sample as developed and the remaining 55 as developing. Out of the 195 crisis episodes considered, 39% occur in the developed group, and the remaining 61% in developing countries. While our main messages outlined earlier largely remain valid for both samples, we do find some differences. In the developing-country sample, normalized imports decline more than in the full sample, reaching the largest decline at a two year horizon (-8.2% change, compared to -5.9% for the full sample). In the developed-country sample we loose precision, perhaps due to the small number of countries, but the main message—that imports tend to fall, and exports tend to stay stay constant or rise, relative to GDP—still stands.

Quantile Regressions In the main text we analyzed the response of (GDP-normalized) exports and imports to financial crises. Here we show that the impact of financial crises is fairly similar at different percentiles of the distribution of exports or imports. We do so using quantile regressions for the 10th, 25th, 50th, 75th and 90th percentiles. The results are shown in Figure A.14

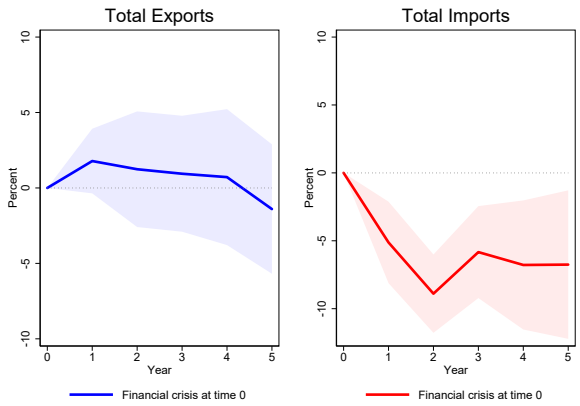
Figure A.12: *Local projections: response of total trade in goods to financial crisis*

This figure shows the response of the level of total GDP-normalized exports ($\ln X_i - \ln Y_i$) and imports ($\ln M_i - \ln Y_i$) to financial crisis in country i. See text.

(a) *Excluding Great Recession*



(b) *Post-WW2*



(c) *Pre-WW2*

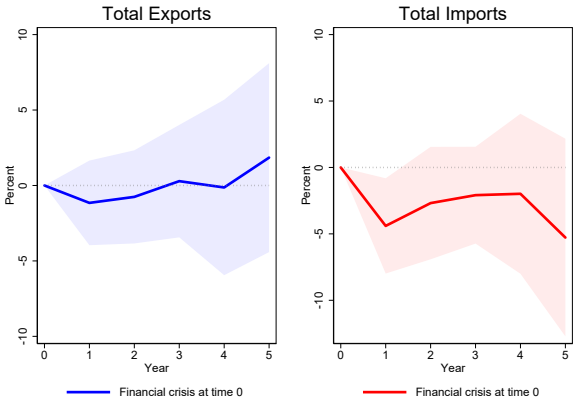


Figure A.13: *Local projections: response of total trade in goods to financial crisis*

This figure shows the response of the level of total GDP-normalized exports ($\ln X_i - \ln Y_i$) and imports ($\ln M_i - \ln Y_i$) to financial crisis in country i. See text.

(a) *Advanced Economies - All Years* **(b)** *Developing Economies - All Years*

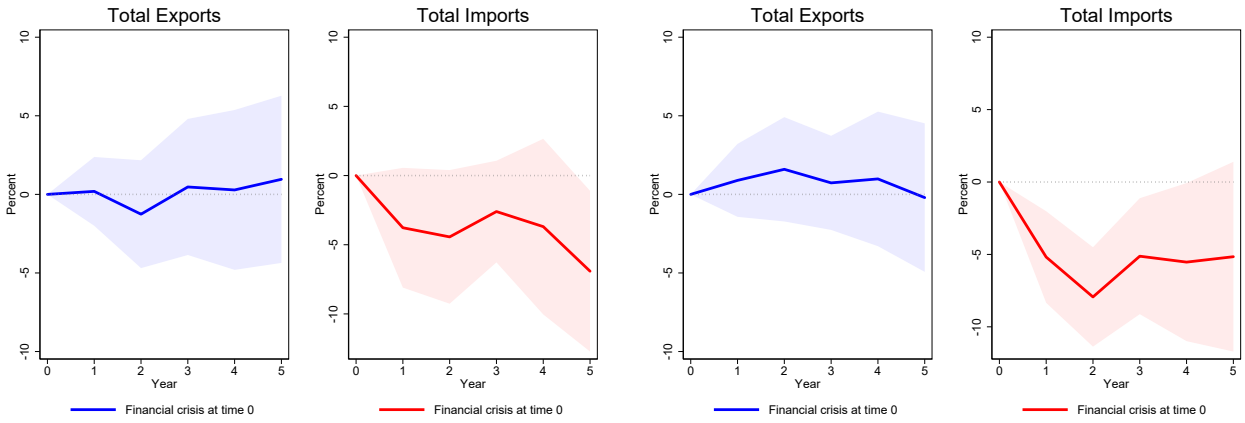


Table A.4: *Local projections: response of total exports and imports to financial crisis*

This table shows the response of the level of total GDP-normalized exports or imports $\ln T_i - \ln Y_i$ to financial crisis in country i (in year 0). See text.

Panel A: Excluding Great Recession.

	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	0.5	0.7	0.8	0.8	-0.2
	(0.9)	(1.4)	(1.4)	(1.6)	(1.7)
N	5957	5877	5797	5717	5640
Total imports	-5.0**	-6.2**	-3.8*	-3.8	-5.1*
	(1.4)	(1.6)	(1.5)	(2.0)	(2.3)
N	5933	5852	5770	5689	5613

Panel B: Post-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	1.8	1.2	0.9	0.7	-1.4
	(1.1)	(2.0)	(2.0)	(2.3)	(2.2)
N	4258	4191	4124	4057	3990
Total imports	-5.1**	-8.9**	-5.8**	-6.8**	-6.8**
	(1.5)	(1.5)	(1.7)	(2.4)	(2.8)
N	4247	4179	4111	4043	3977

Panel C: Pre-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	-1.2	-0.8	0.3	-0.1	1.8
	(1.4)	(1.9)	(2.1)	(2.6)	(2.8)
N	2161	2082	2002	1924	1848
Total imports	-4.4*	-2.7	-2.1	-2.0	-5.3
	(2.1)	(2.6)	(2.4)	(3.5)	(4.0)
N	2148	2069	1988	1910	1834

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.5: *Local projections: response of total exports and imports to financial crisis*

This table shows the response of the level of total GDP-normalized exports or imports $\ln T_i - \ln Y_i$ to financial crisis in country i (in year 0). See text.

Panel A: Advanced Economies.

	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	0.2	-1.3	0.5	0.3	1.0
	(1.0)	(1.9)	(2.1)	(2.1)	(2.0)
N	1946	1904	1861	1819	1777
Total imports	-3.8	-4.4	-2.6	-3.7	-6.9*
	(2.3)	(2.5)	(1.7)	(3.2)	(2.9)
N	1930	1889	1847	1805	1763

Panel B: Developing Economies.

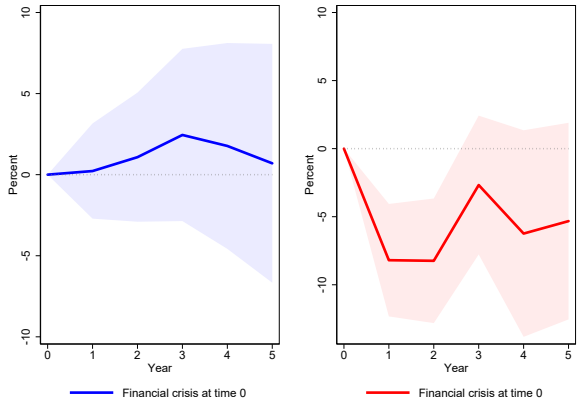
	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	0.9	1.6	0.7	1.0	-0.2
	(1.2)	(1.7)	(1.8)	(2.0)	(2.2)
N	4472	4368	4265	4161	4060
Total imports	-5.2**	-7.9**	-5.1**	-5.5*	-5.2
	(1.8)	(1.9)	(1.9)	(2.4)	(2.9)
N	4464	4358	4252	4147	4047

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

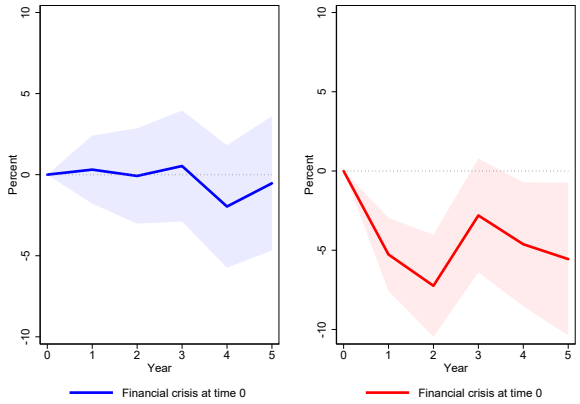
Figure A.14: *Local projections: response of total trade in goods to financial crisis*

This figure shows the response of the level of total GDP-normalized exports ($\ln X_i - \ln Y_i$) and imports ($\ln M_i - \ln Y_i$) to financial crisis in country i. See text.

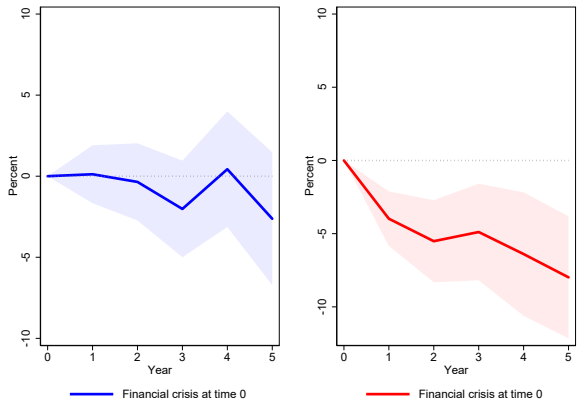
(a) *10th percentile*



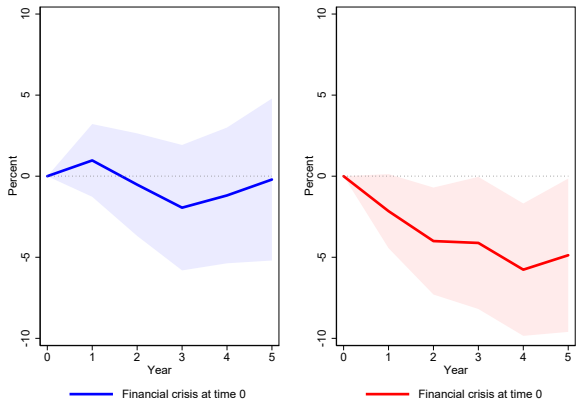
(b) *25th percentile*



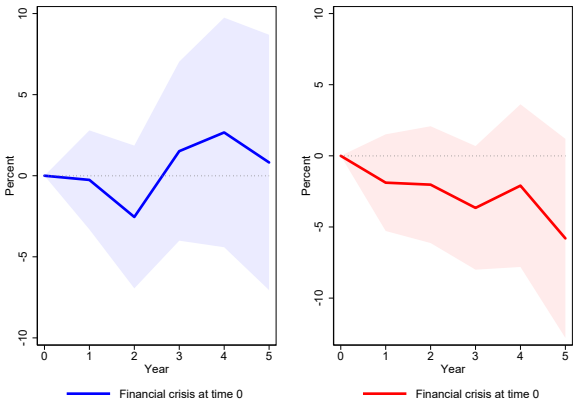
(c) *50th percentile*



(d) *75th percentile*



(e) *90th percentile*



D. Response of Bilateral Trade Flows to Financial Crises

A. Table Corresponding to Figure 4 in Main Text

Table A.6 shows the coefficients from the estimation of equation 2. Table A.7 shows the coefficients from the estimation of equation 3. These coefficients correspond to Figure 4 in the main text.

B. Additional Results

The Post-WW2 Era versus The Pre-WW2 Era. Our dataset spans two centuries, a period over which there have been many changes in economic regimes and institutions. We wonder, then, whether the financial-crisis-as-demand-shocks view that emerges from our analysis so far is valid throughout this long period, or whether different eras are systematically different in this regard. It seems natural to split our sample into before and after World War 2, leaving a similar number of crisis episodes in both subsamples. These results are illustrated by Figure A.15 and Tables A.8 and A.10. In the post-WW2 era, the results are very similar to those documented earlier for the entire two centuries. During the pre-WW2 period, however, our estimates for the impact of crises on trade flows lack precision. The results for the RER, on the other hand, are much the same as those reported earlier.

Advanced versus Developing Economies. We also divide the sample between advanced and developing economies, with 14 countries in the former group and 55 in the latter. We report four sets of results, corresponding to: advanced exporter, advanced importer, developing exporter, and developing importer. Figure A.16 and Tables A.9 and A.11 show that the patterns seen earlier do not differ much across these groups. The main difference is a more pronounced decline in normalized imports when the importer is a developing country instead of an advanced economy.

Table A.6: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.2*	1.1	1.9	4.4**	3.4*
	(1.1)	(1.3)	(1.4)	(1.4)	(1.5)
Financial crisis in importer (year 0)	-5.9**	-7.5**	-5.9**	-7.9**	-5.3**
	(1.1)	(1.3)	(1.4)	(1.5)	(1.5)
N	195273	189378	183695	178261	172990

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.7: *Local projections: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

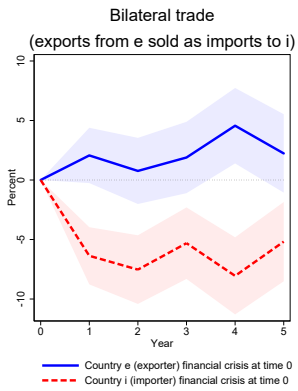
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.7**	0.3	1.1**	0.9*	0.6
	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-2.6**	-0.7*	-1.0**	-0.7*	-0.5
	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
N	202927	196849	190993	185125	179317

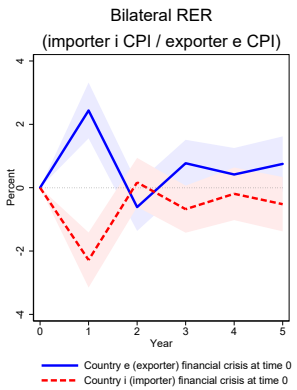
Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Figure A.15: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

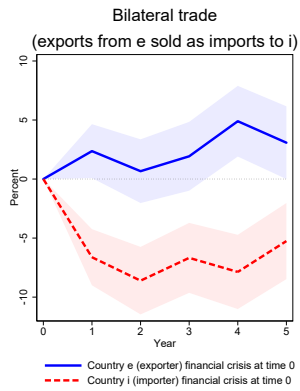
This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. See text.

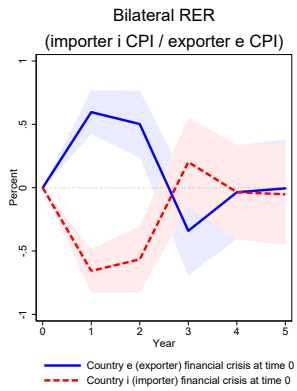
(a) *Excluding Great Recession*



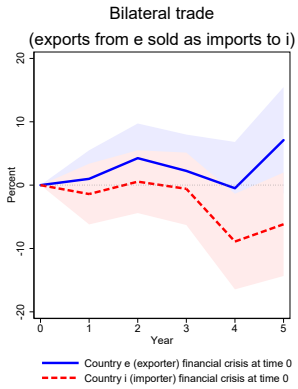


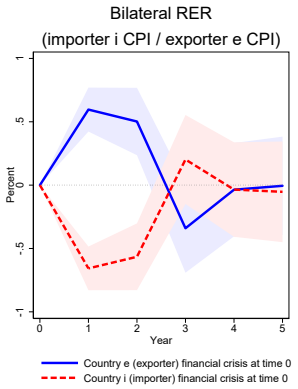
(b) *Post-WW2*





(c) *Pre-WW2*



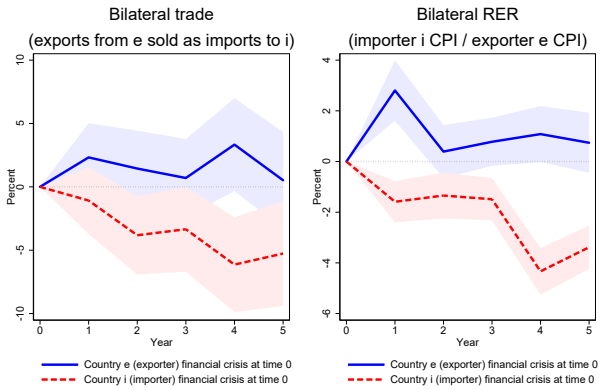


Notes: Shaded regions indicate 95% confidence intervals.

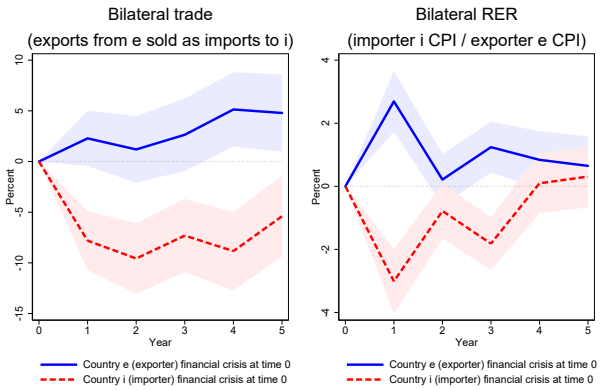
Figure A.16: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. See text.

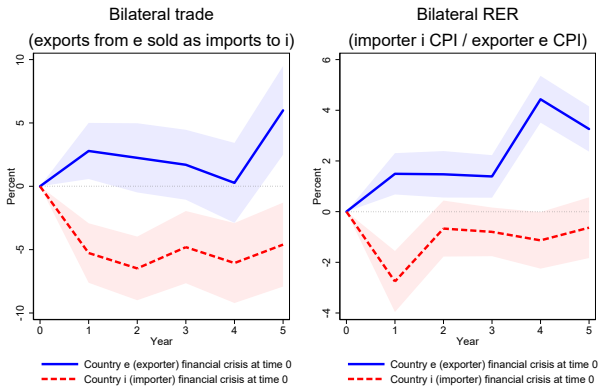
(a) *Advanced Importer - All Years*



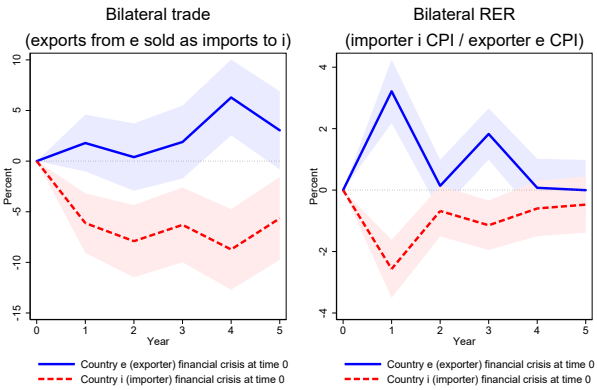
(b) *Developing Importer - All Years*



(c) *Advanced Exporter - All Years*



(d) *Developing Exporter - All Years*



Notes: Shaded regions indicate 95% confidence intervals.

Table A.8: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

Panel A: Excluding Great Recession.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.1	0.8	1.9	4.6**	2.2
	(1.2)	(1.4)	(1.5)	(1.6)	(1.7)
Financial crisis in importer (year 0)	-6.4**	-7.5**	-5.3**	-8.1**	-5.2**
	(1.2)	(1.5)	(1.5)	(1.7)	(1.7)
N	168638	166596	164768	163164	161705

Panel B: Post-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.4*	0.7	1.9	4.9**	3.1*
	(1.2)	(1.4)	(1.5)	(1.5)	(1.6)
Financial crisis in importer (year 0)	-6.6**	-8.6**	-6.7**	-7.9**	-5.3**
	(1.2)	(1.5)	(1.5)	(1.6)	(1.6)
N	178963	174294	169843	165575	161426

Panel C: Pre-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.0	4.3	2.2	-0.5	7.1
	(2.3)	(2.8)	(2.9)	(3.7)	(4.3)
Financial crisis in importer (year 0)	-1.4	0.5	-0.6	-8.9*	-6.2
	(2.4)	(2.5)	(2.9)	(3.8)	(4.2)
N	16310	15084	13852	12686	11564

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.9: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

Panel A: Advanced Importer.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.3	1.4	0.7	3.3	0.5
	(1.4)	(1.5)	(1.6)	(1.9)	(1.9)
Financial crisis in importer (year 0)	-1.1	-3.8*	-3.3*	-6.1**	-5.3*
	(1.3)	(1.6)	(1.7)	(1.9)	(2.1)
N	60243	58602	56978	55419	53879

Panel B: Developing Importer.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.3	1.2	2.6	5.1**	4.8*
	(1.4)	(1.7)	(1.8)	(1.9)	(1.9)
Financial crisis in importer (year 0)	-7.8**	-9.6**	-7.3**	-8.8**	-5.4**
	(1.5)	(1.8)	(1.8)	(2.0)	(2.0)
N	135030	130776	126717	122842	119111

Panel C: Advanced Exporter.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.8*	2.2	1.7	0.3	6.0**
	(1.1)	(1.4)	(1.4)	(1.6)	(1.8)
Financial crisis in importer (year 0)	-5.3**	-6.5**	-4.8**	-6.1**	-4.6**
	(1.2)	(1.3)	(1.5)	(1.6)	(1.7)
N	61226	59566	57932	56361	54824

Panel D: Developing Exporter.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.8	0.4	1.9	6.3**	3.0
	(1.4)	(1.7)	(1.8)	(1.9)	(2.0)
Financial crisis in importer (year 0)	-6.1**	-7.9**	-6.3**	-8.7**	-5.7**
	(1.5)	(1.8)	(1.9)	(2.0)	(2.1)
N	134047	129812	125763	121900	118166

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.10: *Local projections: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

Panel A: Excluding Great Recession.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.7**	-0.3	0.9*	0.9**	1.2**
	(0.3)	(0.3)	(0.4)	(0.3)	(0.3)
Financial crisis in importer (year 0)	-2.5**	0.2	-0.7	-0.6*	-0.8*
	(0.3)	(0.3)	(0.4)	(0.3)	(0.3)
N	174245	172347	170675	168973	167307

Panel B: Post-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.5**	1.1**	1.9**	1.4**	1.0**
	(0.3)	(0.2)	(0.3)	(0.3)	(0.3)
Financial crisis in importer (year 0)	-3.2**	-1.3**	-1.7**	-1.2**	-0.7*
	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
N	185198	180533	176038	171557	167106

Panel C: Pre-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	0.6**	0.5**	-0.3	-0.0	0.0
	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)
Financial crisis in importer (year 0)	-0.7**	-0.6**	0.2	-0.0	-0.1
	(0.1)	(0.1)	(0.2)	(0.2)	(0.2)
N	16162	14812	13464	12127	10874

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.11: *Local projections: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

Panel A: Advanced Importer.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.8**	0.4	0.8	1.1*	0.7
	(0.5)	(0.5)	(0.5)	(0.5)	(0.6)
Financial crisis in importer (year 0)	-1.6**	-1.3**	-1.5**	-4.3**	-3.4**
	(0.4)	(0.5)	(0.4)	(0.5)	(0.4)
N	60684	58964	57286	55604	53945

Panel B: Developing Importer.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.7**	0.2	1.2**	0.8*	0.6
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-3.0**	-0.8*	-1.8**	0.1	0.3
	(0.5)	(0.4)	(0.4)	(0.4)	(0.5)
N	142243	137885	133707	129521	125372

Panel C: Advanced Exporter.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.5**	1.5**	1.4**	4.4**	3.3**
	(0.4)	(0.5)	(0.4)	(0.5)	(0.5)
Financial crisis in importer (year 0)	-2.8**	-0.7	-0.8	-1.1*	-0.6
	(0.5)	(0.5)	(0.5)	(0.5)	(0.6)
N	61651	59922	58240	56548	54870

Panel D: Developing Exporter.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.2**	0.1	1.8**	0.1	-0.0
	(0.5)	(0.4)	(0.4)	(0.4)	(0.5)
Financial crisis in importer (year 0)	-2.6**	-0.7	-1.1**	-0.6	-0.5
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
N	141276	136927	132753	128577	124447

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

C. Robustness

Controlling for All Other Types of Crises. The possible coincidence of financial crises with other types of crisis constitutes a potential challenge to our empirical strategy. We first ask, then, what is the degree of overlap between financial crises and various other types of crises. Secondly and more important, we show that extending our regressions to control for the occurrence of crisis episodes of a different nature leaves our earlier results unscathed.

We obtain data on the dates of various crises types from Reinhart and Rogoff (2011). This is also the source of our data on financial crises dates used in our analysis so far. Reinhart and Rogoff (2011) have created a comprehensive historical record coding dates for currency and inflation crises, stock market crises, and external and domestic sovereign debt crises. With this data as a starting point, we define the first year of a crisis as the relevant shock event, in the same way we have defined financial crisis episodes.

How much of an overlap of various crises types within a country is there? One fifth of our financial crisis events coincide with other crisis events. One half of our financial crises fall within a 5-year window of other crisis events. This degree of overlap merits controlling for coincident crisis events in our regressions. We augment our local projections method that estimates the impact of financial crises on bilateral trade flows or bilateral real exchange rates, with dummy variables marking the various other types of crises described above occuring in either the exporting or the importing country.

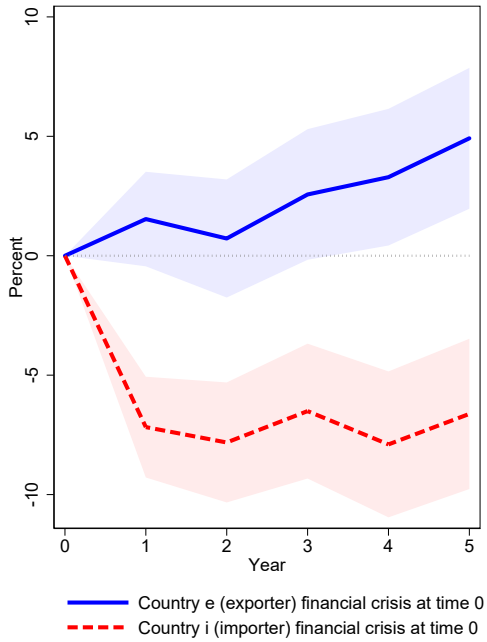
The results in Figure A.17 and Tables A.12 and A.13 show our main message remains true. Financial crises in the exporting country *increase* trade flows, while financial crises in the importing country *decrease* trade flows. Bilateral real exchange rates *appreciate* in response to crises in the exporter, and *depreciate* in response to crises in the importer. While we have significantly expanded the number of regressors, we loose little precision in our estimates.

Controlling for Sudden Stops. In addition we control for sudden stop episodes (i.e. abrupt reductions in capital inflows) in the period from 1970 onwards. We code sudden stops following Cavallo and Frankel (2008), who define these as situations in which "at a year t, the financial account surplus of a country (prevailing at year $t-1$) falls at least two standard deviations below the sample mean." The results in Figure A.18 and Tables A.14 and A.15 show our results to controlling for sudden stops. Note that in these figures we simultaneously control for other types of crises as above.

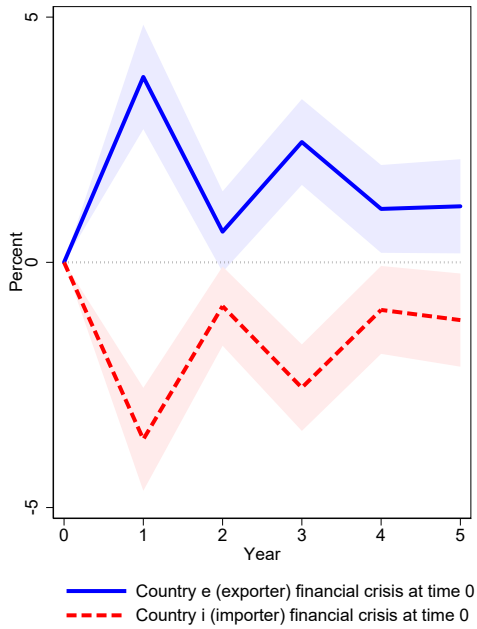
Figure A.17: *Local projections controlling for other crises types: response of bilateral trade and RER to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. See text.

(a) *Bilateral Trade (exports from e sold as imports to i)*



(b) *Bilateral RER (importer i CPI / exporter e CPI)*



Notes: Shaded regions indicate 95% confidence intervals.

Table A.12: *Local projections controlling for other crises types: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.5	0.7	2.6	3.3*	4.9**
	(1.0)	(1.3)	(1.4)	(1.5)	(1.5)
Financial crisis in importer (year 0)	-7.2**	-7.8**	-6.5**	-7.9**	-6.6**
	(1.1)	(1.3)	(1.4)	(1.6)	(1.6)
N	137670	132229	125495	121892	118732

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.13: *Local projections controlling for other crises types: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

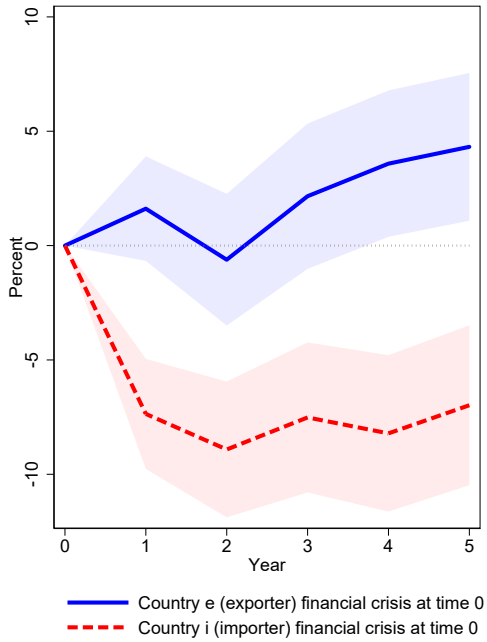
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.8**	0.6	2.5**	1.1*	1.1*
	(0.5)	(0.4)	(0.4)	(0.5)	(0.5)
Financial crisis in importer (year 0)	-3.6**	-0.9*	-2.6**	-1.0*	-1.2*
	(0.5)	(0.4)	(0.4)	(0.5)	(0.5)
N	119600	115383	109545	107130	105083

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

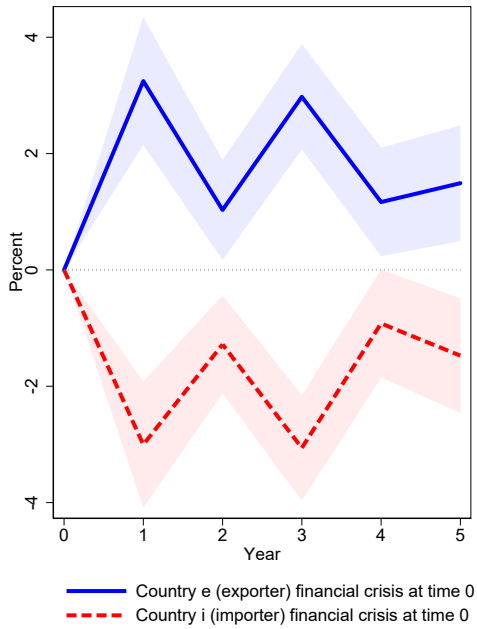
Figure A.18: *Local projections controlling for sudden stops: response of bilateral trade and RER to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. See text.

(a) *Bilateral Trade (exports from e sold as imports to i)*



(b) *Bilateral RER (importer i CPI / exporter e CPI)*



Notes: Shaded regions indicate 95% confidence intervals.

Table A.14: *Local projections controlling for sudden stops: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.6	-0.6	2.2	3.6*	4.3**
	(1.2)	(1.5)	(1.6)	(1.6)	(1.6)
Financial crisis in importer (year 0)	-7.4**	-8.9**	-7.5**	-8.2**	-7.0**
	(1.2)	(1.5)	(1.7)	(1.7)	(1.8)
N	99094	95009	89616	87177	85113

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.15: *Local projections controlling for sudden stops: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.2**	1.0*	3.0**	1.2*	1.5**
	(0.6)	(0.4)	(0.5)	(0.5)	(0.5)
Financial crisis in importer (year 0)	-3.0**	-1.3**	-3.1**	-0.9	-1.5**
	(0.6)	(0.4)	(0.5)	(0.5)	(0.5)
N	99976	95759	89921	87506	85459

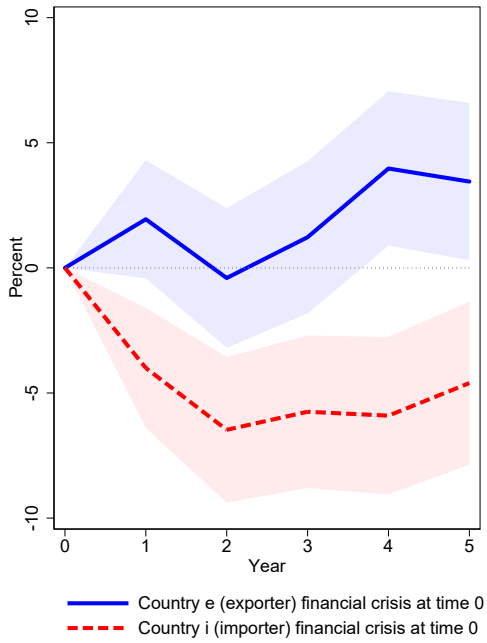
Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Controlling for Changes in TFP. We also control for changes in TFP. Data on TFP comes from Feenstra et al. (2015) for all countries in our sample during the period from 1960 onwards. We augment equations (2) for bilateral trade and (3) for bilateral exchange rates adding the change in log TFP between time t (the occurrence of a crisis) and $t + h$. The results in Figure A.19 and Tables A.12 and A.13 show our results to controlling for changes in TFP.

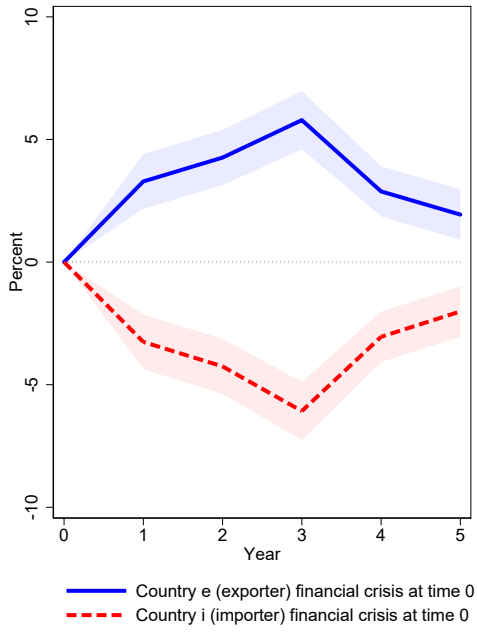
Figure A.19: *Local projections controlling for changes in TFP: response of bilateral trade and RER to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. See text.

(a) *Bilateral Trade (exports from e sold as imports to i)*



(b) *Bilateral RER (importer i CPI / exporter e CPI)*



Notes: Shaded regions indicate 95% confidence intervals.

Table A.16: *Local projections controlling for changes in TFP: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.9	-0.4	1.2	4.0*	3.4*
	(1.2)	(1.4)	(1.6)	(1.6)	(1.6)
Financial crisis in importer (year 0)	-4.0**	-6.5**	-5.8**	-5.9**	-4.6**
	(1.2)	(1.5)	(1.6)	(1.6)	(1.7)
N	128588	124807	121134	117499	113917

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.17: *Local projections controlling for changes in TFP: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.3**	4.3**	5.8**	2.9**	1.9**
	(0.6)	(0.6)	(0.6)	(0.5)	(0.5)
Financial crisis in importer (year 0)	-3.3**	-4.3**	-6.1**	-3.0**	-2.0**
	(0.6)	(0.6)	(0.6)	(0.5)	(0.5)
N	98159	94298	89141	86806	84829

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Controlling for Multilateral Resistance Terms. In standard gravity equations, exclusion of multilateral resistance terms biases estimates of the elasticity of trade flows to trade costs (typically captured by distance). While this is not the case here, and we include exporter-importer fixed effects, it could be possible that changes over time in trade from flows e to i could depend on changes in GDP in other countries, which could be correlated with the ocurrence of crises in e or i.

While these effects are probably very small, we control for changes in multilateral resistance terms of e and i. These multilateral resistance terms can be proxied by countries' remoteness (Wei (1996), Baldwin and Harrigan (2011)). Following Baldwin and Harrigan (2011) we define country e's remoteness as the inverse of the sum of all other countries' GDP Y_{it} weighthed by the inverse of distance d_{ei} to each of them

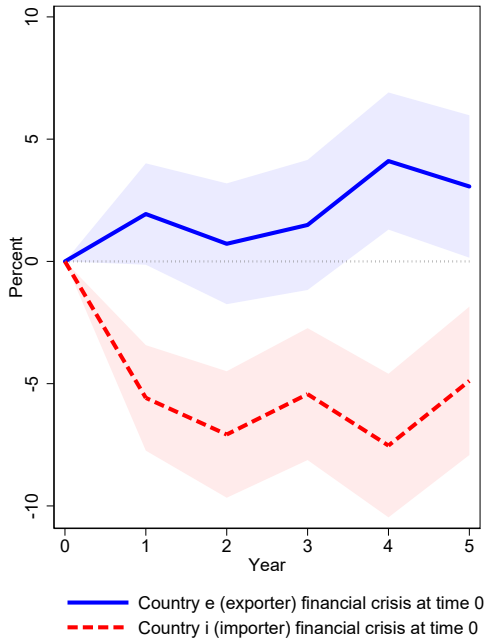
$$R_{et} = \frac{1}{\sum_i \frac{Y_{it}}{d_{ei}^{\nu}}}, \tag{4}$$

and choose $\nu = 1$. We then estimate equation 2 for bilateral trade including the change over time in the remoteness of the exporter ($R_{e,t+h} - R_{et}$) and the importer ($R_{i,t+h} - R_{it}$). The results, shown in Figure A.20 and Tables A.18 and A.19, are very similar to our baseline results. For the same reason, we include these terms in equation 3 for bilateral real exchange rates. Again, results are unchanged, as seen in the right panel of Figure A.20.

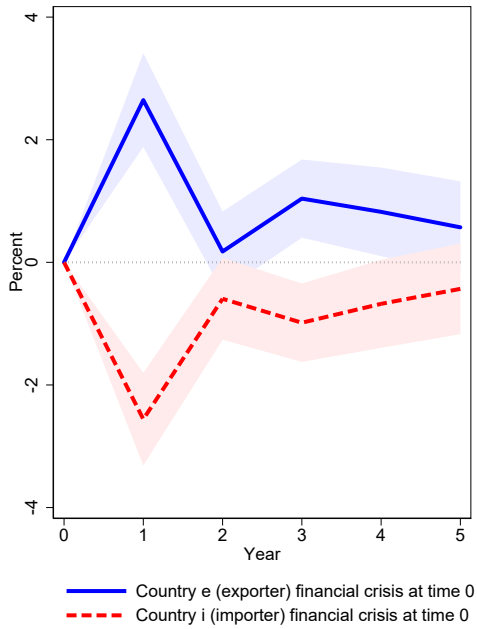
Figure A.20: *Local projections controlling for change in multilateral resistance terms: response of bilateral trade and RER to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. See text.

(a) *Bilateral Trade (exports from e sold as imports to i)*



(b) *Bilateral RER (importer i CPI / exporter e CPI)*



Notes: Shaded regions indicate 95% confidence intervals.

Table A.18: *Local projections controlling for change in multilateral resistance terms: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.9	0.7	1.5	4.1**	3.1*
	(1.1)	(1.3)	(1.4)	(1.4)	(1.5)
Financial crisis in importer (year 0)	-5.6**	-7.1**	-5.4**	-7.5**	-4.9**
	(1.1)	(1.3)	(1.4)	(1.5)	(1.5)
N	195273	189378	183695	178261	172990

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.19: *Local projections controlling for change in multilateral resistance terms: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.6**	0.2	1.0**	0.8*	0.6
	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-2.6**	-0.6	-1.0**	-0.7	-0.4
	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
N	202927	196849	190993	185125	179317

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Alternative Specification The preferred specification for equation 2 in the main text includes two lags of the dependent variable and controls for changes in the real exchange rate, $\ln RER_{ei,t+h} - \ln RER_{ei,t}$. We show in Table A.20 and the left panel in Figure A.21 the results of estimating this equation without these controls.

In addition, the preferred specification for equation 3 in the main text includes two lags of the dependent variable. Table A.21 and the right panel in Figure A.21 the results of estimating this equation without any controls.

Table A.20: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.7	1.6	1.9	4.8*	4.2
	(1.4)	(1.9)	(2.0)	(2.3)	(2.4)
Financial crisis in importer (year 0)	-6.0**	-7.5**	-6.4*	-8.4**	-5.7
	(2.0)	(2.5)	(2.6)	(3.0)	(3.1)
N	242180	235093	228794	222709	216985

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.21: *Local projections: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

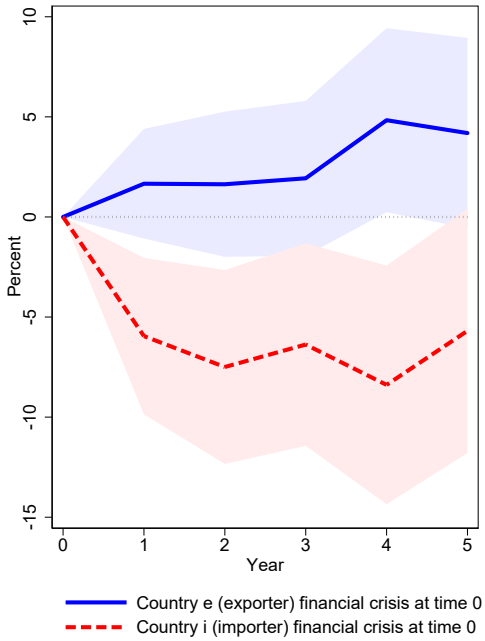
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.3**	3.3**	4.3**	2.2**	0.9*
	(0.4)	(0.5)	(0.5)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-3.1**	-3.4**	-4.3**	-2.3**	-0.9*
	(0.4)	(0.5)	(0.5)	(0.4)	(0.4)
N	213389	208436	203452	198561	193602

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

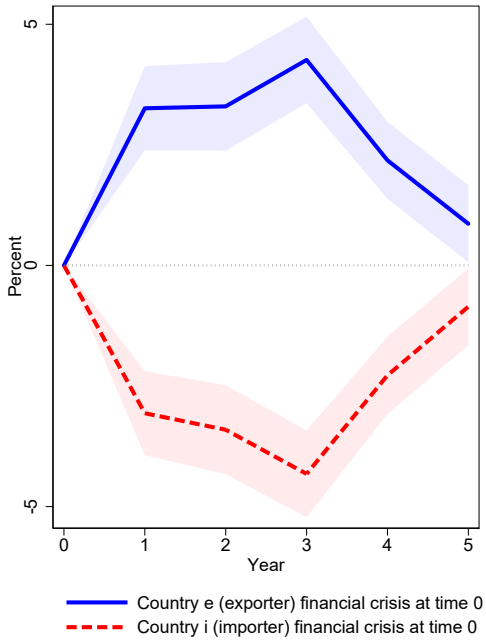
Figure A.21: *Local projections: response of bilateral trade and RER to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. See text.

(a) *Bilateral Trade (exports from e sold as imports to i)*



(b) *Bilateral RER (importer i CPI / exporter e CPI)*



Notes: Shaded regions indicate 95% confidence intervals.

Ruling Out Pre-Existing Trends We address the potential existence of pre-existing trends by plotting the response of pre-crisis changes in bilateral trade or bilateral real exchange rates to financial crises. To this end we estimate equation 2 for bilateral trade and equation 3 for the bilateral RER not only for positive horizons h up to 5, but also for negative horizons $h = -1$ and $h = -2$. The results are shown in Tables A.22 and A.23. The coefficients for pre-crisis changes in bilateral trade or bilateral real exchange rates are small and not statistically different from zero, indicating the abscence of pre-existing trends.

Table A.22: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. See text.

	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	-1.6	-1.4	2.2*	1.1	1.9	4.4**	3.4*
	(1.0)	(1.0)	(1.1)	(1.3)	(1.4)	(1.4)	(1.5)
Financial crisis in importer (year 0)	-0.9	-1.1	-5.9**	-7.5**	-5.9**	-7.9**	-5.3**
	(1.1)	(1.1)	(1.1)	(1.3)	(1.4)	(1.5)	(1.5)
N	199712	201771	195273	189378	183695	178261	172990

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.23: *Local projections: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. See text.

	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	0.2	-0.2	2.7**	0.3	1.1**	0.9*	0.6
	(0.4)	(0.4)	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-0.1	0.2	-2.6**	-0.7*	-1.0**	-0.7*	-0.5
	(0.4)	(0.4)	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
N	201685	205488	202927	196849	190993	185125	179317

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

D. Trade by Product Type

This section reports the results of estimating 2 using each component of bilateral trade flows (trade in final goods, trade in intermediate inputs, and trade in capital goods) as the dependent variable. The results are shown in Figures A.22 and A.23 and Table A.24.

Table A.24: *Local projections: response of bilateral trade in final consumption goods, intermediate inputs and capital goods to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. See text.

Panel A: Trade in Final Goods.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	0.3	1.0	-0.8	3.4	4.1*
	(1.6)	(1.8)	(2.0)	(2.0)	(2.1)
Financial crisis in importer (year 0)	-4.0*	-6.7**	-5.5**	-6.7**	-7.6**
	(1.6)	(1.9)	(2.0)	(2.0)	(2.2)
N	122040	118296	114654	111340	108218

Panel B: Trade in Intermediate Inputs.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	7.1**	5.6**	5.0**	8.1**	10.3**
	(1.5)	(1.7)	(1.8)	(1.9)	(1.9)
Financial crisis in importer (year 0)	-3.9**	-2.6	-1.4	0.2	-0.9
	(1.5)	(1.7)	(1.8)	(1.9)	(2.0)
N	127323	123422	119708	116241	112953

Panel C: Trade in Capital Goods.

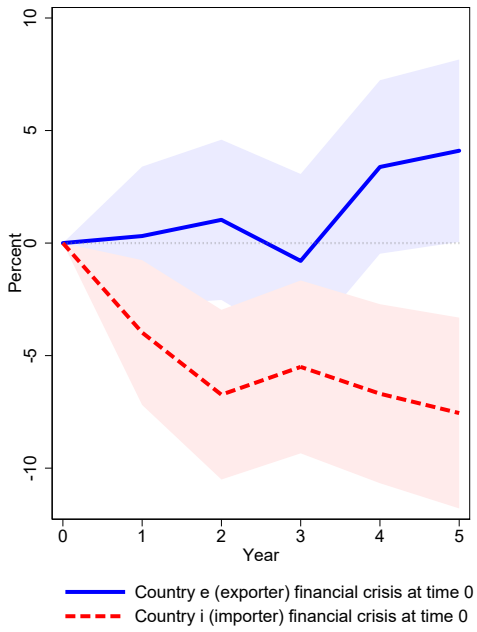
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.0	4.2	10.2**	15.2**	13.6**
	(2.3)	(2.5)	(2.5)	(2.6)	(2.7)
Financial crisis in importer (year 0)	-8.6**	-12.6**	-13.8**	-11.7**	-10.3**
	(2.1)	(2.3)	(2.4)	(2.5)	(2.5)
N	101190	98026	95054	92203	89503

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

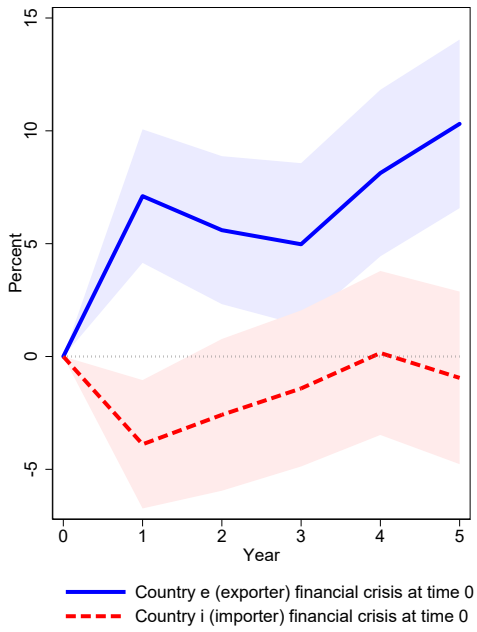
Figure A.22: *Local projections: response of bilateral trade in final consumption goods, intermediate inputs and capital goods to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. See text.

(a) *Final Consumption Goods*



(b) *Intermediate Inputs*

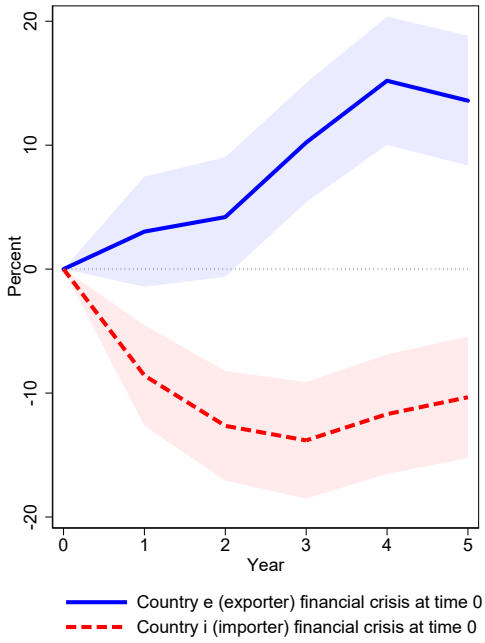


Notes: Shaded regions indicate 95% confidence intervals.

Figure A.23: *Local projections: response of bilateral trade in capital goods to financial crisis in exporter or importer*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. See text.

(a) *Capital Goods*



Notes: Shaded regions indicate 95% confidence intervals.

E. Crisis Endogeneity and Inverse Probability Weighting

We address the concern that financial crisis episodes might be endogenous using the method of inverse probability weighting. This procedure assigns less weight in our bilateral trade and RER regressions to observations that more likely to occur based on prior macroeconomic conditions. This correction for selection bias has been discussed in a time series context by Angrist, Jordà, and Kuersteiner (2018) and applied to the study of financial crises (Jordà, Schularick, and Taylor, 2011, 2016) and to the study of fiscal policy (Jordà and Taylor, 2016).

To start, we construct a first-stage estimator of the probability that country c has a financial crisis at time t. As a predictor of crises, we use credit growth over the five-year period leading to each crisis (between years $t-6$ and $t-1$). This choice follows Schularick and Taylor (2012) who show that credit growth is a powerful predictor of financial crises.[16]

We fit logit models for the probability of experiencing a financial crisis including either country or country and year fixed effects. A successful predictor will maximize the rate of true positives and minimize the rate of false positives. A Receiver Operating Characteristic (ROC) curve reflects the trade-off between these two goals. The AUROC (Area under the ROC curve) statistic summarizes the predictor's quality in this regard.[17] This statistic ranges from 0.5 (for a predictor not different than a random guess) to 1 (for a perfect predictor), and is independent of the cutoff value used to predict an outcome.

We report the first-stage results in Table A.25. Column 1 corresponds to the benchmark case with only country fixed effects, against which we assess the usefulness of credit growth as a crisis predictor. In column 2 we add credit growth, and in column 3 we add year fixed effects.

As shown by Schularick and Taylor (2012), positive credit growth has a statistically significant impact on the probability of experiencing a financial crisis. Further, the AUC statistic in columns 2 and 3 is higher—and statistically different—than in our benchmark case in column 1, showing the contribution for credit growth as a financial crisis predictor.

Let us denote by $\hat{p}_{ct}$ the predicted probability that country c experiences a crisis at time t, and $1-\hat{p}_{ct}$ the probability it does not. We construct weights for our bilateral trade and RER regressions based on these predicted probabilities as follows. We weight observations in which both the exporter e and the importer i experience a financial crisis by $\frac{1}{\hat{p}_{et}\cdot\hat{p}_{it}}$. In cases where both exporter and importer do not face a crisis, we assign weights $\frac{1}{(1-\hat{p}_{et})\cdot(1-\hat{p}_{it})}$. Finally, we assign weights $\frac{1}{\hat{p}_{et}\cdot(1-\hat{p}_{it})}$ for cases with a crisis in the exporter only, and $\frac{1}{(1-\hat{p}_{et})\cdot\hat{p}_{it}}$ for cases with a crisis in the importer only.

[16] Credit is measured as domestic credit to GDP from the World Bank's WDI dataset. Credit data is only available for our wide sample of developed and developing countries for the post-WW2 period.

[17] See Jordà and Taylor (2011) for a detailed explanation of these concepts.

We then re-estimate our bilateral trade regression using these weights. As shown in Table A.26, the results are largely unchanged and our main message still holds. For example, we find (in panel (b)) a similar decrease by -6.6% in the normalized trade flow when the financial crisis event takes place in the importer country, while we had found a -5.9% change in the initial, unweighted results. As before, this impact is highly persistent.

Finally, we also repeat the estimation of the bilateral RER equation using IPW in table A.27, also finding results similar to the baseline ones. The weighted results in panel (b) of table A.27 show a +2.0% change when the financial crisis event takes place in the exporter country and a -1.8% change when it hits the importer country, where these impacts are very similar to the baseline unweighted results of table A.7 (a +2.7% change on impact following crises in the exporter and a -2.6% change on impact following crises in the importer).

Table A.25: *First Stage: Financial Crisis Prediction*

This table shows the results of the logit model of the probability of a financial crisis at time t on credit growth between $t-6$ and $t-1$. See text.

	(1)	(2)	(3)
Credit Growth		0.0194**	0.0198**
		(0.0051)	(0.0055)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	No	No	Yes
N	3740	2916	1934
AUC	0.619	0.655	0.735
	(0.0263)	(0.0278)	(0.0221)

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table A.26: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

This table shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ to financial crisis in either exporter country e or importer country i. This measures deviations in trade relative to the scaled economic size of home and foreign, as in the gravity model. Regressions are weighted using IPW. See text.

Panel A: IPW with country fixed-effects.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.1*	0.3	3.3*	4.0**	1.6
	(1.0)	(1.3)	(1.4)	(1.5)	(1.5)
Financial crisis in importer (year 0)	-4.8**	-7.4**	-5.5**	-8.8**	-7.8**
	(1.0)	(1.3)	(1.3)	(1.4)	(1.4)
N	122330	118768	115328	111768	108232

Panel B: IPW with country and year fixed-effects.

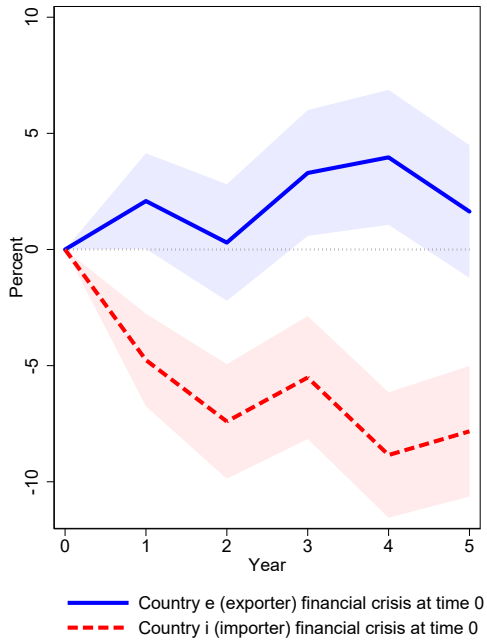
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.9	0.6	3.2*	4.9**	2.7
	(1.1)	(1.3)	(1.4)	(1.5)	(1.5)
Financial crisis in importer (year 0)	-6.6**	-9.6**	-7.2**	-9.3**	-8.1**
	(1.1)	(1.4)	(1.4)	(1.5)	(1.6)
N	84244	83899	83689	83423	83175

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

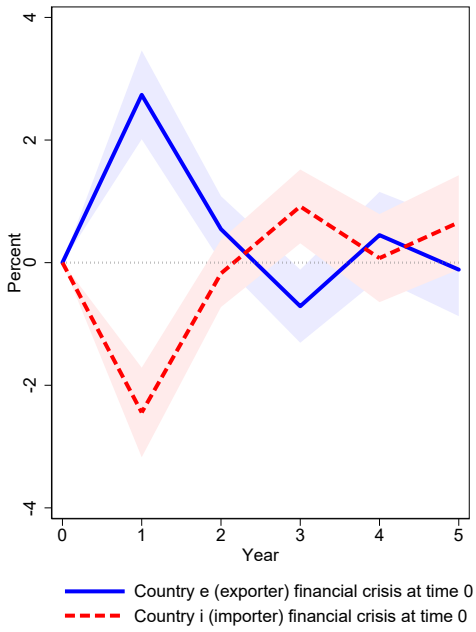
Figure A.24: *Local projections with IPW: response of bilateral trade and RER to financial crisis in exporter or importer with country fixed effects*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. The local projections include country fixed effects. See text.

(a) *Bilateral Trade (exports from e sold as imports to i)*



(b) *Bilateral RER (importer i CPI / exporter e CPI)*

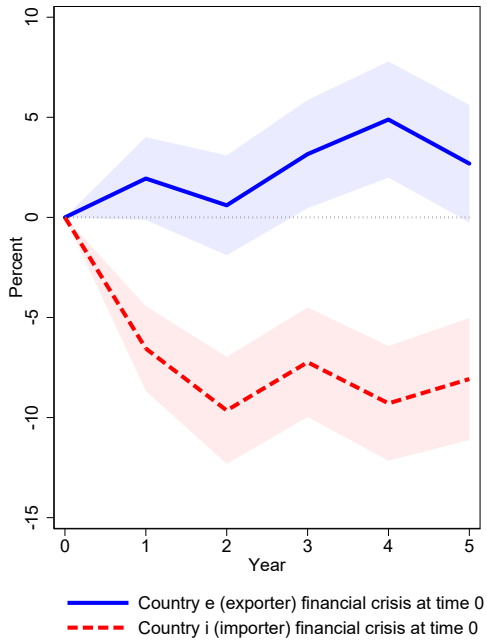


Notes: Shaded regions indicate 95% confidence intervals.

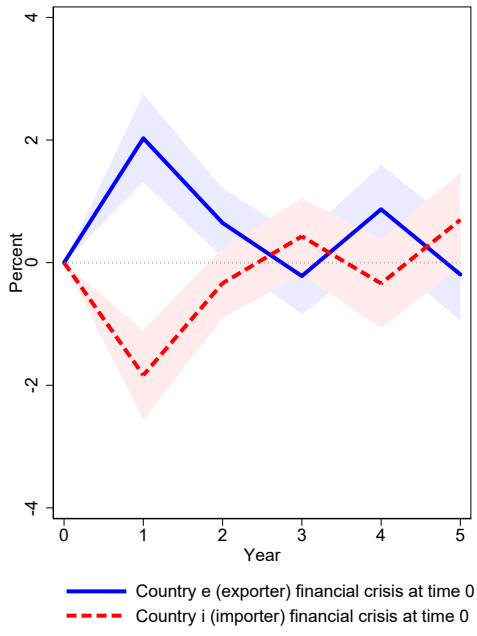
Figure A.25: *Local projections with IPW: response of bilateral trade and RER to financial crisis in exporter or importer with country fixed effects and year effects*

This figure shows the response of the level of bilateral GDP-normalized trade $\ln T_{ei} - \ln Y_e - \ln Y_i$ and the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. The local projections include country fixed effects and year effects. See text.

(a) *Bilateral Trade (exports from e sold as imports to i)*



(b) *Bilateral RER (importer i CPI / exporter e CPI)*



Notes: Shaded regions indicate 95% confidence intervals.

Table A.27: *Local projections: response of bilateral RER to financial crisis in exporter or importer*

This table shows the response of the level of the bilateral real exchange rate $\ln E_{ei} + \ln P_i - \ln P_e$ to financial crisis in either exporter country e or importer country i. In the standard convention, this is the exporter side RER, so an increase is an exporter depreciation, a decrease is an importer depreciation. Regressions are weighted using IPW. See text.

Panel A: IPW with country fixed-effects.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.7**	0.5*	-0.7*	0.4	-0.1
	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-2.4**	-0.2	0.9**	0.1	0.7
	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
N	130446	126656	123000	119229	115470

Panel B: IPW with country and year fixed-effects.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.0**	0.6*	-0.2	0.9*	-0.2
	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-1.8**	-0.3	0.4	-0.3	0.7
	(0.4)	(0.3)	(0.3)	(0.4)	(0.4)
N	89717	89631	89542	89301	89058

Notes: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$.

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