NBER WORKING PAPER SERIES

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Working Paper 25790
http://www.nber.org/papers/w25790

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2019

This work was kindly supported by a research grant from The Bankard Fund for Political Economy at the University of Virginia. We benefitted from helpful comments from conference participants at the 2017 NBER Summer Institute. We are especially thankful to our discussant Julian di Giovanni. All errors are our own. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w25790.ack

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

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NBER Working Paper No. 25790
April 2019
JEL No. E44,F32,F36,F41,G01,N10,N20

ABSTRACT

Are financial crises a negative shock to demand or a negative shock to 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 empirical 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 flow data and event dates for 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. History shows that, on average, financial crises are very clearly a negative shock to demand.

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1. Introduction

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 up to 200 years of international trade and price data to answer this question. Our historical long-run approach is unique, differs from existing studies, and opens up potential new avenues for research.

In particular, we want to ask a very general question: are financial crises, on average, associated with a negative shock to demand or a negative shock to 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, it might have made for a clearer answer as to what was to blame for the Great Recession, and, thus, helped in the search for effective policy responses. In real time, clarity was lacking: many economists and policymakers 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. We show that the historical record might have cast some light and cut through the intellectual and political fog.

In the first part of our paper we develop a simple small open economy model, where 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. Our model builds on the work of Eggertsson and Krugman (2012)—in which households adjust to sudden deleveraging shocks—by adding an analogous shock to firms and by extending the framework to an open economy setting including 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 kind of statistical signatures each kind of event would leave in the empirical time series record.

The answers are very clear, and divide sharply between each type of shock. Household deleveraging shocks, setting aside second order equilibrium effects, are pure demand shocks; these will 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 will 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 theory to the data.

In the second part of our paper we 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, 2011; Schularick and Taylor, 2012).

Our analysis 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? The answer will turn out to be strikingly unambiguous.

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.

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, rather than study only the effects on final goods, 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 non-traded goods, which causes 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 flows by product type for the post-WW2 period, and find that financial crises depress imports of both final and intermediate goods, providing further empirical evidence consistent with the demand-side view of crises.

Our empirical results are quite stable across developed and developing countries, with the difference that the decline in imports is deeper following financial crises in the latter. Since our data spans two centuries, we also ask whether financial crises in different eras have had different consequences over time. The answer is no; while we lose some precision in our 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, though we initially treat financial crises as exogenous events, we later allow for the possibility that these are endogenous to macroeconomic conditions. Following Jordà,

Schularick, and Taylor (2011) and Jordà, Schularick, and Taylor (2016) we use the method of 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 valid when we model crises as endogenous events in this way.

We also acknowledge that economies are exposed to various types of crises in addition to 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 benchmark timings provided by Reinhart and Rogoff (2011). Our results are robust to jointly controlling for all these other kinds of crises.

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

1.1. 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 suggestion is that international trade in inputs is subject to greater fixed costs of shipments; fixed costs induce periodic ordering, but wait-and-see might postpone trades when a supply shock hits the input importer (Alessandria, Kaboski, and Midrigan, 2010). Part of the trade collapse could be a composition effect, since international trade is dominated so much by durable goods and intermediate inputs, and these are much more

[1]Two papers examine the response of trade flows to crises over the past 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 in our goal. Our empirical findings and our model work together to answer the key question in our paper: are financial crises demand or supply shocks? Second, we expand the time horizon fivefold. As argued earlier, 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.

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 non-traded 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, 2014).[2]

These and other explanations may or may not be shown to be mutually exclusive in the end. Our contribution to this literature is to develop a simple model that admits both demand and supply shocks and provides very clear, distinct predictions for the responses of international trade flows and prices under each type of shock. Our theory departs 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 in the response of the economy to a single crisis episode but in the average response to nearly 200 episodes over the past two centuries.

This paper also contributes to a literature documenting the causes and consequences of financial crises (Reinhart, 2010; Reinhart and Rogoff, 2011; Schularick and Taylor, 2012; Jordà, Schularick, and Taylor, 2011). In the same spirit that motivates our paper, this work has looked at the past, gathering evidence from many financial crisis episodes over several decades or centuries. These papers have examined the impact of crises on several macroeconomic outcomes, such as GDP and unemployment, but not on international trade flows and prices. Much of this literature focuses on documenting the consequences, not the 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 contributes to the recent and growing literature that examines, from various perspectives, the causes of 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 based on recent data are consistent with the demand-side view that our long-run historical evidence strongly support.

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

2. 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 an economy populated by patient and impatient households. These households derive utility from the consumption of an import good and a non-traded good. Firms in the economy produce a non-traded 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.

2.1. 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 non-traded good, respectively. The household budget constraint supposes that they receive income as a wage for labor supplied to local firms in the non-traded and export sectors. In addition, patient households (only) own and receive firm profits.[4]

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

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

[4] The assumption that only patient households receive firm profits is for analytical simplicity and follows Martinez and Philippon (2014).

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

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

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 given by

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

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

2.2. Production

We assume that in both the export and the non-traded 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 non-traded 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

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

where δ_{St} is the amount borrowed in period t, π_{St} denotes profits paid to households, and $\widehat{\pi}_{St}$ 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:

$$q_{St} = \left(\theta \cdot l^{\rho}_{St} + (1 - \theta) \cdot i^{\rho}_{St}\right)^{\frac{\epsilon}{\rho}},$$

with $\epsilon < 1$, which implies decreasing returns to scale.[5]

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

Firms' production cost is then given by $C_{S\,t}(q_{S\,t}, w_t, P_I) = \left(\theta^{\sigma} \cdot w_t^{1-\sigma} + (1-\theta)^{\sigma} \cdot P_I^{1-\sigma}\right)^{\frac{1}{1-\sigma}} \cdot q_{S\,t}^{1/\epsilon}$, with $\sigma = 1/(1-\rho)$.

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 $\lambda \cdot C_{S\,t} = \bar{\delta}_S$ each period. This, in turn, implies that firms can only produce $q_{S\,t} = \left(\bar{\delta}_S / \left(\lambda \cdot \left(\theta^{\sigma} \cdot w_t^{1-\sigma} + (1-\theta)^{\sigma} \cdot P_I^{1-\sigma}\right)^{\frac{1}{1-\sigma}}\right)\right)^{\epsilon}$.

2.3. Equilibrium

In equilibrium the non-traded goods market clears, determining its price P_N, where the condition for demand equals supply is given by

$$\chi \cdot c_{N\,t}^{s} + (1-\chi) \cdot c_{N\,t}^{b} = q_{N\,t}\,.$$

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.

2.4. 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.[6] Second, we set the employment share of the nontraded sector to either 60% or 80% of employment.[7] 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.

2.5. Simulations

The goal of the model is to permit us to simulate the responses of the economy to deleveraging shocks to households and firms.

Demand shock We interpret a decline in the borrowing limit for impatient households as a *demand shock*.[8] All else equal, such households are forced to spend less on consumption, given their reduced ability to borrow. On impact, they reduce their 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 non-traded good, leading to lower aggregate demand. In response, the price of the non-traded good falls. Firms in the non-traded sector adjust their 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 non-traded good in response to each of these shocks. The first shock, shown in panel A, is an unanticipated permanent

[6] 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.

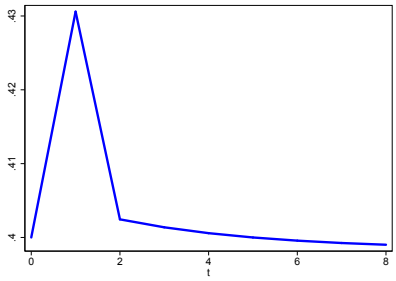
[7] Again, we do not have historical data describing the size of the nontradable sector, so we use a reasonable range of parameters.

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

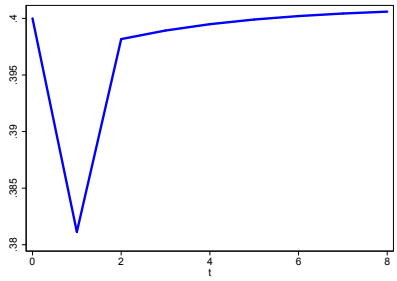
Figure 1: *Adjustment in Response to a Household Deleveraging Shock.*

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.

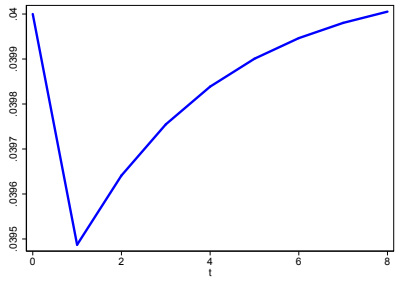
(a) *Exports / GDP*



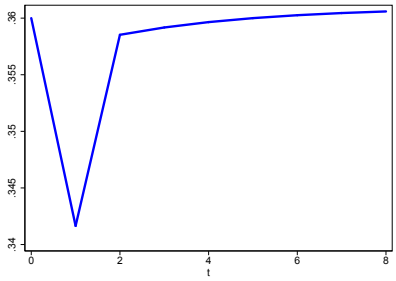
(b) *Imports / GDP*



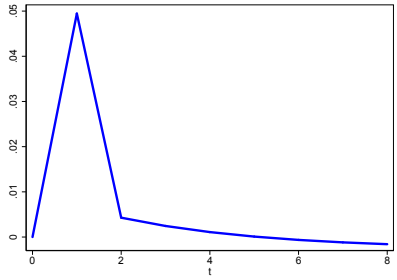
(c) *Imports of Inputs / GDP*



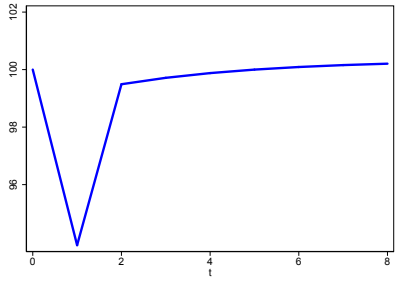
(d) *Imports of Final Goods / GDP*



(e) *Trade Balance / GDP*



(f) *Price of Nontraded Good*



(g) *Households' Borrowing Limit*

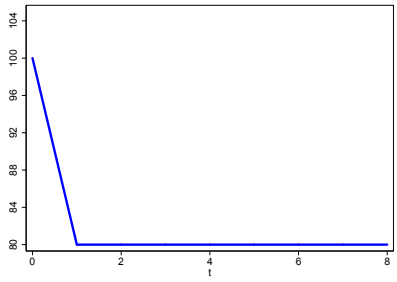
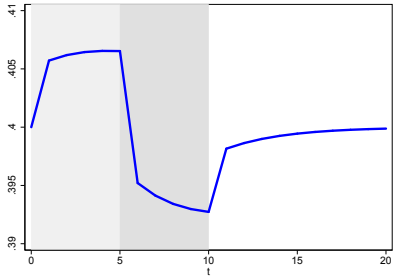


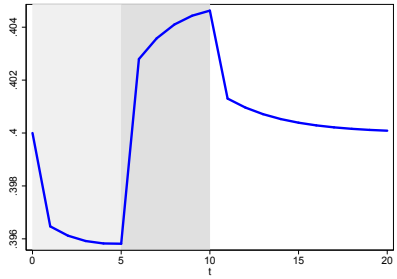
Figure 1: *Adjustment in Response to a Household Deleveraging Shock (continued).*

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).

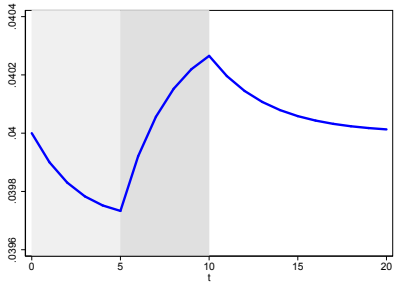
(a) *Exports / GDP*



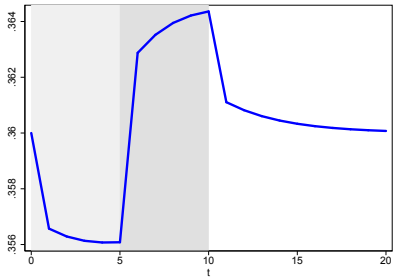
(b) *Imports / GDP*



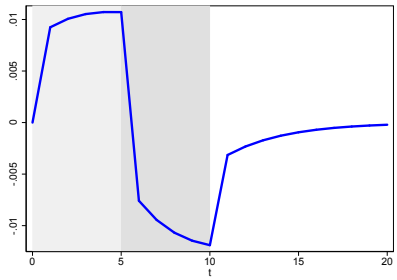
(c) *Imports of Inputs / GDP*



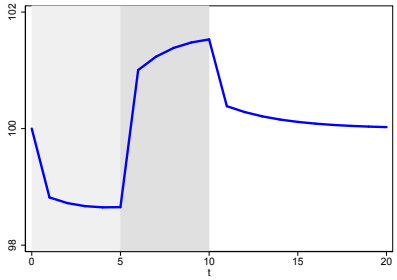
(d) *Imports of Final Goods / GDP*



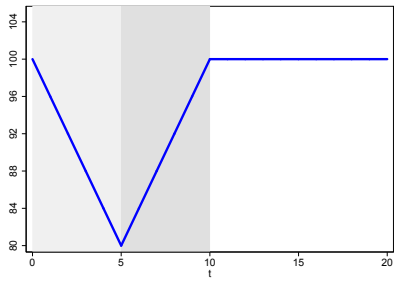
(e) *Trade Balance / GDP*



(f) *Price of Nontraded Good*



(g) *Households' Borrowing Limit*



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 non-traded good falls.

The second shock, in panel B of Figure 1, is an unanticipated gradual decline and subsequent recovery in the borrowing limit, representing a more realistic multi-year financial crisis. This generates similar paths for exports, imports and the price of the non-traded good during the decline in the borrowing limit. All these series, however, recover and "overshoot" beyond the initial level as the borrowing limit returns to the original. The reason is that as the borrowing limit falls, constrained households are re-paying higher levels of past (one-period) debt than they can currently borrow (i.e., refinance), which reduces their consumption. But as the borrowing limit increases, the opposite happens, leading to an increase in their consumption.

Supply shock In turn, we interpret a decline in the borrowing limit for firms as a *supply shock*. All else equal, every firm is forced to produce less output from less input, given their reduced ability to borrow.

The immediate impact is to reduce the production of both the export good and the non-traded good, as firms in both sectors face a tighter borrowing constraint. Exports fall directly due to the shock. Further, the price of the non-traded 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 non-traded 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 adjustment in response to this type of shock. As before, we simulate the economy's adjustment to both an unanticipated permanent decline in the firms' borrowing limit (in panel A) and an unanticipated gradual decline and subsequent recovery in the borrowing limit (in panel B). As with the shock to households, the gradual firm deleveraging shock in panel B generates an "overshooting" in all outcomes.

Robustness We analyze these 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. As we show and

discuss in detail in Appendix B, our results are robust to using a wide range of calibrated parameters.

3. 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. We have also included in the dataset information on bilateral trade barriers as used in typical gravity models of trade. Our dataset is assembled gathering several data sources which we describe below.

3.1. Financial Crisis Dates

We rely on data on the dates of financial (i.e., banking) crises compiled by Reinhart and Rogoff (2011). 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 govermnment to financial institutions. These data are available for 70 countries.[9,10] Reinhart and Rogoff (2011) mark financial crisis dates using dummy variables at an annual frequency. We identify the first year of 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.[11] 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. Figure A.1 in the Appendix illustrates the frequency of financial crises by year.

3.2. Bilateral and Total Trade Flows

Bilateral trade data were obtained from the newly available CEPII TRADHIST database for the pre-WW2 period and entirely from the IMF's *Direction of Trade Statistics* for the

[9] We exclude Taiwan from our sample due to a lack of recent trade and GDP data.

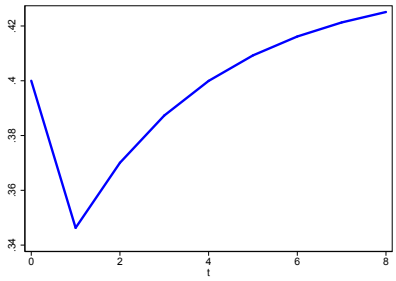
[10] Appendix Table A.1 reports the list of countries and the financial crises start dates.

[11] 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.

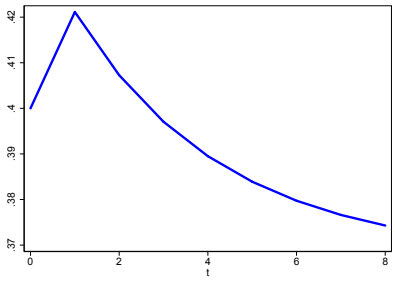
Figure 2: *Adjustment in Response to a Firm Deleveraging Shock.*

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.

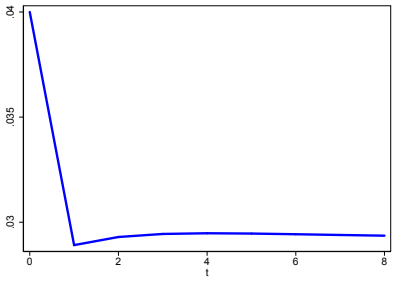
(a) *Exports / GDP*



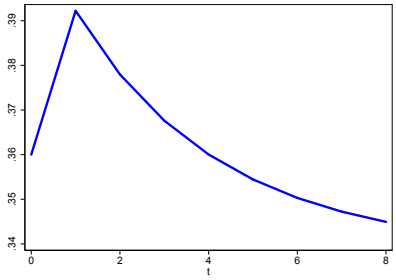
(b) *Imports / GDP*



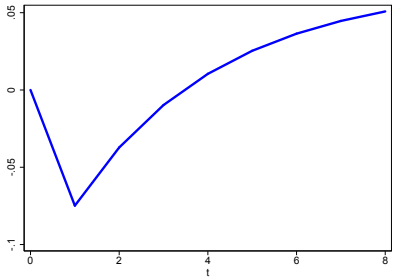
(c) *Imports of Inputs / GDP*



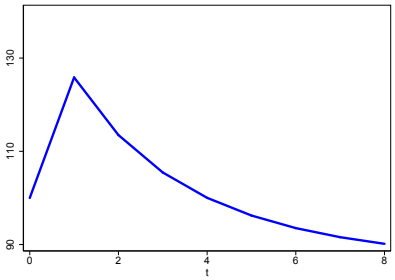
(d) *Imports of Final Goods / GDP*



(e) *Trade Balance / GDP*



(f) *Price of Nontraded Good*



(g) *Firms' Borrowing Limit*

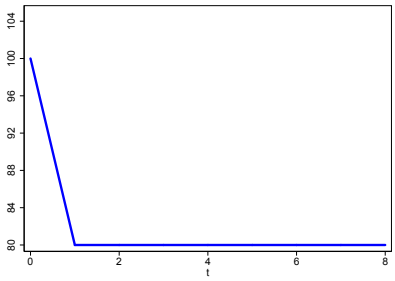
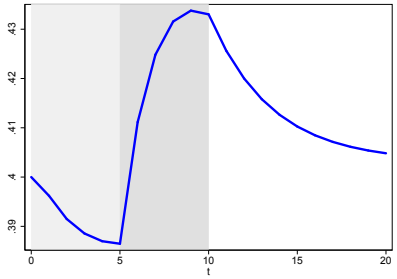


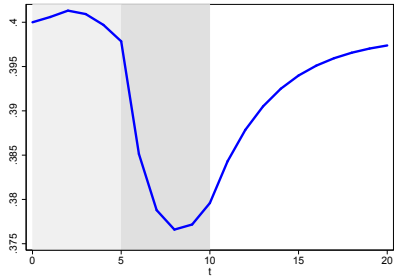
Figure 2: *Adjustment in Response to a Firm Deleveraging Shock (continued).*

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).

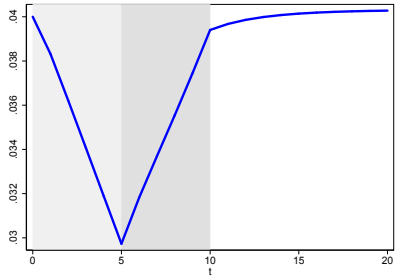
(a) *Exports / GDP*



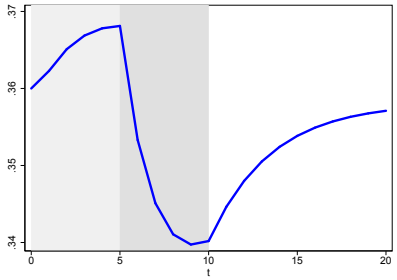
(b) *Imports / GDP*



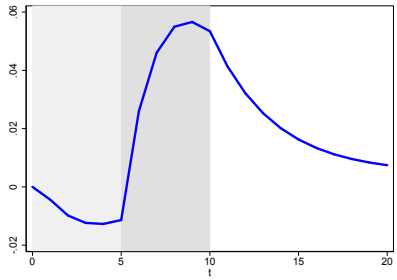
(c) *Imports of Inputs / GDP*



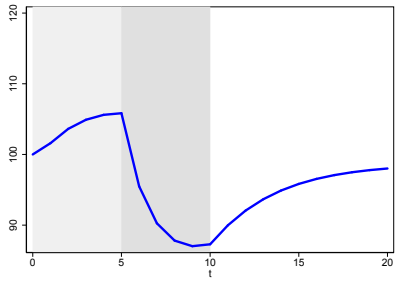
(d) *Imports of Final Goods / GDP*



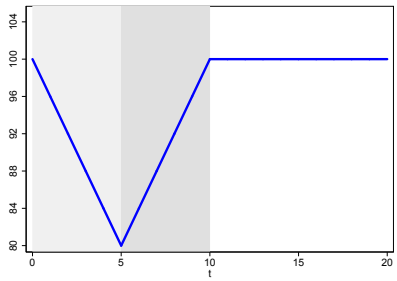
(e) *Trade Balance / GDP*



(f) *Price of Nontraded Good*



(g) *Firms' Borrowing Limit*



post-WW2 period.[12] 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.

Trade in Final Goods and Intermediate Inputs We also 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).[13] We exclude from our data fuels, which at times represent a relevant share of world trade, and a small set of unmatched products.

3.3. 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).

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 (2011) for most of our sample, and from the IMF's *World Economic Outlook* for very recent years.

3.4. World Trade and Major Crises

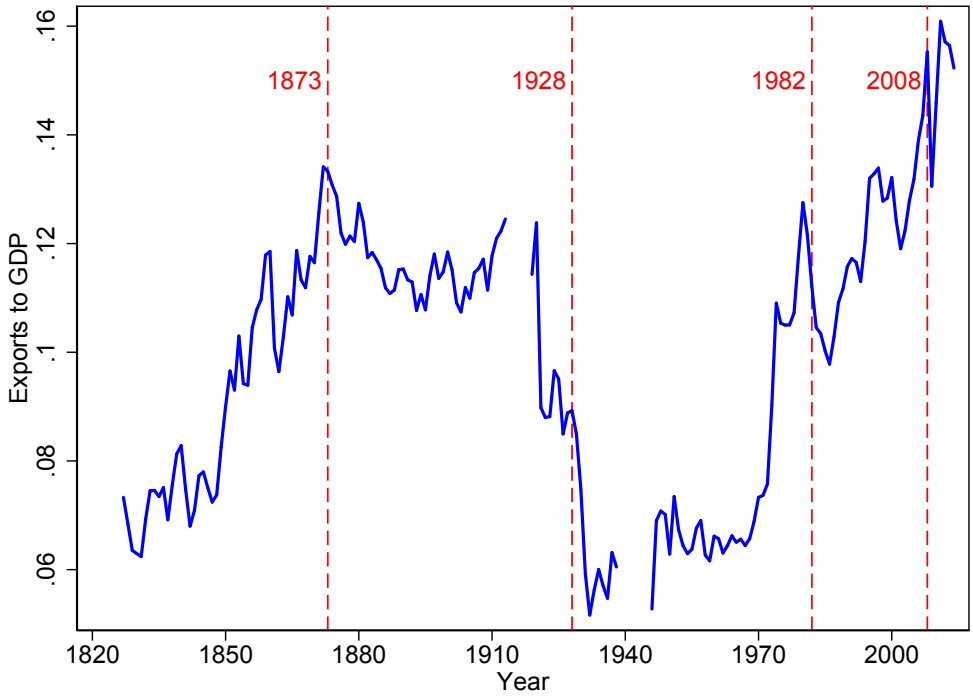
To motivate our analysis, we note that what was witnessed after the global financial crisis in 2008 was nothing new, especially not the so-called Great Trade Collapse, meaning the

[12] The CEPII TRADHIST project has extended substantially the amount of pre-WW2 data available in earlier datasets, adding years further into the past and filling in many gaps. Existing research examining historical trade flows typically have a starting point of 1870. For details on the construction of see CEPII TRADHIST database see Fouquin and Hugot (2016).

[13] 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.

Figure 3: *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.



fall in trade volumes relative to GDP.

Figure 3 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.8 in the Appendix shows the results are very similar based on a broader group of 20 countries over the period 1868–2014.

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. The next sections focus on those issues with a granular empirical analysis.

4. 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. We count 172 such crisis episodes, a third of which occur in the developed countries in our sample. Reinhart and Rogoff (2009) and Jorda, Schularick, and Taylor (2013), and others, have documented the deep impact of crisis episodes on various outcomes such as output, unemployment, and 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 $\ln(T_{it}/Y_{it})$. 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 regression for

each horizon h

$$\ln(T_{i,t+h}/Y_{i,t+h}) - \ln(T_{it}/Y_{it}) = \alpha_i^h + \beta_t^h + \gamma^h Crisis_{it} + e_{it}\,, \tag{1}$$

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 pair and year, and all time-invariant country characteristics (e.g., certain geographical factors) are absorbed in the fixed effects.

Figure 4 and Table 1 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).[14] 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 (-6.0% 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 decline in imports relative to GDP are the norm historically. Finally, the historical record indicates that financial crises disrupt trade flows for many years.

We now turn to robstness. If we exclude the Great Recession, as in Figure 5a, the results are similar to those for the full sample. In the post-WW2 sample (shown in 5b), 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 5c) 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.[15]

We also examine the response of exports and imports in developed and developing

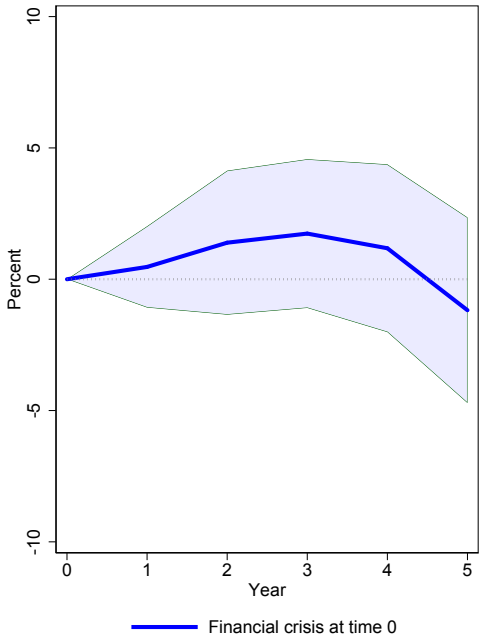
[14] Strictly, the units of the estimated coefficients are log points, but for simplicity we refer to them using the % sign from here onwards as this is a close approximation.

[15] The estimated coefficients corresponding to Figure 5 are shown in Appendix Table A.2.

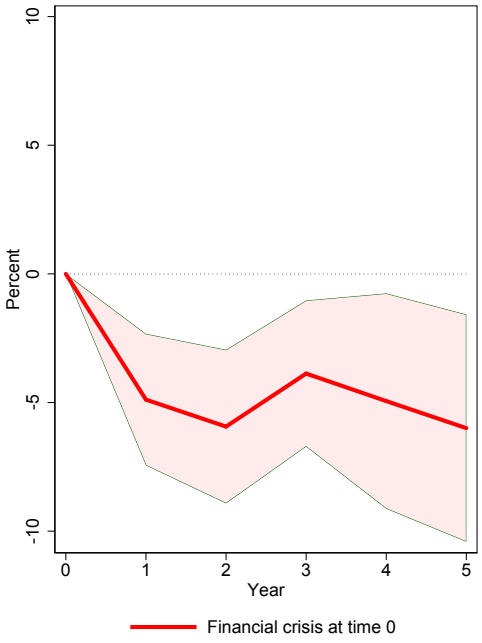
Figure 4: *Local projections: response of total trade in goods to financial crisis*

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) *Total Exports*



(b) *Total Imports*



Notes: Shaded regions indicate 90% confidence intervals.

Table 1: *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.

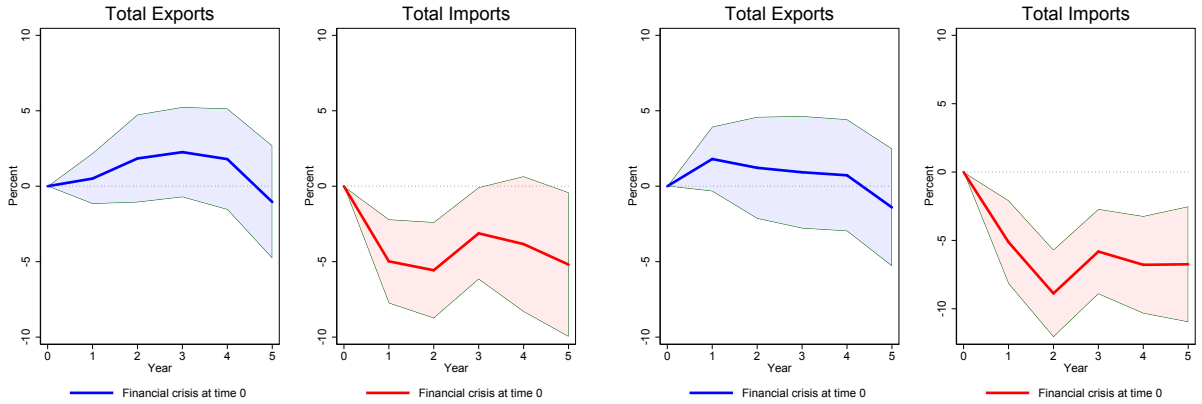
	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	0.5	1.4	1.7	1.2	-1.2
	(0.8)	(1.4)	(1.4)	(1.6)	(1.8)
N	6494	6423	6352	6283	6216
Total imports	-4.9**	-5.9**	-3.9**	-4.9*	-6.0**
	(1.3)	(1.5)	(1.4)	(2.1)	(2.3)
N	6470	6398	6325	6254	6187

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

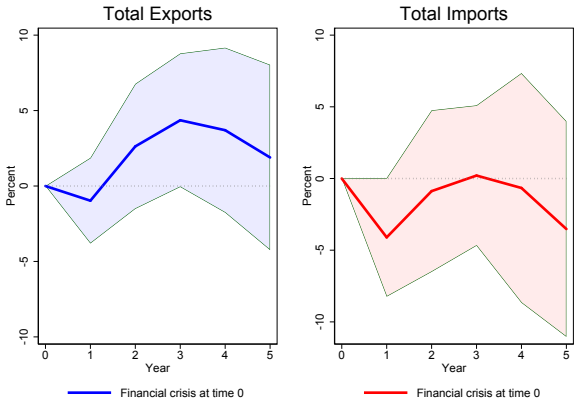
Figure 5: *Local projections: response of total trade in goods to financial crisis*

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*



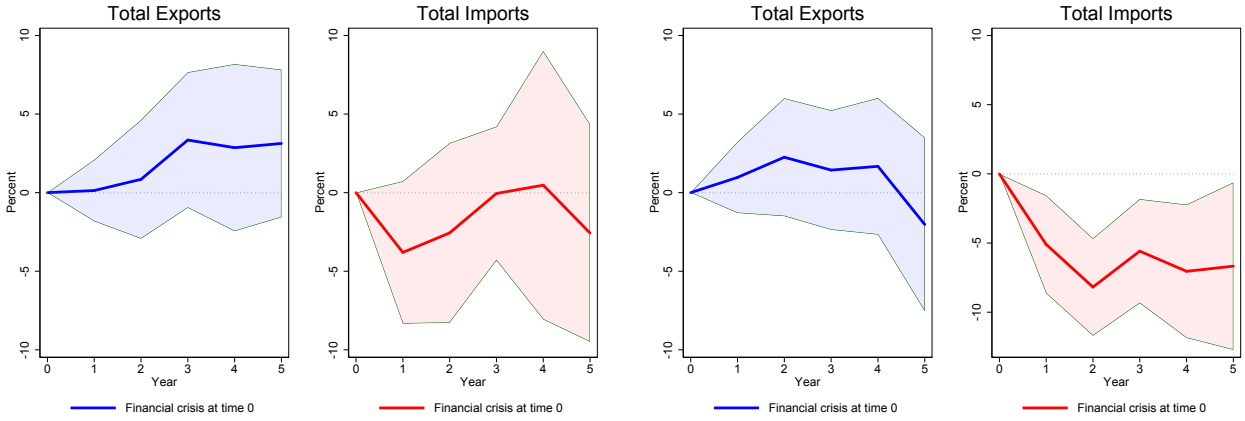
countries separately, as shown in Figures 6a and 6b, respectively.[16] We denominate 14 countries in our sample as developed and the remaining 55 as developing. Out of the 195 crisis episodes considered, 39% occur in the developed group, and the remaining 61% in developing countries. While our main messages 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

[16]The estimated coefficients corresponding to Figure 6 are shown in Appendix Table A.3.

Figure 6: *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 - Full Sample* **(b)** *Developing Economies - Full Sample*



GDP—still stands.

The results above appear inconsistent with the supply-side view of financial crises, and consistent with the demand-side view of financial crises. 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.

5. 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.

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 regression 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 pair and year. Time-invariant pair characteristics (e.g., distance or other geographical factors) are absorbed in the fixed effects.

The full sample estimates are shown in Table 2 and in panel (a) of Figure 7. 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 real exchange rate ($\ln RER_{ei,t+h} - \ln RER_{ei,t}$). In the Appendix (see Table A.4 and panel (a) of Figure A.9) we show that very similar results are obtained when we ignore these additional controls.[17] 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 a *increase* in the normalized trade 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, -6.1% 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 +3.2% and -4.6%.

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 in

[17] Further, a version of all the results in this section without these additional controls is reported in Appendix Section E.

Table 2: *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	0.8	1.9	4.5**	3.2*
	(1.1)	(1.3)	(1.4)	(1.4)	(1.5)
Financial crisis in importer (year 0)	-6.1**	-8.0**	-6.2**	-7.4**	-4.6**
	(1.2)	(1.4)	(1.4)	(1.5)	(1.5)
N	194688	189107	183863	178736	173873

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

Table 3: *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.

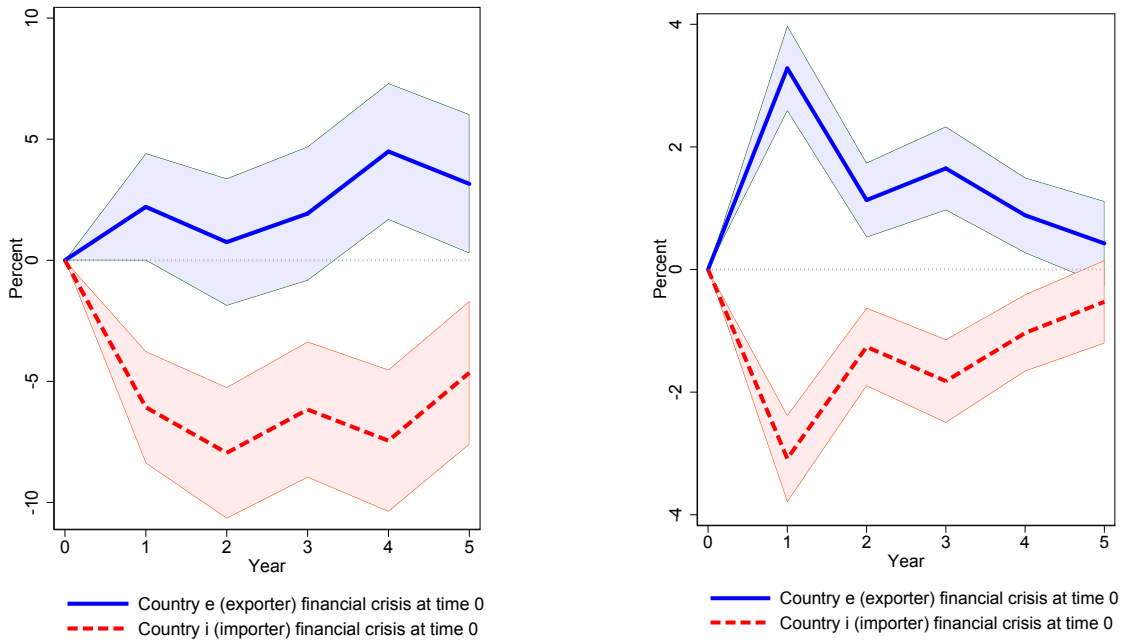
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.3**	1.1**	1.6**	0.9**	0.4
	(0.4)	(0.3)	(0.3)	(0.3)	(0.4)
Financial crisis in importer (year 0)	-3.1**	-1.3**	-1.8**	-1.0**	-0.5
	(0.4)	(0.3)	(0.3)	(0.3)	(0.3)
N	213155	207234	201584	195952	190450

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

Figure 7: *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 90% confidence intervals.

Table 3. We are now estimating the series of regression 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 pair and year.

The full sample estimates are shown in Table 3 and in panel (b) of Figure 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.5 and panel (b) of Figure A.9). On impact a financial crisis is associated with an *appreciation* in the real exchange rate, +3.3% 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, -3.1% change, when the financial crisis event takes place in the importer country. Even at horizon $h = 4$ years, the effects are $+0.9\%$ and -1.0% 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.

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 8.[18] 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 9 shows that the patterns seen earlier do not differ much across these groups.[19] The main difference is a more pronounced decline in normalized imports when the importer is a developing country instead of an advanced economy.

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.

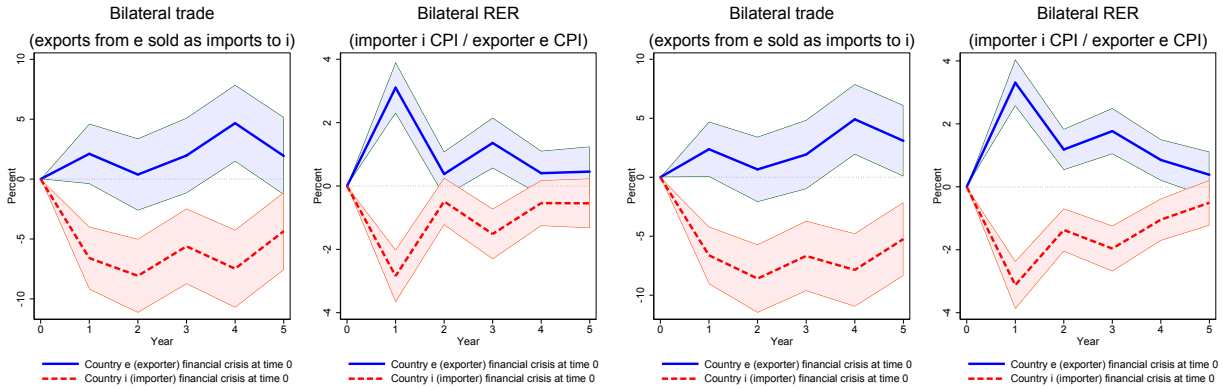
We have assembled data on bilateral trade flows by product type for the post-1962 period, which is described in detail in section 3. We estimate equation 2 using each component of bilateral trade flows (trade in final goods and trade in intermediate inputs)

[18] The estimated coefficients corresponding to Figure 8 are shown in Appendix Tables A.6 and A.8.
[19] The estimated coefficients corresponding to Figure 9 are shown in Appendix Tables A.7 and A.9.

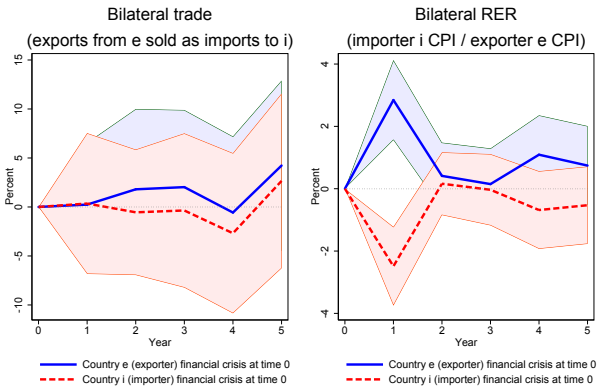
Figure 8: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

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 90% confidence intervals.

as the dependent variable. The results are shown in Figure 10.[20,21] 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.[22] These patterns are consistent with the model's predictions for a demand shock, and inconsistent with the predictions for a supply shock.

[20] In addition, Figure A.17 in the appendix illustrates the response of trade in capital goods to financial crises.

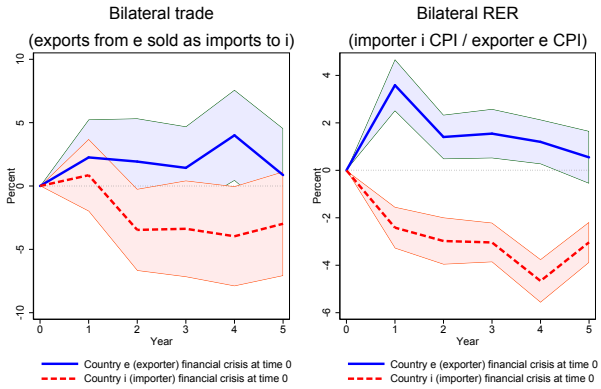
[21] The estimated coefficients corresponding to Figure 10 are shown in Appendix Table A.14.

[22] Note that while trade in both final goods and intermediate inputs fall in response to a crisis in the importer, there are differences in magnitudes. At a two year horizon normalized trade flows of final goods have declined by -6.7% compared to -2.6% for trade in inputs, and at a 5-year horizon the decline is -7.6% for trade in final goods vs. -0.9% for trade in inputs.

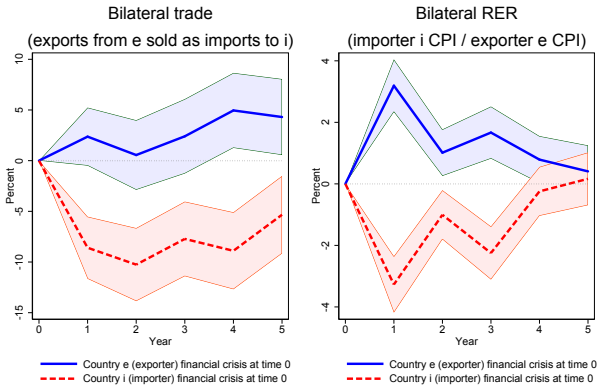
Figure 9: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

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.

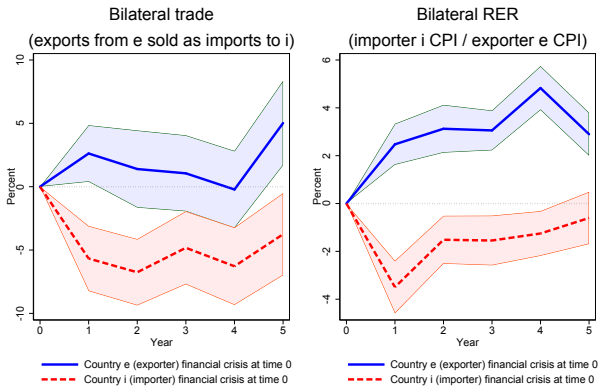
(a) *Advanced Importer - Full Sample*



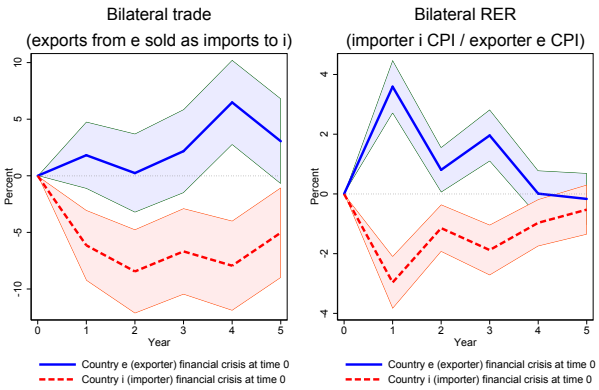
(b) *Developing Importer - Full Sample*



(c) *Advanced Exporter - Full Sample*



(d) *Developing Exporter - Full Sample*



Notes: Shaded regions indicate 90% confidence intervals.

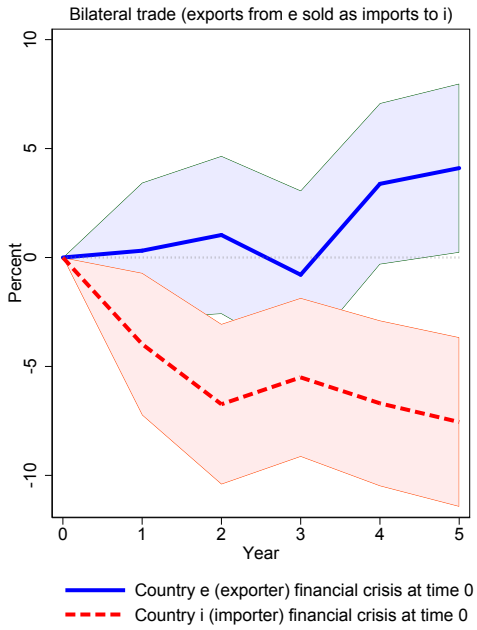
Controlling for All Other Types of Crises. The possible coincidence of financial crises with other types of crisis constitutes a potential challenge to our empirical strategy. We first ask, then, what is the degree of overlap between financial crises and various other types of crises. Secondly and more 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

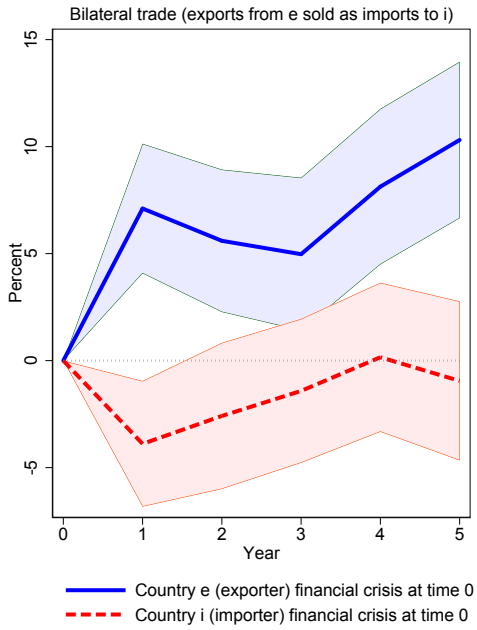
Figure 10: *Local projections: response of bilateral trade in final consumption goods, intermediate inputs and capital goods to financial crisis in exporter or importer*

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 90% confidence intervals.

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.

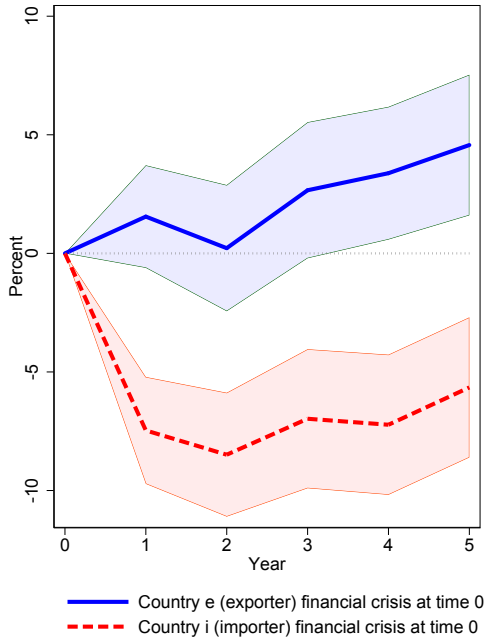
The results in Figure 11 show our main message remains true.[23] Financial crises in the exporting country *increase* trade flows, while financial crises in the importing country *decrease* trade flows. Bilateral real exchange rates *appreciate* in response to crises in the exporter, and *depreciate* in response to crises in the importer. While we have significantly

[23]The estimated coefficients corresponding to Figure 11 are shown in Appendix Tables A.10 and A.11.

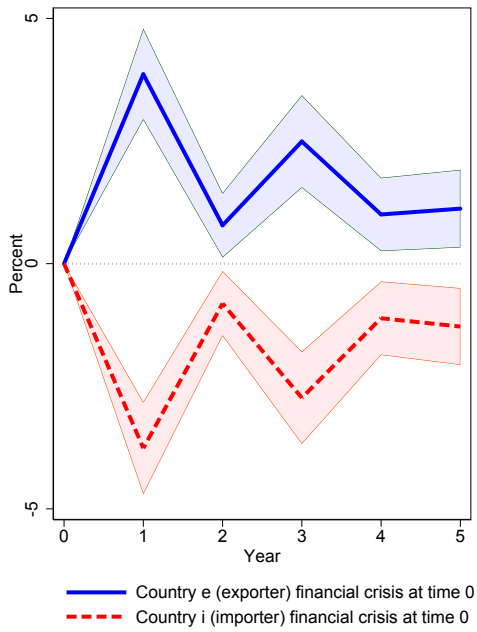
Figure 11: *Local projections controlling for other crises types: response of bilateral trade and RER to financial crisis in exporter or importer*

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 90% confidence intervals.

expanded the number of regressors, we loose little precision in our estimates.

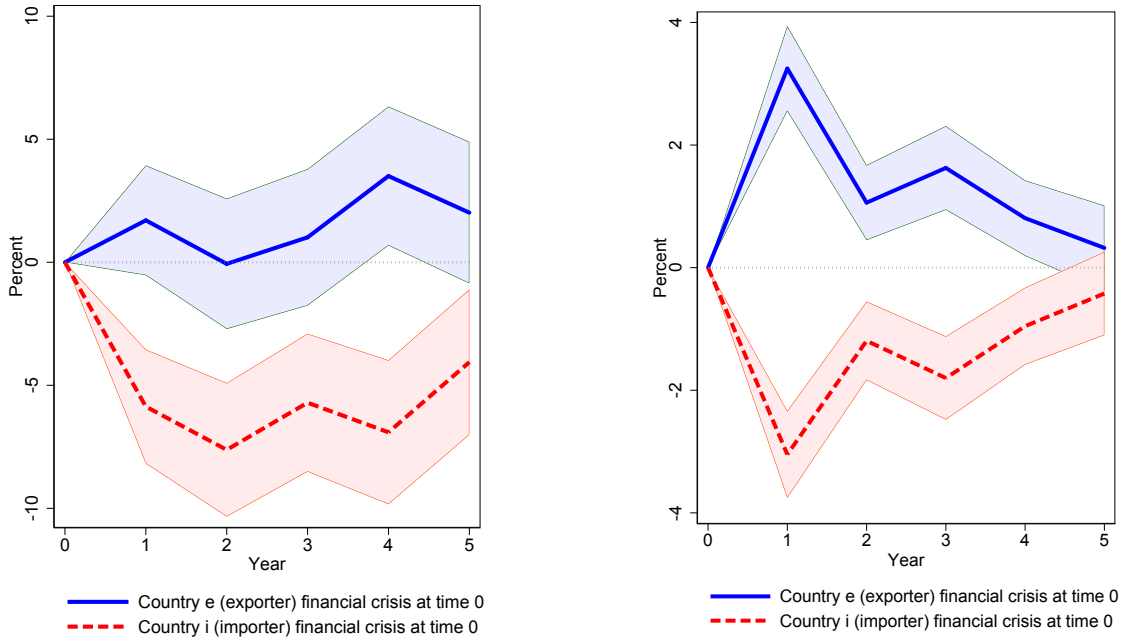
Controlling for Multilateral Resistance Terms. In standard gravity equations, exclusion of multilateral resistance terms biases estimates of the elasticity of trade flows to trade costs (typically captured by distance). While this is not the case here, and we include exporter-importer fixed effects, 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'

Figure 12: *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 90% confidence intervals.

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 12, 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 12.[24]

[24]The estimated coefficients corresponding to Figure 12 are shown in Appendix Tables A.12 and A.13.

6. 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.[25]

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.[26] 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 4. 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.

[25] 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.

[26] 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 5, the results are largely unchanged and our main message still holds. For example, we find (in panel (b)) a similar decrease by -5.1% in the normalized trade flow when the financial crisis event takes place in the importer country, while we had found a -6.1% 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 6, also finding results similar to the baseline ones. The weighted results in panel (b) of table 6 show a +2.6% change when the financial crisis event takes place in the exporter country and a -2.5% change when it hits the importer country, where these impacts are very similar to the baseline unweighted results of table 3 (a +3.3% change on impact following crises in the exporter and a -3.1% change on impact following crises in the importer).

Table 4: *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		0.0230**	0.0222**
		(0.0056)	(0.0061)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	No	No	Yes
N	3575	2879	1878
AUC	0.622	0.666	0.728
	(0.0272)	(0.0288)	(0.0223)

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

Table 5: *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)	2.4	0.1	4.3	4.1	2.0
	(1.9)	(2.6)	(2.7)	(2.7)	(2.9)
Financial crisis in importer (year 0)	-3.4	-6.7**	-2.8	-6.0*	-4.1
	(1.8)	(2.5)	(2.6)	(2.6)	(2.9)
N	104797	101408	98150	94842	91545

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

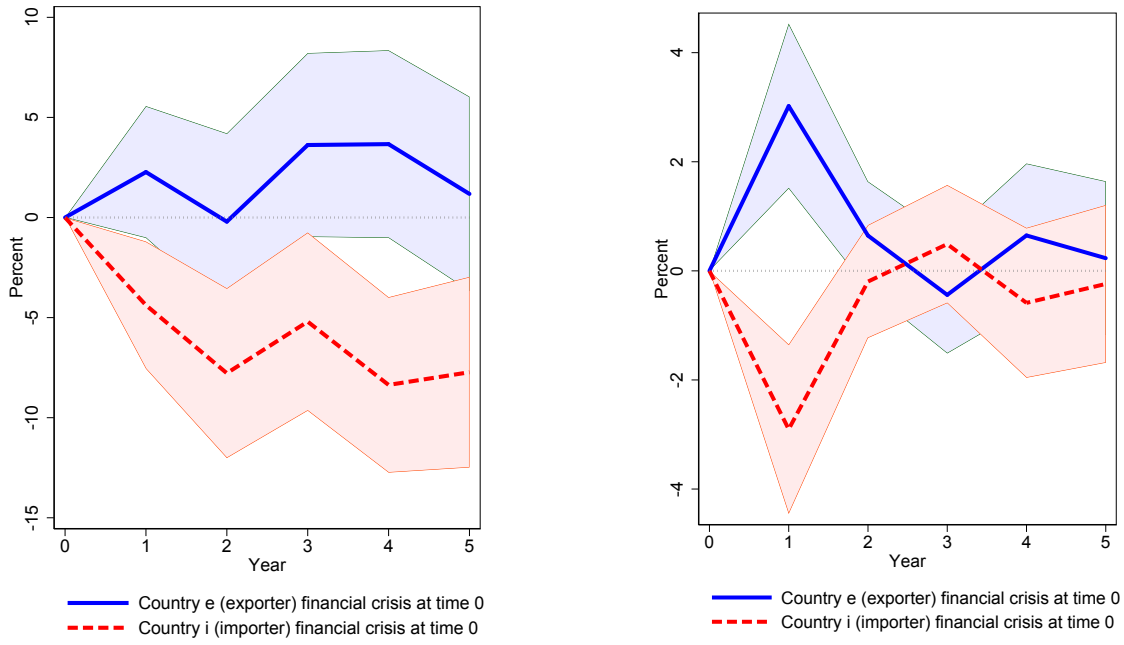
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.6	1.2	4.3	5.4*	3.4
	(1.8)	(2.3)	(2.5)	(2.6)	(2.6)
Financial crisis in importer (year 0)	-5.1**	-9.2**	-4.7*	-7.2**	-5.8*
	(1.7)	(2.3)	(2.4)	(2.4)	(2.6)
N	75247	73903	72700	71484	70261

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

Figure 13: *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)*

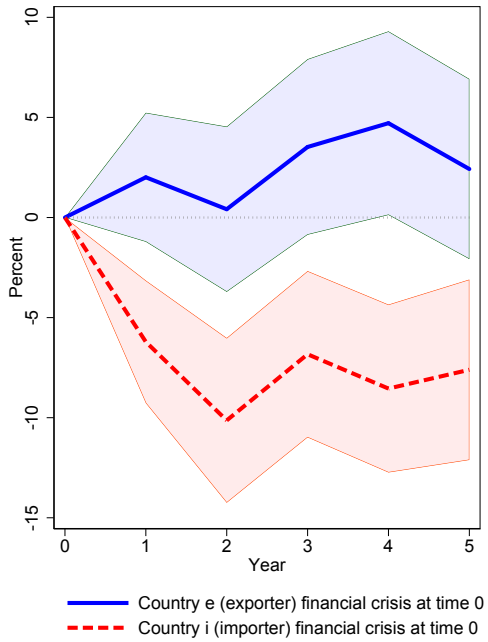


Notes: Shaded regions indicate 90% confidence intervals.

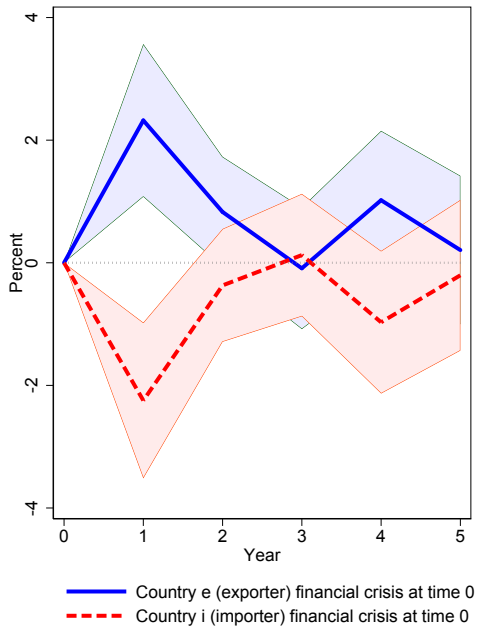
Figure 14: *Local projections with IPW: response of bilateral trade and RER to financial crisis in exporter or importer with country fixed effects and year effects*

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 90% confidence intervals.

Table 6: *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)	3.2**	0.0	-0.6	0.6	0.8
	(0.9)	(0.6)	(0.6)	(0.8)	(0.9)
Financial crisis in importer (year 0)	-3.1**	0.5	0.6	-0.5	-0.8
	(0.9)	(0.6)	(0.6)	(0.8)	(0.9)
N	116352	112675	109180	105641	102087

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)	2.6**	0.5	-0.2	1.1	0.6
	(0.7)	(0.5)	(0.6)	(0.7)	(0.7)
Financial crisis in importer (year 0)	-2.5**	0.0	0.2	-1.0	-0.6
	(0.7)	(0.5)	(0.6)	(0.7)	(0.7)
N	83688	82504	81253	80004	78731

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

7. Conclusions

We have developed a simple small open economy model, where a country is subject to "financial crisis" deleveraging shocks that impose tighter borrowing limits on households and/or firms. These shocks leave distinct statistical signatures in the empirical 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. We conjecture that 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 this model to the data, we compiled a crossed dataset of 200+ years of trade data and dates of almost 200 financial crises in a large sample of countries. We use empirical methods to get a clearer picture of how financial distress affects trade and relative prices. Very clearly in the data, we see after a financial crisis event, on impact, that imports contract, exports hold steady or even rise, and the real exchange rate depreciate, with effects persisting for five years. The effects are statistically significant: this pattern is the rule, not the exception.

Based on both price and quantity evidence from the very long run, a robust interpretation emerges. History shows that on average financial crises are not, for the most part, a supply shock. Rather, they are very clearly a negative shock to demand.

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Appendices

A. List and Frequency of Financial Crises

Table A.1: *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).

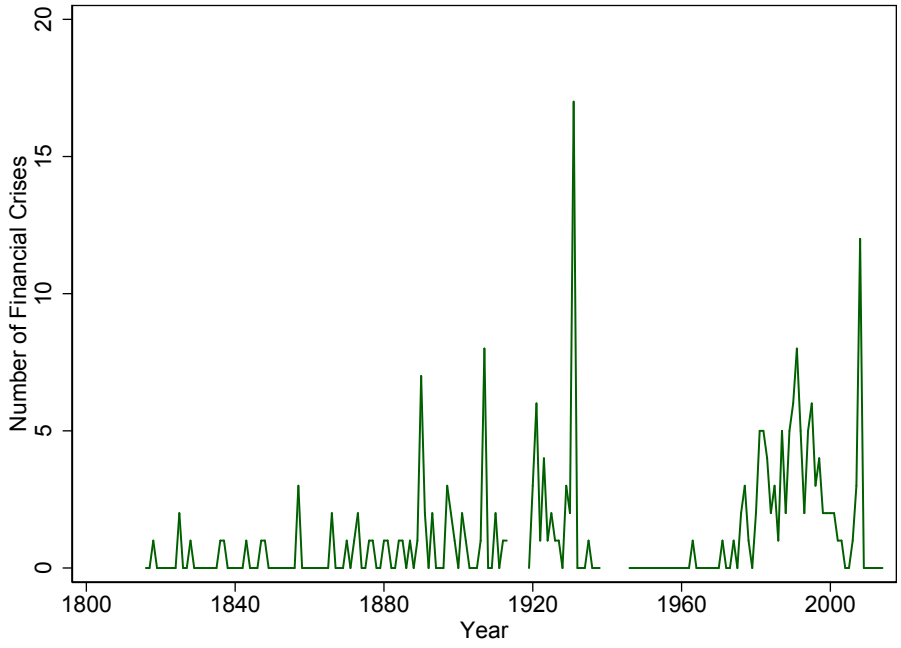
Table A.1: *List of financial crises, CONTINUED.*

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.1: *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).

B. Simulations: Additional Results

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

B.1. 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.2 and A.3) 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.4 and A.5) 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.

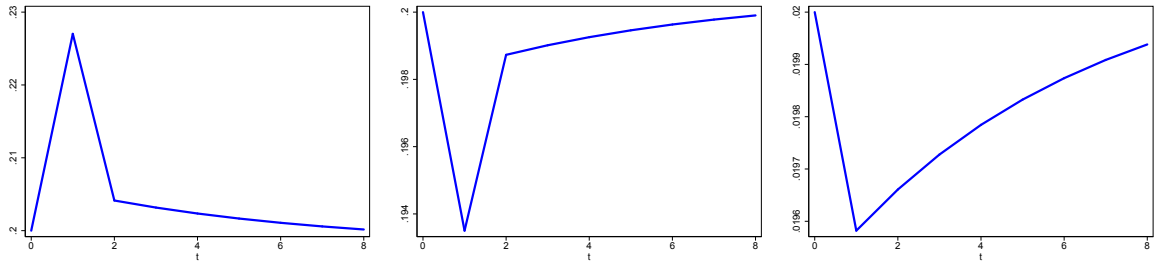
In the case of the temporary shocks, again we find no relevant differences between the baseline case in the main text and the simulations with alternative parameters in the response to the household deleveraging shock. In the case of the firm deleveraging shock, increasing the steady-state share of imported 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.

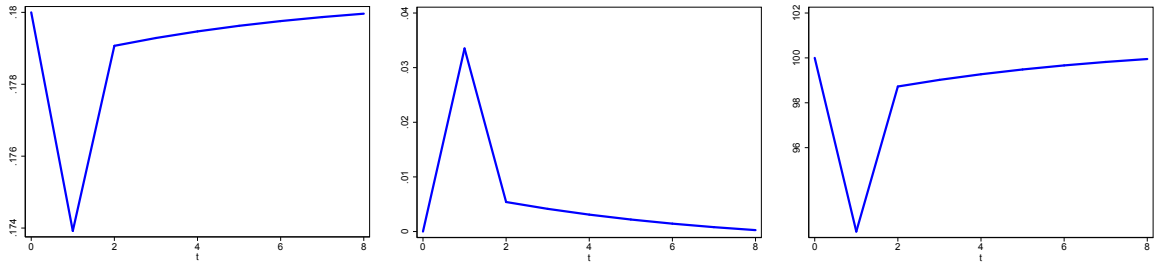
Figure A.2: *Adjustment in Response to a Household Deleveraging Shock.*

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*

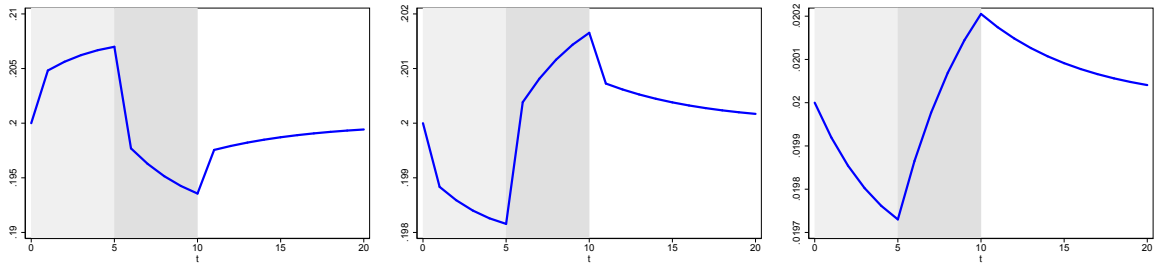


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



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*

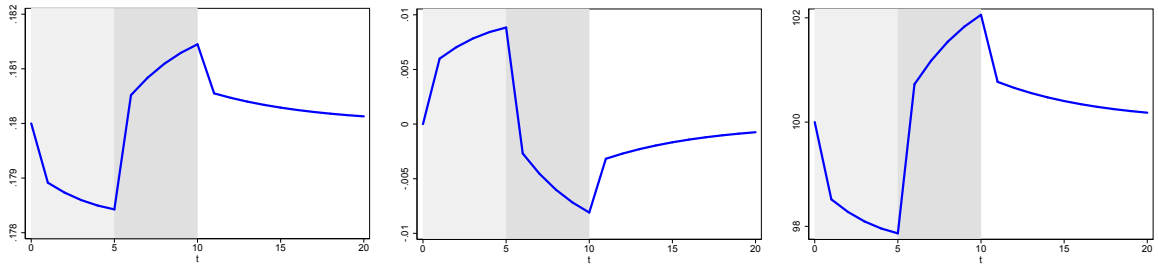
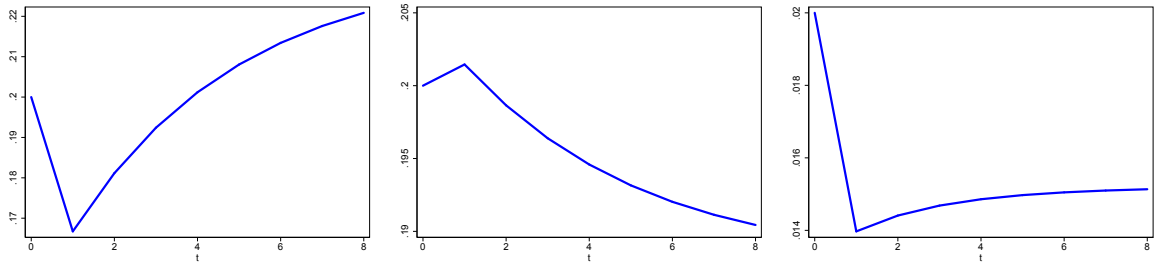


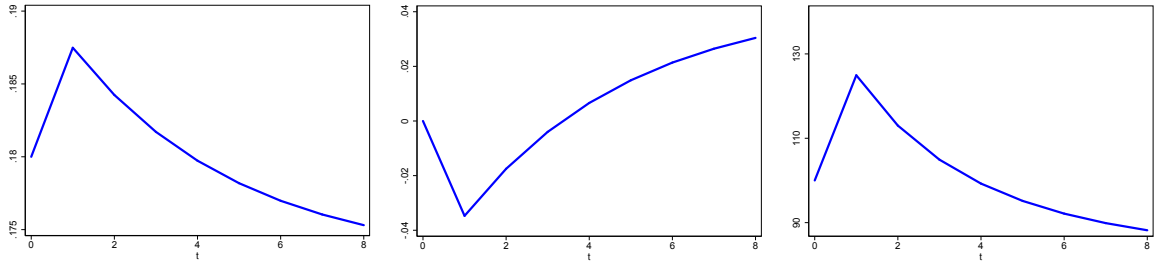
Figure A.3: *Adjustment in Response to a Firm Deleveraging Shock.*

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*

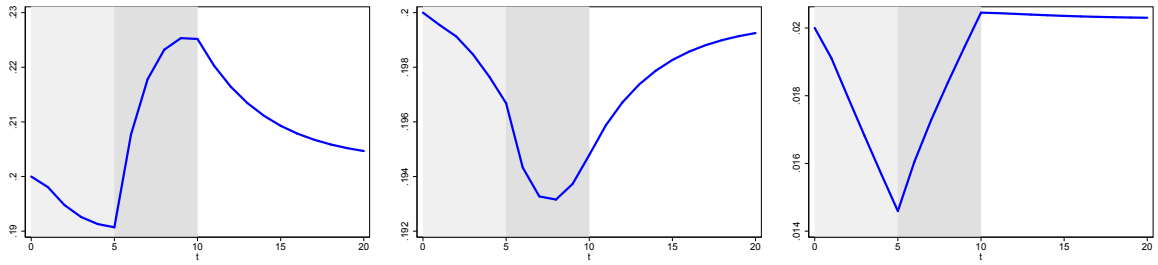


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



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*

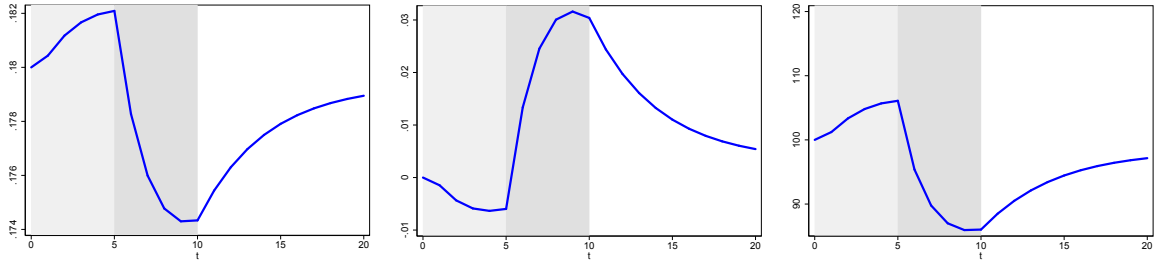
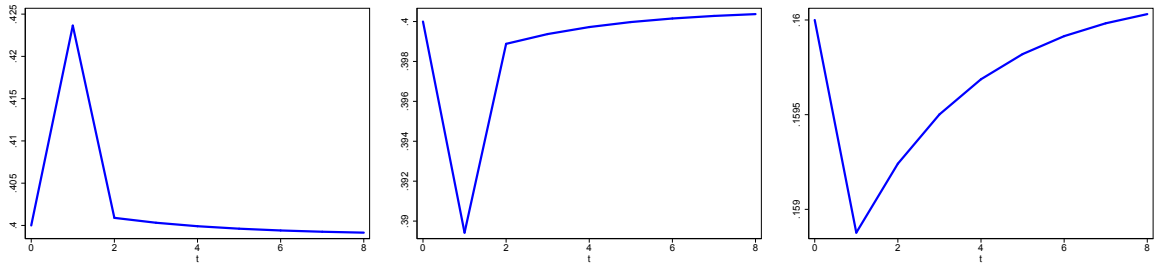


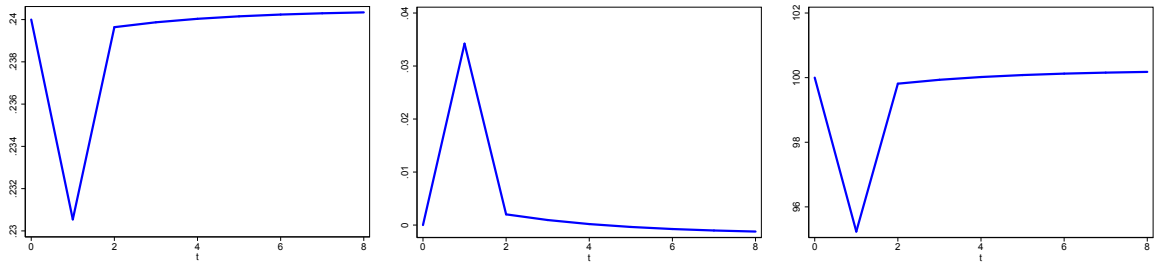
Figure A.4: *Adjustment in Response to a Household Deleveraging Shock.*

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*

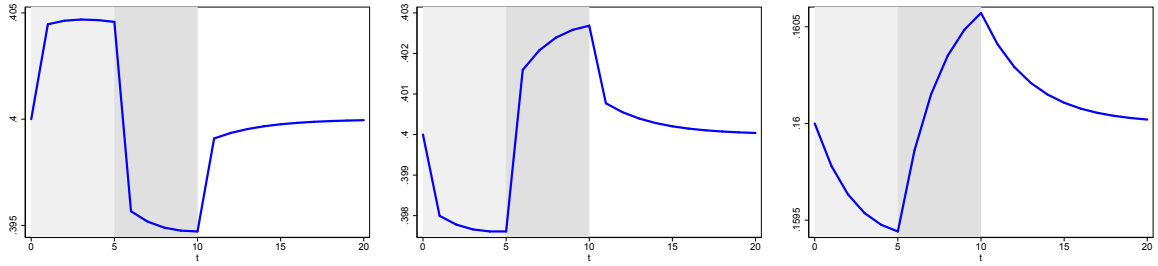


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



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*

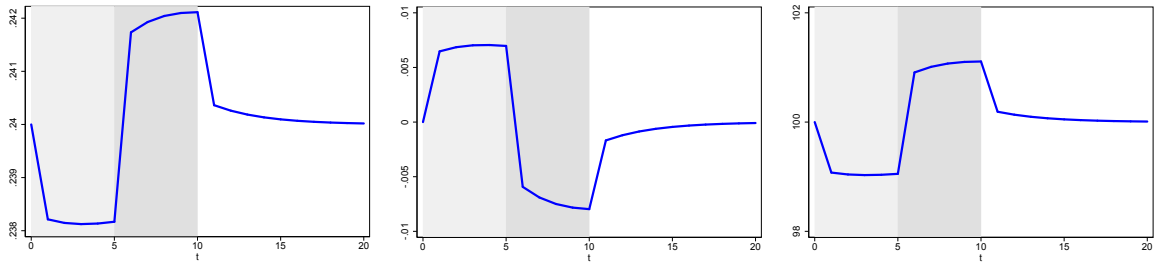
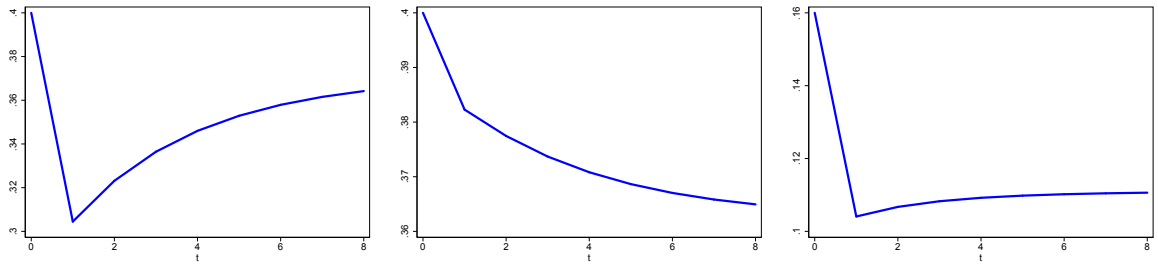


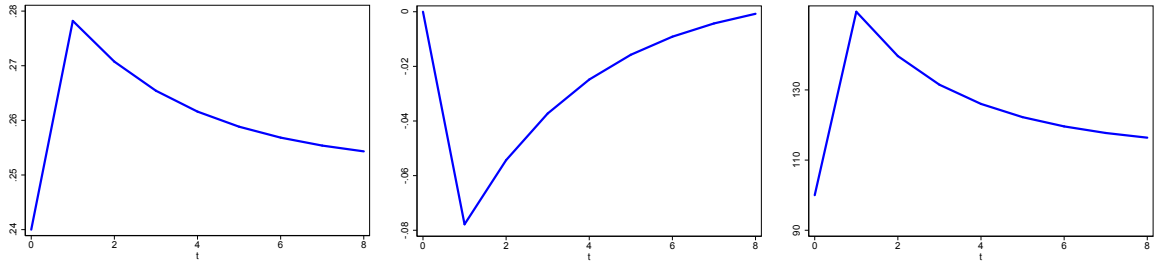
Figure A.5: *Adjustment in Response to a Firm Deleveraging Shock.*

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*

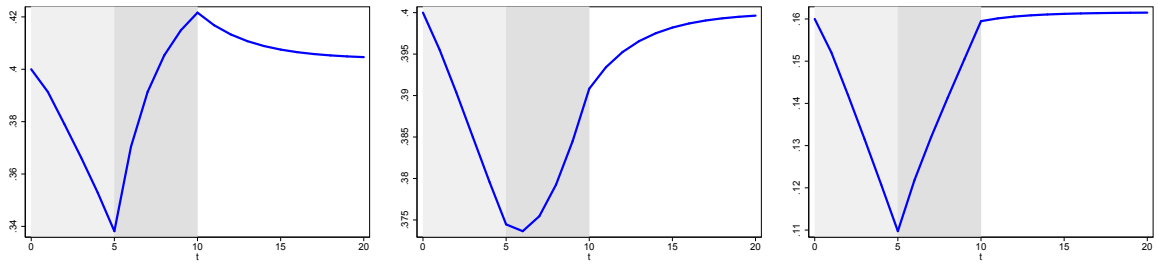


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



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*

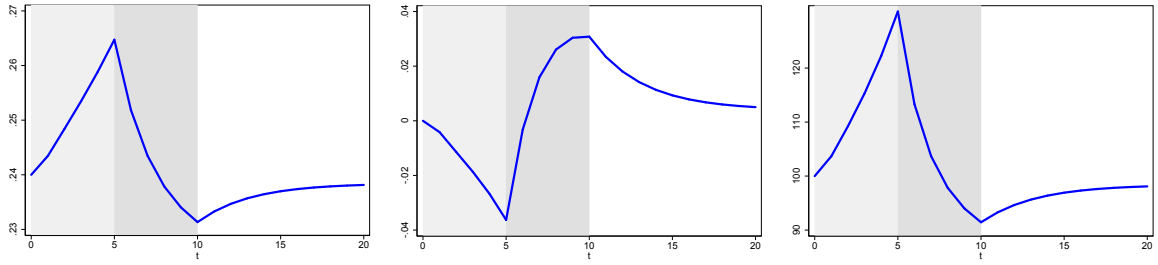
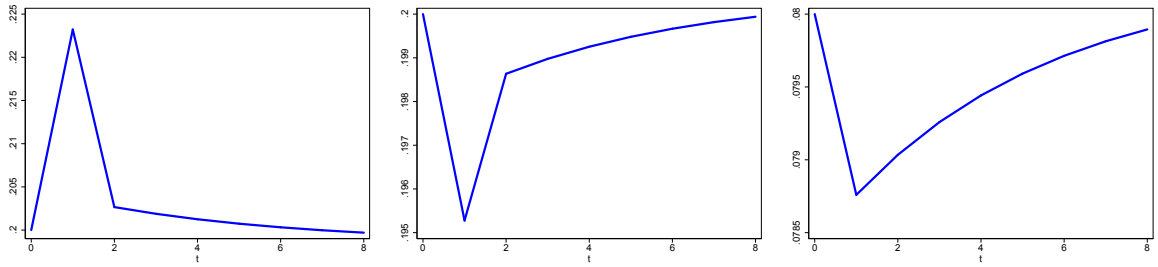


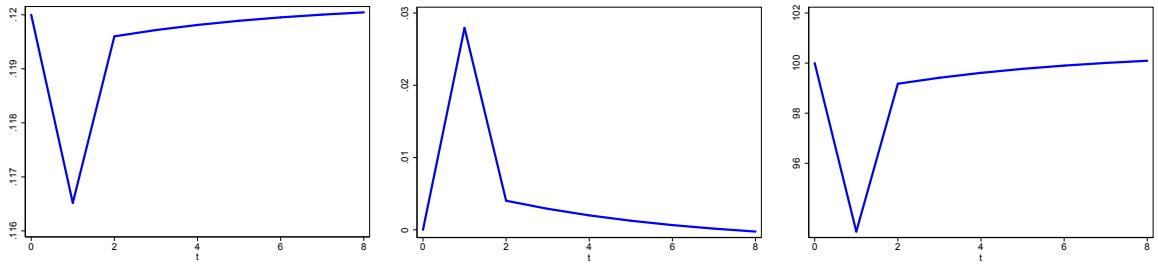
Figure A.6: *Adjustment in Response to a Household Deleveraging Shock.*

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*

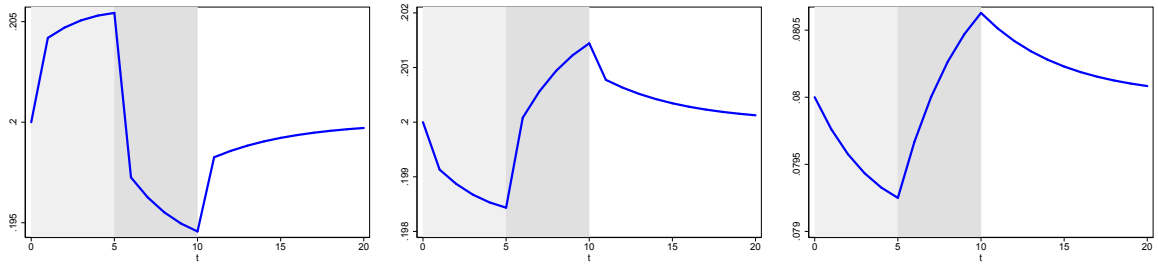


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*



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*

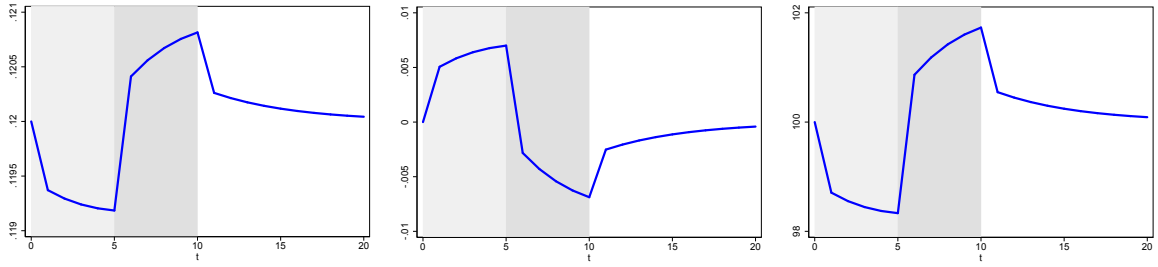
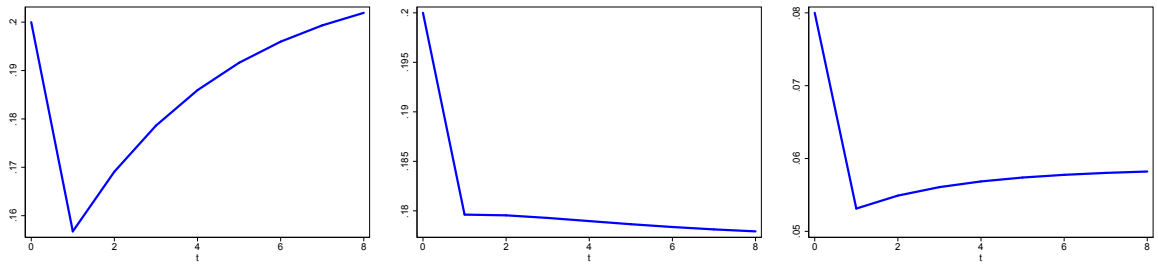


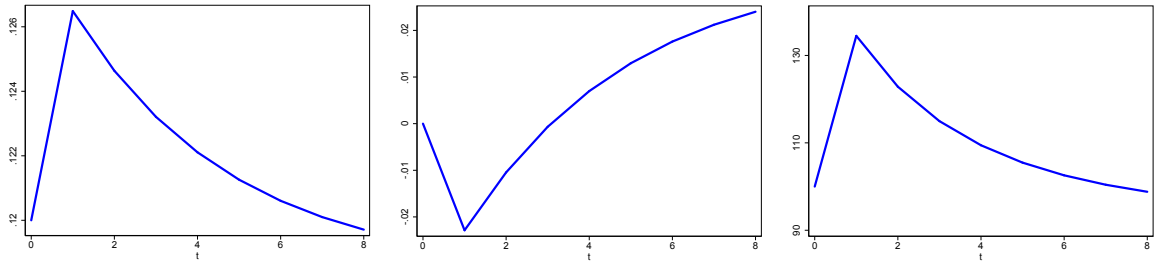
Figure A.7: *Adjustment in Response to a Firm Deleveraging Shock.*

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*

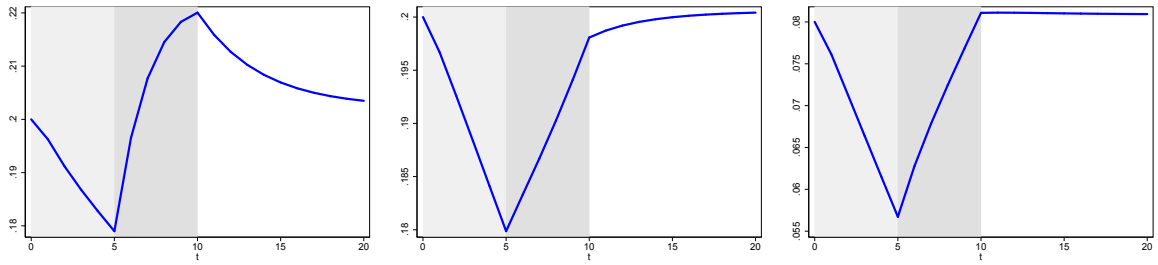


(d) *Imports of Final Goods / GDP* **(e)** *Trade Balance / GDP* **(f)** *Price of Nontraded Good*

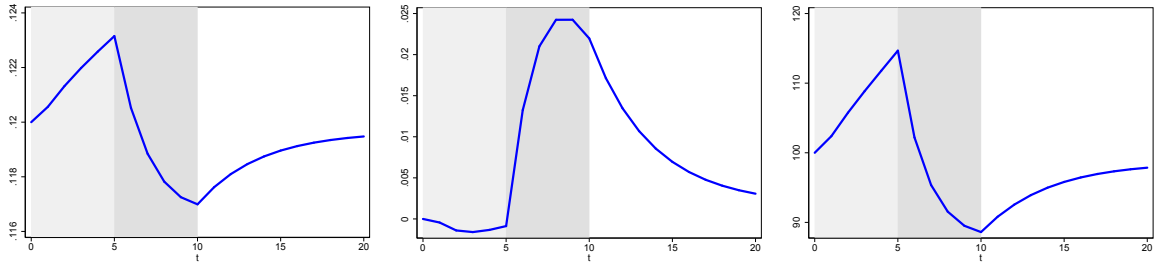


Panel B: This figure describes the adjustment of the trade balance, exports, imports, and the price of the non-traded good to a gradual 20 percent reduction and subsequent recovery in firms' borrowing limit $\overline{\delta}$. The shock starts in period t = 1, with a 4 percent decline in the borrowing 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*

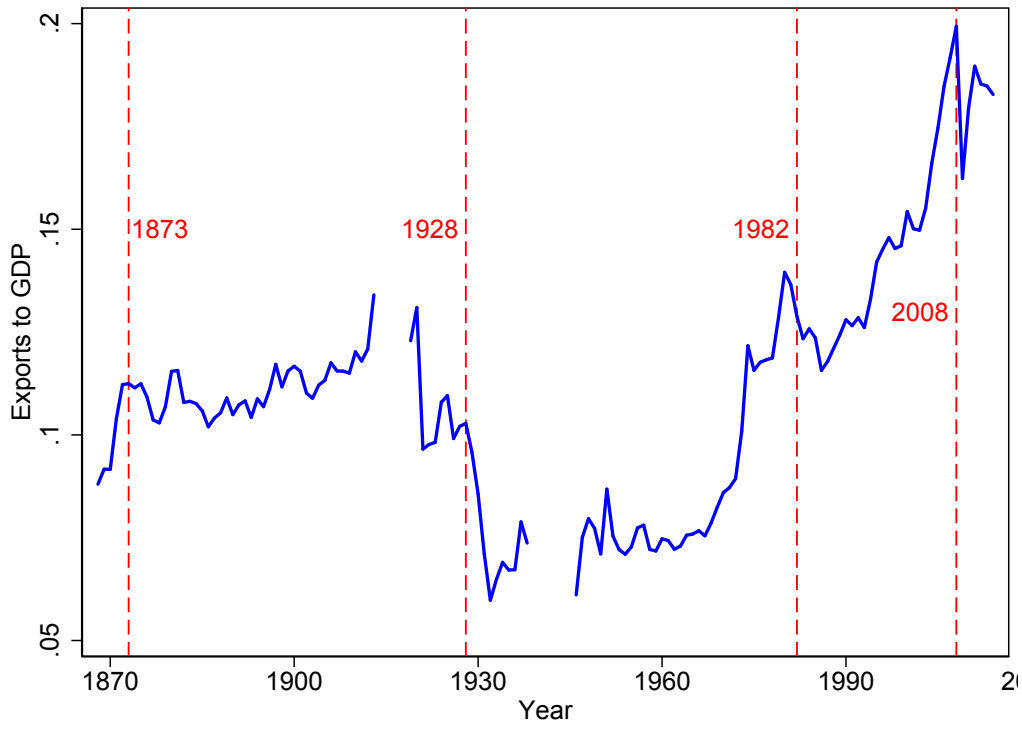


C. Data: Trade and Financial Crises: Additional Figures

Figure 3 in the main text plots the ratio of world exports to GDP based on a constant sample of 10 countries over the period 1827–2014. Figure A.8 shows that using a larger set of 20 countries for the shorter period 1868–2014, the result is very similar.

Figure A.8: *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.



D. Total Trade: Additional Tables

This section includes the tables with estimates corresponding to Figures 5 and 6 in Section 4 in the main text.

- Table A.2 shows the results of the estimation of equation 1 splitting the sample into subperiods. It corresponds to Figure 5 in the main text.
- Table A.3 shows the results of the estimation of equation 1 splitting the sample into groups according to countries' level of development. It corresponds to Figure 6 in the main text.

Table A.2: *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	1.8	2.3	1.8	-1.0
	(0.9)	(1.5)	(1.5)	(1.7)	(1.9)
N	6032	6027	6022	6019	6018
Total imports	-5.0**	-5.6**	-3.1*	-3.8	-5.2*
	(1.4)	(1.6)	(1.6)	(2.3)	(2.4)
N	6008	6002	5995	5990	5989

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)	(1.7)	(1.9)	(1.9)	(2.0)
N	4211	4144	4077	4010	3943
Total imports	-5.1**	-8.9**	-5.8**	-6.8**	-6.7**
	(1.6)	(1.6)	(1.6)	(1.8)	(2.2)
N	4200	4132	4064	3996	3930

Panel C: Pre-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	-1.0	2.6	4.4	3.7	1.9
	(1.4)	(2.1)	(2.3)	(2.8)	(3.1)
N	2236	2232	2227	2225	2226
Total imports	-4.1	-0.9	0.2	-0.7	-3.5
	(2.1)	(2.9)	(2.5)	(4.1)	(3.8)
N	2223	2219	2213	2210	2210

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

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.

Panel A: Advanced Economies.

	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	0.1	0.8	3.3	2.9	3.1
	(1.0)	(1.9)	(2.2)	(2.7)	(2.4)
N	1973	1958	1942	1927	1912
Total imports	-3.8	-2.6	-0.1	0.5	-2.6
	(2.3)	(2.9)	(2.2)	(4.4)	(3.5)
N	1957	1943	1928	1913	1898

Panel B: Developing Economies.

	Year 1	Year 2	Year 3	Year 4	Year 5
Total exports	1.0	2.3	1.4	1.7	-2.0
	(1.2)	(1.9)	(1.9)	(2.2)	(2.8)
N	4520	4464	4409	4355	4303
Total imports	-5.1**	-8.2**	-5.6**	-7.0**	-6.7*
	(1.8)	(1.8)	(1.9)	(2.5)	(3.1)
N	4512	4454	4396	4340	4288

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

E. Response of Bilateral Trade Flows to Financial Crises: 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.4 and the left panel in Figure A.9 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.5 and the right panel in Figure A.9 the results of estimating this equation without any controls.

Figures A.10, A.11, A.12, A.13, A.14, and A.15, A.16 replicate all other figures in the main text without including these controls.

Table A.4: *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	1.7	2.5	5.6**	4.5**
	(1.2)	(1.4)	(1.5)	(1.5)	(1.6)
Financial crisis in importer (year 0)	-6.6**	-8.5**	-7.4**	-8.5**	-5.5**
	(1.3)	(1.5)	(1.5)	(1.6)	(1.6)
N	238726	233346	228756	224347	220216

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

Table A.5: *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.

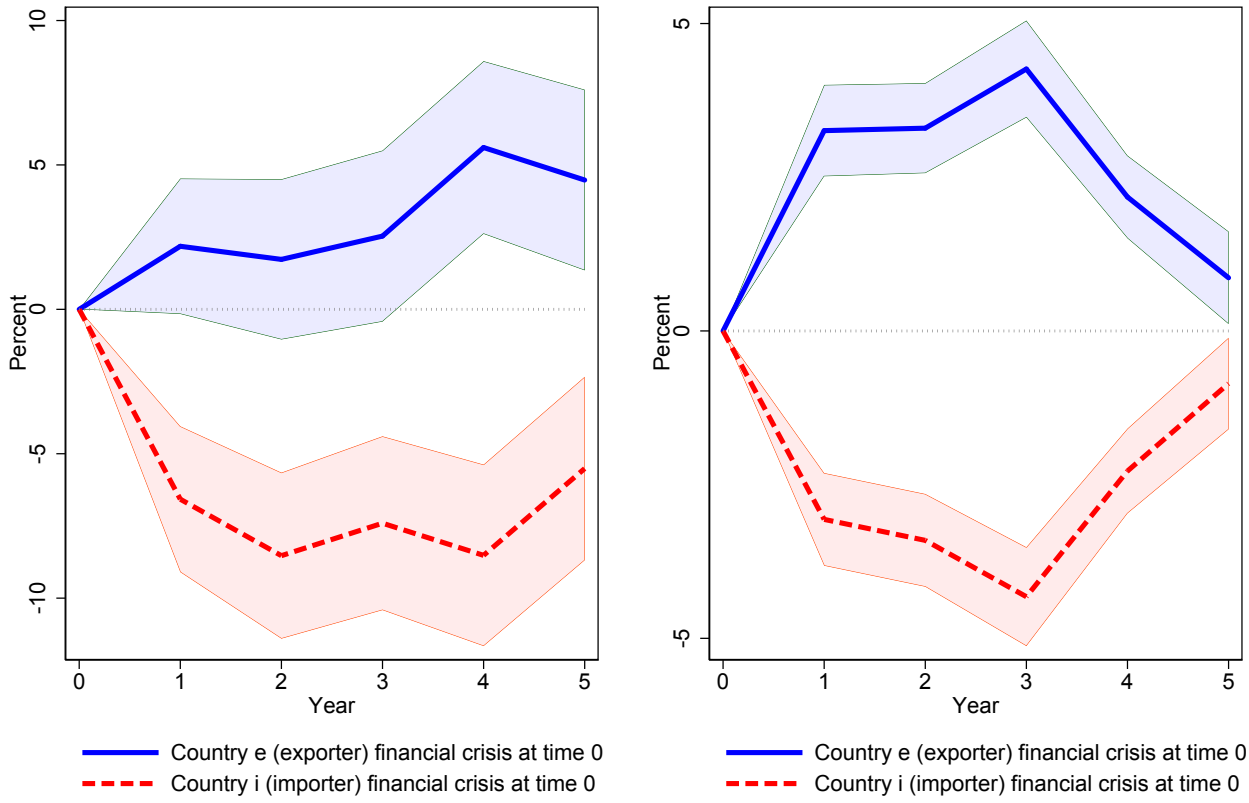
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.3**	3.3**	4.3**	2.2**	0.9*
	(0.4)	(0.4)	(0.4)	(0.3)	(0.4)
Financial crisis in importer (year 0)	-3.1**	-3.4**	-4.3**	-2.3**	-0.9*
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
N	213389	208436	203452	198561	193602

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

Figure A.9: *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)*

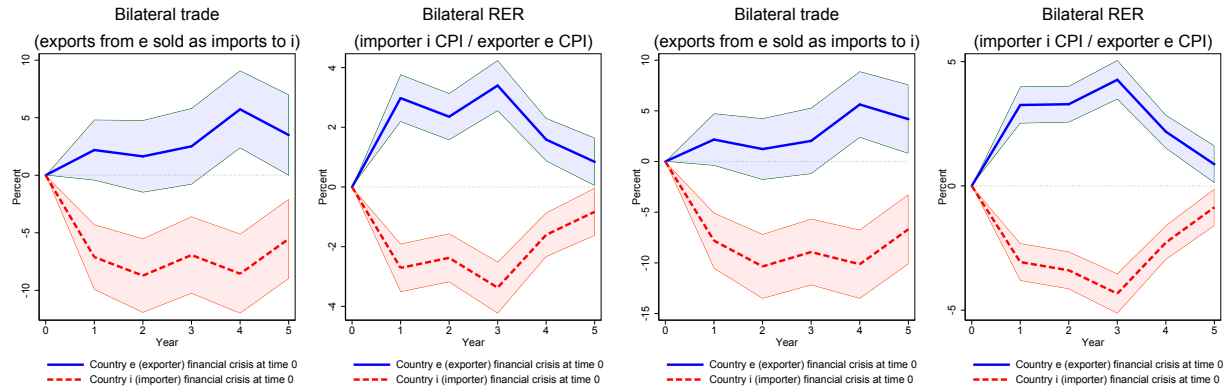


Notes: Shaded regions indicate 90% confidence intervals.

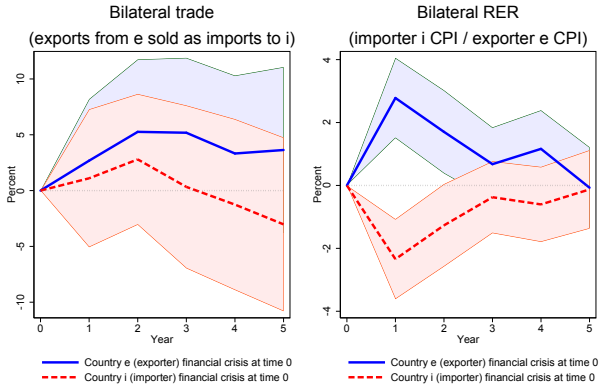
Figure A.10: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

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*

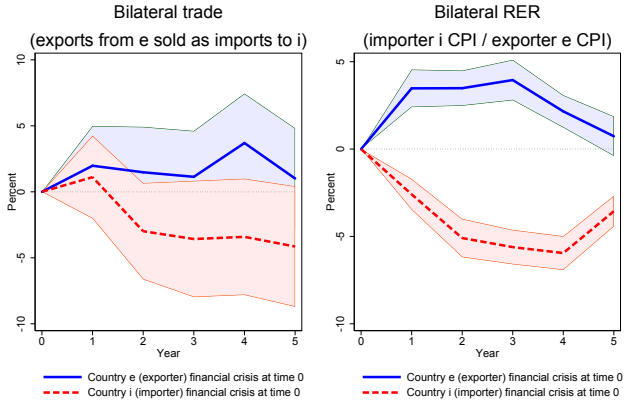


Notes: Shaded regions indicate 90% confidence intervals.

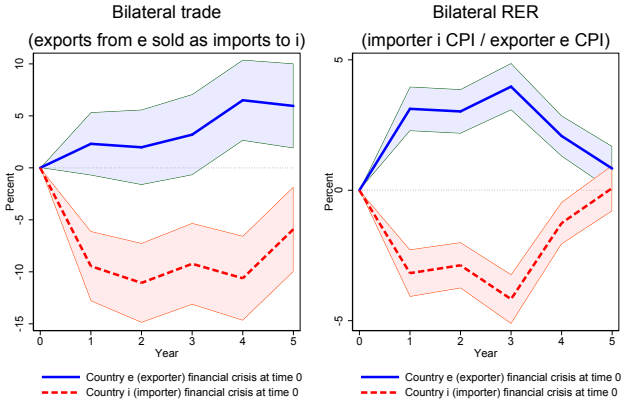
Figure A.11: *Local projections: response of bilateral trade to financial crisis in exporter or importer*

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.

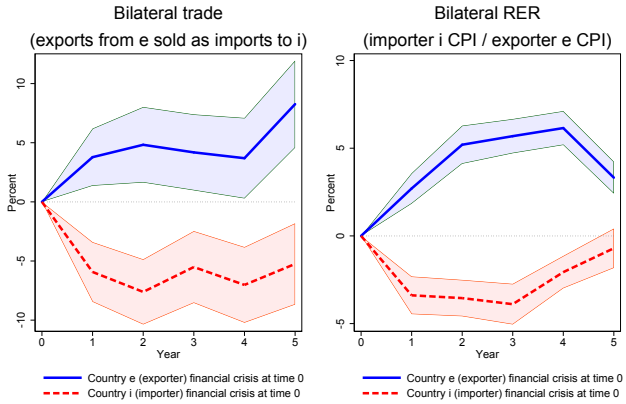
(a) *Advanced Importer - Full Sample*



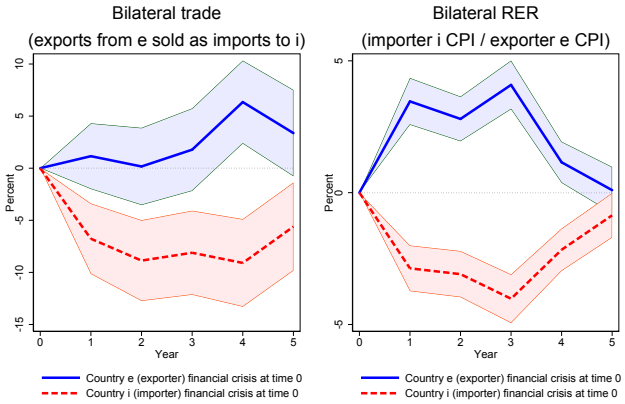
(b) *Developing Importer - Full Sample*



(c) *Advanced Exporter - Full Sample*



(d) *Developing Exporter - Full Sample*

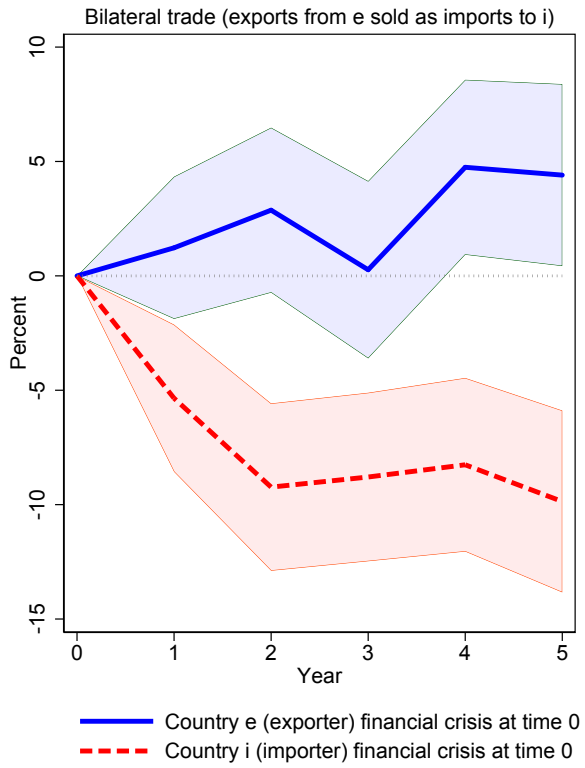


Notes: Shaded regions indicate 90% confidence intervals.

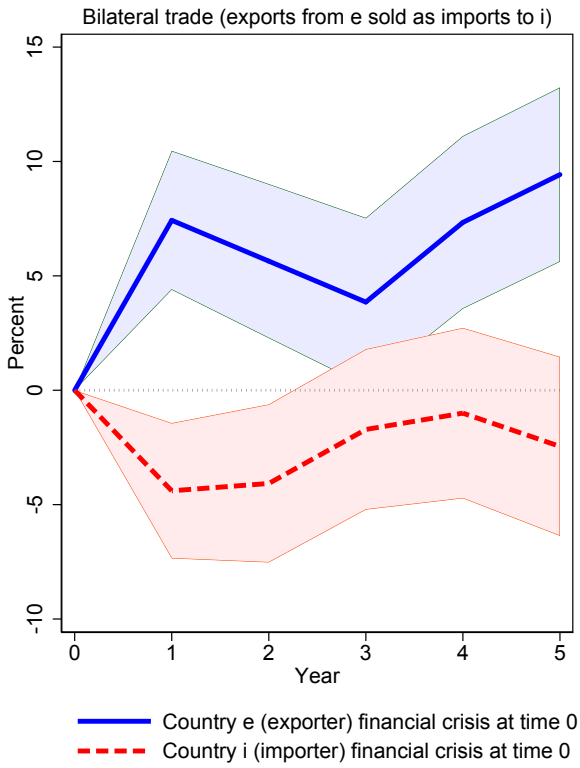
Figure A.12: *Local projections: response of bilateral trade in final consumption goods, intermediate inputs and capital goods to financial crisis in exporter or importer*

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*

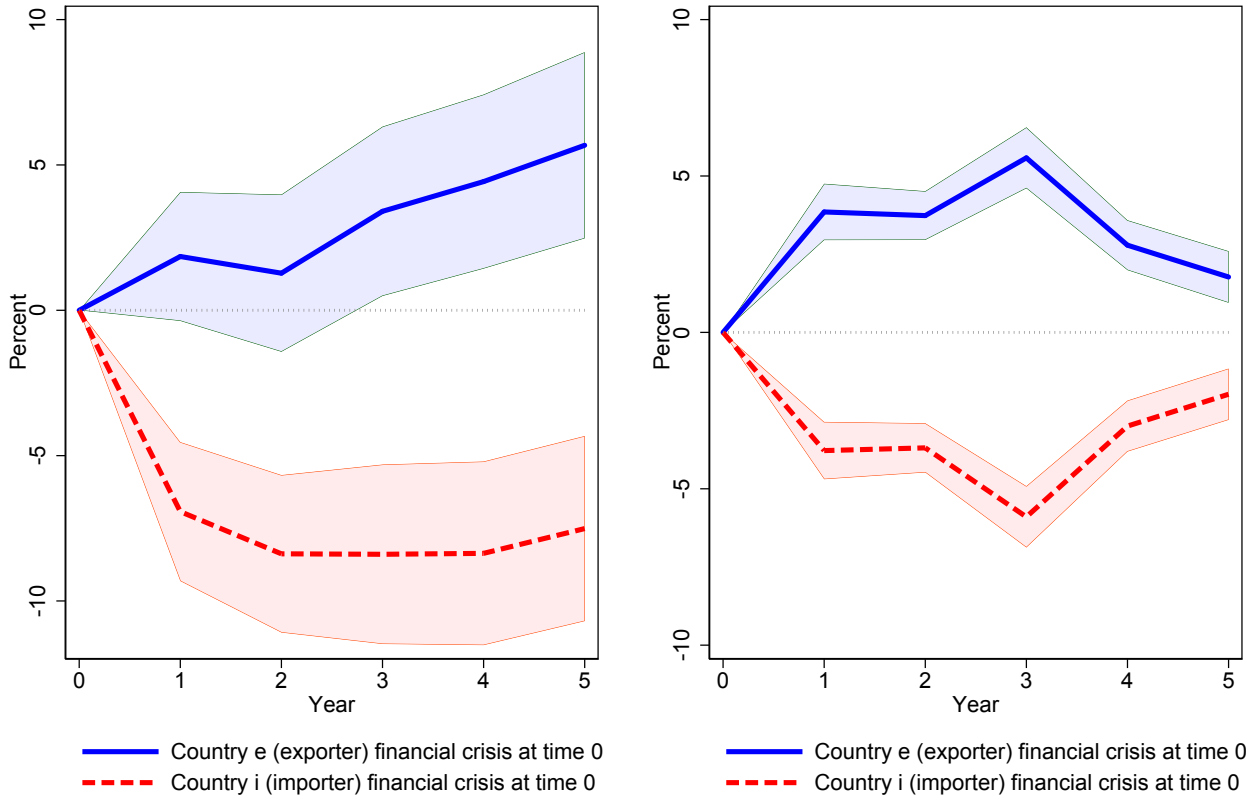


Notes: Shaded regions indicate 90% confidence intervals.

Figure A.13: *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)*

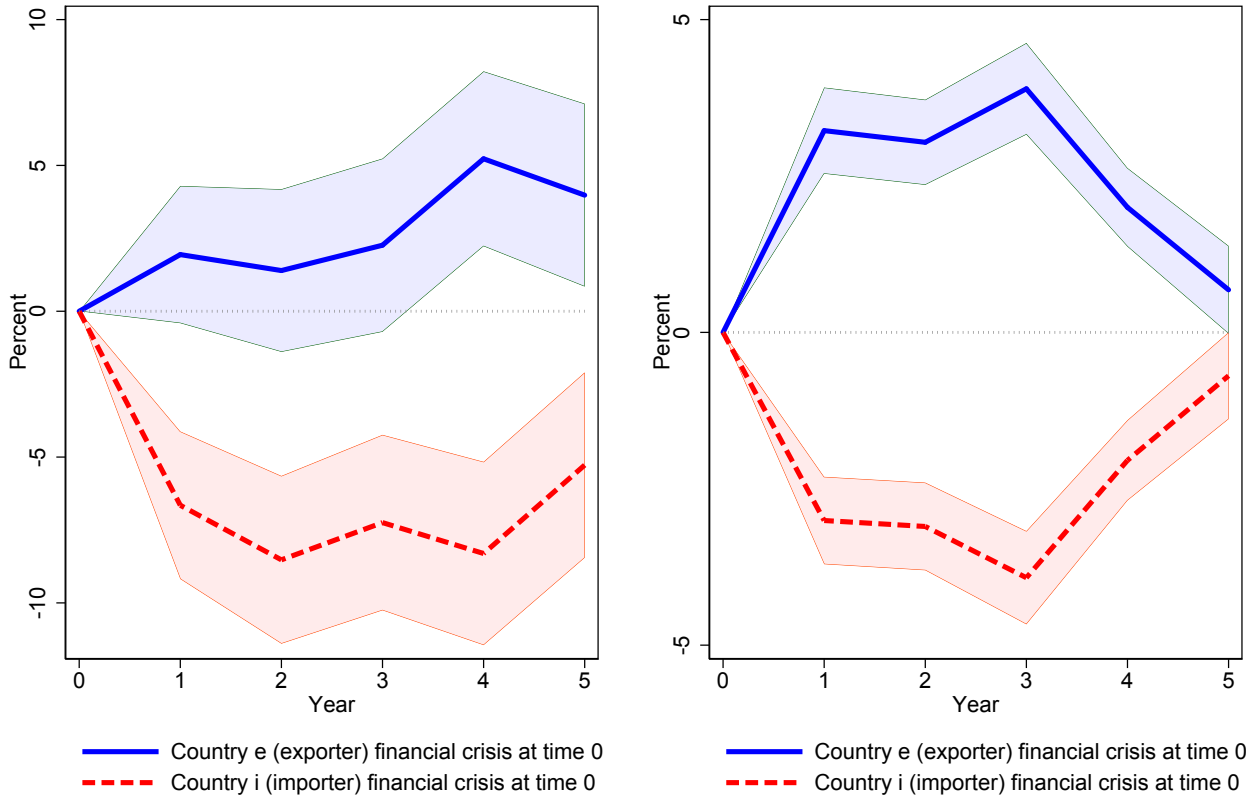


Notes: Shaded regions indicate 90% confidence intervals.

Figure A.14: *Local projections controlling for 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)*

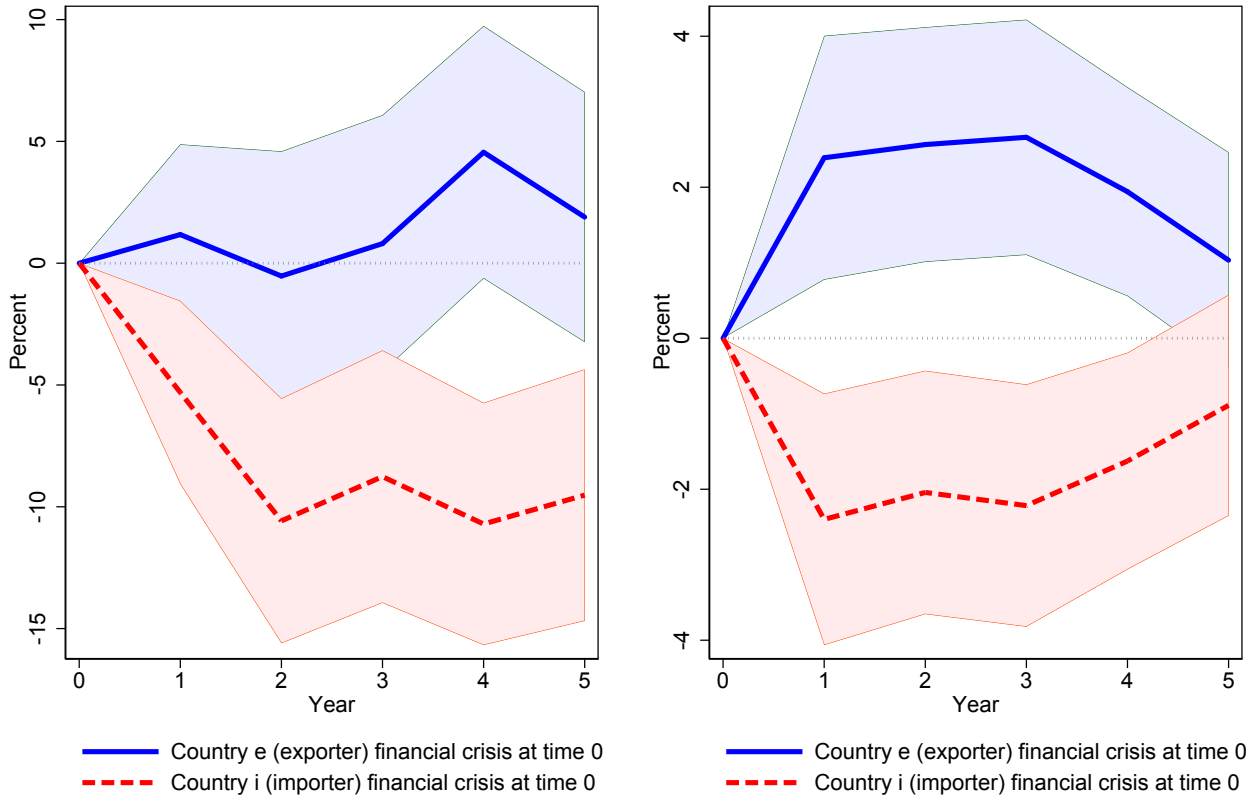


Notes: Shaded regions indicate 90% confidence intervals.

Figure A.15: *Local projections IPW: 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)*

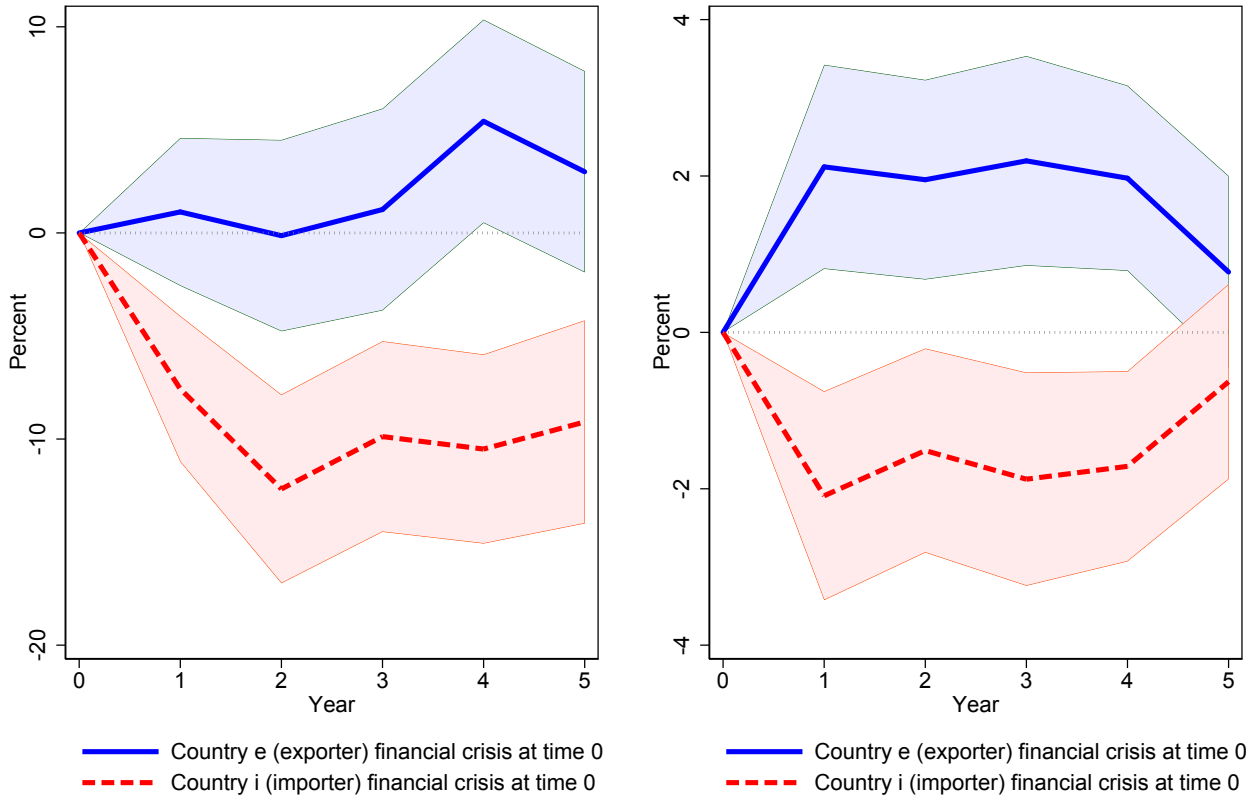


Notes: Shaded regions indicate 90% confidence intervals.

Figure A.16: *Local projections IPW: 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 90% confidence intervals.

F. Response of Bilateral Trade Flows to Financial Crises: Additional Tables and Figures

This section includes the tables with estimates corresponding to figures 8, 9, 10 and 11 in Section 5 in the main text.

- Table A.6 shows the results of the estimation of equation 2 (for bilateral trade) splitting the sample into subperiods. It corresponds to Figure 8 in the main text.
- Table A.7 shows the results of the estimation of equation 2 (for bilateral trade) splitting the sample into groups according to the level of development of the exporter or the importer. It corresponds to Figure 9 in the main text.
- Table A.8 shows the results of the estimation of equation 3 (for the bilateral RER) splitting the sample into subperiods. It corresponds to Figure 8 in the main text.
- Table A.9 shows the results of the estimation of equation 3 (for the bilateral RER) splitting the sample into into groups according to the level of development of the exporter or the importer. It corresponds to Figure 9 in the main text.
- Table A.10 shows the results of the estimation of equation 2 (for bilateral trade) controlling for various other types of crises and corresponds to the left panel in Figure 11 in the main text.
- Table A.11 shows the results of the estimation of equation 3 (for the bilateral RER) controlling for various other types of crises and corresponds to the right panel in Figure 11 in the main text.
- Table A.14 shows the results of the estimation of equation 2 (for bilateral trade) separately for trade in final goods and intermediate inputs. and corresponds to Figure 10 in the main text.
- Figure A.17 and Panel C in Table A.14 shows the results of the estimation of equation 2 (for bilateral trade) separately for trade in capital goods.

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.

Panel A: Excluding Great Recession.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.1	0.4	2.0	4.7**	1.9
	(1.3)	(1.5)	(1.6)	(1.6)	(1.7)
Financial crisis in importer (year 0)	-6.6**	-8.1**	-5.6**	-7.5**	-4.3**
	(1.3)	(1.6)	(1.6)	(1.7)	(1.7)
N	168053	166325	164936	163639	162588

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)	(1.5)
Financial crisis in importer (year 0)	-6.6**	-8.6**	-6.7**	-7.9**	-5.2**
	(1.2)	(1.5)	(1.5)	(1.6)	(1.6)
N	179793	175054	170636	166303	162156

Panel C: Pre-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	0.2	1.8	2.0	-0.6	4.2
	(3.2)	(4.2)	(4.0)	(4.0)	(4.4)
Financial crisis in importer (year 0)	0.4	-0.5	-0.4	-2.7	2.7
	(3.7)	(3.3)	(4.0)	(4.2)	(4.6)
N	14895	14053	13227	12433	11717

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

Table A.7: *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	1.9	1.4	4.0*	0.9
	(1.5)	(1.7)	(1.7)	(1.8)	(1.9)
Financial crisis in importer (year 0)	0.9	-3.5*	-3.4	-4.0*	-3.0
	(1.5)	(1.6)	(1.9)	(2.0)	(2.1)
N	59843	58376	56964	55577	54252

Panel B: Developing Importer.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.4	0.6	2.4	5.0**	4.3*
	(1.5)	(1.8)	(1.9)	(1.9)	(1.9)
Financial crisis in importer (year 0)	-8.6**	-10.3**	-7.7**	-8.9**	-5.3**
	(1.6)	(1.8)	(1.9)	(1.9)	(2.0)
N	134845	130731	126899	123159	119621

Panel C: Advanced Exporter.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.6*	1.4	1.1	-0.2	5.0**
	(1.1)	(1.6)	(1.5)	(1.6)	(1.7)
Financial crisis in importer (year 0)	-5.7**	-6.8**	-4.8**	-6.3**	-3.8*
	(1.3)	(1.3)	(1.5)	(1.6)	(1.7)
N	60856	59378	57947	56534	55210

Panel D: Developing Exporter.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	1.8	0.2	2.2	6.5**	3.1
	(1.5)	(1.8)	(1.9)	(1.9)	(1.9)
Financial crisis in importer (year 0)	-6.1**	-8.4**	-6.7**	-7.9**	-5.0*
	(1.6)	(1.9)	(1.9)	(2.0)	(2.0)
N	133832	129729	125916	122202	118663

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

Table A.8: *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)	3.1**	0.4	1.4**	0.4	0.5
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-2.8**	-0.5	-1.5**	-0.5	-0.5
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
N	183789	182152	180777	179403	178148

Panel B: Post-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.3**	1.2**	1.8**	0.9*	0.4
	(0.4)	(0.3)	(0.4)	(0.3)	(0.4)
Financial crisis in importer (year 0)	-3.1**	-1.4**	-2.0**	-1.0**	-0.5
	(0.4)	(0.3)	(0.4)	(0.3)	(0.4)
N	196697	191779	187131	182419	177800

Panel C: Pre-WW2.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.8**	0.4	0.1	1.1	0.7
	(0.7)	(0.5)	(0.6)	(0.6)	(0.6)
Financial crisis in importer (year 0)	-2.5**	0.2	-0.0	-0.7	-0.5
	(0.6)	(0.5)	(0.6)	(0.6)	(0.6)
N	16458	15455	14453	13533	12650

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

Table A.9: *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)	3.6**	1.4**	1.5**	1.2*	0.5
	(0.6)	(0.5)	(0.5)	(0.5)	(0.6)
Financial crisis in importer (year 0)	-2.4**	-3.0**	-3.0**	-4.7**	-3.0**
	(0.4)	(0.5)	(0.4)	(0.5)	(0.4)
N	60551	59021	57513	56020	54562

Panel B: Developing Importer.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.2**	1.0**	1.7**	0.8*	0.4
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-3.3**	-1.0*	-2.2**	-0.2	0.2
	(0.5)	(0.4)	(0.4)	(0.4)	(0.4)
N	152601	148212	144070	139931	135886

Panel C: Advanced Exporter.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	2.5**	3.1**	3.1**	4.8**	2.9**
	(0.4)	(0.5)	(0.4)	(0.5)	(0.5)
Financial crisis in importer (year 0)	-3.5**	-1.5**	-1.5**	-1.3**	-0.6
	(0.6)	(0.5)	(0.5)	(0.5)	(0.6)
N	61356	59827	58321	56806	55345

Panel D: Developing Exporter.

	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.6**	0.8*	2.0**	0.0	-0.2
	(0.5)	(0.4)	(0.4)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-3.0**	-1.1**	-1.9**	-1.0*	-0.5
	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
N	151799	147407	143263	139146	135105

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

Table A.10: *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)	1.6	0.2	2.7	3.4*	4.6**
	(1.1)	(1.4)	(1.5)	(1.4)	(1.5)
Financial crisis in importer (year 0)	-7.5**	-8.5**	-7.0**	-7.2**	-5.7**
	(1.2)	(1.3)	(1.5)	(1.5)	(1.5)
N	136980	131861	125566	122269	119516

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

Table A.11: *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)	3.9**	0.8*	2.5**	1.0**	1.1**
	(0.5)	(0.3)	(0.5)	(0.4)	(0.4)
Financial crisis in importer (year 0)	-3.8**	-0.8*	-2.7**	-1.1**	-1.3**
	(0.5)	(0.3)	(0.5)	(0.4)	(0.4)
N	123604	119220	113242	110717	108639

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

Table A.12: *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)	1.7	-0.1	1.0	3.5*	2.0
	(1.1)	(1.4)	(1.4)	(1.4)	(1.5)
Financial crisis in importer (year 0)	-5.9**	-7.6**	-5.7**	-6.9**	-4.1**
	(1.2)	(1.4)	(1.4)	(1.5)	(1.5)
N	194688	189107	183863	178736	173873

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

Table A.13: *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)	3.2**	1.1**	1.6**	0.8*	0.3
	(0.4)	(0.3)	(0.3)	(0.3)	(0.4)
Financial crisis in importer (year 0)	-3.0**	-1.2**	-1.8**	-1.0**	-0.4
	(0.4)	(0.3)	(0.3)	(0.3)	(0.3)
N	213155	207234	201584	195952	190450

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

Table A.14: *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)	(1.9)	(2.0)
Financial crisis in importer (year 0)	-4.0*	-6.7**	-5.5**	-6.7**	-7.6**
	(1.7)	(1.9)	(1.9)	(1.9)	(2.0)
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)	(1.7)	(1.8)	(1.9)
N	127323	123422	119708	116241	112953

Panel C: Trade in Capital Goods.

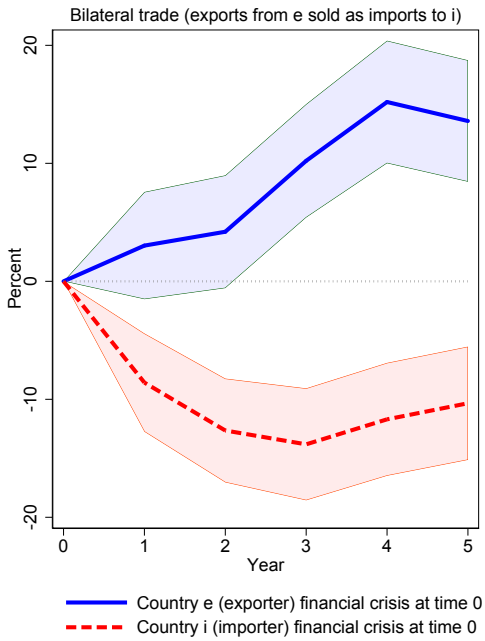
	Year 1	Year 2	Year 3	Year 4	Year 5
Financial crisis in exporter (year 0)	3.0	4.2	10.2**	15.2**	13.6**
	(2.3)	(2.4)	(2.5)	(2.7)	(2.6)
Financial crisis in importer (year 0)	-8.6**	-12.6**	-13.8**	-11.7**	-10.3**
	(2.1)	(2.2)	(2.4)	(2.4)	(2.4)
N	101190	98026	95054	92203	89503

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

Figure A.17: *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 90% confidence intervals.