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Sovereign Debt Repatriation During Crises

Serkan Arslanalp and Laura Sunder-Plassmann

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Prepared by **Serkan Arslanalp and Laura Sunder-Plassmann**

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JEL Classification Numbers:	E44, F34, G01, H63
Keywords:	Sovereign debt, External debt, Capital flows, Sovereign default, Financial crisis, Banking crisis, Currency crisis
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Sovereign Debt Repatriation During Crises*

Serkan Arslanalp [†] Laura Sunder-Plassmann [‡]

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1 Introduction

Our understanding of who holds sovereign debt has been improving in recent years as data advances have been made, but it continues to be comparatively limited for many countries and especially during crises. At the same time, the characteristics of the sovereign debt investor base are crucial for a number of reasons: when assessing government borrowing costs and crisis risk, or to evaluate policy options. In some recent episodes such as the European debt crisis, external private creditors sold off their claims on crisis-struck countries, leading to debt repatriation from foreign to domestic investors. However, it is possible that this was an exception and that debt more often tends to be expatriated during crises as domestic investors, perhaps with an informational advantage, are quicker to sell their claims. This paper aims to contribute to improving our understanding of the composition of the sovereign debt investor base with a focus on crisis times and the distinction between external and domestic investors.

We use a new, comprehensive data set on the sovereign debt investor base, based on an extension of Arslanalp and Tsuda (2014a; 2014b), and document the following novel empirical facts: (i) sovereign debt is repatriated - that is, shifted from external private to domestic investors - prior to sovereign defaults; (ii) not all crises are equal: evidence for repatriation during banking and currency crises is more limited; and (iii) the nature of defaults matters: external investors do not leave during preemptive debt restructurings. We investigate the role played by market size and capital controls in driving our results, and find that repatriation tends to be prevalent in large and open markets. We also show that repatriation during crises is not necessarily associated with worse outcomes in terms of GDP.

Our findings suggest that external sovereign bond investors do not leave indiscriminately during any crisis, but that instead repatriation is tightly linked to sovereign debt crises. Moreover, our results on the type of market structures that facilitate repatriation indicate that these dynamics are broadly consistent with a “free” secondary market outcome, rather than due to financial repression.

The investor base data set we use is uniquely suited to analyzing investor base dynamics during crises due to its large cross-section and time series that covers many of the generally rare crisis events that we are interested in. It provides a consistent debt and residency-based investor definition for 180 countries from 1989 until 2020.

Methodologically we follow a fixed-effects event study approach as in Gourinchas and Obstfeld (2012). We estimate the effect of a crisis episode on an outcome variable of interest using a fixed effect panel regression with dummies for the crisis start year. We include dummies at a range of horizons before and after the start of a crisis such that the estimated coefficients measure the contemporaneous effect on the outcome variable of a crisis at that horizon. Our approach

allows us to control for country-specific omitted variables, estimate confidence intervals of the effects, and efficiently deal with overlapping crises.

We consider different measures of repatriation: the external debt share and a flow measure that controls for exchange rate effects. The first suggests a significant repatriation effect for both sovereign defaults and currency crises. Using the flow measure, we continue to find evidence in favor of repatriation for sovereign defaults, but not the other two types of crises. Qualitatively, the point estimates suggest similar dynamics across the two measures, but the uncertainty is larger for the flows measure.

In terms of debt dynamics, we find that total debt to GDP ratios increase prior to sovereign defaults and currency crises, and fall thereafter. The reverse pattern is true for banking crises, perhaps as governments start bailout programs. GDP declines in the course of all crises while current accounts improve during defaults and currency, but not banking crises.

We analyze the cyclical dynamics of the investor base and find no evidence of systematic comovement of the external debt share with the borrowing country's business cycle. Creditors, in other words, do not appear to leave a country due to relatively mild cyclical fluctuations, but only during more severe crises.

Our main findings are robust across a broad range of specifications, including alternative crisis definitions, restricting the sample of countries, different event window lengths, and including control variables such as market size and openness. While the baseline results are based on private debt excluding foreign official loans, we show that these loans offset some of the private flows during crises and contribute to rising debt and external debt shares in the wake of defaults and currency crises. A causal interpretation of our baseline specification relies on crises being exogenous to repatriation, and we document that this is more likely than not based on a set of Granger causality tests.

Literature It is well established in the literature that crises and especially defaults are associated with capital outflows in general, see for example Sturzenegger and Zettelmeyer (2006). There are a number of related studies that look at the composition of these flows, in particular the sovereign debt investor base. These studies are typically based on more limited sets of countries or time periods than this paper. Abbas et al. (2014), for example, document the historical sovereign debt composition in 13 advanced economies going back to 1900. Reinhart and Trebesch (2015) are an example of an empirical paper that use a case study - Greece - to analyze the role external investors played in precipitating their sovereign defaults. In another recent case study, Papadia and Schioppa (2020) document large scale repatriation of debt in Nazi Germany.

There are also some related, and consistent, findings on gross capital inflows more generally rather than specifically flows of sovereign debt. Broner et al. (2013) document a retrenchment in

gross capital inflows during debt restructurings and Asonuma et al. (2021) show that gross capital inflows fall especially during post-default as opposed to preemptive restructurings.

Closely related to our study is Brutti and Sauré (2016) who analyze the repatriation of debt during the recent European crisis using bilateral bank portfolio data. Our findings corroborate and extend their results. Advantages of our study are our global coverage, that we provide evidence for different types of crisis, not just debt crises, and that we can analyze repatriation dynamics in the years before and after a crisis begins. To the best of our knowledge, we are the first to show that repatriation is indeed a systematic phenomenon across countries over the last three decades. In addition, our results suggest that the foreign investor base reacts differently to different types of crisis, to how debt defaults are managed, and to the size and openness of the relevant sovereign debt market.

We view our empirical findings as interesting *per se*, but also as important for informing theories of sovereign debt and default. They are consistent with theories proposed in Broner et al. (2010) and Broner et al. (2014) where the existence of secondary markets and creditor discrimination imply a shift towards domestic investors in crisis times. Our findings also show that the assumption of an invariant and homogeneous investor base that many theoretical papers of sovereign borrowing rely on is an oversimplification - an assumption that is crucial in determining the predictions regarding borrowing, default and restructuring incentives.¹

The rest of this paper is structured as follows. We present the sovereign debt investor base in section (2), the construction of the crisis data in section (3), the main analysis and discussion of results are presented in section (4), and robustness checks in section (5). Section (6) concludes.

2 The sovereign debt investor base

2.1 Data description

We use the sovereign debt investor database recently extended to all advanced and emerging markets following the approach of Arslanalp and Tsuda (2014a; 2014b).² The debt is broken down by the residence of the creditors: domestic versus foreign. The advantage of this data set over existing sources is its wider coverage and consistency in the definition of sovereign debt.

The sample is near global and includes 189 countries: All 120 advanced and emerging market countries that are classified as having market access according to the IMF as of end-2019, plus 69

¹The sovereign default literature has most commonly assumed risk-neutral foreign lenders, which is relaxed in a number of papers (Asonuma and Joo (2020) for example discuss the role of creditor risk aversion in shaping debt renegotiation outcomes; D’Erasmus and Mendoza (2021) study default on domestic and external creditors).

²The data set is available at https://www.imf.org/-/media/Websites/IMF/imported-datasets/external/pubs/ft/wp/2012/Data/_wp12284.ashx and <https://www.imf.org/-/media/Websites/IMF/imported-datasets/external/pubs/ft/wp/2014/Data/wp1439.ashx>

low-income countries.³ External debt data are available for 180 countries. The data are compiled on an annual basis from 1989 until 2020 (where available). Annual as opposed to higher frequency allows us to go back further in time to cover a substantial number of crisis episodes.

The data set provides a consistent estimate across countries and time of gross general government debt (or central government debt if data for general government are unavailable). The definition of debt includes three types of financial instruments: currency and deposits; debt securities; and loans.⁴ This definition does not include other types of government liabilities, such as accounts payable, insurance and pension reserves, or social security obligations. Government liabilities in the form of financial derivatives or contingent liabilities such as guaranteed debt are not part of government debt either. Finally, all debt figures are expressed in face value and on a gross basis. For European Union countries, this definition matches the definition of Maastricht debt. For most emerging market and low-income countries, general government debt consists predominantly of central government debt. The debt is measured in local currency units.

In this study, we use data for total, external, and domestic debt to track changes in the investor base. Investor types are defined according to the residence principle: They are classified as external if they are held by nonresidents from the perspective of the country of issuance. This is in contrast to older definitions of external debt based on either the currency of debt, country of jurisdiction, or the market of issuance, for example.

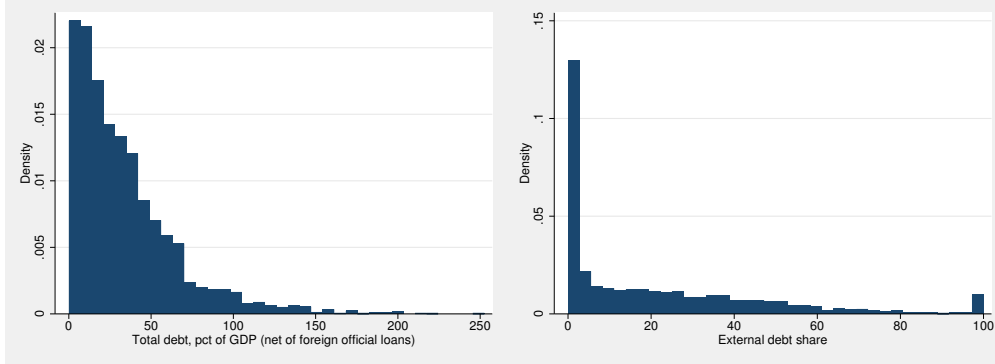
The data set is based on international sources as far as possible to facilitate comparability, and supplemented with national sources where necessary. Estimates of total debt in the data set are based on international sources including the BIS, Eurostat (supplemented with AMECO, which has longer time series for some EU countries), the IMF/World Bank Quarterly Public Sector Debt (QPSD) database, and the IMF Global Debt Database (GDD). National sources are used to extend the data set further back in time for several countries. The external debt data in the updated Arslanalp and Tsuda (2014a; 2014b) data set follow the original methodology with additional source data coming from the ECB, IMF/World Bank's Quarterly Public Sector Debt (QPSD) database, World Bank's International Debt Statistics (IDS) database, as well as national sources.

For most of the analysis below, we net out foreign official loans - which include bilateral loans from other countries and multilateral loans from international financial institutions - from external debt since we are primarily interested in the actions of private external investors. The data on foreign official loans are from the updated Arslanalp and Tsuda (2014a; 2014b) data set, with additional sources from the World Bank's International Debt Statistics (IDS) database and national sources.

³See the appendix for a complete list of countries.

⁴Currency and deposits mainly represent saving certificates and retail bonds that can be redeemed before maturity, and are generally a relatively small share of total debt for most economies.

Figure 1: Government debt distributions



Note: Unconditional distribution of observations in the panel. LHS: External private plus domestic debt as a percent of GDP. RHS: External private debt as a percent of external private plus domestic debt.

2.2 Summary statistics

Table 1: Summary statistics

	Mean	SD	min	max	N
Total debt % of GDP	56	40	0	292	5255
net of foreign official loans	34	31	0	253	4926
External debt % of GDP	31	30	0	286	4710
net of foreign official loans	8	12	0	135	4673
External debt % of total	54	28	0	100	4757
net of foreign official loans	21	25	0	100	4536

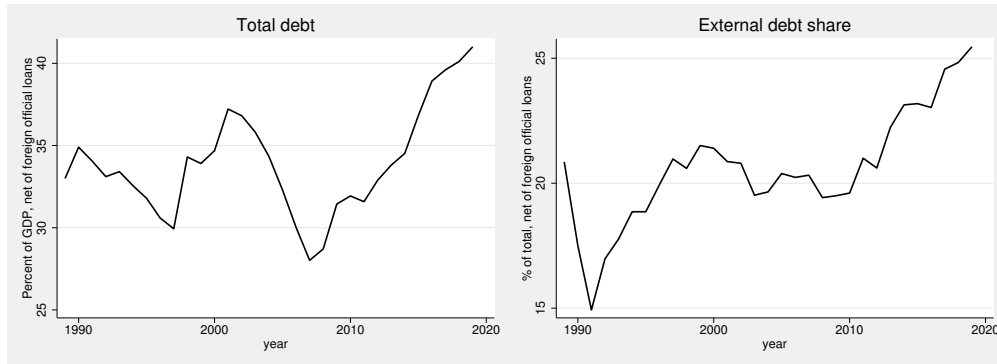
We compute the external debt share, our primary variable of interest, as external debt divided by total debt. Table (1) shows summary statistics for the external debt share, as well as total debt to GDP and external debt to GDP. Where specified, we subtract foreign official loans.

As shown in the Table, total debt relative to GDP stands at 57 percent on average across all countries and years. External debt to GDP is just over 30 percent and the external debt share therefore a little over 50 percent.

Foreign official loans play a large role in the sample on average: Net of foreign official loans, total debt to GDP is just 34 percent on average, and only a fifth of this is externally held. For the rest of the paper, we focus on debt measures net of foreign official loans unless otherwise specified since we are interested in the behavior of private sovereign debt investors.

Figure (1) plots the unconditional distributions of total debt to GDP and the external debt share, net of official loans. Both are skewed to the left. Examples of observations with very low debt levels include for example Australia and Chile. High debt observations are, for instance, Japan and Lebanon. Meanwhile, debt is mainly external for some countries, especially around

Figure 2: Government debt over time



Note: Unweighted country-average over time. LHS: External private plus domestic debt as a percent of GDP. RHS: External private debt as a percent of external private plus domestic debt.

the time of their respective debt crises. At the other end of the extreme, there are many countries that have no or very little external debt for most of the sample (e.g., India and Saudi Arabia).

Focusing on the time dimension, Figure (2) plots unweighted country averages for the total debt to GDP ratio and the external share, net of official loans, over the last three decades. It shows that debt as a share of GDP was broadly trending down throughout most of the 1990s and until the financial crisis in 2008. It has picked up since then rising to around 40 percent, an all-time high, at the end of the sample. The external debt share has increased over the sample from a trough of around 15 percent in the early 1990s to 25 percent currently. It was largely flat in the 2000s, with increases in both the 1990s and the 2010s.

2.3 Country group differences

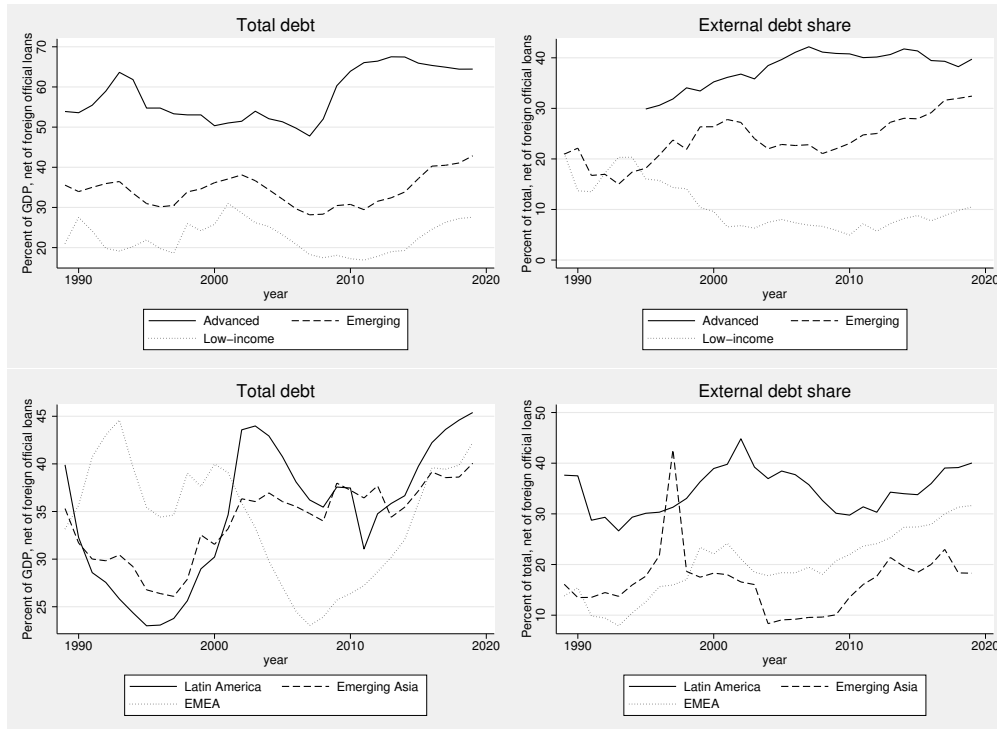
Table 2: Summary statistics by country groups

	Advanced (Mean)	Emerging (Mean)	Low-income (Mean)
Total debt % of GDP	61	47	66
net of foreign official loans	58	34	24
External debt % of GDP	25	21	44
net of foreign official loans	22	8	2
External debt % of total	40	45	66
net of foreign official loans	38	24	10

Table (2) splits the sample of countries into advanced, emerging market, and low-income countries.⁵ It shows that advanced countries have virtually no foreign official loans, whereas

⁵See the appendix for the classification.

Figure 3: Debt over time by country group



Note: Unweighted country-average over time, by country income or geographical group. LHS: External private plus domestic debt as a percent of GDP. RHS: External private debt as a percent of external private plus domestic debt.

for emerging market and especially low-income countries foreign official loans make up a large fraction of their external debt.

Turning to the evolution of debt over time by country group, Figure (3) shows the average for debt to GDP ratios and external debt shares by advanced, emerging market and low-income countries in the top row, as well as for emerging markets by geographic region in the bottom row. One key feature is the sharp increase in debt in advanced countries in the wake of the financial crisis of 2008. Average debt to GDP increases from below 50 percent before the crisis to nearly 70 percent by 2012, before leveling off before the COVID-19 crisis. For emerging economies and low-income countries, total debt trended down during the 2000s, before rising again in the 2010s. For low-income countries, this was partly driven by debt relief initiatives (incl. HIPC/MDRI) and commodity booms.

The external share for advanced countries has increased since the mid-1990s from 30 percent to 40 percent by the start of the financial crisis and has stayed roughly constant since then.⁶ Emerging market countries have seen an increase in the external debt share over the sample from 20 to 30 percent. Low-income countries have stayed below ten percent for the last two

⁶Prior to 1995 data availability for advanced countries is very limited (Italy, Korea, and New Zealand), so we do not report advanced country averages for that sample period.

decades.

The bottom row of the Figure shows averages for emerging market economies by geographic region. Debt to GDP ratios rose in Latin America and Emerging Asia around the turn of the millennium while it fell in Europe, Middle East and Africa (EMEA). The external debt share is consistently higher in Latin America but has been trending up in EMEA. Emerging Asia experienced a notable spike around the time of the Asian crisis in the late 1990s, as did Latin America around the Argentinian default in 2001.

3 Crisis data

In order to study how the investor base behaves during crises, we need a crisis database. We consider the three main types of crises that have received attention in the literature and have been analyzed in theoretical models of sovereign borrowing: default crises in which a government stops paying or reschedules its outstanding debt, banking crises featuring, for example, bank runs and large-scale losses, and currency crises with sharp depreciation of the domestic currency. We draw on a number of existing sources to compile a database of these crises.

3.1 Data sources

Default crises We draw on Asonuma and Trebesch (2016) as our source for sovereign default episodes. They compile an exhaustive database of defaults on external private creditors since the 1970s, recently updated to 2020. The main advantage of this database is its comprehensiveness both in the cross-section and time dimension. A second advantage is that it includes information on whether debt restructuring was initiated preemptively and with creditor involvement, or whether it happened more abruptly following outright default. We use this in our analysis to investigate whether “hard” defaults come with different investor base dynamics than preemptive “soft” defaults.⁷

Countries frequently restructure debt in adjacent years or even in the same year. 20 percent of default events start the year following another default, 11 percent each within two and three years, respectively. We consolidate crises that start within three years of each other since these are likely linked and can be viewed as part of an ongoing crisis, and use the earliest year as

⁷We do not attempt to distinguish between default on external versus domestic investors for data availability reasons. Reinhart and Rogoff (2011) catalog “domestic” defaults where domestic debt is defined as debt issued under domestic law. This may not coincide with residence of the investor which is what we are interested in. Beers and Chambers (2006) report a number of “local currency” debt defaults, where again the currency does not necessarily imply that it is held by domestic investors. Another factor that makes analysis difficult is that these non-external default episodes are rare and data on them not comprehensive; Reinhart and Rogoff (2011) for example list just 24 episodes since 1989 and note that their estimates are almost certainly a lower bound.

Table 3: Number of crises in the sample

	Total	EMEs and LICs
Default	65	63
Banking	129	100
Currency	213	191

the start year. In the sensitivity section we explore alternative assumptions and show that our baseline results are robust.

Banking crises The source for systemic banking crises is Laeven and Valencia (2020) with global coverage from 1970 through 2017. A banking crisis is defined as an event that meets two conditions: (i) significant signs of financial distress in the banking system (for example bank runs, losses or liquidations); and (ii) significant banking policy intervention measures in response. These crises do not start in adjacent years and there is only one event that starts within three years of the last.

Currency crises Our definition of currency crises follows Gourinchas and Obstfeld (2012). For emerging market economies, we use the Frankel and Rose (1996) definition.⁸ For advanced countries, we use the list of crises identified in Bordo et al. (2001), which extends through 1997. We include no further advanced country currency crises after that.⁹ Currency crises according to these definitions tend to occur in subsequent years: 10 percent of crises occur in adjacent years, 18 percent two years apart and 8 percent three years apart. We treat crises that start within three years of each other as one event and record the earliest year as the start year. The robustness section presents results under alternative assumptions.

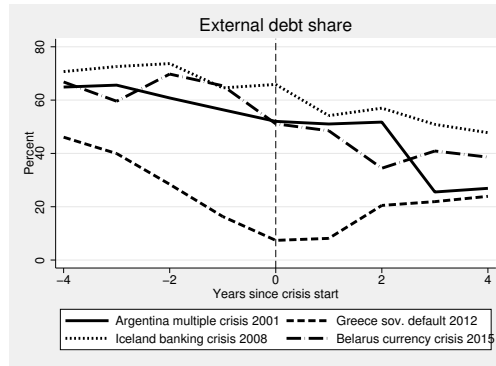
3.2 Properties

We include all crises starting in 1985 or later since the investor database starts in 1989 and we consider event study horizons of four years. This provides us with a total of 65 defaults, 129 banking crises and 213 currency crises, as reported in Table (3). Crises are predominantly an emerging market phenomenon. There were just 22 advanced country currency crises, most of which were associated with the ERM crisis in the early 1990s. Out of 29 advanced country banking

⁸An annual nominal depreciation of at least 25 percent *and* an increase in depreciation of at least 10ppt.

⁹Gourinchas and Obstfeld (2012) note that the last currency crisis for an advanced economy was in 1995 and include Iceland 2008 since then. We do not include Iceland (2008) in the baseline specification, but our results are not sensitive to this.

Figure 4: Debt repatriation during crisis episodes



Note: External private debt as a percent of external private and domestic debt, as a function of distance in years from the start of a crisis.

crises, more than half occurred in 2008 during the Global Financial Crisis. Multiple crises - defined as at least two crises starting in the same year - are not uncommon, with a total of 29 such events in the sample.

The crises we consider are not limited to a few countries in serial crisis: 50 percent of countries were in either one or two crises since 1985. Almost 30 percent were in three or four crises. Just 16 percent have not experienced any kind of crisis. Repeat currency crises are most common with almost 30 percent of countries experiencing two or more currency crises. Serial defaults and banking crises with less than 10 percent of countries experiencing more than one of each are much less common.

4 Empirical analysis: The investor base during crises

Next, we turn to the dynamics of the sovereign debt investor base and ask whether we can find evidence for systematic repatriation of debt during crises.

4.1 Individual episodes

There is anecdotal evidence of debt repatriation during crises that we take as the motivation for our study. Figure (4) illustrates this. It plots the external debt share, net of foreign official loans, as a function of the distance in years from a given crisis for a few country/year pairs: Argentina was in a multiple default/banking/currency crisis in 2001; Greece entered sovereign default in 2011/12; Iceland suffered a banking crisis in 2008 in the wake of the global financial crisis; and Belarus experienced a currency crisis in 2015.

The Figure shows that the external debt share falls over the event window in these episodes.

This starts before the actual start of the crisis and continues several years into the crisis. The question that we address next is to what extent this is a systematic phenomenon. We would also like to distinguish between the effects of different crises occurring simultaneously (as in the case of Argentina in the Figure, for example).

4.2 Methodology

To analyze these anecdotal relationships more systematically, we employ a fixed-effects event study approach following Gourinchas and Obstfeld (2012): To measure the effect of a crisis on a variable of interest, we compute the conditional expectation of that variable as a function of the distance in time from a given crisis start year, relative to a country-year-specific, non-crisis baseline. Specifically, for a variable y_{it} where i is a country and t is a year, we estimate

$$y_{it} = \alpha_i + \gamma_t + \sum_k \sum_s \beta_{sk} D_{itsk} + \epsilon_{it}$$

where D_{itsk} is a dummy variable that takes the value 1 if country i in year t is s years away from a crisis of type k . Our event study window is four years before and after the start of a crisis, that is $s \in [-4, 4]$. We include dummies for all three crisis types, $k \in \{d, b, c\}$, sovereign default, banking or currency crisis. The outcome variable y_{it} in the baseline specification is our measure of repatriation, the external debt share.

Outside of crisis times, the expected value of the variable is its country-year-specific non-crisis average $\alpha_i + \gamma_t$. The coefficients β_{ks} measure the effect of a given crisis relative to the non-crisis baseline on the variable of interest over the event window.

Advantages of this framework are that it allows us to easily incorporate repeat and multiple crises, that we can control for country-level and global time-specific effects, and that it provides us with confidence intervals on the point estimates of the effects. One potential limitation is that we do not include interaction effects. Even though in the data crises frequently coincide, we therefore do not allow for more than additive effects of any twin crises. We have experimented with including a variety of interaction effects (on all three types of crises, on any two subsets, only for the period of the crisis start year) and have found that the point estimates are overwhelmingly insignificant. As a result, we only report results without interaction effects here.¹⁰

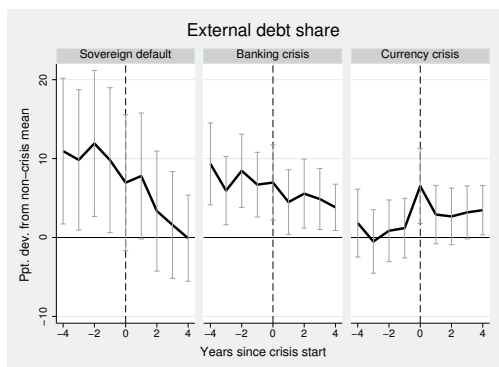
Table 4: Crisis dynamics

	(1) ExtShare	(2) ExtFlows	(3) Debt	(4) Output	(5) CurrAcc
<i>Sovereign default</i>					
D(-4)	10.95* (0.05)	1.47** (0.03)	11.03*** (0.00)	0.33 (0.70)	-1.94* (0.08)
D(-3)	9.83* (0.07)	1.19 (0.12)	13.52*** (0.00)	0.18 (0.84)	-1.73 (0.10)
D(-2)	11.92** (0.03)	2.33 (0.21)	15.34*** (0.00)	0.54 (0.56)	-2.32** (0.04)
D(-1)	9.80* (0.08)	0.39 (0.74)	16.40*** (0.00)	0.09 (0.91)	-2.05* (0.06)
D(0)	6.95 (0.18)	-1.07 (0.34)	20.98*** (0.00)	-1.91** (0.02)	-1.42 (0.30)
D(1)	7.80 (0.11)	-0.05 (0.92)	18.73*** (0.00)	-1.33 (0.17)	-0.20 (0.84)
D(2)	3.35 (0.47)	-0.79 (0.24)	12.88*** (0.01)	-2.14** (0.03)	-0.05 (0.96)
D(3)	1.59 (0.70)	-1.34* (0.07)	9.85* (0.09)	-1.54* (0.06)	0.03 (0.97)
D(4)	-0.09 (0.98)	0.56 (0.74)	2.75 (0.47)	0.99 (0.41)	1.20 (0.15)
<i>Banking crisis</i>					
D(-4)	9.33*** (0.00)	0.62 (0.16)	-7.33** (0.03)	1.50*** (0.00)	-0.13 (0.87)
D(-3)	5.94** (0.02)	0.36 (0.33)	-6.65* (0.08)	2.23*** (0.01)	-1.00* (0.09)
D(-2)	8.46*** (0.00)	0.82 (0.35)	-8.26*** (0.00)	1.89*** (0.00)	-1.02 (0.14)
D(-1)	6.70*** (0.01)	0.31 (0.41)	-9.53*** (0.00)	1.22* (0.08)	-0.90 (0.29)
D(0)	6.96** (0.02)	0.90** (0.02)	-4.30* (0.05)	0.15 (0.84)	-0.47 (0.57)
D(1)	4.49* (0.07)	0.18 (0.70)	-1.52 (0.57)	-1.49*** (0.01)	0.79 (0.31)
D(2)	5.56** (0.04)	-0.04 (0.88)	-0.29 (0.90)	-1.63*** (0.01)	-0.13 (0.88)
D(3)	4.87** (0.04)	-0.32 (0.31)	1.31 (0.59)	-1.42** (0.01)	-1.39* (0.07)
D(4)	3.82** (0.03)	0.05 (0.87)	2.28 (0.43)	-0.83* (0.09)	-0.62 (0.34)
<i>Currency crisis</i>					
D(-4)	1.83 (0.48)	0.18 (0.33)	-1.51 (0.48)	0.40 (0.49)	0.10 (0.88)
D(-3)	-0.50 (0.84)	-0.15 (0.33)	-1.96 (0.35)	1.30* (0.06)	-0.80 (0.19)
D(-2)	0.85 (0.72)	0.12 (0.61)	-0.76 (0.74)	0.87* (0.08)	-0.80 (0.19)
D(-1)	1.19 (0.60)	0.62 (0.10)	0.11 (0.96)	-0.47 (0.41)	-1.03* (0.08)
D(0)	6.52** (0.02)	0.38 (0.21)	3.41 (0.27)	-1.73*** (0.00)	-0.69 (0.34)
D(1)	2.91 (0.20)	0.06 (0.82)	3.33 (0.21)	-2.36*** (0.00)	0.25 (0.76)
D(2)	2.67 (0.22)	-0.03 (0.92)	1.17 (0.62)	-1.73*** (0.00)	-0.03 (0.98)
D(3)	3.18 (0.12)	0.04 (0.83)	-0.46 (0.85)	-0.49 (0.23)	0.66 (0.35)
D(4)	3.46* (0.07)	0.95* (0.06)	-0.70 (0.74)	-0.31 (0.52)	-0.16 (0.79)
country FE	Y	Y	Y	Y	Y
year FE	Y	Y	Y	Y	Y
Obs	4,205	4,152	4,572	5,840	5,075
Adj. R ²	0.03	0.02	0.06	0.07	0.00

*p<0.1, **p<0.05, ***p<0.01. Robust SE in parentheses.

Note: Dependent variables: External debt share (1), external debt flows as a percent of GDP (2), debt as a percent of GDP (3), output deviations from trend (4), current account as a percent of GDP (5).

Figure 5: Repatriation during crises



Note: Estimated coefficients and 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on the external debt share, by crisis type. Regression includes country and year fixed effects, SEs are clustered at the country level. External debt share is measured as external private debt as a percent of external private plus domestic debt.

4.3 Repatriation during crises

The baseline results with the external debt share as our measure of repatriation are presented in column 1 of Table (4) and Figure (5). The Figure plots the coefficient estimates β_{sk} along with 90 percent confidence intervals for the main outcome variable of interest, the external debt share, when we include dummies for each of the three main crises: sovereign default, banking crises, and currency crises.

We find that the external share is significantly above non-crisis levels prior to defaults and falls back down to non-crisis levels by the time the crisis starts, and the decline over the event window is statistically significant. We thus find evidence of debt repatriation in the run-up to sovereign default episodes.

Banking crises also show a decline, but not a significant one. Currency crises look somewhat different: The external share rises until the start year of the crisis at which point it is above the non-crisis mean and then declines significantly at the start of the crisis. Repatriation thus appears limited to the immediate crisis onset.

The finding that the external debt share is elevated prior to crises is reminiscent of studies documenting capital inflow bonanzas (see Reinhart and Reinhart (2009) for an overview of the literature and cross-country analysis of the macroeconomic dynamics associated with surges in capital inflows). We provide the additional and more nuanced result that it is specifically the share of sovereign debt held abroad that is relatively elevated.¹¹

¹⁰The evolving literature on difference-in-difference methodology has highlighted some challenges when there is variation in treatment timing (Goodman-Bacon, 2021; Borusyak et al., 2021); note that these do not apply to our specification, as our setup is a staggered roll-out, but *temporary* treatment, dynamic (event-study) specification.

¹¹Both external and domestic debt to GDP levels are high before sovereign defaults, but not banking or currency crises in our sample – see figures in the appendix.

4.4 An alternative measure: Flows and exchange rate effects

There are two main concerns with the external debt share as a measure of repatriation. The first is that repatriation is inherently a flow concept while the external debt share is based on stocks. The second is that exchange rate movements may cause changes in the external debt share due to valuation effects rather than actual sales.¹²

Note that such exchange rate effects tend to work *against* a finding of repatriation: Crises are typically associated with an exchange rate depreciation, and since foreigners tend to hold disproportionately more foreign-currency debt, an exchange rate depreciation would imply a rise in the value of foreign-held debt and thus a measured *expatriation*.

We attempt to control formally for exchange rate effects by constructing the following flow variable. Define the flow of external debt between periods $t - 1$ and t in local currency units as

$$x_t = \left(\frac{f_{\$,t}}{e_t} - \frac{f_{\$,t-1}}{e_{t-1}} \right) \tilde{e}_t + (f_t - f_{t-1})$$

where $f_{\$,t}$ is the stock of foreign-denominated private external debt, measured in local currency units (LCU), at time t , f_t is the stock of local-currency denominated private external debt, measured in local currency units, at time t , e_t is the end-of-period exchange rate (LCU per USD) at time t , and \tilde{e}_t is the average exchange rate between $t - 1$ and t .

In our data set, f_t and $f_{\$,t}$ do *not* include debt write-offs. In the period of a default, we would thus count a larger outflow of external debt than is warranted since written-off debt does not represent a flow from external to domestic residents. We adjust for this using estimates of the face value of debt write-offs from Cruces and Trebesch (2013), which contains 95 percent of our default episodes from (Asonuma and Trebesch, 2016). We report flows relative to GDP, x_t/GDP_t .

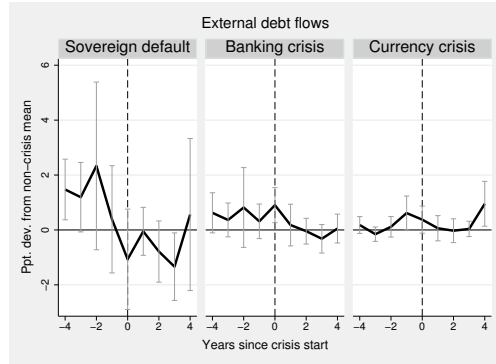
We assume that advanced economies issue external debt only in their own currencies, low-income countries only in foreign currency, and emerging market countries only in foreign currency except for 24 “major” emerging market countries where foreign investors also participate in local bond markets.¹³ For these, the actual currency split is available starting from 2004. Before 2004, we assume exclusively foreign currency issuance. In 2004, the average local currency share was quite small at just six percent, which makes our assumption of no local currency issuances prior to that reasonable.

Figure (6) and column 2 of Table (4) show the estimation results using this alternative repatriation measure. The point estimates are consistent with the baseline results but the uncertainty around these is larger: External debt flows fall below the non-crisis mean over the course of

¹²Note that we control for valuation effects due to movements in yields since the data set is compiled on the principle of face (not market) value.

¹³See the appendix for the country classification.

Figure 6: An alternative repatriation measure



Note: Estimated coefficients and 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on external debt flows, by crisis type. Regression includes country and year fixed effects, SEs are clustered at the country level. External debt flows are measured as the exchange rate adjusted change in external private debt, as a percent of GDP.

sovereign defaults. For banking crises, flows are not significantly different from the baseline although the point estimates suggest a decline following the crisis onset. They are significantly above the baseline in the year of the crisis start. For currency crises, the point estimates continue to suggest expatriation before and a reversal after the start of the crisis, but we can no longer reject a hypothesis of no significant difference in flows from the non-crisis mean over the event window (except for *higher* flows at the very end of the window). Overall, we thus continue to find significant repatriation relative to non-crisis times during sovereign defaults also after controlling for exchange rate effects, while repatriation during banking and currency crises is more tentative once exchange rates are taken into account.

4.5 The role of preemptive debt restructuring

We next analyze whether repatriation differs depending on the nature of the sovereign default, and in particular, whether the sovereign sought to restructure the debt in consultation with creditors or instead stopped payments unilaterally. Asonuma and Trebesch (2016) classify all default events in their database according to whether the debt restructuring occurred strictly or weakly preemptively, or post-default. We re-run our regressions using these three crisis dummies as regressors. Note that a single default can be associated with more than one category, for example if a first restructuring was preemptive, but ultimately unsuccessful and followed by a unilateral default and post-default restructuring less than three years later.

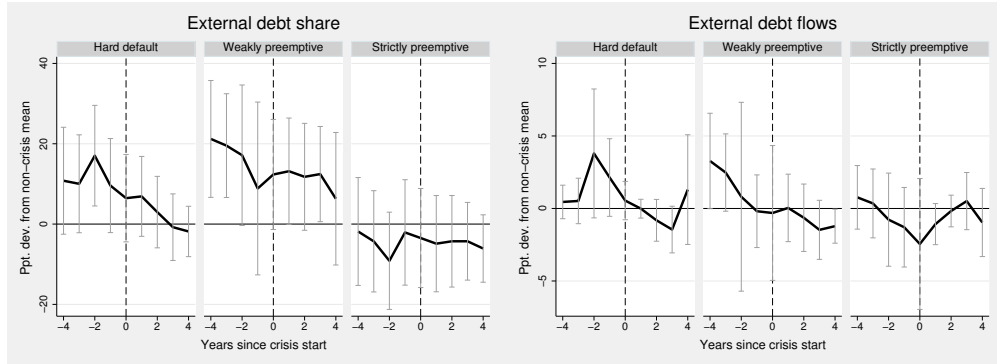
Figure (7) and Table (5) show the results. While associated with more uncertainty since the sample of crises of each type is smaller, the figure suggests that creditors may preferentially leave during hard defaults, but not strictly preemptive restructurings. Hard and weakly preemptive

Table 5: Default type

	(1) ExtShare	(2) ExtFlows
<i>Hard default</i>		
D(-4)	10.79 (0.18)	0.45 (0.52)
D(-3)	10.03 (0.18)	0.52 (0.59)
D(-2)	17.04** (0.03)	3.80 (0.16)
D(-1)	9.59 (0.18)	2.13 (0.19)
D(0)	6.45 (0.33)	0.54 (0.50)
D(1)	6.89 (0.25)	-0.01 (0.97)
D(2)	2.98 (0.58)	-0.82 (0.35)
D(3)	-0.77 (0.88)	-1.45 (0.14)
D(4)	-1.84 (0.63)	1.30 (0.57)
<i>Weakly preemptive</i>		
D(-4)	21.21** (0.02)	3.28 (0.10)
D(-3)	19.54** (0.01)	2.48 (0.13)
D(-2)	17.15 (0.11)	0.81 (0.84)
D(-1)	8.87 (0.50)	-0.19 (0.90)
D(0)	12.35 (0.14)	-0.31 (0.91)
D(1)	13.16 (0.10)	0.04 (0.98)
D(2)	11.77 (0.15)	-0.64 (0.65)
D(3)	12.45* (0.08)	-1.47 (0.23)
D(4)	6.31 (0.53)	-1.22* (0.09)
<i>Strictly preemptive</i>		
D(-4)	-1.85 (0.82)	0.77 (0.56)
D(-3)	-4.29 (0.57)	0.35 (0.81)
D(-2)	-9.14 (0.21)	-0.77 (0.69)
D(-1)	-2.08 (0.79)	-1.29 (0.44)
D(0)	-3.47 (0.64)	-2.45 (0.37)
D(1)	-4.88 (0.50)	-1.08 (0.21)
D(2)	-4.29 (0.53)	-0.17 (0.79)
D(3)	-4.28 (0.47)	0.51 (0.67)
D(4)	-6.09 (0.23)	-0.97 (0.50)
country FE	Y	Y
year FE	Y	Y
Obs	4,605	4,570
Adj. R^2	0.02	0.02

*p<0.1, **p<0.05, ***p<0.01. Robust SE in parentheses.
 Note: Dependent variables: External debt share (1), external debt flows as a percent of GDP (2)

Figure 7: Repatriation and preemptive debt restructuring



Note: Estimated coefficients and 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on the external debt share (LHS) and external debt flows (RHS), by sovereign default type. Regression includes country and year fixed effects, SEs are clustered at the country level. External debt share is measured as external private debt as a percent of external private plus domestic debt. External debt flows are measured as the exchange rate adjusted change in external private debt, as a percent of GDP.

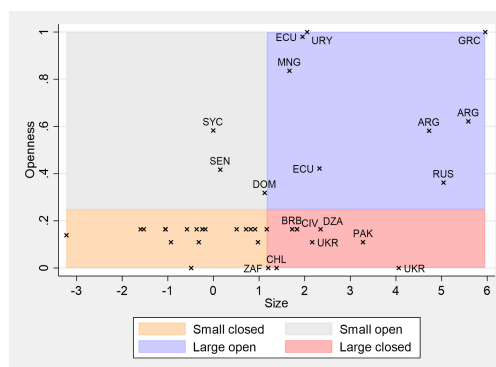
restructurings are associated with a significant decline in the external debt share, while strictly preemptive restructurings are not. This is less apparent from the alternative repatriation measure (right panel in the Figure and second column in the Table). It shows significantly negative flows only in the case of weakly preemptive restructurings, but a downward trend in the point estimates for post-default restructurings, and a quick rebound after strictly preemptive restructurings.

4.6 The role of secondary markets and financial repression

Repatriation may come about due to financial repression by the government or as an equilibrium market outcome. Reinhart and Sbrancia (2015) emphasize the former and document empirically the prevalence of “moral suasion” policies - implicit or explicit pressure exerted on domestic investors to buy government bonds - between 1945 and the early 1980s. Brutti and Sauré (2016) discuss (and challenge) the view that such political pressure led to repatriation during the European debt crisis. Broner et al. (2010) develop a model that predicts repatriation during crises as a result of trading in secondary markets and domestic residents’ higher valuation of the debt. Broner et al. (2014) show that creditor discrimination that favors domestic residents - whether as a result of free-market forces or financial repression - implies repatriation, and discuss that well-functioning secondary markets may impede successful discrimination.

We attempt to disentangle the role played by financial repression and secondary markets in driving repatriation during sovereign defaults. To do so, we distinguish the sovereign defaults in our data set along two dimensions: (i) the size of the market in which they occurred, and (ii) the degree of financial openness in the country at the time of the crisis. If repatriation is primarily a free-market phenomenon, then we should find that a larger, more liquid market facilitates repa-

Figure 8: Default classification by market size and openness



Note: Market size is the log of total outstanding debt in USD, deflated using the US GDP deflator. Openness is the Chinn-Ito index. Both are measured as the average in the three years leading up to a sovereign default. Cutoffs for classification are based on averages in each dimension.

triation. If repatriation is brought about by financial repression and government regulation, then we should see more of it during times of tight controls on cross-border transactions.

Measuring both financial repression and the depth of secondary markets is difficult. Data on measures of liquidity such as bid-ask-spreads or volumes traded are too limited in terms of country and year coverage to include sufficiently many default episodes. We therefore use market size measured as the log of total outstanding debt measured in USD, deflated using the US GDP deflator, to capture market depth and liquidity. Larger markets are assumed to function better. Measuring financial repression is similarly challenging. What we would like to capture conceptually is the existence and enforcement of policies aimed specifically at controlling the cross-border flow of sovereign debt - we are not aware of a cross-country source on such data. As a rough proxy, we use the Chinn-Ito index of capital account openness.¹⁴ Data availability for market size and openness means that we successfully classify 38 out of our 65 default episodes in this way. Figure (8) plots each episode according to size and openness, along with the classification. The cutoff for each dimension is the mean across episodes.¹⁵

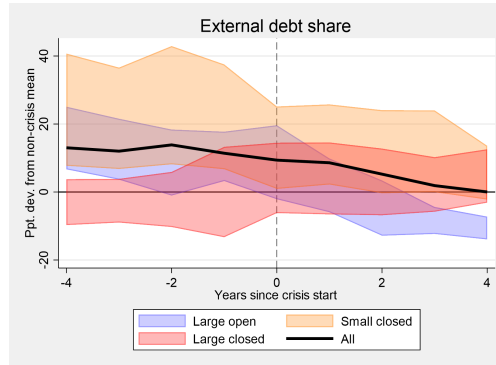
Figure (9) shows the results from our regressions when we use the four different types of defaults, classified as in Figure (8), as regressors.¹⁶ We plot the 90 percent confidence intervals for the effects of each type of default, along with the point estimates for the baseline estimate

¹⁴This measures the extent and intensity of restrictions on exchange rates, capital or current account transactions and regulatory requirements on export proceeds.

¹⁵For each episode, we calculate market size and openness as the average, within the country, in the three years leading up to the default in order to account for the fact that market size and openness sometimes change substantially over this period (in particular, openness tends to drop when defaults are imminent). Our results are robust to not averaging at all or including more years in the average.

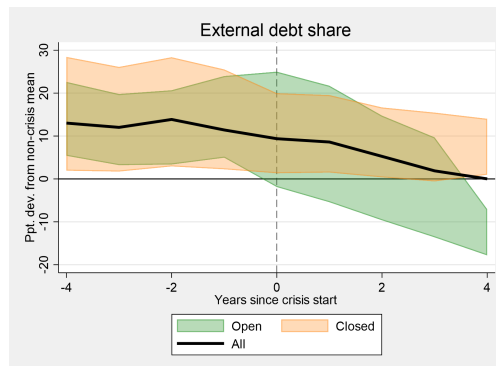
¹⁶Note that due to the small number of crises classified as occurring in small and open markets we omit this as a category in the Figure. The effects are very imprecisely estimated. Results using the flows variable are in the appendix.

Figure 9: Repatriation, market size, and openness



Note: Estimated 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on the external debt share, by market size and openness type. Regression includes country and year fixed effects, SEs are clustered at the country level. External debt share is measured as external private debt as a percent of external private plus domestic debt.

Figure 10: Repatriation and openness



Note: Estimated 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on the external debt share, by openness type. Regression includes country and year fixed effects, SEs are clustered at the country level. External debt share is measured as external private debt as a percent of external private plus domestic debt.

without differentiating the defaults.

The Figure shows that repatriation is pronounced among defaults occurring in large and open markets, but not at all present in large and closed markets. For small and closed markets, the uncertainty around estimates is substantially larger. These results suggest that financial controls do not tend to reinforce repatriation: Defaults in more tightly controlled markets exhibit less of it. They also highlight market size as an important facilitator of repatriation: The difference between closed and open markets only becomes clear when conditioning on market size. Figure (10) plots the results when using only open or closed markets as categories and shows that the difference in repatriation is not significant except at the very tail end of the event window.

It is important to note that this analysis relies on relatively few sovereign defaults in each group and may therefore not generalize. This caveat notwithstanding, the results suggest that repatriation does not tend to occur because of financial repression, and that the size of secondary markets is an important facilitator of repatriation.

4.7 Other channels

4.7.1 Domestic capital flight

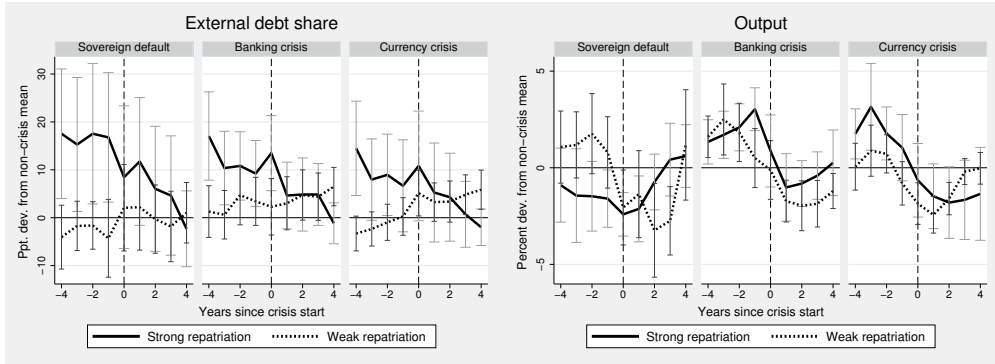
The literature on capital flight emphasizes domestic capital flight as opposed to repatriation, and specifically the loss of reserves due to domestic investors during a number of crises, with one proposed rationale being that domestic investors have informational advantages over external investors and therefore leave sooner (see for example Frankel and Schmukler (1996) or Choe et al. (2001)). A possible explanation to reconcile this finding with one of repatriation is that informational advantages may have eroded over time as countries have become more transparent. Another reason for the difference is that, while this literature focuses on domestic households and firms, we focus on the domestic financial system as the counterparty to foreigners selling sovereign bonds (households/ firms do not operate directly in this market). It is thus possible to observe both capital flight by firms/households and repatriation of sovereign debt from foreign to domestic financial institutions during crises simultaneously.¹⁷

4.7.2 Maturity

It is well documented that debt maturity tends to shorten during defaults (see for example Arellano and Ramanarayanan, 2012 or Sanchez et al., 2018). Repatriation can thus come about in a

¹⁷During the Mexican 1995 crisis, for example, Folkerts-Landau and Ito (1995) note that “On balance, there was a net outflow in the form of foreign holdings of Mexican domestic government securities (including Cetes, Tesobonos, and others) of about MexN\$3.6 billion (\$790 million), while the Banco de Mexico sold \$6.6 billion in foreign reserves during December.”

Figure 11: Repatriation and GDP downturns



Note: Estimated coefficients and 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on the external debt share and output, by crisis type and strength of repatriation (above/below mean). Regression includes country and year fixed effects, SEs are clustered at the country level. External debt share is measured as external private debt as a percent of total external private and domestic debt. Output are deviations from HP-filtered log real GDP.

number of ways that interacts with maturity. For example, external investors might disproportionately sell long-term bonds in the secondary market or rollover their short-term holdings without actively selling them in the market. In parallel, domestic residents may be forced (through moral suasion) to buy the newly issued government bonds at a time when foreign investors are retrenching. Our data do not allow us to analyze the interaction of maturity and ownership; we can only compute the breakdown of the face value of holdings by domestic versus external investors as net outcomes of these transactions. Any drop in the share of holdings regardless of maturity or counterparty is therefore included in our concept of repatriation. An extension along the maturity dimension would be a very interesting avenue of future research.

4.8 Repatriation and recessions

It is of interest to study to what extent repatriation is related to output fluctuations. We address two specific questions related to this topic: First, does GDP fall more in crises with strong repatriation? Second, do external creditors also leave during “normal” cyclical downturns, or only during full-blown crises? Our findings suggest that repatriation is not strongly linked to output, either during crises or over the cycle.

Implications for GDP Figure (11) answers the first question - is strong repatriation associated with worse GDP outcomes? It compares outcomes for crises with strong repatriation to those with weak repatriation. The left panel shows the dynamics of the external debt share, the right panel

Table 6: Cyclicity

	(1)	(2)	(3)	(4)	(5)
	Ext. share	Ext. flows/GDP	Ext. share	Ext. share	Ext. share
GDP (cycle)	-0.15 (0.14)	0.02 (0.11)	0.19 (0.51)	0.11 (0.42)	-0.35** (0.02)
Sample	Full	Full	Adv	EME	LIC
Obs	4,157	4,121	635	1,873	1,649
Adj. R^2	0.01	0.01	0.19	0.04	0.04

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Clustered SE in parentheses.

Note: Independent variable is HP-filtered log of real GDP. All debt measures net of foreign official loans. All models include country and year fixed effects and crisis dummies

for GDP.¹⁸ We split the set of crises and include those with strong and weak repatriation, respectively, as separate crisis types. Crises with strong (weak) repatriation are defined as those with an above (below) average cumulative change in the external debt share over the event window.¹⁹ The left panel of the Figure shows how strong repatriation crises - by definition - are associated with a larger drop of the external debt share over the event window for each type of crisis. The right panel shows the response of GDP. The differences across episodes with strong versus weak repatriation are not significant. In terms of point estimates, strong repatriation default episodes may be associated with a less sharp but more protracted output decline. Overall, however, we find no strong evidence of worse GDP implications for crises that are disproportionately associated with external investors leaving.

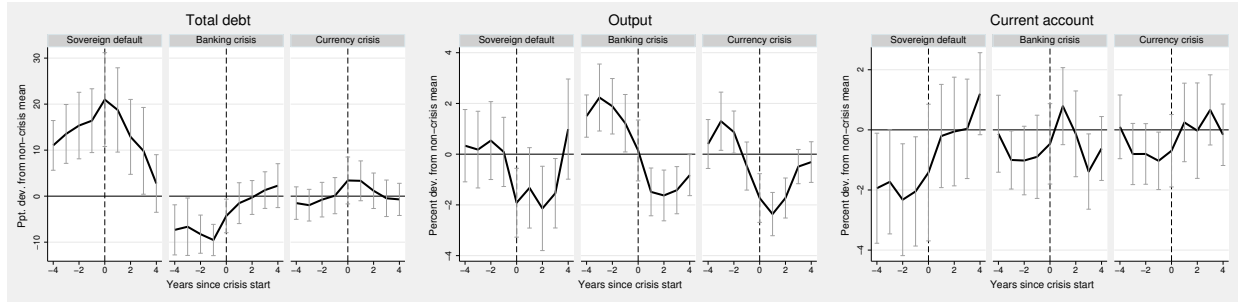
Cyclical repatriation Table (6) answers the second question - do external creditors also leave during “normal” recessions? We regress the cyclical component of GDP on our repatriation measures, controlling for country and year fixed effects as well as crisis dummies. The first two columns of the Table use the different repatriation measures in turn and together show that repatriation is acyclical: According to none of the measures do external investors tend to leave during cyclical downturns - nor do they arrive. Countries are thus generally more indebted in bad times, but they do not appear to borrow disproportionately from either domestic or external investors over the cycle.

The fact that we find repatriation during crisis times but not during “normal” cyclical fluctuations is, for example, consistent with it being related to sovereign default risk rather than

¹⁸GDP data are from the WDI and, in case coverage is longer for a given country, the WEO. They are in real terms, logs, and HP filtered with $\lambda = 100$ for annual data. We do not detrend other variables since they are ratios and stationary.

¹⁹Based on the crisis-type-specific average. Alternative definitions based on the unconditional average, median, upper quartile or maximum repatriation yield similar results.

Figure 12: Debt, GDP, and current account during crises



Note: Estimated coefficients and 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on debt, output, and the current account balance, by crisis type. Regression includes country and year fixed effects, SEs are clustered at the country level. Total debt is external private plus domestic. Output are deviations from HP-filtered log real GDP. Current account is as a percent of GDP.

negative output prospects *per se*. Even though both full-blown crises and cyclical downturns are associated with output below trend, only crises - in which default risk is elevated - also bring repatriation with them.

Columns 3 through 5 consider whether this holds across country groups. The coefficient remains insignificant when restricting the sample to advanced or emerging market countries, but it becomes significantly negative for low-income countries. This suggests that external investors do not leave during downturns, but in fact provide more of the lending specifically in recessions for these countries.²⁰

4.9 Other variables during crises: Debt, GDP, and current account

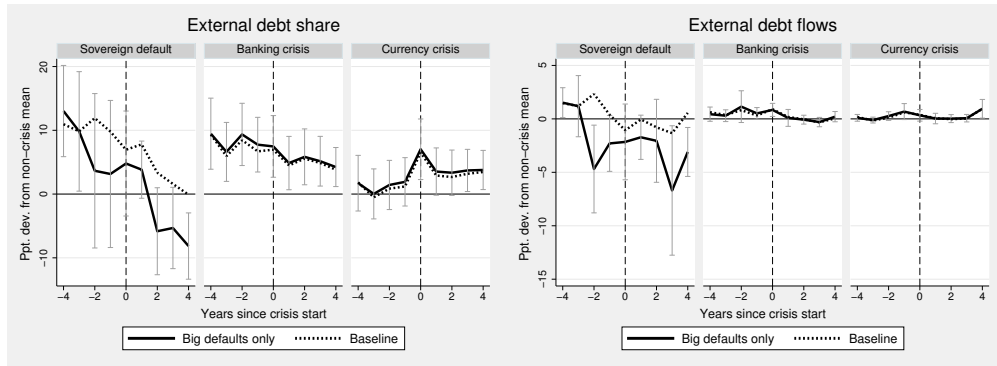
The dynamics of other relevant outcome variables, GDP, the current account and debt to GDP, are shown in Figure (12) and columns 3, 4 and 5 of Table (4).²¹ They confirm and extend findings in the literature that are typically based on more limited samples (Gourinchas and Obstfeld, 2012 among others): All crises are associated with recessions and to a lesser extent with current account improvements. Peak to trough GDP declines by around three percent in all cases. The onset of banking crises tends to occur when GDP is above the non-crisis baseline, whereas the other two crises start with GDP not significantly different from their non-crisis means.

The current account improves very clearly in the course of defaults. It also displays an upward trend during currency crises, although this is less pronounced and smaller. Banking crises are accompanied by a current account deterioration in the years after the crisis.

²⁰In all country groups, total private debt to GDP is countercyclical as expected. This is least pronounced for low-income countries who may have a comparatively harder time borrowing in bad times. The coefficient is estimated imprecisely for advanced countries after including crisis dummies, but remains large and negative in terms of the point estimate. Detailed results available on request.

²¹Current account (and again GDP) data are from the WDI and, in case coverage is longer for a given country, the WEO.

Figure 13: Alternative sovereign default measure



Note: Estimated coefficients and 90% confidence intervals from regressing dummies for temporal distance from the start of a "consensus" sovereign default on the external debt share (LHS) and external debt flows (RHS), respectively. Regression includes country and year fixed effects, SEs are clustered at the country level. External debt share is measured as external private debt as a percent of external private plus domestic debt. External debt flows are measured as the exchange rate adjusted change in external private debt, as a percent of GDP.

Indebtedness, finally, measured as total debt to GDP, rises in the run-up to and then falls substantially in the wake of sovereign defaults, from around 20 percentage points above non-crisis baseline back down to zero to in the five years after the start of a default. Currency crises follow a similar pattern of a rise in debt prior and somewhat smaller fall post crisis onset. Banking crises on the other hand are associated with a rise in debt levels. This matches the view that governments use their ability to borrow in order to smooth out some of the negative effects of banking crises.²²

5 Robustness

We consider a number of robustness checks to the main results by modifying our crisis definitions, adding potentially omitted variables to our model, and discussing reverse causality concerns. We also present results when including foreign official loans in our debt measures. The appendix contains further robustness checks including restricting the sample of countries included in the analysis, the choice of horizon for the event study, and the inclusion of country and/or year fixed effects.

Table 7: Robustness

	(1) Baseline	(2) Big defaults	(3) Controls	(4) Official
<i>Sovereign default</i>				
D(-4)	10.95* (0.05)	13.02*** (0.00)	12.57** (0.01)	3.01 (0.34)
D(-3)	9.83* (0.07)	9.83* (0.08)	12.39*** (0.01)	2.07 (0.48)
D(-2)	11.92** (0.03)	3.65 (0.62)	14.11*** (0.00)	1.96 (0.46)
D(-1)	9.80* (0.08)	3.15 (0.65)	13.32*** (0.00)	1.08 (0.77)
D(0)	6.95 (0.18)	4.79 (0.34)	10.73** (0.02)	0.83 (0.84)
D(1)	7.80 (0.11)	3.83 (0.16)	10.55** (0.01)	0.83 (0.83)
D(2)	3.35 (0.47)	-5.83 (0.16)	6.68* (0.09)	-0.19 (0.96)
D(3)	1.59 (0.70)	-5.32 (0.17)	5.95 (0.12)	-0.73 (0.84)
D(4)	-0.09 (0.98)	-8.15** (0.01)	1.34 (0.65)	-0.58 (0.82)
<i>Banking crisis</i>				
D(-4)	9.33*** (0.00)	9.47*** (0.01)	9.18*** (0.00)	5.41** (0.03)
D(-3)	5.94** (0.02)	6.61** (0.02)	5.17* (0.06)	4.81* (0.05)
D(-2)	8.46*** (0.00)	9.36*** (0.00)	6.50** (0.01)	7.66*** (0.00)
D(-1)	6.70*** (0.01)	7.75*** (0.00)	5.09** (0.04)	7.61*** (0.00)
D(0)	6.96** (0.02)	7.47** (0.01)	7.12*** (0.01)	5.80** (0.03)
D(1)	4.49* (0.07)	4.86* (0.06)	3.33 (0.16)	5.17** (0.03)
D(2)	5.56** (0.04)	5.84** (0.03)	4.56* (0.07)	4.45* (0.06)
D(3)	4.87** (0.04)	5.15** (0.03)	3.69* (0.10)	4.23* (0.05)
D(4)	3.82** (0.03)	4.24** (0.02)	3.07* (0.08)	4.26** (0.03)
<i>Currency crisis</i>				
D(-4)	1.83 (0.48)	1.71 (0.52)	3.83 (0.11)	-1.14 (0.55)
D(-3)	-0.50 (0.84)	0.03 (0.99)	1.69 (0.48)	-2.64 (0.17)
D(-2)	0.85 (0.72)	1.43 (0.54)	2.06 (0.39)	-2.79 (0.15)
D(-1)	1.19 (0.60)	1.92 (0.40)	2.95 (0.20)	-2.46 (0.22)
D(0)	6.52** (0.02)	7.03** (0.02)	5.74** (0.04)	3.89* (0.07)
D(1)	2.91 (0.20)	3.53 (0.12)	3.23 (0.18)	2.23 (0.24)
D(2)	2.67 (0.22)	3.35 (0.12)	3.10 (0.18)	3.46* (0.08)
D(3)	3.18 (0.12)	3.71* (0.07)	2.70 (0.17)	3.51* (0.05)
D(4)	3.46* (0.07)	3.78** (0.04)	2.57 (0.15)	4.71*** (0.00)
Openness			-10.16* (0.06)	
Market size			-5.62*** (0.00)	
country FE	Y	Y	Y	Y
year FE	Y	Y	Y	Y
Obs	4,205	4,205	4,050	4,409
Adj. R^2	0.03	0.03	0.12	0.08

*p<0.1, **p<0.05, ***p<0.01. Robust SE in parentheses.

Note: (1) Baseline specification; (2) Alternative default crisis definition ("big" defaults only); (3) with control variables; (4) foreign official loans included in debt measures. Dependent variable in all models: External debt share.

5.1 Consensus defaults

Crisis databases differ in their definitions of crises and which episodes to include. Especially for defaults, there are a number of alternative databases with different sets of crises. We therefore re-run our analysis focusing only on the least controversial events featured in most databases:²³ Argentina 1989, Argentina 2001, Russia 1998, Ecuador 1999, Ecuador 2008, Greece 2012 and Ukraine 1998. Figure (13) and column 2 of Table (7) shows the estimates for our different repatriation measures. It confirms the baseline results: The external share falls over the event window; its first difference is significantly negative, as are external flows.

5.2 Omitted variables

The ability of investors to sell debt may both affect the riskiness of debt and observed repatriation. In light of the discussion in Section (4.6), we include both market size and openness²⁴ as controls in our baseline specification

$$y_{it} = \alpha_i + \gamma_t + \sum_k \sum_s \beta_{sk} D_{it sk} + x_{it} + \epsilon_{it}$$

where x_{it} is the vector of control variables. We find that our results are robust to this, as shown in column 3 of Table (7).

5.3 Crisis consolidation

In the baseline results, we assume that currency and default crises that start within three years of each other are part of the same episode, and use the first year as the relevant crisis start year. Figure (14) reports the repatriation results for alternative crisis consolidation assumption between zero and three years for both types of crises.²⁵ The left panel of each graph shows the results for sovereign defaults. The reported confidence intervals refer to the baseline case. The results for alternative assumptions lie within those confidence intervals in all cases. For all but zero aggregation, they are also qualitatively insignificantly different from the baseline case. The right panel of each graph shows the same results for currency crises. Shorter aggregation makes no significant different here either.

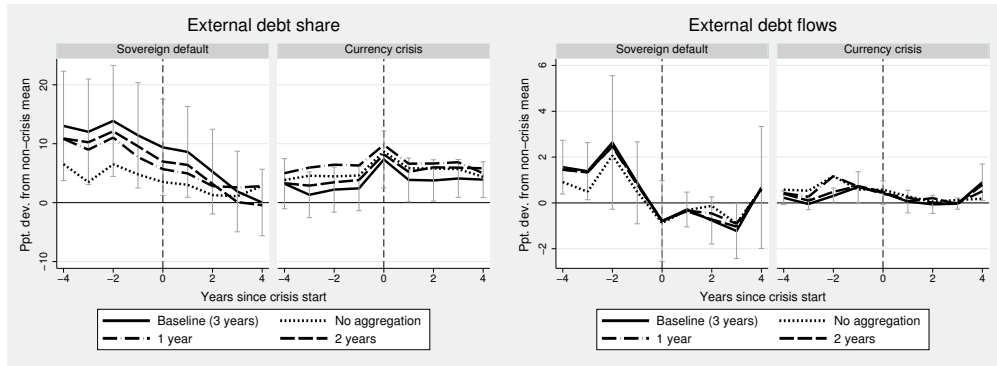
²²Other existing studies use different debt measures and are thus not readily comparable. Despite this, results reported in Mendoza and Yue 2012, for example, are qualitatively similar based on different public debt and crisis measures.

²³Based on Sturzenegger and Zettelmeyer (2006), Beers and Chambers (2006), Reinhart and Rogoff (2011), and Gourinchas and Obstfeld (2012).

²⁴(measured as described in Section (4.6))

²⁵Recall banking crises were not bunched in the same way and thus not consolidated.

Figure 14: Alternative consolidation: Defaults and currency crises



Note: Estimated coefficients and 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on the external debt share (LHS) and external debt flows (RHS), respectively, for alternative crisis consolidation assumptions. Regression includes country and year fixed effects, SEs are clustered at the country level. External debt share is measured as external private debt as a percent of external private plus domestic debt. External debt flows are measured as the exchange rate adjusted change in external private debt, as a percent of GDP.

Table 8: Granger causality tests

	Unidirectional, intended direction	Bidirectional	Unidirectional, reverse direction	Neither direction	Total
Advanced	8	13	1	1	23
Emerging	14	15	6	7	42
Low-income	8	14	10	7	39
Total	30	42	17	15	104

Note: Column 1: # countries for which the test is significant only in the intended direction. Column 2: # countries for which the test is significant in both directions. Column 3: significant only in the reverse direction. Column 4: not significant in either direction. Significance: Reject the null of non-causality at the 95% level. Only countries where the test can be run in both directions are included.

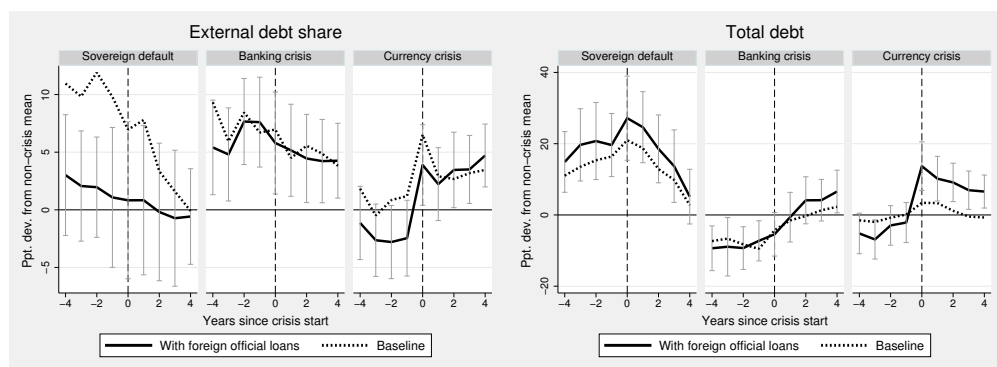
5.4 Reverse causality

Our baseline empirical framework assumes that crises are exogenous to shifts in the investor base. One concern with this assumption is that repatriation causally contributes to crises as opposed to the other way around. We investigate this using Granger causality tests and find more evidence for crises Granger-causing repatriation than the reverse.

Specifically, we run two sets of Granger causality tests: A first test with the external share as the dependent variable and a crisis dummy as the independent variable that takes the value one in the start year of a crisis of any type; and a second test with the variables reversed. We run these tests for each country separately and report the number of countries for which we can reject the null hypothesis of non-causality at the 95 percent level in Table (8).²⁶

²⁶We need non-zero variation in both dependent and independent variables to successfully run the test. If we ran

Figure 15: Other debt measures: Including foreign official loans



Note: Estimated coefficients and 90% confidence intervals from regressing dummies for temporal distance from the start of a crisis on the external debt share and debt to GDP, by crisis type. Regression includes country and year fixed effects, SEs are clustered at the country level. External debt share is measured as external private debt as a percent of external private plus domestic debt. Debt is external private plus domestic debt as a percent of GDP.

Column 1 in the Table reports the number of countries, by country type, for which we find evidence that crises Granger-causally contribute to repatriation, but not the other way around. Column 2 shows the number of countries for which we find evidence in the intended direction, but also cannot rule out that crises contributed to repatriation. The last two columns count the countries for which there was either no evidence in any direction or in the reverse direction only.

Overall there are substantially more countries in the first two columns than the last two (about 70 percent of the total number of countries), that is, we find more evidence in favor of crises causing repatriation than the other way around. This is more so the case for advanced and emerging market than for low-income countries, perhaps speaking to different mechanisms at play and/or data quality being lower in low-income countries. Overall, this provides some support for our assumption that crises are the drivers of repatriation.²⁷

5.5 Foreign official loans

In the baseline analysis, we are interested in the dynamics of *private* lending and net out foreign official loans. However, since foreign official loans are often a large fraction of external borrowing in emerging market countries, it is also interesting to investigate how including them affects debt dynamics during crises. Figure (15) and column 4 of Table (7) show the results for debt and

a panel version we also needed a strongly balanced panel. Due to the unbalanced nature of our data where balancing would lead to eliminating many observations, and due to the rare nature of crises (low variance) we instead run the test country-by-country, and report results for the countries for which estimation was feasible. We choose the lag length optimally based on the Bayesian Information Criterion (BIC), the maximum considered is 4 years. We only report results for countries for which we can run the test in both directions.

²⁷We have also conducted reverse causality tests broken down by type of crises. The sample size becomes small for sovereign defaults and hence the results are not particularly clear. However, the evidence for crises causing repatriation rather than the reverse looks quite a bit stronger for banking crises than currency crises.

the external debt share including foreign official loans. We find that foreign official loans offset private repatriation during sovereign defaults and at the onset of currency crises: The external share with foreign official loans is large flat over the event window for sovereign defaults and does not decline at the start of currency crises. There is no marked shift in the dynamics surrounding banking crises. This is mirrored in total debt to GDP: It increases post currency crisis, and to a less extent sovereign defaults. In all three types of crises, point estimates suggest that debt levels including foreign official loans are more elevated than private debt throughout the event window. Overall, this confirms that governments use foreign official loans predominantly when hit by crises, especially sovereign default and currency crises.

6 Conclusion

This paper has used a comprehensive data set to document new empirical facts on the dynamics of the sovereign debt investor base. We find evidence of systematic repatriation - shifts of sovereign debt from external private to domestic investors - during some types of crises but not others, and show how the timing and extent of repatriation depends on the type of crisis and market structure.

Keeping some caveats to our analysis in mind - in particular, relatively large uncertainty surrounding some of the point estimates in the face of noisy debt estimates and rare crises - we believe these findings contribute to our understanding of sovereign debt dynamics during crises and help inform theories of why repatriation occurs. In particular, the finding of repatriation being dependent on the type of crisis appears consistent with a differential default risk hypothesis, which says that debt should move towards domestic investors who will be treated less harshly. In contrast, it is perhaps less consistent with informational asymmetries between domestic and external investors. If domestic investors have an informational advantage in one type of crisis, they would likely have it in other types of crises, too.

The results also speak towards possible policy options to pursue during crises. Careful management of debt renegotiations seems conducive towards avoiding repatriation flows, while such flows are instead facilitated by large and open debt markets.

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A List of countries in investor base data set

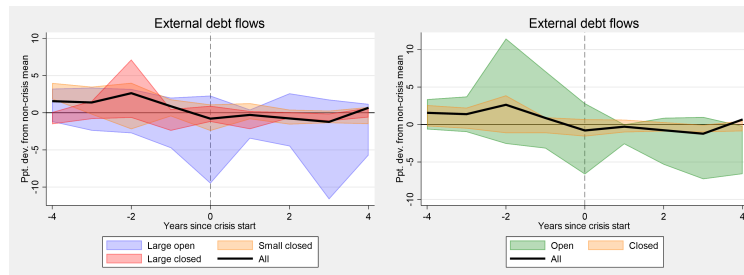
Advanced countries		Emerging market countries ("major": starred)			
1	Australia	1	Albania	45	Lebanon
2	Austria	2	Algeria	46	Libya
3	Belgium	3	Angola	47	Lithuania*
4	Canada	4	Antigua and Barbuda	48	Malaysia*
5	Cyprus	5	Argentina*	49	Mauritius
6	Czech Republic	6	Armenia	50	Mexico*
7	Denmark	7	Azerbaijan	51	Mongolia
8	Estonia	8	Bahamas, The	52	Montenegro
9	Finland	9	Bahrain	53	Morocco
10	France	10	Barbados	54	Namibia
11	Germany	11	Belarus	55	Nauru
12	Greece	12	Belize	56	Nigeria
13	Iceland	13	Bolivia	57	North Macedonia, Republic of
14	Ireland	14	Bosnia and Herzegovina	58	Oman
15	Israel	15	Botswana	59	Pakistan
16	Italy	16	Brazil*	60	Palau
17	Japan	17	Brunei Darussalam	61	Panama
18	Korea	18	Bulgaria*	62	Paraguay
19	Luxembourg	19	Chile*	63	Peru*
20	Malta	20	China*	64	Philippines*
21	Netherlands	21	Colombia*	65	Poland*
22	New Zealand	22	Costa Rica	66	Qatar
23	Norway	23	Croatia	67	Romania*
24	Portugal	24	Dominican Republic	68	Russia*
25	San Marino	25	Ecuador	69	Saudi Arabia
26	Singapore	26	Egypt*	70	Serbia
27	Slovak Republic	27	El Salvador	71	Seychelles
28	Slovenia	28	Equatorial Guinea	72	South Africa*
29	Spain	29	Eswatini	73	Sri Lanka
30	Sweden	30	Fiji	74	St. Kitts and Nevis
31	Switzerland	31	Gabon	75	St. Lucia
32	United Kingdom	32	Georgia	76	Suriname
33	United States	33	Guatemala	77	Syria
		34	Hungary*	78	Thailand*
		35	India*	79	Trinidad and Tobago
		36	Indonesia*	80	Tunisia
		37	Iran	81	Turkey*
		38	Iraq	82	Turkmenistan
		39	Jamaica	83	Ukraine*
		40	Jordan	84	United Arab Emirates
		41	Kazakhstan	85	Uruguay*
		42	Kosovo	86	Vietnam
		43	Kuwait		
		44	Latvia*		

Low-income countries

1	Afghanistan	36	Maldives
2	Bangladesh	37	Mali
3	Benin	38	Marshall Islands
4	Bhutan	39	Mauritania
5	Burkina Faso	40	Micronesia
6	Burundi	41	Moldova
7	Cambodia	42	Mozambique
8	Cameroon	43	Myanmar
9	Cabo Verde	44	Nepal
10	Central African Republic	45	Nicaragua
11	Chad	46	Niger
12	Comoros	47	Papua New Guinea
13	Congo, Rep	48	Rwanda
14	Congo, Dem. Rep.	49	Samoa
15	Côte d'Ivoire	50	São Tomé and Príncipe
16	Djibouti	51	Senegal
17	Dominica	52	Sierra Leone
18	Eritrea	53	Solomon Islands
19	Ethiopia	54	Somalia
20	Gambia, The	55	South Sudan
21	Ghana	56	St. Vincent and the Grenadines
22	Grenada	57	Sudan
23	Guinea	58	Tajikistan
24	Guinea-Bissau	59	Tanzania
25	Guyana	60	Timor-Leste
26	Haiti	61	Togo
27	Honduras	62	Tonga
28	Kenya	63	Tuvalu
29	Kiribati	64	Uganda
30	Kyrgyz Republic	65	Uzbekistan
31	Lao PDR	66	Vanuatu
32	Lesotho	67	Yemen
33	Liberia	68	Zambia
34	Madagascar	69	Zimbabwe
35	Malawi		

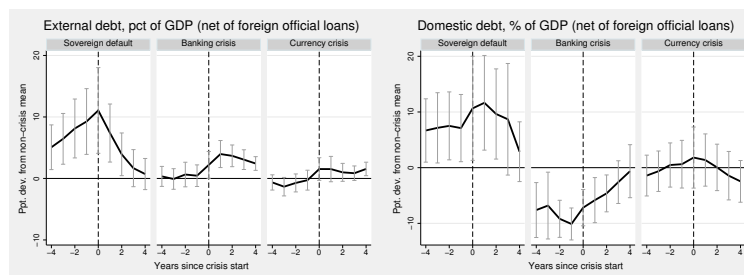
B Market size and openness: External flows

Figure 16: Repatriation, market size, and openness



C Other variables of interest: External and domestic debt to GDP

Figure 17: External and domestic debt to GDP ratios during crises



D Robustness

D.1 Event horizon

Figure 18: Shorter (2 year) and longer (10 year) event windows

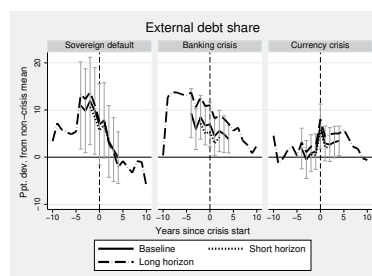


Table 9: Robustness II

	(1) Baseline	(2) No FEs I	(3) No FEs II	(4) EMEs	(5) AEs	(6) MACs
<i>Sovereign default</i>						
D(-4)	10.95* (0.05)	23.05*** (0.00)	11.31** (0.05)	8.03 (0.18)	9.93*** (0.00)	8.78 (0.10)
D(-3)	9.83* (0.07)	20.10*** (0.00)	10.28* (0.06)	6.88 (0.25)	10.86*** (0.00)	8.09 (0.13)
D(-2)	11.92** (0.03)	18.69*** (0.00)	12.38** (0.03)	7.14 (0.29)	12.60*** (0.00)	8.41 (0.16)
D(-1)	9.80* (0.08)	15.87*** (0.00)	10.60** (0.05)	7.45 (0.34)	6.00** (0.04)	7.58 (0.28)
D(0)	6.95 (0.18)	12.22** (0.02)	7.21 (0.16)	9.72 (0.20)	8.56*** (0.00)	8.72 (0.20)
D(1)	7.80 (0.11)	11.32** (0.02)	7.66 (0.11)	12.00* (0.07)	-3.75 (0.22)	10.13 (0.10)
D(2)	3.35 (0.47)	4.88 (0.27)	3.48 (0.44)	5.24 (0.43)	0.07 (0.98)	4.49 (0.46)
D(3)	1.59 (0.70)	3.02 (0.47)	1.47 (0.72)	0.93 (0.87)	-17.41* (0.07)	-0.94 (0.86)
D(4)	-0.09 (0.98)	0.78 (0.82)	-0.29 (0.93)	-1.72 (0.70)	-10.26*** (0.00)	-2.73 (0.49)
<i>Banking crisis</i>						
D(-4)	9.33*** (0.00)	14.35*** (0.00)	7.41** (0.03)	7.15 (0.14)	2.98 (0.32)	7.25** (0.02)
D(-3)	5.94** (0.02)	10.66*** (0.00)	4.19 (0.13)	5.87 (0.15)	3.14 (0.36)	6.62** (0.02)
D(-2)	8.46*** (0.00)	14.84*** (0.00)	6.74** (0.02)	6.60* (0.06)	4.15 (0.23)	7.79*** (0.00)
D(-1)	6.70*** (0.01)	12.57*** (0.00)	5.25** (0.04)	6.20 (0.15)	7.23** (0.04)	8.29*** (0.00)
D(0)	6.96** (0.02)	11.51*** (0.00)	5.12* (0.09)	3.42 (0.52)	10.94*** (0.00)	7.37** (0.05)
D(1)	4.49* (0.07)	9.66*** (0.00)	3.01 (0.24)	-1.97 (0.66)	9.64*** (0.00)	3.35 (0.29)
D(2)	5.56** (0.04)	10.35*** (0.00)	4.34 (0.12)	0.35 (0.95)	4.30 (0.21)	3.29 (0.36)
D(3)	4.87** (0.04)	9.56*** (0.00)	3.90 (0.11)	0.62 (0.89)	3.58 (0.31)	2.74 (0.39)
D(4)	3.82** (0.03)	8.83*** (0.00)	2.93 (0.10)	2.15 (0.49)	3.24 (0.20)	3.40 (0.12)
<i>Currency crisis</i>						
D(-4)	1.83 (0.48)	-3.63 (0.22)	1.03 (0.68)	5.79 (0.20)	4.49 (0.16)	5.02 (0.24)
D(-3)	-0.50 (0.84)	-7.35*** (0.00)	-1.07 (0.64)	2.42 (0.54)	-0.62 (0.88)	1.12 (0.76)
D(-2)	0.85 (0.72)	-6.99*** (0.00)	0.43 (0.86)	1.17 (0.72)	0.68 (0.87)	0.16 (0.96)
D(-1)	1.19 (0.60)	-6.08** (0.01)	0.89 (0.68)	0.77 (0.82)	-3.74 (0.20)	-0.27 (0.93)
D(0)	6.52** (0.02)	0.46 (0.87)	6.16** (0.03)	10.55** (0.03)	-8.77** (0.02)	8.59** (0.04)
D(1)	2.91 (0.20)	-3.41 (0.16)	2.36 (0.27)	4.68 (0.18)	-5.32 (0.19)	3.24 (0.30)
D(2)	2.67 (0.22)	-2.03 (0.41)	2.53 (0.25)	2.44 (0.47)	-1.56 (0.69)	1.68 (0.56)
D(3)	3.18 (0.12)	-1.57 (0.52)	2.67 (0.20)	1.74 (0.55)	5.34 (0.23)	1.30 (0.58)
D(4)	3.46* (0.07)	-0.30 (0.91)	2.79 (0.15)	4.82 (0.12)	4.82 (0.29)	3.97 (0.11)
country FE	Y	N	Y	Y	Y	Y
year FE	Y	N	N	Y	Y	Y
Obs	4,205	4,205	4,205	1,874	640	2,514
Adj. R^2	0.03	0.05	0.03	0.05	0.21	0.06

*p<0.1, **p<0.05, ***p<0.01. Robust SE in parentheses.

Note: (1) Baseline specification; (2) no country or year fixed effects; (3) no year fixed effects; (4) emerging market countries only; (5) advanced economies only; (6) market access countries only. Dependent variable in all models: External debt share.

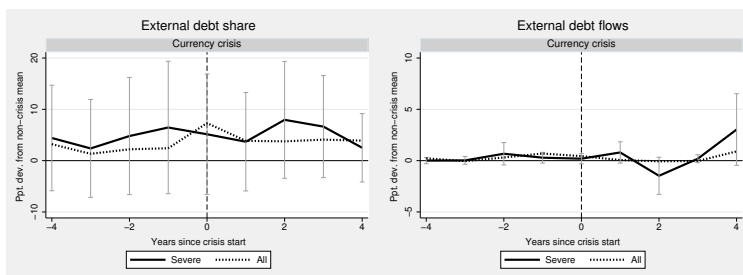
D.2 Country subsamples and fixed effects

Table (9) shows the results from the baseline regression when restricting the sample of countries and for versions of the model without fixed effects.

D.3 Severe currency crises

Figure (19) plots the dynamics of the external debt share during severe currency crises and compares it with those during all currency crises. Severe currency crises are defined as the top quartile of nominal exchange rate depreciations in the sample of emerging market or low-income countries (since for advanced countries we use a dummy to identify crises rather than the magnitude of the depreciation). This includes a total of 47 crises. The point estimates suggest a drop in the external share between one year before and one year after the crisis onset. Nonetheless, the confidence intervals for the set of severe crises are much wider than when including all currency crises.

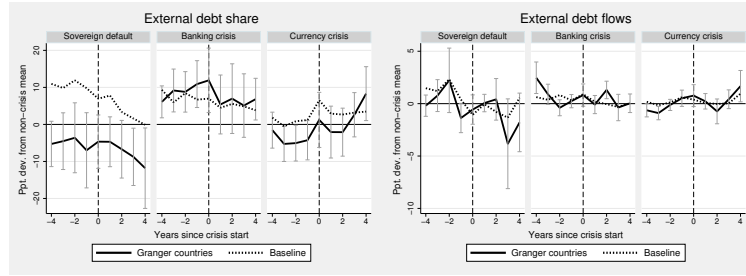
Figure 19: Repatriation during severe currency crises



D.4 Countries identified in Granger tests

We have run the estimation restricting the sample to the countries for which the Granger tests suggest causality runs only in the intended direction. One limitation of this analysis is that it involves a smaller sample, so we are not looking at the same non-crisis baseline when comparing this analysis with the baseline and estimation uncertainty is increased. With this caveat in mind, repatriation for this subset of countries look qualitatively similar to the baseline. In the case of defaults, the level is lower and in the case of both banking crises and defaults, repatriation may start later, in line with how Granger tests attribute causality.

Figure 20: Repatriation for subset of countries from Granger tests

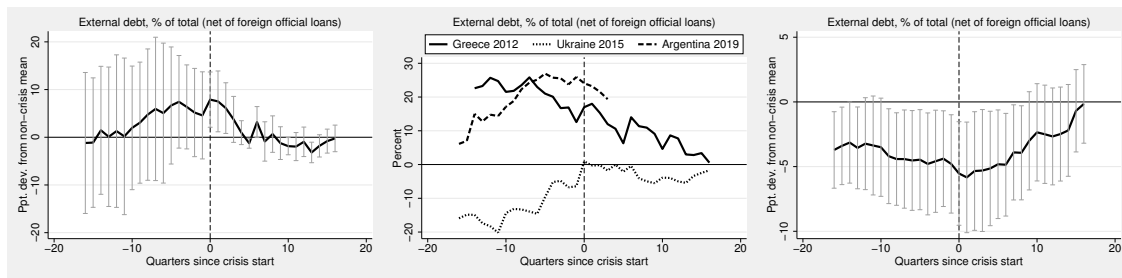


E Quarterly data

In principle, it would be desirable to use higher frequency data in order to investigate the timing of repatriation and investor base dynamics more precisely. This is challenging due to data limitations. Quarterly investor data is available from 2004 and for a narrower set of countries (major emerging market countries and advanced countries, 48 altogether) from Arslanalp and Tsuda (2014a) and Arslanalp and Tsuda (2014b), but this time period and set of countries cover relatively few crises. Specifically, it covers the full 9 year crisis event window for just three sovereign defaults in Asonuma and Trebesch (2016) (Greece 2012Q3, Ukraine 2015Q1 and Argentina 2019Q4), and it covers part of the event window for three more defaults (Argentina 2001Q4, Ukraine 2000Q1 and Uruguay 2003Q1). We can construct currency crisis measures as in the main paper using quarterly data, which yields 22 currency crises.²⁸ We know of no quarterly banking crisis measure. These data limitations are what motivated the use of the more comprehensive annual investor database for the main results of the paper where we are able to include orders of magnitude more events. This caveat notwithstanding, Figure (21) shows the results for the dynamics of the external debt share during sovereign defaults (left two graphs) and currency crises (right graph) using quarterly data.

²⁸They are defined following Frankel and Rose (1996) using year-on-year changes for the quarterly end-of-period exchange rate and for emerging market economies only. Crisis events thus identified are: Argentina 2013Q4 2018Q1, Brazil 2008Q4, 2012Q2, 2020Q1, Chile 2009Q1, Colombia 2009Q1, 2015Q1, Egypt 2016Q4, Hungary 2009Q1, Mexico 2009Q1, Malaysia 2015Q3, Poland 2009Q1, Romania 2009Q1, Russia 2009Q1, Russia 2014Q4, Turkey 2008Q4, 2015Q3, Ukraine 2008Q4, 2014Q1, South Africa 2008Q4, 2015Q4.

Figure 21: Quarterly data: Sovereign defaults and currency crises





PUBLICATIONS

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