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# **The International Transmission of Shocks through the Lens of Foreign Banks in Hong Kong**

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## **Abstract**

This paper studies the international transmission of shocks through the foreign bank lending channel. We find evidence that foreign banks whose parent is headquartered in a country experiencing a financial crisis significantly reduce their lending in the host country. Our results are based on studying foreign banks in Hong Kong during the 2008 US financial crisis and the 2010 European sovereign debt crisis. However, we do not find an overall decline in bank lending during the foreign crisis. Banks from crisis country with a higher deposit ratio reduced lending less. Banks from crisis country with preference for liquidity reduced lending more, consistent with liquidity hoarding during crisis.

Keywords: financial crisis, foreign banks, liquidity shock

JEL Codes: G01, G21, F65

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The transmission of shocks in the global financial system has always been an important topic in international finance. With the globalization of financial markets and increasing capital flows across countries, the international transmission of shocks is evolving over time. While shocks may take some time to materialize through trade and direct investment channels, they could have immediate and unpredictable effects through financial channels, including the banking system. A deeper understanding of the mechanics and details of the shock transmission through the banking channel would be particularly relevant to an international financial center like Hong Kong, whose financial system relies heavily on bank intermediation and is populated by a large number of foreign banks.

In this paper, we examine how two recent shocks in advanced foreign economies - namely, the 2008 U.S. financial crisis and the 2010 euro area sovereign debt crisis - were transmitted to Hong Kong through the crisis country's foreign banking organizations operating in Hong Kong. Hong Kong, being a gateway to China, is a unique financial center. Not only is its economy closely tied to the Chinese economy, Hong Kong serves as an important funding hub for Chinese companies. Given the rapid growth and resiliency of the second largest economy in the world over the last two decades, the effects of a foreign financial crisis on bank lending in Hong Kong has not been examined thoroughly. Whether the results from the large body of literature on international bank lending during a financial crisis apply to Hong Kong is an empirical question.

Our empirical strategy is to compare two groups of banks in Hong Kong: foreign banks whose home country was hit by a financial shock versus all other banks, including domestic institutions, before and after the shock using a difference-in-differences approach. The variable of interest is lending activities. To the extent that the difference-in-differences controls for the loan demand in the Hong Kong economy, this methodology uncovers the loan supply effects between crisis-country foreign banks and other banks in Hong Kong. Because the two crises being studied were associated with severe dislocations in short-term funding markets in the home country, we also investigate the interaction between liquidity and lending using a triple-difference method. The results add to the literature on the transmission mechanism of foreign crisis on host country banks' lending activities.

The literature on the transmission of shocks through the bank lending channel is well established. It includes Kashyap, Stein and Wilcox (1993), Peek and Rosengren (1997), Kashyap and Stein (2000), Paravisini (2008), Khwaja and Mian (2008), and Schnabl (2012). These papers found evidence that banks changed their loan supply in response to an exogenous shock.

Focusing on the 2008 financial crisis, Cetorelli and Goldberg (2011) studied the international shock transmission by global banks from developed-country banking systems to emerging markets using aggregate data, and found that the contraction in loan supply by foreign banks' affiliates in emerging markets as an important transmission channel. In this paper, we employ bank-level data and extend the

analysis to include the 2010 euro area sovereign debt crisis. While our results compliment theirs with respect to crisis-country foreign banks, we do not find a contraction in loan supply by non-crisis banks, including domestic banks, during the foreign crisis. This points to the resiliency of bank lending in Hong Kong, and the uniqueness of this international financial center which also plays a key funding role in the Chinese financial system. Our robustness test shows that banks in Hong Kong that were from Asian countries behaved differently than other foreign banks during the global financial crisis, suggesting the unevenness of the impact of the 2008 financial crisis on different parts of the world.

Our paper is related to Giannetti and Laeven (2012) and De Haas and Van Horen (2013), both of which studied the cross-border syndicate lending in many countries during the 2008-09 financial crisis. Besides also looking into the euro area crisis, our data include all lending by Hong Kong banks whose borrowers include households and small businesses. Our focus on total bank lending therefore speaks to the supply side effect more comprehensively.

This paper is also related to the literature on how global banks manage their worldwide operations. Cetorelli and Goldberg (2012) studied the liquidity management of U.S. global banks from the perspective of the parent company. They found that funds regularly flow between parent banks and their foreign affiliates in diverse foreign markets. They further showed that parent banks experiencing funding shocks tend to reallocate liquidity according to a location-related pecking order, which depends on the relative importance of the foreign affiliates' contributions to their parent companies' revenue stream. Buch and Goldberg (2015) conducted a meta-analysis of liquidity risk transmission through international bank lending across eleven countries, including Hong Kong. While they aimed at uncovering broad patterns of liquidity risk transmission in a multi-country setting, we are interested in the narrow transmission mechanism in Hong Kong that is specific to this unique financial center, using more comprehensive bank-level data at monthly frequency, the difference-in-differences method to control for demand factors, and the event study methodology on two financial crises.

Another closely related paper is Wong, Tsang, and Kong (2015), which provided evidence that during the financial crisis, global banks reacted to a parent-bank funding shock by repatriating funds from their Hong Kong branches through their internal capital market, and thereby transmitting global banks' liquidity shock from the home to the host country. We follow a similar line of inquiry and extend the analysis to include the euro area crisis, while using the difference-in-differences to control for demand effects. Furthermore, unlike their focus on foreign bank branches only, we include domestic banks in our analysis to allow for more broadly any substitution effects so that we can shed light on total lending activities in Hong Kong during crises and their macroeconomic implications.

The dislocations in short-term funding markets during the recent financial crises prompted researchers to study the phenomenon of liquidity hoarding. Those

studies include Heider, Hoerova and Holthausen (2009), Gale and Yorulmazer (2011), Ashcraft, McAndrews and Skeie (2011), and Acharya and Merrouche (2012). In this paper, we ask whether liquidity hoarding led to banks' heterogeneous response to lending.

Rather than focusing on the parent companies of a few global banks, our approach is to study the cross section of banks in Hong Kong whose parents are headquartered in different countries. The host country should have a vested interest in the effects of foreign shocks on foreign banks' activities in its jurisdiction, especially the lending activities in local banking markets. This is particularly relevant given that prior research points to the real effects of bank credit availability on the local economy. While quantifying the magnitude of the economic impact could be challenging, host country policymakers may want to lean against the possibility of an adverse macroeconomic shock originated from a foreign source that is transmitted through the foreign bank channel. Regarding prudential regulation, a host country may also want to guard against any adverse spillover from foreign shocks to the local banking system, for example, the implications of liquidity hoarding.

The rest of the paper is organized as follows. In the next section, we discuss foreign banks in Hong Kong and the recent financial crises originated from the United States and the euro area. Section II describes the data and summary statistics. Section III lays out our empirical strategy and the model. Section IV provides the estimation results of the baseline model and alternative specifications for robustness. Section V delves into the transmission mechanism. More robustness tests are discussed in Section VI. Section VII concludes.

## **I. Institutional and Environmental Background**

Hong Kong, a former British colony and currently a Special Administrative Region of the People's Republic of China, is a small open economy that has its own government. It is characterized by free trade, low taxation, and minimum government intervention. It is the world's 7<sup>th</sup> largest trading economy, with mainland China as its most significant trading partner. Just before the COVID-19 pandemic, Hong Kong gross domestic product (GDP) was US\$366 billion in 2019, less than 2 percent of the U.S. GDP in that year. Despite its small size, Hong Kong is an international financial center, hosting 45 of the 50 largest global banking organizations (in terms of consolidated total assets).

As of the end of 2019, there were 155 licensed banks in Hong Kong, 148 of which were headquartered in a foreign country. Seventeen of these 148 foreign banking affiliates were established as subsidiaries while the remaining 131 were branches. These foreign banking operations vary by size, complexity, and scope of activities. Some of them are active in both funding and lending activities, gathering local deposits to provide loans to local borrowers. Others tend to rely more heavily on either lending or funding in the local market, depending on the global bank's business

model.<sup>1</sup> As such, there exists a large cross sectional variation in asset and liability management of foreign bank affiliates in Hong Kong, providing a rich empirical setting to study how foreign banking operations respond to home country financial shocks in a small open economy.

The Hong Kong dollar has been pegged to the US dollar under the Linked Exchange Rate System since 1983, providing a stable local currency that has almost no exchange rate risk with the US dollar. With a stable currency, no restriction on capital flows, and strong links to mainland China and the Asia Pacific region, Hong Kong serves as both a lending and funding hub for international banks, as well as an important source of funding for Chinese companies in the mainland. The cross-border banking funds by the Hong Kong banking sector, on a net basis, rose rapidly before the 2008 financial crisis and peaked at US\$222 billion in October 2007; these cross-border funding flows were driven largely by intra-firm funding flows of globally active bank branches in Hong Kong (Hong Kong Monetary Authority 2014).

The banking system in Hong Kong has been stable and sound. In 2017, over 60 percent of total financial assets in Hong Kong was intermediated through the banking system (compared to less than 40 percent in the United States and about 40 percent in the euro area) (Financial Stability Board 2019). Many small and medium business enterprises, and households rely solely on banks as a major source of credit. Moreover, banks in Hong Kong have broad power under the so-called universal banking model, so that they can provide a portfolio of financial services to their customers, including securities brokerage, money managing, and insurance. Profitability of banks in Hong Kong has been robust, with return on equity growing to about 13 percent in 2018. Hong Kong has been an attractive market for foreign banks.

### *Foreign Financial Shocks*

Both the 2008 financial crisis, triggered by the collapse of Lehman Brothers in the United States, and the 2010 sovereign debt crisis in the euro area, were well documented.<sup>2</sup> Many global banks headquartered in the United States and the euro area established branches or subsidiaries in Hong Kong well before the onset of the crises. Despite their original source from abroad, these foreign shocks had effects on the local economy through both the real channels and the financial channels.

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<sup>1</sup> Please see Kwan, Ho, and Tan (2019), and also Box 6 “Changing business models of Hong Kong branches of US and European global banks” (pp. 81-84) in Hong Kong Monetary Authority (2013) for a description of business models of Hong Kong branches of US and European global banks.

<sup>2</sup> See, for example, the twenty-one books reviewed by Lo (2012), Financial Crisis Inquiry Commission (2011), and Gorton and Metrick (2012a, 2012b) and the references therein for the 2008 financial crisis in the United States; the special issue of the *Journal of International Money and Finance* on the European sovereign debt crisis edited by Aizerman, Hutchison, and Lothian (2013), Lane (2012), and the references therein for the euro area sovereign debt crisis.

Nevertheless, the extent to which foreign banks from the crisis country behaved differently than banks from non-crisis countries is an empirical question.

### 2008 US Financial Crisis

A prominent feature of the 2008 US financial crisis was the severe dislocation in short-term funding markets in the United States during the onset of the crisis. Figure 1 shows the spread between the three-month London interbank offered rate (LIBOR) and the US overnight indexed swap (OIS) rate, which reflects expectations of the overnight federal funds rate over the same three-month period, from 2005 to 2013. This spread measures the risk premium that banks in the Libor panel face in borrowing three-month term funds rather than overnight. Before the financial crisis, the Libor-OIS spread was negligible, implying that banks paid a very small premium in borrowing term funds versus overnight funds. When the run on the wholesale funding market started in August 2007, the Libor-OIS spread spiked up.<sup>3</sup> In response, shortly after the Federal Reserve's policymaking body, the Federal Open Market Committee (FOMC) concluded their scheduled meeting on August 7, 2007, the Federal Reserve announced on August 10 that it was providing liquidity to facilitate the orderly functioning of financial markets.

While the liquidity injection by the Federal Reserve helped market functioning, occasional flare-ups continued. Towards the end of 2007, the dislocation in short-term funding markets worsened, most likely due to heightened demand for term funds when banks prepared for their year-end financial statements. On December 17, 2007, the Federal Reserve, along with four other foreign central banks in Canada, the United Kingdom, the euro area, and Switzerland responded to the liquidity shock by announcing a number of extraordinary measures designed to address elevated pressures in short-term funding markets. In the United States, the Federal Reserve started auctioning term funds to depository institutions under the Term Auction Facility (TAF). To meet the dollar shortage overseas, the FOMC authorized temporary swap lines with the European Central Bank (ECB) and the Swiss National Bank.

The introduction of TAF provided much-needed temporary relief to the interbank funding market, and the Libor-OIS spread eased somewhat in early 2008. However, large financial institutions in the United States, especially broker-dealers which relied heavily on wholesale funding, remained under intense liquidity pressure. The financial markets weathered the forced sale of Bear Stearns in March 2008 reasonably well. In early September 2008, the placement of both Fannie Mae and

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<sup>3</sup> Although the run on the wholesale funding market began in August 2007, the buildup of financial excesses - including the credit boom, rising house prices, and expansion of wholesale funding in the so-called shadow banking system - had been happening over a number of years before the crisis. What triggered the run seemed to be the failure of a number of subprime mortgage originators in the first half of 2007 and the rapid deterioration in subprime-related security prices.

Freddie Mac into conservatorship by the U.S. Treasury pushed the U.S. financial system closer to the edge.

On September 15, 2008, Lehman Brothers filed for bankruptcy. Financial markets plummeted, and credit markets seized up. Due to the interconnectedness of large financial institutions, as well as their common exposure, the solvency of many large financial firms was in doubt. Merrill Lynch, another large broker-dealer, announced on September 15, 2008, that it was being acquired by Bank of America. AIG received emergency liquidity assistance from the Federal Reserve on the next day. The Washington Mutual Bank was closed by its regulators and announced on September 25, 2008, that it was being acquired by JP Morgan Chase. Wachovia announced on October 3, 2008, that it was being acquired by Wells Fargo.

In the empirical analysis, we assume September 2008 as the defining moment of the global financial crisis that erupted in the United States. An important feature of this crisis is that it involved very large financial institutions, many of which were global banks and active players in Hong Kong. Moreover, the run in the wholesale funding market was unprecedented and had widespread implications on global banks' liquidity management.

#### The Eurozone Sovereign Debt Crisis

The integration of European Union (EU) economies took a major step forward in 1992 by launching the Economic and Monetary Union. In 1999, the euro was launched in twelve EU countries, forming the euro zone. Without a banking union nor a fiscal union, imbalances built up in the euro area over time [Shambaugh (2012) and Lane (2012)].

In late 2009, market participants started to pay attention to Greece's slowing economy, underperforming banking system, and large fiscal imbalances. In December 2009, rating agencies downgraded Greek bank and government bonds. In January 2010, the EU condemned "severe irregularities" in Greek government accounting procedures and revised Greece's budget deficit in 2009 from 3.7 percent to 12.7 percent, more than four times the maximum allowed by EU rules. Concerns about Greece exiting the EU exploded, and the risk premium on Greece sovereign debts surged. Market participants also quickly turned their attention to other heavily indebted euro zone countries, including Portugal, Ireland, Spain, and Italy, which shared similar economic problems as Greece regarding weak banks and ballooning deficits. Risk premiums of sovereign debts from these countries rose in tandem, leading to a downward spiral in their banking systems in part due to the holding of sovereign debts by their own banks.

While the sovereign debt crisis exposed the weaknesses of the banking systems in euro zone crisis countries, it also raised doubt about the soundness of banks in non-crisis euro zone countries due to their cross border exposures. Figure 2 shows the three-month euribor-onia spread, which is a measure of the risk premium European banks faced in borrowing term funds versus overnight funds, similar to the

Libor-OIS spread in the United States. At the height of the European sovereign debt crisis, the interbank market in the euro area ceased to function properly. Nevertheless, the euribor-eonia spread suggests that the dislocation in funding markets during the European sovereign debt crisis appeared to be less severe than that during the US financial crisis.

To ease liquidity problems in the euro area, the ECB announced on December 8, 2011, that it would conduct two three-year long-term refinancing operations (LTROs), one in December 2011 and the other in February 2012. The two LTROs totaled about 1.1 trillion euros. While strong demand reflected genuine funding needs by banks, the ECB's estimated excess liquidity reached exceptionally high levels, suggesting that euro area banks were accumulating sizable precautionary liquidity buffers, signs of liquidity hoarding by banks.<sup>4</sup>

Like the US financial crisis, the European sovereign debt crisis led to a banking crisis involving very large global banks headquartered in the euro area. These global banks also had extensive presence in Hong Kong. The dislocation in the short-term funding market played out prominently in the euro area, providing a similar setting to study euro area global banks' operation in Hong Kong during the crisis.

## II. Data and Descriptive Statistics

To study foreign banks' operation in a host country during financial crisis in the home country, we obtain monthly bank entity-level data for all licensed domestic and foreign banks in Hong Kong from 2006 to 2014. The data are from the monthly returns of assets and liabilities and the returns of liquidity position that licensed banks in Hong Kong are required to report to the Hong Kong Monetary Authority. From the monthly data, we construct the following variables:

Total loans = total loans and advances to customers<sup>5</sup>;

Loan growth =  $(\text{Log}(\text{Total loans at } t) - \text{Log}(\text{Total loans at } t-1))$ ;

Liquid assets = the sum of cash, due from Hong Kong's Exchange Fund, Exchange Fund Bills and Notes, and government bonds;<sup>6</sup>

Liquid asset ratio = Liquid assets / Total assets;

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<sup>4</sup> See European Central Bank Monthly Bulletin in January 2014.

<sup>5</sup> Interbank bank loans are not included.

<sup>6</sup> The Exchange Fund's statutory purpose is primarily to affect, either directly or indirectly, the exchange value of the currency of Hong Kong, and to maintain the stability and integrity of Hong Kong's monetary and financial systems, with a view to maintaining Hong Kong as an international financial center.

Loan-to-asset ratio = Total loans / Total assets;

Deposit-to-asset ratio = Total deposits / Total assets;

Non-interest income share = Noninterest income / Total income; and

Classified loan ratio = Classified loans / Total loans.

Total loans and Loan growth measure banks' lending activities in Hong Kong. Liquid asset ratio measures banks' liquidity position. Loan-to-asset ratio, Deposit-to-asset ratio, and Non-interest income share are used to control for banks' business model. Classified loan ratio measures portfolio quality.

In addition to the financial data of foreign banks, we also collect data of their parent companies on a consolidated basis from the Standard and Poor's Capital IQ database, so that we can control for the parent companies' liquidity condition. Specifically, we construct the following variable for the parent companies:

Parent liquidity ratio = Parent company's liquid asset-to-total asset ratio.

Furthermore, we collect variables capturing the macroeconomic condition of the parent companies' home country, including the followings:

Real GDP growth = year-over-year real GDP growth rate; and

Industrial production = year-over-year growth of industrial production.

Our sample includes a panel of 121 banks for the US crisis, and 139 banks for the euro area crisis. Table 1 provides descriptive statistics for our sample banks just before the crisis, grouped by banks headquartered in the crisis country and non-crisis country. Panel A in Table 1 shows that at the onset of the US financial crisis, US banks in Hong Kong and non-US banks had similar attributes. They are statistically indistinguishable in lending activities, liquidity, and business models. Panel B in Table 1 shows that at the onset of the euro area sovereign debt crisis, euro area banks in Hong Kong and non-euro area banks there were also statistically indistinguishable in lending activities and liquidity ratio; foreign banks from euro area tended to be bigger, had lower loan-to-asset ratios but higher non-interest income share.

Figure 3 charts the aggregate lending in Hong Kong, by US banks and non-US banks from 2006 to 2010, indexed to 100 as of September 2008. It shows that, prior to the peak of the US financial crisis, lending in Hong Kong by both US banks and non-US banks were growing at similar pace. However, following the peak of the financial crisis, US banks' lending in Hong Kong slowed markedly while lending by non-US banks was steady. By late 2009, outstanding loans by US banks fell by about 40 percent relative to just one year earlier, while aggregate lending by non-US banks was holding up well.

Figure 4 charts the aggregate lending in Hong Kong, by euro area banks and non-euro area banks from 2010 to 2014, indexed to 100 as of February 2012. It shows that,

prior to the peak of the European sovereign debt crisis, lending in Hong Kong by euro area banks grew at a slightly faster pace than non-euro area banks. However, following the peak of the euro area crisis, aggregate lending by euro area banks in Hong Kong slowed markedly, falling by about 40 percent in one year. On the other hand, total lending by non-euro area banks continued to grow.

### III. Empirical Strategy

To address the main research question - do foreign banks from crisis country lend less than banks from non-crisis countries, including domestic banks - we estimate a model of difference-in-differences by comparing the lending in Hong Kong by crisis country banks to non-crisis country banks over the same period. Leveraging the small geographic area of the Hong Kong banking market and its long tradition of being a laissez-faire economy, we assume all banks in Hong Kong face similar demand for loanable funds, and a similar supply of deposits. By netting out the differences between foreign banks from the crisis country and the control group, we will be able to isolate the effect of the crisis in the home country on global banks' lending in the host country. Using the lending by non-crisis country banks to control for loan demand, the difference-in-differences captures the supply shift by crisis-country banks.

The baseline specification that we use to implement this approach is a standard difference-in-differences regression model estimated using the full sample of both foreign banks from crisis countries and all domestic and foreign banks from non-crisis countries over the event window of five years, 30 months before the peak of the financial crisis and 30 months after:

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy})_i + \beta_4 \text{ controls} + \varepsilon_{it}; \quad (1)$$

where  $Y_{it}$  is the growth in lending by bank  $i$  at month  $t$ ; time-fixed-effect is month-year dummy; crisis-dummy equals 1 on or after the peak of the crisis, 0 otherwise; shock-dummy equals 1 if the foreign bank's parent is headquartered in the crisis country, 0 otherwise;<sup>7</sup> and controls are control variables for bank size, Loan-to-asset ratio, Deposit-to-asset ratio, Non-interest income share, Classified loan ratio, real GDP growth at home country, and industrial production growth at home country, all lagged by one month except for the real GDP growth by one quarter. As discussed in Section I, we use September 2008 as the peak of the U.S. financial crisis, and February 2012 as the peak of the euro zone sovereign debt crisis. The variable of interest,  $Y_{it}$  is Loan growth, which measures the growth rate in bank lending, taking both loan maturity and origination into consideration. The coefficient of interest is  $\beta_3$ , which measures the difference in lending activities by foreign banks from the crisis

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<sup>7</sup> In this paper, we distinguish between parent company and its foreign branch to allow for internal capital market, and use the location of the parent company for the shock dummy.

country. By including a crisis dummy as an explanatory variable, we allow all banks in Hong Kong to be affected by the foreign crisis. However, the interaction term of crisis dummy and shock dummy tests whether foreign banks from crisis country behave differently during the crisis. The standard identifying assumption in this framework is that lending trends across banks would not differ systematically in the absence of crisis in the foreign banks' home country.

#### IV. Results

Table 2 reports the results of estimating the baseline differences-in-differences specification given by equation (1) for the US financial crisis. In column (1), the regression controls for both the bank-fixed-effect and the time-fixed-effect, which is our baseline model. For robustness, in columns (2) to (4), the regressions control for only the time-fixed-effect, only the bank-fixed-effect, and no fixed-effect, respectively, to show how important are the fixed effects. In columns (3) and (4) when the regressions do not control for the time-fixed-effect, we include the change in the VIX index to proxy for the change in global risk sentiment.

The coefficient of interest,  $\beta_3$ , measures the average difference in lending by US banks in Hong Kong following the peak of the US financial crisis. It is significantly negative after controlling for the bank-fixed-effect, indicating that US banks in Hong Kong lend significantly less than non-US banks in Hong Kong during the US financial crisis. This finding is consistent with Wong, Tsang, and Kong (2015).

The coefficient  $\beta_2$  measures the average change in lending by all banks in Hong Kong following the peak of the US financial crises. It is significantly positive when both the bank-fixed-effect and the time-fixed-effect are controlled. The result suggests that bank lending in Hong Kong continued to grow during the US financial crisis, pointing to the resiliency in lending in Hong Kong.<sup>8</sup>

Regarding the control variables, loan growth is determined by bank size, business model, portfolio quality, and macroeconomic condition in home country.

Table 3 reports the results of estimating equation (1) for the euro area sovereign debt crisis, with and without fixed-effects in columns (1) to (4). The coefficient  $\beta_3$  is significantly negative after controlling for the bank-fixed-effect. The results suggest that euro area banks in Hong Kong lend significantly less than the other banks in Hong Kong during the European sovereign debt crisis.

In Table 3, the coefficient  $\beta_2$  is insignificant in the baseline regression but is significantly positive in column (3), suggesting an upward shift in lending by all banks in Hong Kong during the European sovereign debt crisis. The coefficients of

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<sup>8</sup> This is inconsistent with Cetorelli and Goldberg (2011) who reported that external crisis tends to depress overall lending.

the control variables are broadly similar to the regression results of the US financial crisis.

## V. Mechanism

Our results indicate that foreign banks from the crisis country collectively lend significantly less in Hong Kong than other banks during the crisis. In this section, we investigate heterogeneity across foreign banks' lending in response to their home country crisis. Due to the fact that both the US financial crisis and the euro area sovereign debt crisis led to severe dislocation in short-term funding markets in the home country, our investigation focuses on the liquidity of the foreign bank and the liquidity of their parent company. Foreign banks that hold relatively more liquid assets on their balance sheet reflect their stronger preference for liquidity, and therefore may shrink their loan supply more in response to the heightened demand for liquidity in the home country.

Foreign banks that rely more on local deposits for funding, which tend to be more stable than wholesale funding, may be more willing to lend. We also test whether foreign banks from crisis countries that attracted more local deposits reduced their lending less. Our test variables, therefore, include Liquidity ratio, Deposit-to-asset ratio, and Parent liquidity ratio.

We first compute the monthly average of the test variables before the peak of the crisis, that is, from March 2006 to August 2008 for the US crisis and from September 2009 to January 2012 for the euro area crisis. We then estimate the following triple-difference-in-differences regression model using the full sample of both foreign banks from the crisis country and the other banks from non-crisis countries over the event window, with the monthly average of the test variables entering equation (2) one at a time:

$$\begin{aligned}
 Y_{it} = & \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} \\
 & + \beta_3 (\text{crisis-dummy})_i * (\text{shock-dummy})_i \\
 & + \beta_4 (\text{crisis-dummy})_i * (\text{shock-dummy})_i * (\text{test variable})_i \\
 & + \beta_5 \text{ controls} + \varepsilon_{it};
 \end{aligned} \tag{2}$$

where  $Y_{it}$  is the Loan growth by bank  $i$  at month  $t$ ; time-fixed-effect is month-year dummy; crisis-dummy equals 1 on or after the peak of the crisis, 0 otherwise; shock-dummy equals 1 if the foreign bank's parent is headquartered in the crisis country, 0 otherwise; and controls are the same control variables in equation (1). The coefficient of interest is  $\beta_4$ , which measures the difference in lending activities by foreign banks from crisis country interacted with the foreign bank's characteristics before the peak of the crisis.

Table 4 reports the results of estimating the triple-difference-in-differences specification given by equation (2) for the US crisis, with the definition of the Shock-

dummy to include only US banks. In column (1) where the test variable is the foreign bank's liquidity ratio, the coefficient  $\beta_3$  remains significantly negative while the coefficient  $\beta_4$  is not significant. In column (2) where the test variable is the deposit ratio, the coefficient  $\beta_3$  is significantly negative, and the coefficient  $\beta_4$  is significantly positive. The results suggest that foreign banks from the US lend less in Hong Kong than other banks during the US financial crisis, but those US foreign banks with more deposit funding before the crisis shrunk their lending less than US foreign banks with less deposit funding. In columns (3), the coefficients  $\beta_3$  and  $\beta_4$  are insignificant.

Table 5 reports the results of estimating equation (2) for the euro area crisis. The coefficient  $\beta_3$  remains significantly negative in the first two columns. That is, foreign banks from euro area lend less in Hong Kong than non-euro area banks during the European sovereign debt crisis. However, the transmission channel in the euro area crisis is less clear as the coefficients of the triple interaction terms are insignificant. Compared to the US crisis, the dislocation in the short-term funding markets in the euro area during the European sovereign debt crisis was less acute, perhaps making the transmission mechanism more difficult to detect.

## **VI. Robustness**

In the baseline regressions for the US financial crisis, we treat all foreign banks in Hong Kong that were headquartered in the US as crisis-country banks (Shock-dummy equals one) and all non-US banks in Hong Kong as non-crisis-country banks (Shock-dummy equals zero). To the extent that the 2008 financial crisis originated from the US spread quickly to other countries, prompting the US Federal Reserve to arrange emergency swap lines with central banks in other advanced economies including the euro area, United Kingdom, Canada, Japan, and Switzerland, we change the definition of crisis-country and rerun the regressions for robustness. In the first alternative definition, all countries that had an emergency swap line with the Federal Reserve are added to the list of crisis-country. In the second alternative definition, we assume all Asian countries, which are geographically furthest away from the US and financially less integrated with the US financial system, as non-crisis countries and all countries outside Asia as crisis country.

Table 6 and Table 7 report the results of estimating equation (1) for the US financial crisis with alternative definitions for the Shock-dummy. In Table 6, both the US and all countries that had established emergency swap lines with the Federal Reserve are classified as crisis countries. In Table 7, all countries outside Asia are classified as crisis countries. The coefficient  $\beta_3$  is significantly negative in both Tables 6 and 7. Thus, after expanding the definition of crisis countries, the results still suggest that foreign banks from crisis countries lend significantly less than non-crisis-country banks in Hong Kong during the US financial crisis.

The coefficient  $\beta_2$  is insignificant in both Tables 6 and 7 with the expanded definitions of crisis country. This result indicates that loan growth in Hong Kong during the crisis is statistically indistinguishable from the growth rate before the

crisis, again confirming the resiliency of bank lending in Hong Kong amid the foreign crisis. The strength of bank lending in Hong Kong during the US financial crisis is noteworthy and has important implications for credit availability in Hong Kong.

Table 8 reports the results of estimating equation (2) for the US crisis with the expanded definition for crisis countries to include both the US and other countries that established emergency swap line with the Federal Reserve. The coefficient  $\beta_3$  is insignificant, so we refrain from drawing inferences from the triple interaction terms.

Table 9 reports the results of estimating equation (2) for the US crisis with the expanded definition for crisis countries to include all countries outside Asia. Here, the coefficient  $\beta_3$  is significantly negative in all three columns. Moreover, in column (1), the coefficient of the triple interaction term with liquidity at the branch level is significantly negative. The result suggests that foreign banks from crisis countries with preference for liquidity tended to lend less during the crisis, which is consistent with liquidity hoarding.

## **VII. Conclusions**

This paper studies the international transmission of shocks through the foreign bank lending channel. We find evidence that foreign banks whose parent is headquartered in a country experiencing a financial crisis significantly reduce their lending in the host country. Our results are based on studying foreign banks in Hong Kong during the 2008 US financial crisis and the 2010 European sovereign debt crisis. This could have adverse effects on the host country's economy if there were no readily available close substitutes for foreign banks' credit services, such as relationship lending.

However, we do not find lending by non-crisis country banks, including domestic banks, to decline during the foreign crisis. In fact, our evidence points to continued growth in bank lending and the resiliency of the Hong Kong banking system in weathering foreign shocks.

In examining the transmission mechanism, we find evidence that foreign banks from crisis countries that gathered more deposits reduced their local lending less during the crisis, suggesting that stable funding dampened the inward shift in loan supply. There is also evidence that the liquidity preference of the foreign bank determines the reduction in loan supply during the crisis when the foreign banks' home country is hit by a crisis.

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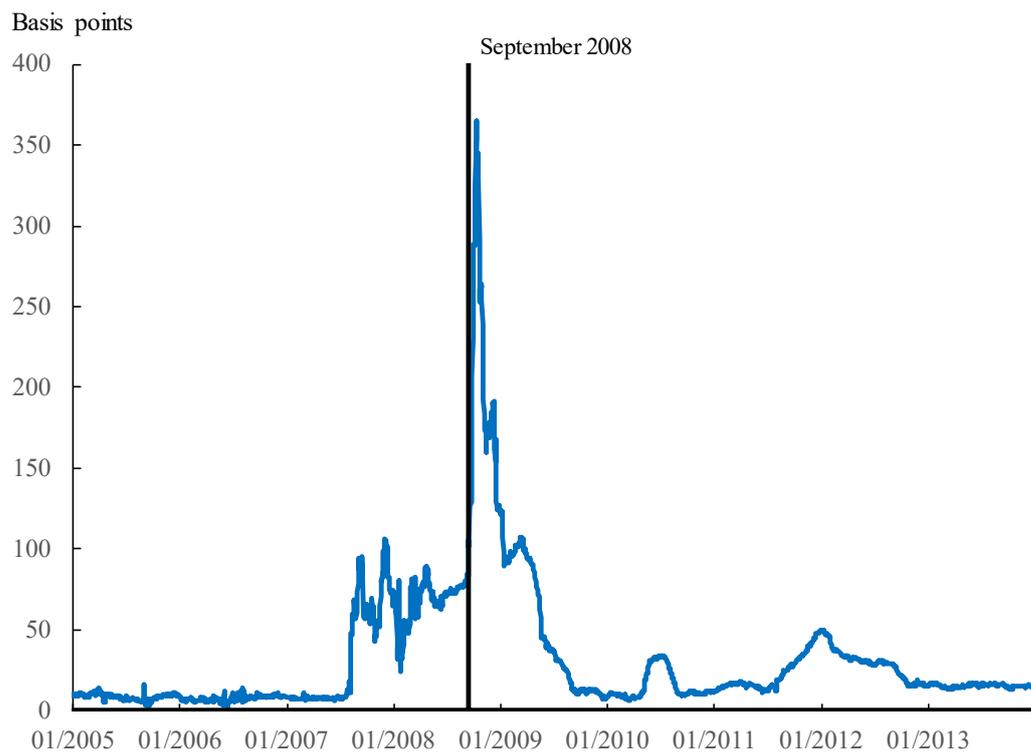
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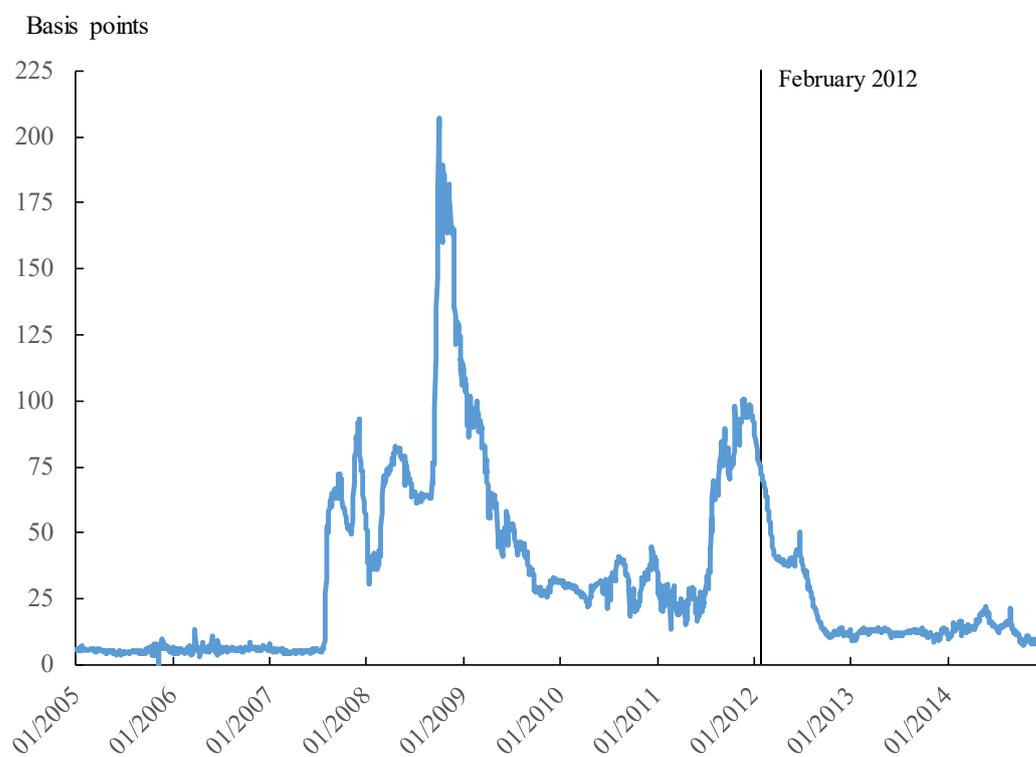
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**Figure 1: 3-month Libor-OIS Spread, daily, 2005 to 2013.**



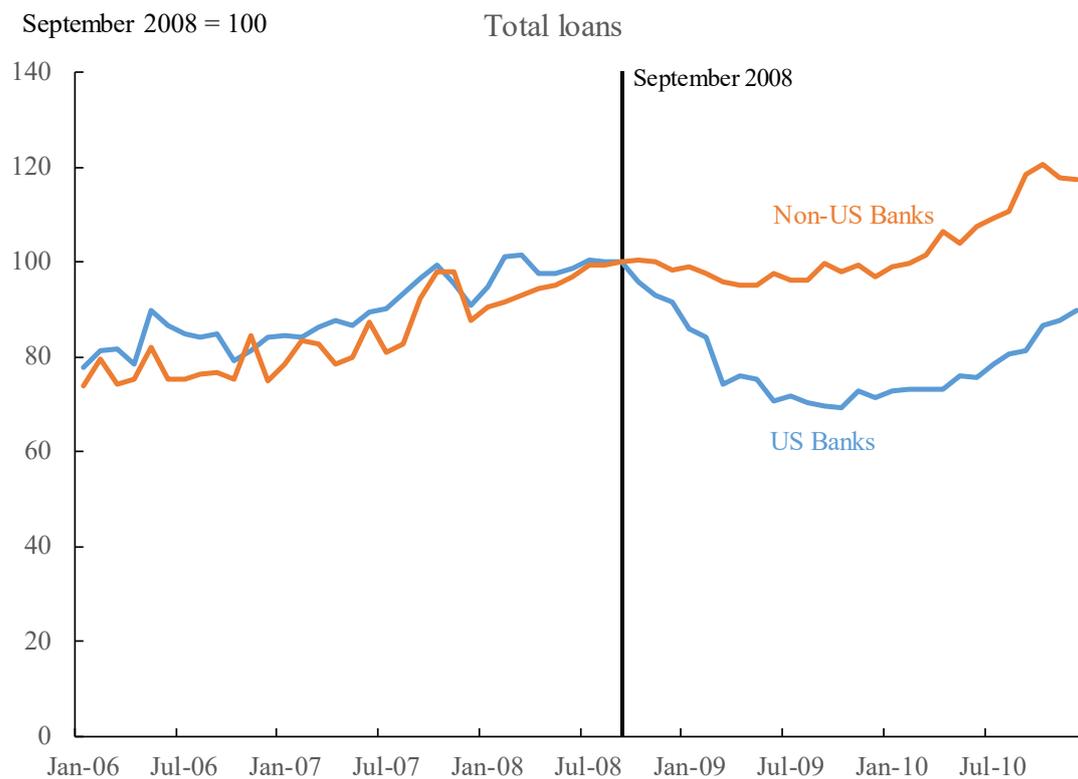
Source: Bloomberg

**Figure 2: 3-month Euribor-Eonia Spread, daily, 2005-2013.**

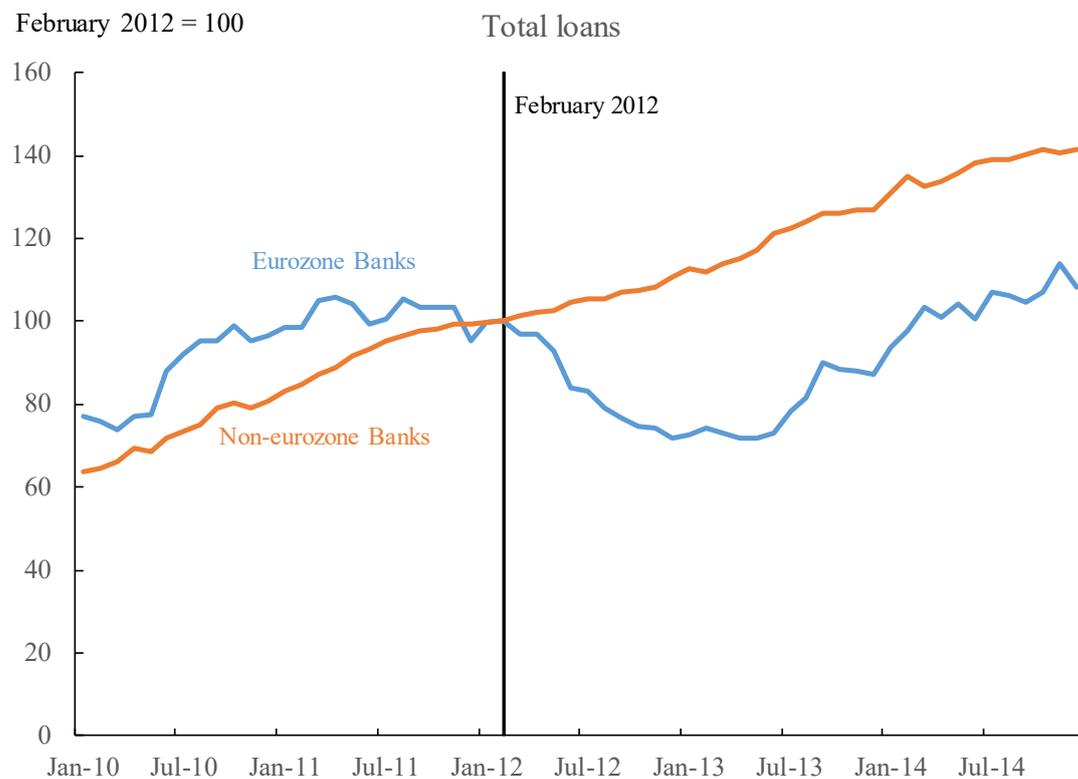


Source: Bloomberg

**Figure 3: US financial crisis and aggregate bank lending in Hong Kong, monthly from 2006 to 2010 (Indexed to 100 as of September 2008)**



**Figure 4: European debt crisis and aggregate bank lending in Hong Kong, monthly 2010 to 2014 (Indexed to 100 as of February 2012)**



**Table 1: Summary statistics**

<b>Panel A: US financial crisis (descriptive statistics at end-2006)</b>									
		Banks from crisis country (i.e. US banks)			Banks from non-crisis country (i.e. Non-US banks)			Equality-of-medians test	
Variables	Unit	Obs	Mean	Median	Obs	Mean	Median	Pearson chi-sq	P-value
Loan growth	Percent	7	-8.08	-0.08	113	-0.36	0.22	2.36	0.13
Log (total assets)		7	24.22	24.81	116	23.20	23.12	0.64	0.42
Liquid asset ratio	Percent	7	1.32	0.48	116	3.61	1.34	2.36	0.13
Loan to asset ratio	Percent	7	9.89	5.36	116	27.48	23.95	2.36	0.13
Deposit to asset ratio	Percent	7	49.40	44.60	116	40.76	37.93	0.00	0.98
Non-interest income share	Percent	7	27.98	25.23	113	15.60	11.42	2.51	0.11
Classified loan ratio	Percent	7	1.18	0.30	116	2.28	0.61	0.00	0.98
Liquidity ratio (parent)	Percent	7	16.50	18.67	110	10.08	10.17	2.66	0.10
<b>Panel B: European sovereign debt crisis (descriptive statistics at end-2010)</b>									
		Banks from crisis country (i.e. euro area banks)			Banks from non-crisis country (i.e. Non-euro area banks)			Equality-of-medians test	
Variables	Unit	Obs	Mean	Median	Obs	Mean	Median	Pearson chi-sq	P-value
Loan growth	Percent	22	-0.51	0.52	110	3.19	2.12	0.05	0.82
Log (total assets)		24	24.08	24.52	115	23.59	23.54	4.24**	0.04
Liquid asset ratio	Percent	24	8.50	6.25	115	6.40	2.86	1.35	0.25
Loan to asset ratio	Percent	24	20.86	21.91	115	35.29	36.78	11.07***	0.00
Deposit to asset ratio	Percent	24	14.36	9.16	115	43.34	39.85	17.85***	0.00
Non-interest income share	Percent	22	47.02	37.26	111	33.04	29.16	2.80*	0.09
Classified loan ratio	Percent	24	2.28	0.88	115	0.90	0.19	0.51	0.48
Liquidity ratio (parent)	Percent	23	10.90	8.49	111	11.26	9.26	0.14	0.70

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 2: Regression results of bank lending in Hong Kong during the US financial crisis**

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy})_i + \beta_4 \text{Control}_{i,t-1} + \varepsilon_{it}$$

Crisis-dummy equals 1 on or after September 2008, 0 otherwise. Shock-dummy equals 1 if the foreign bank's parent was headquartered in the US, and 0 otherwise.

VARIABLES	(1) Loan growth	(2) Loan growth	(3) Loan growth	(4) Loan growth
Crisis-dummy	2.694* (1.496)	1.743 (1.399)	-0.142 (0.506)	-0.557* (0.317)
Crisis-dummy x shock-dummy	-1.784** (0.881)	-0.219 (0.691)	-1.973** (0.932)	-0.341 (0.712)
Log(assets)_t-1	-1.939* (0.999)	0.063 (0.072)	-1.800** (0.860)	0.065 (0.075)
Loan-to-asset ratio_t-1	-0.218*** (0.037)	-0.032*** (0.008)	-0.217*** (0.036)	-0.033*** (0.008)
Deposit-to-asset ratio_t-1	0.023 (0.018)	-0.005 (0.006)	0.024 (0.017)	-0.006 (0.006)
Non-interest income share_t-1	0.043*** (0.016)	-0.005 (0.013)	0.055*** (0.015)	0.002 (0.013)
Classified loan ratio_t-1	-0.254*** (0.069)	-0.180*** (0.049)	-0.252*** (0.067)	-0.176*** (0.049)
Industrial production growth (home)_t-1	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
GDP growth (home)_t-3	0.181*** (0.063)	0.165*** (0.046)	0.216*** (0.034)	0.204*** (0.027)
$\Delta$ VIX_t			-0.004 (0.024)	-0.004 (0.023)
Observations	6,665	6,665	6,665	6,665
Bank-fixed-effect	Yes	No	Yes	No
Time-fixed-effect	Yes	Yes	No	No
No. of banks	121	121	121	121

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 3: Regression results of bank lending in Hong Kong during the European sovereign debt crisis**

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy})_i + \beta_4 \text{Control}_{i,t-1} + \varepsilon_{it}$$

Crisis-dummy equals 1 on or after Feb 2012, 0 otherwise. Shock-dummy equals 1 if the foreign bank's parent was headquartered in euro area, 0 otherwise.

VARIABLES	(1)	(2)	(3)	(4)
	Loan growth	Loan growth	Loan growth	Loan growth
Crisis-dummy	1.287 (1.461)	-1.697 (1.398)	0.652* (0.362)	-0.601* (0.306)
Crisis-dummy x shock-dummy	-1.882** (0.781)	-0.262 (0.524)	-1.492** (0.732)	-0.287 (0.511)
Log(assets)_t-1	-3.966*** (0.789)	-0.244** (0.113)	-3.627*** (0.759)	-0.249** (0.113)
Loan-to-asset ratio_t-1	-0.176*** (0.021)	-0.036*** (0.010)	-0.168*** (0.021)	-0.037*** (0.009)
Deposit-to-asset ratio_t-1	-0.028 (0.031)	-0.006 (0.006)	-0.033 (0.031)	-0.005 (0.006)
Non-interest income share_t-1	0.051*** (0.017)	0.017** (0.007)	0.052*** (0.016)	0.017** (0.007)
Classified loan ratio_t-1	-0.284* (0.164)	-0.257*** (0.086)	-0.299* (0.161)	-0.256*** (0.081)
Industrial production growth (home)_t-1	0.000 (0.000)	-0.000 (0.000)	0.001 (0.000)	-0.000 (0.000)
GDP growth (home)_t-3	0.116 (0.071)	0.207*** (0.057)	0.163*** (0.050)	0.209*** (0.042)
$\Delta$ VIX_t			0.081* (0.041)	0.084** (0.042)
Observations	7,466	7,466	7,466	7,466
Bank-fixed-effect	Yes	No	Yes	No
Time-fixed-effect	Yes	Yes	No	No
No. of banks	139	139	139	139

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 4: Transmission mechanism in US financial crisis**

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy})_i + \beta_4 (\text{crisis-dummy}) * (\text{shock-dummy})_i * (\text{test variable})_i + \beta_5 \text{Control}_{i,t-1} + \varepsilon_{it}$$

Crisis-dummy equals 1 on or after September 2008, 0 otherwise. Shock-dummy equals 1 if the foreign bank's parent was headquartered in the US, 0 otherwise. Test variables are monthly average before the crisis.

VARIABLES	(1) Loan growth	(2) Loan growth	(3) Loan growth
Crisis-dummy	0.135 (1.893)	0.092 (1.902)	0.231 (1.955)
Crisis-dummy x shock-dummy	-2.755** (1.280)	-5.278*** (1.616)	-2.567 (2.531)
Crisis-dummy x Shock-dummy x liquidity ratio	0.224 (0.295)		
Crisis-dummy x Shock-dummy x deposit ratio		0.058* (0.032)	
Crisis-dummy x Shock-dummy x Parent liquidity ratio			0.009 (0.138)
Time-fixed-effect	Yes	Yes	Yes
Bank-fixed-effect	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	6,665	6,665	6,380
No. of banks	121	121	116

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 5: Transmission mechanism in European sovereign debt crisis**

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy})_i + \beta_4 (\text{crisis-dummy}) * (\text{shock-dummy})_i * (\text{test variable})_i + \beta_5 \text{Control}_{i,t-1} + \varepsilon_{it}$$

Crisis-dummy equals 1 on or after Feb 2012, 0 otherwise. Shock-dummy equals 1 if the foreign bank's parent was headquartered in euro area, 0 otherwise. Test variables are monthly average before the crisis.

VARIABLES	(1) Loan growth	(2) Loan growth	(3) Loan growth
Crisis-dummy	1.276 (1.461)	1.348 (1.462)	1.146 (1.499)
Crisis-dummy x Shock-dummy	-2.073* (1.085)	-2.672*** (0.891)	-0.875 (1.477)
Crisis-dummy x Shock-dummy x liquidity ratio	0.026 (0.087)		
Crisis-dummy x Shock-dummy x deposit ratio		0.044 (0.034)	
Crisis-dummy x Shock-dummy x Parent Liquidity ratio			-0.058 (0.095)
Time-fixed-effect	Yes	Yes	Yes
Bank-fixed-effect	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	7,466	7,466	7,292
No. of banks	139	139	136

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 6: Robustness test using alternative definition of crisis countries**

Regression results of bank lending in Hong Kong during the US financial crisis

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy})_i + \beta_4 \text{Control}_{i,t-1} + \varepsilon_{it}$$

Crisis-dummy equals 1 on or after September 2008, 0 otherwise. Shock-dummy equals 1 if the foreign bank's parent was headquartered in the US or countries with access to Fed's emergency swap line, and 0 otherwise.

VARIABLES	(1) Loan growth	(2) Loan growth	(3) Loan growth	(4) Loan growth
Crisis-dummy	0.816 (1.896)	-0.226 (1.754)	0.261 (0.594)	-0.398 (0.378)
Crisis-dummy x shock-dummy	-1.491** (0.727)	-0.957* (0.567)	-1.542** (0.727)	-0.874 (0.580)
Log(assets)_t-1	-1.741 (1.134)	0.079 (0.072)	-1.623* (0.962)	0.076 (0.073)
Loan-to-asset ratio_t-1	-0.224*** (0.039)	-0.032*** (0.008)	-0.225*** (0.038)	-0.032*** (0.008)
Deposit-to-asset ratio_t-1	0.026 (0.020)	-0.008 (0.006)	0.028 (0.019)	-0.009 (0.007)
Non-interest income share_t-1	0.040** (0.017)	-0.005 (0.014)	0.051*** (0.015)	0.002 (0.014)
Classified loan ratio_t-1	-0.274*** (0.082)	-0.195*** (0.056)	-0.273*** (0.082)	-0.191*** (0.057)
Industrial production growth (home)_t-1	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
GDP growth (home)_t-3	0.180*** (0.063)	0.139*** (0.045)	0.212*** (0.038)	0.179*** (0.028)
$\Delta$ VIX_t			-0.002 (0.024)	-0.003 (0.024)
Observations	6,665	6,665	6,665	6,665
Bank-fixed-effect	Yes	No	Yes	No
Time-fixed-effect	Yes	Yes	No	No
No. of banks	121	121	121	121

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 7: Robustness test using alternative definition of crisis countries**

Regression results of bank lending in Hong Kong during the US financial crisis

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy}) + \beta_4 \text{Control}_{i,t-1} + \varepsilon_{it}$$

Crisis-dummy equals 1 on or after September 2008, 0 otherwise. Shock-dummy equals 1 if the foreign bank's parent was headquartered in countries except Asia, 0 otherwise.

VARIABLES	(1)	(2)	(3)	(4)
	Loan growth	Loan growth	Loan growth	Loan growth
Crisis-dummy	1.075 (1.780)	-0.144 (1.749)	0.496 (0.457)	-0.266 (0.328)
Crisis-dummy x shock-dummy	-2.846*** (0.758)	-1.856*** (0.535)	-2.910*** (0.773)	-1.872*** (0.558)
Log(assets)_t-1	-1.797 (1.093)	0.105 (0.074)	-1.675* (0.935)	0.105 (0.075)
Loan-to-asset ratio_t-1	-0.229*** (0.038)	-0.033*** (0.009)	-0.230*** (0.037)	-0.034*** (0.009)
Deposit-to-asset ratio_t-1	0.024 (0.019)	-0.009 (0.006)	0.027 (0.019)	-0.011* (0.006)
Non-interest income share_t-1	0.049*** (0.017)	0.004 (0.013)	0.059*** (0.015)	0.010 (0.013)
Classified loan ratio_t-1	-0.266*** (0.081)	-0.188*** (0.054)	-0.266*** (0.080)	-0.185*** (0.054)
Industrial production growth (home)_t-1	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
GDP growth (home)_t-3	0.170*** (0.063)	0.132*** (0.043)	0.207*** (0.037)	0.171*** (0.027)
$\Delta$ VIX_t			0.000 (0.024)	-0.000 (0.024)
Observations	6,665	6,665	6,665	6,665
Bank-fixed-effect	Yes	No	Yes	No
Time-fixed-effect	Yes	Yes	No	No
No. of banks	121	121	121	121

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 8: Robustness test of transmission mechanism based on alternative definition of crisis countries**

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy})_i + \beta_4 (\text{crisis-dummy}) * (\text{shock-dummy})_i * (\text{test variable})_i + \beta_5 \text{Control}_{i,t-1} + \epsilon_{it}$$

Crisis-dummy equals 1 on or after September 2008, 0 otherwise. Shock-dummy equals 1 if the foreign bank's parent was headquartered in the US or countries with access to Fed's emergency swap line, and 0 otherwise. Test variables are monthly average before the crisis.

VARIABLES	(1) Loan growth	(2) Loan growth	(3) Loan growth
Crisis-dummy	0.877 (1.891)	0.719 (1.894)	0.859 (1.979)
Crisis-dummy x shock-dummy	-0.969 (0.749)	-0.405 (0.971)	-0.423 (0.964)
Crisis-dummy x Shock-dummy x liquidity ratio	-0.205 (0.152)		
Crisis-dummy x Shock-dummy x deposit ratio		-0.035* (0.020)	
Crisis-dummy x Shock-dummy x Parent liquidity ratio			-0.123** (0.052)
Time-fixed-effect	Yes	Yes	Yes
Bank-fixed-effect	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	6,665	6,665	6,380
No. of banks	121	121	116

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Table 9: Robustness test of transmission mechanism based on alternative definition of crisis countries**

$$Y_{it} = \beta_0 \text{ time-fixed-effect} + \beta_1 \text{ bank-fixed-effect} + \beta_2 \text{ crisis-dummy} + \beta_3 (\text{crisis-dummy}) * (\text{shock-dummy})_i + \beta_4 (\text{crisis-dummy}) * (\text{shock-dummy})_i * (\text{test variable})_i + \beta_5 \text{Control}_{i,t-1} + \epsilon_{it}$$

Crisis-dummy equals 1 on or after September 2008, 0 otherwise. Shock-dummy equals 1 if the foreign bank's parent was headquartered in countries except Asia, 0 otherwise. Test variables are monthly average before the crisis.

VARIABLES	(1) Loan growth	(2) Loan growth	(3) Loan growth
Crisis-dummy	1.358 (1.759)	1.055 (1.776)	1.308 (1.838)
Crisis-dummy x shock-dummy	-1.687** (0.712)	-2.074* (1.151)	-3.441** (1.426)
Crisis-dummy x Shock-dummy x liquidity ratio	-0.362*** (0.128)		
Crisis-dummy x Shock-dummy x deposit ratio	-0.023 (0.023)		
Crisis-dummy x Shock-dummy x Parent liquidity ratio	0.023 (0.084)		
Time-fixed-effect	Yes	Yes	Yes
Bank-fixed-effect	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	6,665	6,665	6,380
No. of banks	121	121	116

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively.