

The Role of U.S. Monetary Policy in Global Banking Crises*

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Abstract

We examine the role of U.S. monetary policy in global financial stability by using a cross-country database spanning the period from 1870-2010 across 69 countries. U.S. monetary policy tightening increases the probability of banking crises for those countries with direct linkages to the U.S., either in the form of trade links or significant share of USD-denominated liabilities. Conversely, if a country is integrated globally, rather than having a direct exposure, the effect is ambiguous. One possible channel we identify is capital flows: If the correction in capital flows is disorderly (e.g., sudden stops), the probability of banking crises increases. These findings suggest that the effect of U.S. monetary policy in global banking crises is not uniform and largely dependent on the nature of linkages with the U.S.

JEL Classification: *E44, E52, F42, G15*

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1 Introduction

Quantitative tightening in U.S. monetary policy and recent rises in the U.S. federal funds rate have attracted broad attention in academic and policy circles about how U.S. monetary policy actions could affect financial stability in foreign economies. In this paper, we aim to explore this issue by providing answers to the following questions: What are the effects of U.S. monetary policy on global banking crises? Are there differential effects depending on country characteristics and the nature of linkages with the U.S. and to the rest of the world?

To this end, we examine how the interaction of U.S. monetary policy with a country's exposure to the U.S. and to the rest of the world affects the probability of banking crises in those countries by using various macroeconomic, financial, and trade indicators. More specifically, we construct a historical cross-country database covering 69 countries over the 1870-2010 period. We capture banking sector stress using the systemic banking crises database of Reinhart and Rogoff (2009).¹

One line of literature shows that *local* monetary policy decisions affect financial stability. Financial markets may react to monetary policy changes as they influence the pricing of risky assets, including equity and bonds. Bernanke and Kuttner (2005) and Gilchrist et al. (2015), among others, show that monetary policy surprises affect equity and corporate bond risk premiums, respectively. Moreover, a negative monetary policy change (an accommodative monetary policy) can increase financial instability by leading to buildups of financial vulnerabilities, such as credit booms or excessive financial leverage (Adrian and Liang, 2018). Such booms are generally associated with over-optimistic investors and less quality of loans. When booms reverse, increasing number of defaults may stress the financial system and increase the likelihood of a banking crisis (See Schularick and Taylor, 2012; Baron and Xiong, 2017; Danielsson et al., 2018). However, this literature does not address how *external* monetary policy decisions (e.g., monetary policy decisions in an hegemon country) could affect domestic financial stability.

¹We check the sensitivity of our findings by employing other systemic crises databases of Bordo et al. (2001); Laeven and Valencia (2012); Gourinchas and Obstfeld (2012); Schularick and Taylor (2012). The results discussed in Section 4.4 are qualitatively similar to those using Reinhart and Rogoff's (2009) definition.

In a recent influential paper, Rey (2015) argues that there is a global financial cycle, which is driven by U.S. monetary policy. Gourinchas (2017) shows in the context of an estimated DSGE model that the degree of financial spillovers between the U.S. and emerging market economies matter for the transmission of U.S. monetary policy, a potential transmission mechanism of Rey (2015) global financial cycles. Jorda et al. (2018) outline another potential linkage by showing that U.S. monetary policy plays an important role in shaping risk appetite across global equity markets. This raises the question of how U.S. monetary policy shocks plays a role in global banking crises episodes and if so, whether such effects depend on the nature of countries' integration with the U.S. and the rest of the world.

We make two contributions to this literature. First, we use a historical database to examine the role of U.S. monetary policy on banking crises. Since crises are rare events – a typical OECD country suffers a banking crises once in every 37 years on average according to the banking crisis database of Reinhart and Rogoff (2009) – we take a long-time-series to have statistically meaningful relationships. Second, we examine whether U.S. monetary policy is a uniform driver of financial vulnerabilities abroad or its effects are dependent on local factors.

Examining logit regressions in our panel of countries, we find that U.S. monetary policy tightening has a significant and positive contemporaneous effect on probability of banking crises for those countries with direct exposures to the United States. However, if a county is integrated globally rather than having a primary direct exposure to the United States, then U.S. monetary policy has an ambiguous effect on that country's probability of crises. The results are robust to the alternative definitions of monetary policy stance and alternative definitions of monetary shocks as well as country specific macroeconomic and financial indicators such as GDP growth, inflation, and institutional quality of a country.

Using historical data comes at the expense of limited data availability. The biggest challenge for this time period is to proxy U.S. monetary policy shocks. Hence, we directly use U.S. monetary policy stance based on change in the US 3-month Treasury rates. For the more recent period starting in 1990, we use monetary policy shocks based on three-month-ahead fed-funds futures rate Gertler and Karadi (2015) or six-month Euro-Dollar

contracts (Rogers et al., 2014), and the FED Greenbook forecasts of output growth and inflation along with the fed-funds rates to estimate shocks (Romer and Romer, 2004), and we reach similar conclusions.

We interact U.S. monetary policy proxies with measures of integration. In our main regressions with the historical data, we use a country's bilateral trade intensity with the U.S. as a proxy for direct economic integration. We measure the economic integration of a country with the rest of the world by using a trade openness ratio (exports plus imports as a percentage of GDP). In addition to those two measures, we also use the gravity instrument of trade intensity and openness ratio proposed by Frankel and Romer (1999). As discussed in Frankel and Romer (1999), the effects of trade on income or crises is expected to be endogenous and hence, one can question the causality. Gravity instruments, however, are derived via countries' geographic characteristics. Such characteristics are expected to be correlated with trade as they have important effects on trade, and are plausibly uncorrelated with other determinants of economic and financial stability measures.

In our analysis of more recent data, in addition to the exposure measures introduced above, we use each country's debt liabilities in USD (in net of assets) as a percent of GDP (Lane and Shambaugh, 2010; Benetrix et al., 2015), and Chinn-Ito's capital account openness index. The former is used as another proxy to measure the direct spillovers from the United States, whereas the latter index measures each country's capital account integration with the rest of the world.

What are the channels through which U.S. monetary policy affects global banking crises? U.S. monetary policy may affect other countries through capital flows. Since U.S. monetary policy stance affects relative return on investment in foreign economies, it would also influence credit cycles and in turn financial sector leverage. A negative monetary policy shock can lead to a credit boom in foreign economies since it is likely that capital would flow out of the U.S. due to increase in reach for yield incentives. During a credit boom, the quality of loans gets poor (Greenwood and Hanson, 2013), which eventually increases the likelihood of a banking crisis. Schularick and Taylor (2012) and Baron and Xiong (2017) find that excessive lending adversely affects the likelihood of banking crises and bank equity crash risk, respectively. Hence, the findings of this literature suggests

that a positive U.S. monetary policy shock could help rein in excesses and reduce the probability of crises (e.g., leaning-against-the wind channel). Another line of literature finds that a positive U.S. monetary policy shock might increase vulnerabilities, especially in emerging economies, since it might lead to a sudden reversal of capital flows (see Neumeyer and Perri, 2005; Uribe and Yue, 2006, etc.). In our analysis of the drivers of capital flows and how U.S. monetary policy affects these flows, we ask which one of these effects operates or is dominant.

We find that a positive U.S. monetary policy shock reduces capital flows to foreign economies for those countries with direct exposure to the U.S. When this reduction is disorderly, it would lead to an increase in banking crises. However, if this reduction is orderly, the crisis probability can actually decrease as vulnerabilities that might have built up from low rates would ease. In our main findings, we find evidence suggesting that the former effect dominates. In particular, for those countries with direct spillovers to the U.S. the adjustment becomes disorderly and the crisis probability indeed goes up. By splitting our sample into emerging market and developed countries, we find that the increase in the probability of crisis due to direct exposures or linkages to the U.S. is more relevant for emerging market economies. Indeed, emerging market economies are prone to disorderly adjustments or sudden stops.

This paper is related to three strands of the literature: The first strand is literature on the spillover of monetary policy. As mentioned above, Rey (2015) builds on the empirical framework in Bekaert et al. (2013) and shows that U.S. monetary policy is a key driver of stock market volatility as measured by the VIX, which, in turn, is an import driver of the global financial cycle. Bruno and Shin (2015) study the relationship between capital flows and monetary policy. Additionally, Jorda et al. (2018) study the modern synchronization of global markets and its relationship to a global financial cycle. They find that global financial cycles are closely related to changes in risk premiums, with changes in U.S. monetary policy driving risk appetite and thus serving as a transmission mechanism. In this framework, the variability in exchange rate regimes among countries is one significant explanation of the differential effects of U.S. monetary policy on other countries. We contribute to this literature on global financial cycles by providing empirical evidence in support of the hypothesis that the degree of financial spillovers matters. However, we

rather argue that U.S. monetary policy affects financial stability in foreign economies only to the extent that these countries have direct exposure to the U.S. Those countries with indirect exposure do not always face an increase in their financial stability risks.

The second strand is literature on global financial crises. Prominent early examples include Demirguc-Kunt and Detragiache (1998) and Kaminsky and Reinhart (1999). Demirguc-Kunt and Detragiache (1998) consider the factors affecting the probability of banking crises for 65 countries for the period of 1980 to 1994. By constructing a data set of banking and currency crises spanning 120 years, Bordo et al. (2001) document that capital controls affect the probability of a crisis. More recently, several authors have made use of the Reinhart and Rogoff (2009) database, including Reinhart and Rogoff (2011), who focus on banking crises and relevant variables affecting their likelihood. More recent studies along the similar lines are Gourinchas and Obstfeld (2012); Schularick and Taylor (2012). Danielsson et al. (2018) show that domestic risk appetite—proxied by low financial volatility—is an important predictor of banking crises. Finally, Broner et al. (2013) look at the behavior of capital flows during business cycles and economic crisis. We contribute to this literature by examining the effect of U.S. monetary policy on global banking crises.

The third strand is the literature on the role of integration on probability of crises. In this literature, there are two opposing views on the relationship between a country's exposure to the world and whether such integration makes the country more or less prone to crises. On one hand, high integration may increase the crises probability through propagation, as the country is more exposed to shocks from abroad, as in Stiglitz (2010). In a multi-country model, Azzimonti et al. (2014) argue that government debt increases with economic integration. Therefore, a policy implication of the model is that integration increases the vulnerability to crises. On the other hand, countries that are open to international financial and trade markets could be less vulnerable to shocks, per Ayhan et al. (2006); Cavallo and Frankel (2008). Cavallo and Frankel (2008) point out that a number of channels could reduce vulnerability to crises for countries with higher trade integration. First, countries that rely more on trade would be less prone to default, as they are heavily incentivized to maintain trade. Hence, international investors would be less likely to pull out of countries with high trade integration. In addition, trade integration helps countries better absorb shocks. We contribute to this literature by

distinguishing the integration with the center country and globally. Moreover, we identify which domestic factors play an important role in determining how U.S. monetary policy affects financial stability risks for these countries.

The rest of the paper is organized as follows. Section 2 details the data we use. Section 3 describes the empirical methodology. Section 4 summarizes our results. Section 5 offers concluding remarks.

2 Data and Descriptive Analysis

2.1 Banking crises data

For the analysis, we create an annual-level panel dataset on 69 countries spanning 1870-2010, as available. The sample includes 24 developed and 45 emerging countries (based on the IMF's classification). Appendix B lists the countries included in our sample with their coverage. We base our analysis on the systemic banking crises of Reinhart and Rogoff (2009). A crisis is defined as an event with a closure, merger, or public takeover of one or more financial institutions or large scale government assistance of a systemically important financial institution. The unbalanced panel contains a binary indicator of whether a banking crisis *starts* in a given year and country and includes 239 distinct banking crises.

Figure 1 plots the unconditional probability of banking crises for each country in our sample, defined as the number of crisis divided by the available sample period. The figure also contains the unconditional probability of banking crises for the United States, but this is for comparison purposes only, as the United States is not included in our sample. Within the developed countries, Italy has the highest annual crisis probability at 6.38%; New Zealand has the lowest, 0.96%. For emerging countries, the annual unconditional crisis probability ranges from 0% for Mauritius to 7.8% for Brazil. Given the differences in the probability of banking crises for emerging and developed countries, it is important to explore how our analysis on the likelihood of banking crises differ in these two groups of countries.

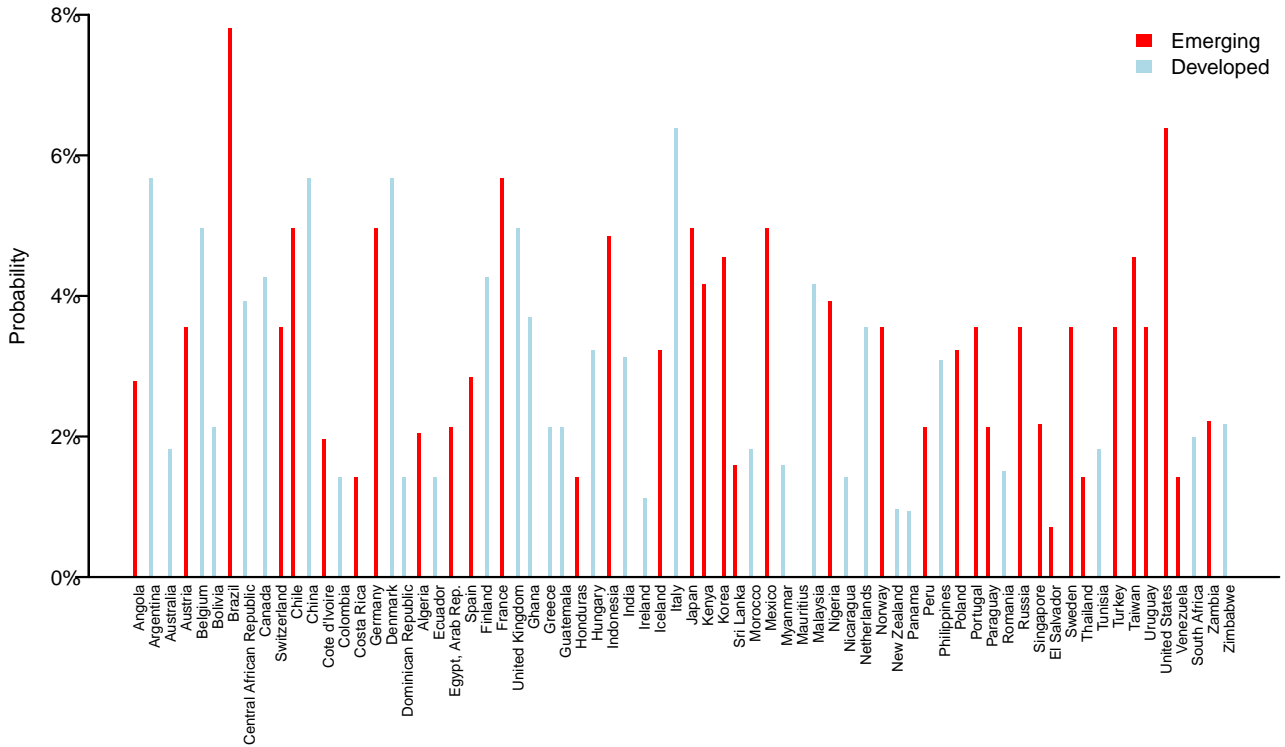


Figure 1: **Unconditional annual probability of banking crises**

The figure presents the probability of banking crises for emerging and developed countries. For a given country, the probability of a banking crisis is calculated as the number of crisis divided by the available sample period.

2.2 U.S. Monetary policy

We proxy U.S. monetary policy as the change in short term interest rates from the Jorda et al. (2017) macrohistory database. In the more recent period, it is possible to disentangle monetary policy surprises from expected changes. We pursue this approach as a robustness to our main findings. In particular, we use surprise series constructed by Gertler and Karadi (2015), Romer and Romer (2004) and Rogers et al. (2014).

Romer and Romer (2004) narratively identify changes in the federal funds rate targets surrounding FOMC meetings. By regressing these target changes on the current rate and the Greenbook forecasts for output growth and inflation in the following two quarters, they are able to separate the natural policy response of the economy from the exogenous monetary policy surprise. The residuals from this estimation can be used as a proxy for monetary policy shocks in regression analysis.

Gertler and Karadi (2015) construct a measure of monetary policy surprise using the change in high-frequency interest-rate futures, limited to a 30-minute period surrounding

the publication of a monetary policy decision. They then compute a measure of monetary policy shocks by taking the monthly average of these monetary policy surprises. Rogers et al. (2014) use a similar method to Gertler and Karadi (2015), but applied to the eurodollar contracts, where monetary policy surprises are calculated using the fourth eurodollar futures contract in a more limited time period, defined as 15 minutes prior to an FOMC announcement to 1 hour and 45 minutes after.

Table 2 Panel A presents the descriptive statistics for the monetary policy proxies. We find that all four measures of U.S. monetary policy proxies are significantly correlated with each other, with the correlation ranging from 0.52 to 0.83. Of these, the Romer and Romer (2004) shocks have the most dispersion, while the Gertler and Karadi (2015) and Rogers et al. (2014) shocks have similar and relatively small standard deviations, in addition to similar means. This is not surprising given the similarity in the way they are constructed. While our main measure of monetary policy stance has a standard deviation between those of Romer and Romer (2004), Gertler and Karadi (2015), and Rogers et al. (2014), it is the only measure of monetary policy surprise in our sample that has a positive mean.

2.3 Exposure variables

We include different exposure proxies that can be grouped into *direct exposure* and *indirect exposure* measures. Direct exposure measures include first, the ratio of a country's trade with the U.S. to its total trade. One can think of the measure as the intensity of a given country's trade with the U.S. Second, in the recent sample, we include a country's debt liabilities in USD (% of GDP) as a proxy of direct exposure with the U.S. (Lane and Shambaugh, 2010; Benetrix et al., 2015).

As indirect exposure measure, we calculate country's total exports and imports as a share of GDP (trade openness) to proxy the economic globalization of a country with the rest of the world. In the recent sample, we also include the capital account openness index of Chinn and Ito (2006).

Table 2, Panel B, columns 1 to 3 list the summary statistics of the exposure variables for the whole sample as well as for the developed and emerging economies. Developed

countries on average are more globally integrated than emerging countries, irrespective of the way we measure. For emerging countries, trade intensity is more widely dispersed than for developed ones. With regards to economic integration, emerging countries have a much smaller standard deviation than developed ones.

Both trade intensity and trade openness can endogenously affect the macroeconomic outlook and financial stability of a country. To address this, we use gravity estimates to construct instrumental variables for trade intensity and openness, following the methodology first introduced by Frankel and Romer (1999). To this end, we instrument a country's bilateral trade by means of its distance (to its partners), population, common language, land-border, land-area, and landlocked status. Gravity estimates are expected to be good instrumental variables because they are based on variables that are plausibly exogenous and yet highly correlated with a country's overall trade.

To estimate gravity instruments for the trade intensity of a country with U.S., for each year t , we first run the following regressions:

$$\begin{aligned} \log(T_{i,US}/T_i) &= c + \beta_1 \log distw_{i,US} + \beta_2 pop_{US} + \beta_3 comlang_{i,US} + \beta_4 border_{i,US} \\ &+ \beta_5 areap_{i,US} + \beta_6 landlocked_i + \beta_7 colony_i + \varepsilon_{i,US} \end{aligned} \quad (1)$$

$T_{i,US}$ is the total trade of country i with the U.S. T_i is the total trade with the whole trade partners. pop_{US} is the population of U.S., $\log dist_{i,US}$ is the log of the weighted-distance between the economic centers of the two countries, $comlang_{i,US}$ is a dummy variable that takes value 1 if i and U.S. share the same ethnic common language, and is 0 otherwise; $border_{i,US}$ is a dummy variable that takes value 1 if the two countries share a border and is 0 otherwise; $areap_{i,US}$ is the log of the product of the areas (in km^2) of countries i and U.S., $landlock_i$ equals to 1 if i is landlocked (i.e., entirely enclosed by land), and 0 otherwise, and finally $colony_i$ takes the value 1 if the country has ever had a colonial link with the U.S. and 0 otherwise.

Similarly, following Cavallo and Frankel (2008), we run the following regression to estimate the gravity of trade openness:

$$\begin{aligned} \log(T_{i,j}/GDP_i) &= c + \beta_1 \log dist_{i,j} + \beta_2 pop_j + \beta_3 comlang_{i,j} + \beta_4 border_{i,j} \\ &+ \beta_5 areap_{i,j} + \beta_6 landlocked_{i,j} + \beta_7 colony_{i,j} + \varepsilon_{i,j} \end{aligned} \quad (2)$$

where, $T_{i,j}$ is the bilateral trade value between countries i and j and GDP_i is the real GDP level of country i . $landlock_{i,j}$ equals to 2 if both i and j are landlocked (i.e., entirely enclosed by land), 1 if either i or j are landlocked, and 0 otherwise.

The gravity estimates (or predicted trade to GDP ratios used in the regressions) are then calculated as the exponential of the fitted values, summing across bilateral trading partners j . For the sake of brevity, we do not present the estimates for the gravity equations 1 and 2.

2.4 Control variables

While testing the effects of monetary policy decisions on crises, we include a number of variables known to be predictors of crises as control variables. We first include per-capita gross domestic product growth (ΔGDP). Second, inflation affects the likelihood of a financial crisis (see e.g., Demirguc-Kunt and Detragiache, 1998). We calculate inflation as the annual percentage change in the consumer price index. Lastly, to control for institutional quality, which can affect political and macroeconomic stability (see, e.g., Cerra and Saxena, 2008), we use the POLCOMP variable from the Polity IV Project database as a proxy for institutional quality.²

Table 2, Panel B, Columns 4 through 7 detail selected descriptive statistics for the control variables. Most notably, developed countries have much higher institutional quality and much lower inflation than their emerging counterparts. In addition, the variability

²Local monetary policy decisions and changes in the exchange rates are also expected to affect the economic and financial conditions. However, historical coverage for both series for many of the countries are poor. When we include changes in the short-term interest rates and exchange rate in our baseline specification, the sample size shrinks by three quarters, hence we do not include these local variables in our main regressions and instead present them as part of robustness analysis in section 4.4.

of GDP growth and variability of inflation are also low for developed countries relative to emerging markets.

3 Empirical Methodology

We hypothesize that U.S. monetary policy affects a country’s financial system to the extent that the country is exposed to the U.S. To test this hypothesis, for country i and year t , we estimate the following logit-panel regressions:

$$\begin{aligned} \text{logit}(C_{i,t}) &= \beta_1 \text{Exposure}_{i,t} + \beta_2 \text{Exposure}_{i,t} \times MP_t + \beta_3 \text{Exposure}_{i,t-1} \times MP_{t-1} \\ &+ \gamma_1 \times X_{i,t} + \gamma_2 \times X_{i,t-1} + \eta_i + \nu_t + \varepsilon_{i,t}, \end{aligned} \quad (3)$$

where $\text{logit}(C) = \log(C/(1 - C))$ is the log of the odds ratio of the binary crisis indicator $C_{i,t}$ (defined as (Reinhart and Rogoff, 2009)’s systemic banking crises) Exposure is the measure of a country’s exposure to the U.S. and the world, introduced in Section (2), and MP is the U.S. monetary policy (defined as the change in US 3-month Treasury yields). X are the control variables, namely: inflation rate, GDP growth rate, and political competition. η_i and ν_t are cross-sectional and time-series fixed effects, respectively. Throughout the analysis, we dually cluster standard errors both at the country and year levels to address possible time-series and cross-country correlation of residuals.

4 Results

This section first establishes how U.S. monetary policy affects banking crises and how the nature of linkages affects these results. Subsequently we provide some evidence on the transmission mechanisms, and explore the robustness of our results in various dimensions.

4.1 Effects of U.S. Monetary Policy on Banking Crises

Table 3 shows our main panel-logit regression results with the historical data. Column I shows the effect of the interaction of monetary policy with direct exposure measures of

trade intensity. This column shows that U.S. monetary policy tightening has a positive and statistically significant effect on probability of banking crises for those countries that have direct trade linkages with the U.S. The estimated marginal effects (MEs) show that the impact of U.S. monetary policy on the probability of crisis is economically meaningful: a 1 % tightening in monetary policy increases the probability of crises by 0.998-6.825% for a given level of direct exposure to the U.S. Column II uses the gravity instrument for the trade intensity to correct potential endogeneity that occurs when using trade intensity as the dependent variable. In Column II, the contemporaneous interaction term for U.S. monetary policy with the exposure variable remains positive and becomes more significant both statistically and economically.

As we formally explore below, when U.S. monetary policy tightens, foreign countries could experience capital outflows, leading to an adjustment in external accounts and domestic vulnerabilities. If this correction is sudden, and sizable, it might lead to a sudden stop. Indeed the countries that have direct exposure to the U.S. appear to be more prone sudden stops, hence for these countries, the probability of banking crises go up.

Columns III and IV explore the role of U.S. monetary policy for those countries that are open but do not necessarily have direct exposure to the U.S. We measure the openness using the trade openness indicator (in column III) and its gravity instrument (in column IV). For those countries without direct exposure to the U.S., the role of U.S. monetary policy is ambiguous. In column III, the coefficient for the contemporaneous interaction term is negative and statistically significant, suggesting that the contemporaneous rate changes for these countries might decrease the probability of banking crises. Our interpretation of this result is that, for these countries, openness helps with diversification, and these countries might be the immediate beneficiaries of the funds outflowing from those other countries which have direct exposure with the U.S. In addition, even if these countries are not the direct beneficiaries of capital flowing out of countries that have direct exposure to the U.S., a more orderly reversal of capital flows might help correct imbalances that might have accumulated in the run-up period. With an orderly correction of imbalances, the probability of banking crises drops. However, the significant relationship we find for the U.S. monetary policy and the probability of banking crises

for these countries in column III disappears when we control the endogeneity for trade openness indicator.³ In particular, in column IV, the interaction term for the monetary policy and exposure variable becomes insignificant.

Our control variables have the right sign. Higher GDP growth has a negative coefficient, suggesting higher growth reduces the probability of banking crises. Higher institutional quality of a country (POLCOMP) lowers the probability of a banking crisis (albeit not significant). It could be that governance is better for countries with better quality scores, where it is more difficult for politicians to distort bank lending decisions.

4.2 Transmission Mechanisms

Our results so far show that U.S. monetary policy shocks affect the likelihood of banking crises in foreign countries, to the extent that these countries have direct links to the U.S. economy. In this section, we explore possible mechanisms as to why monetary policy shocks may lead to financial instability.

U.S. monetary policy may affect other countries through capital flows, credit growth, and bank leverages. Since U.S. monetary policy stance affects relative return on investment in foreign economies, the US monetary policy may affect credit flows across countries. A negative monetary policy shock or a loosening stance of U.S. monetary policy can lead to a credit boom in foreign economies since it is likely that capital would flow out of the U.S. due to increase in reach-for-yield incentives. With large capital inflows to these countries, the quality of loans gets poor (Greenwood and Hanson, 2013), which eventually increases the likelihood of a banking crisis. Schularick and Taylor (2012) and Baron and Xiong (2017) find that excessive lending adversely affects the likelihood of banking crises and bank equity crash risk, respectively. A positive monetary policy shock or a tightening of the stance of U.S. monetary policy can lead to reversal of capital flows. If the correction in capital flows becomes sudden and disorderly, it can lead to an increase in the probability of banking crises (see Neumeyer and Perri, 2005; Uribe and Yue, 2006, among others).

³As Frankel and Romer (1999) show, the trade openness indicator might be subject to endogeneity, and the gravity estimates would serve as a more robust instrument for the degree of openness.

To examine if U.S. monetary policy tightening could cause a reversal of capital flows in foreign economies, we run the following regression

$$\begin{aligned} \Delta CF_{i,t} = & \beta_1 \text{Exposure}_{i,t} + \beta_2 \text{Exposure}_{i,t} \times MP_t + \beta_3 \text{Exposure}_{i,t-1} \times MP_{t-1} \\ & + \gamma_1 \Delta CF_{i,t-1} + \gamma_2 \times X_{i,t} + \gamma_3 \times X_{i,t-1} + \eta_i + \nu_t + \varepsilon_{i,t}, \end{aligned} \quad (4)$$

where, $\Delta CF_{i,t}$ is the logged-total portfolio investment flows (% of GDP) for country i in year t . We include all of the control variables introduced in (3). In addition, we control for the change in domestic interest rates to account for the local monetary policy decisions. In addition, as the sample covers only post 1970s, we can use two additional exposure measures, which are not available at our original historical sample period. The first one is the difference between the debt liabilities and debt assets denominated in U.S. dollar, and the second one is the capital account openness.

We consider countries with dollar denominated liabilities as having direct exposures to U.S. monetary policy, since changes in U.S. monetary policy directly affects the debt servicing costs. As thoroughly discussed in the literature (See Calvo, 2002; Choi and Cook, 2004; Mendoza, 2002, , among others), liability dollarization is a significant source of financial stability risk. Because when dollar denominated liabilities are financed by income derived in local currency, any changes in exchange rate fluctuations would make the debt servicing cost higher. When U.S. monetary policy tightens, the cost of holding dollar-denominated debt for foreign economies rises through two channels. First, the rate at which the borrowers roll over their debt would be higher. Second, a higher U.S. monetary policy rate would drive up the value of the dollar relative to other currencies. We consider with more open capital accounts as being globally integrated but not necessarily having direct exposure with the U.S. Therefore, we consider capital account openness as an indirect exposure measure.

Table 4 shows that the interaction term is negative and significant for the direct exposure measures and but insignificant for indirect exposure measures. That is, a positive shock to, or a tightening stance in, the U.S. monetary policy is followed by reduction in capital flows to these countries only if the country has direct economic exposure to the U.S. However, if the country is globally integrated, then the effect of U.S. monetary policy is ambiguous. This finding suggests that when U.S. monetary policy tightens, the

countries with direct exposure to the U.S. will face capital outflows. If the outflows are disorderly (e.g., sudden stops), probability of banking crises increases.

4.3 Monetary policy surprises and crises

The literature has offered various proxies for monetary policy. To explore the effects of policy surprises, rather than changes in the decisions, in Table 3, we use the monetary policy surprise series constructed by Gertler and Karadi (2015), Romer and Romer (2004) and Rogers et al. (2014). These indicators of monetary policy surprises, however, are available only for the more recent period, hence we have to restrict our sample in these regressions to 1990–2010 period.

Table 5 shows that our main findings in the historical sample hold with trade intensity with the U.S. and trade integration globally with all three versions of monetary policy shocks (see columns I-VI and X-XV). In these regressions we can use two additional exposure variables: dollar denominated liabilities, as a proxy for direct exposure, and Chinn-Ito’s capital account openness indicator, as a proxy for indirect exposure.

With dollar denominated liabilities being the exposure variable, we find that the U.S. monetary policy shocks increase the probability of banking crises for countries that hold more dollar-denominated liabilities. This finding is statistically significant with the GK shocks (see columns VII to IX), and reinforces our earlier finding that U.S. monetary policy would increase the probability of banking crises only to the extent that countries have direct exposure to the U.S.

With Chinn-Ito index being the exposure variable, we find that the U.S. monetary policy shocks has a negative effect but this effect is statistically significant only with the RSW shocks (see columns XIX to XXI). This finding is also reinforces our earlier finding that U.S. monetary policy does not increase the probability of banking crises for those countries without direct exposure to the U.S.

Our results in this section provide evidence that U.S. monetary policy shocks lead to a contemporaneous increase in probability of banking crises for only for those countries with a direct exposure to the U.S. For other countries with indirect exposure, the effect

of monetary policy shocks are ambiguous—point to a reduction in probability of banking crises with some exposure measures and point to an ambiguous effect with some other exposure measures.

4.4 Robustness

We examine the robustness of our findings in two main dimensions. First, we look at subsamples. Second, we examine alternative econometric specifications and alternative data. In the interest of space, we exclusively present robustness results for our regression results for the gravity instrument for trade intensity, e.g., our main direct exposure variable shown in column II of Table 3, and leave robustness for all the other columns to an online appendix.

Table 7 shows our results with different subsamples. In particular, we look at post-WWII period (column II), a sample that excludes major crises events (the Great Depression and the Great Recession) and war periods, both WWI and WWII (column III), a sample with emerging markets only (column IV), a sample with developed countries only (column V), and a sample controlling for countries that anchor their exchange rates to the U.S. dollar (column VI). In all these subsamples, the interaction variable for U.S. monetary policy and exposure variable remains positive and statistically significant, with the exception of the sample for developed countries. This finding suggests that the effect of U.S. monetary policy on probability of banking crises (due to increased risk of sudden stops) is mainly an emerging market phenomena. It is also worth highlighting the results with exchange rate anchors. In this column, we add the contemporaneous and lagged interaction of U.S. monetary policy with a dummy of anchors taking a value of 1 if the country anchors its exchange rate to the U.S. dollar, and 0, otherwise. We find that the U.S. monetary policy has a positive effect on the probability of banking crises for those countries that anchor their exchange rate to the dollar. However, even controlling for this effect, U.S. monetary policy continues to play a significant role for the probability of banking crises for countries with direct exposure to the U.S. that *do not* anchor their currency to the dollar.

In Table 6, we present additional robustness analyses with alternative econometric specifications and alternative data. In columns II and III, we examine the robustness of our findings with the use of simple OLS and probit regressions, respectively. In column IV, we investigate whether our results are sensitive to the inclusion of local monetary policy changes and changes in the exchange rates. Local monetary policy decisions, not only the U.S. monetary policy ones, are expected to affect the economic conditions. We proxy local monetary policy changes as the changes in the short-term local interest rates.

In column V, we test the sensitivity of our findings by considering alternative crisis databases. Our motivation in doing this is to see if our results are sensitive to the critiques raised in the literature see, e.g., Romer and Romer, 2015 regarding Reinhart and Rogoff (2009). In particular, following Danielsson et al. (2018) we merged the databases of Bordo et al. (2001); Laeven and Valencia (2012); Gourinchas and Obstfeld (2012); Schularick and Taylor (2012) with that of Reinhart and Rogoff (2009) for banking by using consistent definitions of crises and use it as the dependent variable. Finally, we re-estimate the baseline equation with non-winsorized variables (column VI).

Overall, we find that the results are qualitatively similar under the various robustness checks. There are small changes in different specifications, but the main conclusions hold.

5 Conclusion

In this paper we examine the role of U.S. monetary policy in global financial stability using data on systemic banking crises and other indicators of financial vulnerability. We find that positive U.S. monetary policy shocks leads to an increase in banking crises for those countries with direct linkages to the U.S., either in the form of trade links or significant share of USD-denominated liabilities. However, if a county is integrated globally, rather than having a direct exposure to the U.S., the effects of U.S. monetary policy shocks is ambiguous. These results offer a useful policy implication. To reduce vulnerability to U.S. monetary policy decisions, countries could diversify their global trade exposure and also reduce their dependence on dollar-denominated debt.

References

- Adrian, T. and N. Liang (2018). Monetary policy, financial conditions, and financial stability. *International Journal of Central Banking* 14, 73–131.
- Ayhan, K. M., P. E. S., and M. E. Terrones (2006). How do trade and financial integration affect the relationship between growth and volatility. *Journal of International Economics* 69(1), 176–202.
- Azzimonti, M., E. de Francisco, and V. Quadrini (2014). Financial globalization, inequality, and the rising public debt. *American Economic Review* 104, 2267–2302.
- Baron, M. and W. Xiong (2017). Credit expansion and neglected crash risk. *Quarterly Journal of Economics* 132, 713–764.
- Bekaert, G., M. Hoerova, and M. L. Duca (2013). Risk, uncertainty and monetary policy. *Journal of Monetary Economics* 60(7), 771 – 788.
- Benetrix, A. S., J. C. Shambaugh, and P. R. Lane (2015). Financial exchange rates and international currency exposures. *American Economic Review* 100, 518–540.
- Bernanke, B. S. and K. N. Kuttner (2005). What explains the stock market’s reaction to federal reserve policy? *Journal of Finance* 60, 1221–1257.
- Bordo, M., B. Eichengreen, D. Klingebiel, S. M. Martinez-Peria, and A. K. Rose (2001). Is the crisis problem growing more severe? *Economic Policy* 24, 51–82.
- Broner, F., T. Didier, A. Erce, and S. L. Schmukler (2013). Gross capital flows: Dynamics and crises. *Journal of Monetary Economics* 60(1), 113–133.
- Bruno, V. and H. S. Shin (2015). Cross-Border Banking and Global Liquidity. *Review of Economic Studies* 82(2), 535–564.
- Calvo, G. (2002). On dollarization. *Economics of Transition* 10, 393–403.
- Cavallo, E. and J. Frankel (2008). Does openness to trade make countries less vulnerable to sudden stops? using gravity to establish causality. *Journal of International Money and Finance* 27, 1530–1452.

- Chinn, M. D. and H. Ito (2006). What matters for financial development? capital controls, institutions, and interactions. *Journal of Development Economics* 81, 163–192.
- Choi, W. and D. Cook (2004). Liability dollarization and the bank balance sheet channel. *Journal of International Economics* 64, 247–275.
- Danielsson, J., M. Valenzuela, and I. Zer (2018). Learning from history: Volatility and financial crises. *Review of Financial Studies* forthcoming.
- Demirguc-Kunt, A. and E. Detragiache (1998, March). The determinants of banking crises in developing and developed countries. IMF Staff Paper.
- Frankel, J. A. and D. H. Romer (1999, June). Does trade cause growth? *American Economic Review* 89(3), 379–399.
- Gertler, M. and P. Karadi (2015). Monetary policy surprises, credit costs, and economic activity. *American Economic Journal: Macroeconomics* 7, 44–76.
- Gilchrist, S., D. Lopez-Salido, and E. Zakrajsek (2015). Monetary policy and real borrowing costs at the zero lower bound. *American Economic Journal: Macroeconomics* 7, 77—109.
- Gourinchas, P.-O. (2017). Monetary policy transmission in emerging markets: An application to Chile.
- Gourinchas, P.-O. and M. Obstfeld (2012). Stories of the twentieth century for the twenty-first. *American Economic Journal: Macroeconomics* 8, S85–S118.
- Greenwood, R. and S. G. Hanson (2013). Issuer quality and corporate bond returns. *Review of Financial Studies* 26, 1483–1525.
- Ilzetki, E., C. M. Reinhart, and K. S. Rogoff (2017). Exchange arrangements entering the 21st century: Which anchor will hold? (23134).
- Jorda, O., M. Schularick, and A. M. Taylor (2017). Macrofinancial history and the new business cycle facts. *NBER Macroeconomics Annual* 2016 31.
- Jorda, O., M. Schularick, A. M. Taylor, and F. Ward (2018, June). Global financial cycles and risk premiums. (24677).

- Kaminsky, G. and C. Reinhart (1999). The twin crises: The causes of banking and balance-of-payments problems. *American Economic Review* 89, 473–500.
- Laeven, L. and F. Valencia (2012). Systemic banking crises database : An update. IMF Working Paper No. 12/163.
- Lane, P. R. and J. C. Shambaugh (2010). Financial exchange rates and international currency exposures. *American Economic Review* 100, 518–540.
- Mayer, T. and S. Zignago (2011). Notes on cepii’s distances measures: The geodist database. Technical Report 2011-25, CEPII.
- Mendoza, E. G. (2002). Credit, prices, and crashes: Business cycles with a sudden stop. In *Preventing Currency Crises in Emerging Markets*, pp. 103–148. University of Chicago Press.
- Neumeyer, P. A. and F. Perri (2005). Business cycles in emerging economies: the role of interest rates. *Journal of Monetary Economics* 52, 345–380.
- Reinhart, C. M. and K. S. Rogoff (2009). *This Time is Different: Eight Centuries of Financial Folly*. Princeton University Press.
- Reinhart, C. M. and K. S. Rogoff (2011). From financial crash to debt crisis. *American Economic Review* 101, 1676–1706.
- Rey, H. (2015, May). Dilemma not trilemma: The global financial cycle and monetary policy independence. Working Paper 21162, National Bureau of Economic Research.
- Rogers, J. H., C. Scotti, and J. H. Wright (2014). Evaluating asset-market effects of unconventional monetary policy: a multi-country review. *Economic Policy* 29, 749–799.
- Romer, C. D. and D. H. Romer (2004). A new measure of monetary shocks: Derivation and implications. *American Economic Review* 94, 1055–1084.
- Romer, C. D. and D. H. Romer (2015). New evidence on the impact of financial crises in advanced countries. (21021).

- Schularick, M. and A. Taylor (2012). Credit booms gone bust: Monetary policy, leverage cycles, and financial crises, 1870–2008. *American Economic Review* 102, 1029–1061.
- Stiglitz, J. E. (2010). Risk and global economic architecture: Why full financial integration may be undesirable. *American Economic Review* 100(2), 388–392.
- Uribe, M. and V. Yue (2006). Country spreads and emerging countries: Who drives whom? *Journal of International Economics* 69(1), 6–36.

6 Appendix A: Definition of variables

6.1 Monetary policy shocks

- MP: US monetary policy change, defined as the percentage change in US short-term interest rates from the Jorda et al. (2017) macrohistory database.
- GK: US monetary policy shocks introduced in Gertler and Karadi (2015), and defined as the surprises in the three months ahead federal funds rate futures.
- RSW: US monetary policy shocks introduced in Rogers et al. (2014), and constructed through the surprises on the six-month Euro-Dollar contracts.
- RR: US monetary policy shocks introduced in Romer and Romer (2004). The authors use the FED Greenbook forecasts of output growth and inflation along with the fed-funds rates to estimate shocks.

6.2 Exposure variables

- UStradeIntensity: Trade intensity to US, calculated as total trade to US divided by total trades of the country. Data is from COW trade project.
- Gravity–UStradeIntensity: The instrument of trade intensity, introduced in 1.
- Debt_in_USD: Debt liabilities minus debt assets in USD (% of GDP) in log terms, constructed by using data from the IMF’s Coordinated Portfolio Investment Survey (CPIS) and the BIS locational banking statistics as detailed by Lane and Shambaugh (2010); Benetrix et al. (2015).
- EconInteg: Economic integration, calculated as a country’s total exports and imports as a % of GDP (trade openness). Trade data is from COW trade project and GDP data is from Maddison project.
- Gravity–EconInteg: The instrument of trade openness, introduced in 2.
- KAOPEN: The Chinn-Ito financial openness index. It measures a country’s degree of capital account openness, introduced in Chinn and Ito (2006). KAOPEN is based

on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

6.3 Control variables

- **GDPgrowth**: Real GDP per capita growth rate. Data from the Maddison project.
- **INF**: Inflation rate calculated as the annual percentage change of the CPI index. Data from the Global Financial Data.
- **POLCOMP**: Political competition as a proxy for institutional quality. Data is from the Polity IV Project database. POLCOMP is the combination of the degree of institutionalization or regulation of political competition and the extent of government restriction on political competition. The higher the value of the POLCOMP, the better the institution quality of a given country.
- $\Delta \text{INT_RATES}$: Change in local 3-month Treasury yields. Used as a proxy for the local monetary policy surprises. Data from the Global Financial Data.
- ΔXR : The change in the exchange rate of the local currency to the dollar, from Global Financial Data.
- **ANCHOR**: A dummy variable equal to 1 if a country's currency is pegged to the U.S. Dollar in year t and 0 otherwise. Data from Ilzetzki et al. (2017).
- **Gravity variables**
 - *areap* is the log of the product of the areas in km² of two countries. Data is from the GeoDist database–CEPII (Mayer and Zignago, 2011)
 - $T_{i,j}$ is the bilateral trade value between countries i and j . Data is from the COW project
 - *pop* is the population of a country. Data from the Maddison project
 - *distw* is the bilateral distances between the biggest cities of two countries, those inter-city distances being weighted by the share of the city in the overall country's population (see Mayer and Zignago, 2011, for details).

- *areap* is the log of the product of the areas (in squared kilometers) of countries *i* and U.S.
- *comlang* is equals to 1 if the countries share the same official language and 0 otherwise
- *border* if equals to 1 if the countries share a border and 0 otherwise
- *landlocked* equals to 1 if the local country is landlocked (i.e., entirely enclosed by land) and 0 otherwise
- *colony* equals 1 if the countries have ever had a colonial link with the U.S

7 Appendix B: Sample details

Table 1: This table lists the countries in our sample and sample coverage, divided into panels by IMF Classification.

Panel A: Developed Countries					
Country	Coverage	Country	Coverage	Country	Coverage
Australia	1901-2010	France	1870-2010	Norway	1870-2010
Austria	1870-2010	Greece	1870-2010	New Zealand	1907-2010
Belgium	1870-2010	Ireland	1922-2010	Portugal	1870-2010
Canada	1870-2010	Iceland	1918-2010	Singapore	1965-2010
Switzerland	1870-2010	Italy	1870-2010	Spain	1870-2010
Germany	1870-2010	Japan	1870-2010	Sweden	1870-2010
Denmark	1870-2010	Korea	1945-2010	Taiwan	1945-2010
Finland	1917-2010	Netherlands	1870-2010	United Kingdom	1870-2010
Panel B: Emerging Countries					
Country	Coverage	Country	Coverage	Country	Coverage
Algeria	1962-2010	Guatemala	1870-2010	Philippines	1946-2010
Angola	1975-2010	Honduras	1870-2010	Poland	1918-2010
Argentina	1870-2010	Hungary	1918-2010	Paraguay	1870-2010
Bolivia	1870-2010	Indonesia	1949-2010	Romania	1878-2010
Brazil	1870-2010	India	1947-2010	Russia	1870-2010
Central African Republic	1960-2010	Kenya	1963-2010	El Salvador	1870-2010
Chile	1870-2010	Morocco	1956-2010	South Africa	1910-2010
China	1870-2010	Mexico	1870-2010	Sri Lanka	1948-2010
Cote d'Ivoire	1960-2010	Myanmar	1948-2010	Thailand	1870-2010
Colombia	1870-2010	Mauritius	1968-2010	Tunisia	1956-2010
Costa Rica	1870-2010	Malaysia	1963-2010	Turkey	1870-2010
Dominican Republic	1870-2010	Nigeria	1960-2010	Uruguay	1870-2010
Ecuador	1870-2010	Nicaragua	1870-2010	Venezuela	1870-2010
Egypt, Arab Rep.	1870-2010	Panama	1903-2010	Zambia	1966-2010
Ghana	1957-2010	Peru	1870-2010	Zimbabwe	1965-2010

Table 2: Selected Descriptive Statistics

Panel A		MP	GK	RSW	RR
MP Shocks					
Average	0.000	-0.158	-0.090	-0.030	
Std. Dev.	0.013	0.289	0.235	1.102	
Obs.	8400	1610	2170	2730	

Panel B		UStadeIntensity	EconInteg	Debt_in_USD	KAOpen	CapFlows	GDPgrowth	POLCOMP	INF	Δ IntRates	Δ XR
Whole	Average	0.197	1.852	2.671	0.240	0.086	0.020	6.182	8.068	-0.285	1.184
	Std. Dev.	0.192	3.055	0.973	1.593	1.171	0.051	3.339	14.810	4.349	7.564
	Obs.	6134	5790	1101	2821	808	7063	7422	6077	2026	8325
Developed	Average	0.127	2.495	2.259	1.251	0.096	0.022	7.839	4.480	-0.147	0.447
	Std. Dev.	0.127	4.010	0.943	1.336	0.998	0.048	3.171	8.877	1.786	4.878
	Obs.	2442	2428	334	1003	560	3051	2787	2915	1119	3293
Emerging	Average	0.244	1.387	2.851	-0.317	0.063	0.019	5.187	11.375	-0.456	1.667
	Std. Dev.	0.212	1.986	0.931	1.442	1.491	0.054	3.028	18.060	6.187	8.861
	Obs.	3692	3362	767	1818	248	4012	4635	3162	907	5032

This table shows the average, standard deviation, and number of observations for the data we use in the regressions. Panel A highlights monetary policy change or surprise measures, which represent U.S. monetary policy and do not vary by country. Panel B gives descriptive statistics for variables used as measures of exposure and controls, which do vary by country. Variable definitions are given in Appendix A.

Table 3: Role of US Monetary Policy in Financial Crises: Historical Sample

$Y : C_{i,t}$	I	II	III	IV
Exp:	UStradeIntensity	Gravity–UStradeIntensity	EconInteg	Gravity
$Exp_{i,t}$	0.33 (0.329)	-3.45** (1.351)	-0.26 (0.259)	-4.91* (2.816)
$(Exp*MP)_{i,t}$	23.68** (11.930)	162.88*** (55.724)	-29.61*** (8.766)	-96.94 (93.510)
$(Exp*MP)_{i,t-1}$	-10.66 (11.747)	-4.12 (56.419)	15.14 (11.181)	39.64 (63.851)
$GDPgrowth_{i,t}$	-10.84*** (2.682)	-9.63*** (2.705)	-9.86*** (2.659)	-9.48*** (2.832)
$POLCOMP_{i,t}$	-0.07 (0.075)	-0.00 (0.091)	-0.05 (0.073)	0.01 (0.092)
$INF_{i,t}$	-0.01 (0.010)	-0.00 (0.009)	-0.00 (0.009)	-0.00 (0.009)
$GDPgrowth_{i,t-1}$	0.62 (2.306)	0.08 (2.141)	0.26 (2.023)	0.15 (2.238)
$POLCOMP_{i,t-1}$	-0.00 (0.065)	-0.06 (0.078)	-0.01 (0.067)	-0.06 (0.079)
$INF_{i,t-1}$	0.01 (0.010)	0.01 (0.010)	0.01 (0.010)	0.00 (0.009)
Obs.	1,496	1,541	1,555	1,541
Pseudo R2	0.168	0.203	0.185	0.191
MFx				
$(Exp*MP)_{i,t}$	0.998	6.825	-1.216	-4.692
$(Exp*MP)_{i,t-1}$	-0.450	-0.173	0.539	2.223

The table shows the estimated coefficients of the panel-logit regressions introduced in (3). The dependent variable is a dummy variable that equals to 1 at the beginning year of a systemic banking crises, defined in Reinhart and Rogoff (2009). MP is the U.S. monetary policy shocks, defined as the percentage change in US 3-month Treasury yields. The exposure variable used (Exp) is listed at the column header. UStradeIntensity is a country's total trade to U.S. divided by its total trades. Gravity–UStradeIntensity is the instrument of trade intensity, introduced in 1. EconInteg is economic integration proxied by the trade openness (exports+imports as a ratio of GDP), Gravity is the instrumented trade measure as introduced in 2. GDPgrowth is the GDP growth rate, POLCOMP is the degree of political competition, and INF is the annual inflation rate. All of the specifications include country fixed effects and time trend, where the estimated coefficients are omitted for the sake of brevity. The panel covers 69 countries and spans 1870–2010. The standard errors, reported in parentheses, are robust and dually clustered at the year and country level. Estimated marginal effects of the interaction term and lagged interaction term are reported in the last two rows.

Table 4: The Role of U.S. Monetary Policy in Net Capital Flows to Foreign Countries

$Y : CapFlows_{i,t}$	I	II	III	IV	V	VI
Exp:	USttradeIntensity	Gravity-UStradeIntensity	Debt_in_USD	EconInteg	Gravity	KAOpen
$Exp_{i,t}$	-0.51 (0.466)	0.12 (1.244)	-0.15 (0.142)	-0.10 (0.167)	-0.25 (0.905)	0.06 (0.107)
$(Exp*MP)_{i,t}$	-5.62** (2.196)	-28.96*** (5.479)	-9.68* (4.669)	-0.12 (3.108)	-8.53 (22.228)	-3.16 (2.813)
$(Exp*MP)_{i,t-1}$	0.59 (1.470)	-16.51 (17.183)	-1.59 (4.962)	1.47 (1.638)	-26.94 (22.258)	4.29 (3.367)
$CapFlows_{i,t-1}$	-0.46*** (0.075)	-0.46*** (0.067)	-0.50*** (0.080)	-0.44*** (0.071)	-0.44*** (0.061)	-0.43*** (0.072)
$GDPgrowth_{i,t}$	3.86 (2.906)	2.96 (2.804)	6.51* (3.693)	3.30 (2.993)	2.65 (2.587)	3.63 (2.590)
$POLCOMP_{i,t}$	-0.18* (0.095)	-0.18** (0.079)	-0.02 (0.194)	-0.17** (0.077)	-0.17** (0.077)	-0.18** (0.072)
$INF_{i,t}$	0.02 (0.022)	0.02 (0.018)	-0.04* (0.022)	0.02 (0.018)	0.02 (0.020)	0.02 (0.018)
$\Delta IntRates_{I,t}$	-0.02 (0.032)	-0.01 (0.029)	-0.00 (0.027)	-0.03 (0.028)	-0.02 (0.030)	-0.02 (0.029)
$GDPgrowth_{i,t-1}$	13.41*** (3.065)	12.48*** (3.607)	14.64*** (3.016)	13.95*** (3.121)	12.16*** (2.869)	13.11*** (3.056)
$POLCOMP_{i,t-1}$	0.20*** (0.067)	0.22** (0.085)	-0.09 (0.257)	0.20*** (0.067)	0.23*** (0.075)	0.18** (0.076)
$INF_{i,t-1}$	-0.01 (0.028)	-0.01 (0.020)	0.05** (0.024)	-0.01 (0.019)	-0.01 (0.022)	-0.01 (0.019)
$\Delta IntRates_{i,t-1}$	-0.01 (0.017)	-0.00 (0.014)	-0.01 (0.020)	-0.01 (0.013)	-0.01 (0.014)	-0.01 (0.015)
Obs.	446	464	229	459	464	463
R2	0.364	0.365	0.444	0.350	0.355	0.352

The table shows estimated coefficients of the panel-logit regressions introduced in Table 3, using the sample starting in 1975, as available. The dependent variable, CapFlows, is net capital inflows as a percentage of the local country's GDP, taken from the IMF Balance of Payments statistics (BPM6). The exposure variable used (Exposure) is listed at the column header, and are as introduced in Table 3 or 5. Sample includes 69 countries and spans from 1951 to 2010, as available. All of the specifications include the control variables listed in (3) with the addition of $\Delta IntRates$, which is the change in a country's short term interest rates from Global Financial Data, country fixed effects, and time trend. The standard errors, reported in parentheses, are robust and dually clustered at the year and country level.

Table 5: Role of US Monetary Policy in Financial Crises: Recent Sample

$Y : C_{i,t}$	I		II		III		IV		V		VI		VII		VIII		IX	
Exp: MP:	UStradeIntensity		Gravity-UStradeIntensity		Debt_in_USD		GK		RSW		RR		GK		RSW		RR	
	GK	RSW	RR	GK	RSW	RR	GK	RSW	RR	GK	RSW	RR	GK	RSW	RR	GK	RSW	RR
Exp _{i,t}	13.93** (5.592)	13.96** (6.561)	3.12 (3.579)	0.27 (1.240)	-0.17 (1.240)	-2.15** (1.013)	0.27 (1.240)	-0.17 (1.240)	-2.15** (1.013)	1.66* (0.880)	1.67** (0.828)	1.47* (0.815)	1.66* (0.880)	1.67** (0.828)	1.47* (0.815)	1.66* (0.880)	1.67** (0.828)	1.47* (0.815)
(Exp*MP) _{i,t}	8.51*** (2.240)	14.86*** (4.867)	1.04** (0.477)	1.50 (1.353)	2.66** (1.123)	1.00*** (0.386)	1.50 (1.353)	2.66** (1.123)	1.00*** (0.386)	0.73** (0.322)	0.73** (0.322)	-0.00 (0.250)	0.73** (0.322)	0.73** (0.322)	-0.00 (0.250)	0.73** (0.322)	0.73** (0.322)	-0.00 (0.250)
(Exp*MP) _{i,t-1}	-6.11*** (1.747)	-6.14*** (2.249)	-0.74 (0.621)	0.03 (1.107)	0.79 (1.062)	-0.37 (0.506)	0.03 (1.107)	0.79 (1.062)	-0.37 (0.506)	-1.31 (1.323)	-1.38 (2.109)	2.74* (1.529)	-1.31 (1.323)	-1.38 (2.109)	2.74* (1.529)	-1.31 (1.323)	-1.38 (2.109)	2.74* (1.529)
GDPgrowth _{i,t}	-13.35 (8.735)	-15.98* (8.258)	-12.29* (6.844)	-20.33*** (2.979)	-19.84*** (3.169)	-22.33*** (6.254)	-20.33*** (2.979)	-19.84*** (3.169)	-22.33*** (6.254)	-13.20 (9.847)	-13.36 (9.806)	-12.62 (15.411)	-13.20 (9.847)	-13.36 (9.806)	-12.62 (15.411)	-13.20 (9.847)	-13.36 (9.806)	-12.62 (15.411)
POLCOMP _{i,t}	-1.25*** (0.247)	-1.16*** (0.348)	-0.70*** (0.239)	-0.67*** (0.127)	-0.62*** (0.163)	-0.55** (0.230)	-0.67*** (0.127)	-0.62*** (0.163)	-0.55** (0.230)	-0.49 (0.366)	-0.49 (0.374)	-0.70** (0.338)	-0.49 (0.366)	-0.49 (0.374)	-0.70** (0.338)	-0.49 (0.366)	-0.49 (0.374)	-0.70** (0.338)
INF _{i,t}	-0.03 (0.055)	-0.03 (0.049)	-0.02 (0.048)	-0.02 (0.049)	-0.02 (0.047)	-0.01 (0.048)	-0.02 (0.049)	-0.02 (0.047)	-0.01 (0.048)	-0.03 (0.048)	-0.03 (0.047)	-0.04 (0.064)	-0.03 (0.048)	-0.03 (0.047)	-0.04 (0.064)	-0.03 (0.048)	-0.03 (0.047)	-0.04 (0.064)
ΔIntRates _{I,t}	0.04 (0.094)	0.03 (0.096)	0.05 (0.094)	0.03 (0.105)	0.03 (0.107)	0.04 (0.108)	0.03 (0.105)	0.03 (0.107)	0.04 (0.108)	0.11** (0.053)	0.11* (0.058)	0.20** (0.089)	0.11** (0.053)	0.11* (0.058)	0.20** (0.089)	0.11** (0.053)	0.11* (0.058)	0.20** (0.089)
GDPgrowth _{i,t-1}	-5.87 (12.988)	-7.08 (13.613)	-8.32 (9.268)	-6.32 (9.878)	-6.76 (10.050)	-4.69 (10.082)	-6.32 (9.878)	-6.76 (10.050)	-4.69 (10.082)	-29.94* (17.545)	-30.70* (17.719)	-33.07 (21.597)	-29.94* (17.545)	-30.70* (17.719)	-33.07 (21.597)	-29.94* (17.545)	-30.70* (17.719)	-33.07 (21.597)
POLCOMP _{i,t-1}	0.43 (0.276)	0.41 (0.337)	0.24 (0.211)	0.72*** (0.224)	0.76*** (0.196)	0.76*** (0.286)	0.72*** (0.224)	0.76*** (0.196)	0.76*** (0.286)	0.47 (0.463)	0.46 (0.433)	0.56 (0.382)	0.47 (0.463)	0.46 (0.433)	0.56 (0.382)	0.47 (0.463)	0.46 (0.433)	0.56 (0.382)
INF _{i,t-1}	0.03 (0.060)	0.02 (0.059)	0.02 (0.050)	0.02 (0.048)	0.02 (0.047)	0.02 (0.050)	0.02 (0.048)	0.02 (0.047)	0.02 (0.050)	0.03 (0.042)	0.03 (0.042)	0.03 (0.091)	0.03 (0.042)	0.03 (0.042)	0.03 (0.091)	0.03 (0.042)	0.03 (0.042)	0.03 (0.091)
ΔIntRates _{I,t-1}	-0.08* (0.047)	-0.07 (0.055)	-0.04 (0.036)	-0.06* (0.032)	-0.06* (0.032)	-0.06* (0.034)	-0.06* (0.032)	-0.06* (0.032)	-0.06* (0.034)	-0.11** (0.048)	-0.11** (0.049)	-0.10 (0.122)	-0.11** (0.048)	-0.11** (0.049)	-0.10 (0.122)	-0.11** (0.048)	-0.11** (0.049)	-0.10 (0.122)
Observations	235	235	235	220	220	220	220	220	220	146	146	146	146	146	146	146	146	146
Pseudo R2	0.381	0.398	0.269	0.284	0.293	0.307	0.284	0.293	0.307	0.409	0.409	0.431	0.409	0.409	0.431	0.409	0.409	0.431
MFX																		
(Exp*MP) _{i,t}	0.201	0.184	0.067	0.104	0.112	0.059	0.104	0.112	0.059	0.035	0.046	-0.001	0.035	0.046	-0.001	0.035	0.046	-0.001
(Exp*MP) _{i,t-1}	-0.145	-0.064	-0.048	0.002	0.044	-0.022	0.002	0.044	-0.022	-0.063	-0.062	0.060	-0.063	-0.062	0.060	-0.063	-0.062	0.060

The table shows estimated coefficients of the panel-logit regressions introduced in (3), using the sample after 1990. The dependent variable is a dummy variable that equals to 1 at the beginning year of a systemic banking crises, defined in Reinhart and Rogoff (2009). The exposure variable used (Exposure) is listed at the column header as well as the definition of the monetary policy shocks. GK, RSW, and RR are the shocks defined by Gertler and Karadi (2015); Rogers et al. (2014); Romer and Romer (2004), respectively. Debt_in_USD is countries' debt liabilities minus debt assets in USD (% of GDP), introduced in Lane and Shambaugh (2010). KAOPEX is the Chinn-Ito Index openness index. The rest of the variables are introduced in Table 3. Sample includes 69 countries and spans from 1990 to 2010, as available. All of the specifications include the control variables listed in (3), country fixed effects, and time trend. The standard errors, reported in parentheses, are robust and dually clustered at the year and country level. Estimated marginal effects of the interaction term and the lagged interaction term are reported in the last two rows.

Table 5: Role of US Monetary Policy on Financial Crises: Recent Sample (Cont.)

$Y : C_{i,t}$	X	XI	XII	XIII	XIV	XV	XIX	XX	XXI
Exp: MP:	GK	Econ Integ RSW	RR	GK	Gravity RSW	RR	GK	KAOpen RSW	RR
$Exp_{i,t}$	2.21** (0.870)	1.37** (0.651)	0.49 (1.784)	-19.57*** (6.847)	-16.88*** (6.369)	-12.50* (6.505)	0.09 (0.868)	-0.54 (0.870)	0.01 (0.832)
$(Exp*MP)_{i,t}$	-1.24* (0.657)	-3.26* (1.741)	-0.95* (0.510)	-21.57*** (8.184)	-33.22*** (14.773)	-2.43 (4.439)	-0.24 (0.766)	-2.33* (1.256)	-0.71 (0.536)
$(Exp*MP)_{i,t-1}$	1.90 (2.010)	2.18 (3.572)	0.54 (0.549)	19.55*** (6.681)	22.88** (10.914)	1.78 (2.672)	0.15 (0.850)	-1.41 (1.577)	0.20 (0.504)
$GDPgrowth_{i,t}$	-13.82*** (3.888)	-11.84*** (4.036)	-10.68** (4.882)	-12.69*** (3.182)	-13.95*** (3.887)	-16.08*** (5.159)	-13.26*** (3.415)	-13.97*** (3.896)	-11.86*** (3.354)
$POLCOMP_{i,t}$	-0.93*** (0.342)	-0.91*** (0.344)	-0.77* (0.426)	-0.67*** (0.260)	-0.66** (0.263)	-0.52** (0.227)	-0.79*** (0.302)	-0.65** (0.268)	-0.66** (0.290)
$INF_{i,t}$	-0.02 (0.049)	-0.03 (0.047)	-0.03 (0.049)	-0.01 (0.040)	-0.01 (0.040)	-0.02 (0.043)	-0.02 (0.048)	-0.02 (0.045)	-0.03 (0.046)
$\Delta IntRates_{I,t}$	0.08 (0.106)	0.09 (0.101)	0.07 (0.094)	0.07 (0.100)	0.07 (0.103)	0.07 (0.097)	0.05 (0.093)	0.07 (0.081)	0.08 (0.082)
$GDPgrowth_{i,t-1}$	-16.44 (10.773)	-16.35 (11.709)	-12.92 (9.583)	-8.94 (10.455)	-8.89 (10.929)	-9.11 (10.629)	-7.98 (8.884)	-9.16 (8.829)	-9.81 (9.214)
$POLCOMP_{i,t-1}$	0.36 (0.231)	0.42 (0.262)	0.41 (0.360)	0.69** (0.329)	0.70** (0.341)	0.70** (0.285)	0.31 (0.209)	0.29 (0.233)	0.39 (0.260)
$INF_{i,t-1}$	0.01 (0.044)	0.01 (0.042)	0.01 (0.045)	0.01 (0.049)	0.01 (0.048)	0.02 (0.045)	0.01 (0.050)	-0.00 (0.043)	0.00 (0.044)
$\Delta IntRates_{I,t-1}$	-0.02 (0.027)	-0.03 (0.028)	-0.02 (0.032)	-0.05 (0.045)	-0.05 (0.048)	-0.05 (0.033)	-0.03 (0.021)	-0.02 (0.015)	-0.04* (0.022)
Observations	235	235	235	220	220	220	232	232	232
Pseudo R2	0.269	0.287	0.289	0.345	0.353	0.290	0.218	0.246	0.245
MFx									
$(Exp*MP)_{i,t}$	-0.087	-0.147	-0.050	-1.154	-1.437	-0.150	-0.013	-0.091	-0.052
$(Exp*MP)_{i,t-1}$	0.103	0.179	0.013	1.015	0.975	0.010	0.013	-0.004	0.020

This table is continued from the previous page.

Table 6: Robustness Regressions: Specification Analysis

$Y : C_{i,t}$	I Baseline	II OLS	III Probit	IV IntRateControl	V Merged BKCrises	VI Without winsorization
Exposure: Gravity–UStadeIntensity						
$Exp_{i,t}$	-3.45** (1.351)	-0.04* (0.025)	-1.92*** (0.527)	-3.69 (2.384)	-2.83** (1.150)	-3.49** (1.366)
$(Exp*MP)_{i,t}$	162.88*** (55.724)	4.83** (1.916)	75.25*** (23.908)	192.39** (93.560)	141.85** (56.163)	163.31*** (56.900)
$(Exp*MP)_{i,t-1}$	-4.12 (56.419)	0.43 (2.456)	-10.24 (22.637)	-95.98 (72.353)	-12.08 (55.153)	0.24 (56.967)
GDPgrowth $_{i,t}$	-9.63*** (2.705)	-0.35*** (0.095)	-5.51*** (1.085)	-13.77*** (5.141)	-9.75*** (2.581)	-8.59*** (2.702)
POLCOMP $_{i,t}$	-0.00 (0.091)	0.00 (0.004)	-0.00 (0.050)	0.10 (0.248)	-0.00 (0.083)	-0.00 (0.091)
INF $_{i,t}$	-0.00 (0.009)	0.00 (0.000)	-0.00 (0.004)	-0.03 (0.027)	-0.00 (0.009)	-0.01 (0.007)
GDPgrowth $_{i,t-1}$	0.08 (2.141)	0.00 (0.067)	-0.20 (1.096)	-5.32 (7.853)	-1.48 (2.089)	-0.09 (2.091)
POLCOMP $_{i,t-1}$	-0.06 (0.078)	-0.00 (0.004)	-0.03 (0.042)	-0.11 (0.238)	-0.08 (0.072)	-0.06 (0.078)
INF $_{i,t-1}$	0.01 (0.010)	0.00 (0.000)	0.00 (0.005)	0.03 (0.025)	0.01 (0.009)	0.01 (0.008)
$\Delta IntRates_{I,t}$				0.07 (0.049)		
$\Delta IntRates_{I,t-1}$				-0.03 (0.037)		
$\Delta ExchRates_{I,t}$				0.03 (0.034)		
$\Delta ExchRates_{I,t-1}$				0.02 (0.042)		
Observations	2,068	4,251	2,068	559	2,130	2,068
R-squared	0.203	0.154	0.205	0.217	0.204	0.200

The table shows the estimated coefficients of the panel-logit regressions in terms of modifications to Table 3. Results labeled Baseline are the same as presented in Table 3. The OLS and probit columns show the results as estimated with OLS and probit, respectively, instead of logit. The control column represents the results estimated with controls for $\Delta IntRates$, the change in local 3-month Treasury yields, and $\Delta ExchRates$, the change in the exchange rate of the local currency to the dollar, from Global Financial Data. The Merged Banking Crises column uses an alternative definition of banking crises formed by merging the systemic crises databases of Bordo et al. (2001); Laeven and Valencia (2012); Gourinchas and Obstfeld (2012); Schularick and Taylor (2012). We also show results for our main model estimated without applying winsorization.

Table 7: Robustness Regressions: Subsample Analysis

$Y : C_{i,t}$	I	II	III	IV	V	VI
Exp: Gravity-UStadeIntensity	Whole Sample	1946-2010	Without Major Crises	Emerging Economies	Developed Economies	Control for Anchor Currency
Exp _{<i>i,t</i>}	-3.45** (1.351)	-0.52 (0.709)	-3.83** (1.491)	-5.15** (2.359)	-4.14*** (1.305)	-1.53 (2.812)
(Exp*MP) _{<i>i,t</i>}	162.88*** (55.724)	38.88** (17.339)	152.64** (61.238)	243.78*** (85.801)	105.02 (90.822)	164.42** (76.902)
(Exp*MP) _{<i>i,t-1</i>}	-4.12 (56.419)	-13.43 (13.203)	-43.48 (57.339)	25.61 (76.698)	-31.82 (92.856)	-67.58 (59.193)
GDPgrowth _{<i>i,t</i>}	-9.63*** (2.705)	-17.43*** (3.808)	-10.84*** (2.944)	-12.36*** (3.448)	-4.43 (5.144)	-18.81*** (3.729)
POLCOMP _{<i>i,t</i>}	-0.00 (0.091)	-0.04 (0.095)	0.01 (0.094)	-0.04 (0.093)	0.16 (0.298)	-0.06 (0.114)
INF _{<i>i,t</i>}	-0.00 (0.009)	-0.02 (0.012)	-0.00 (0.010)	-0.01 (0.013)	-0.03 (0.029)	-0.01 (0.013)
GDPgrowth _{<i>i,t-1</i>}	0.08 (2.141)	3.32 (4.532)	-0.92 (2.350)	-1.01 (2.754)	4.29 (4.884)	4.34 (5.292)
POLCOMP _{<i>i,t-1</i>}	-0.06 (0.078)	-0.02 (0.086)	-0.05 (0.085)	-0.04 (0.073)	-0.25 (0.319)	-0.00 (0.102)
INF _{<i>i,t-1</i>}	0.01 (0.010)	0.02 (0.013)	0.01 (0.010)	0.00 (0.013)	-0.00 (0.027)	0.02 (0.012)
ANCHOR _{<i>i,t</i>}						0.69 (0.451)
(ANCHOR*MP) _{<i>i,t</i>}						40.20* (23.515)
(ANCHOR*MP) _{<i>i,t-1</i>}						7.96 (22.549)
Observations	2,068	1,541	1,875	934	620	1,513
R2	0.203	0.186	0.160	0.195	0.244	0.201

The table shows the estimated coefficients of the panel-logit regressions in terms of subsamples of Table 3 for the given exposure variable Gravity-UStadeIntensity as defined in Table 3. Variables are as defined in Table 3 and Table 5, with the addition of Anchor, which is equal to 1 if a country is pegged to the U.S. Dollar in a given year T and the interaction and lagged interaction of Anchor and MP. Results labeled whole sample are the same as presented in Table 3. Column II presents results for the model estimated just for the years 1946-2010. Column III estimates the model without the observations dating to the Great Depression or the Great Recession. Columns IV and V present estimates for developing and emerging economies, respectively. Column VI is estimated for the whole sample but with the additional Anchor and Anchor *MP controls.