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Offshore Bond Issuance and Noncore Liability in China

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Abstract

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Abstract

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1. Introduction

The United States Federal Reserve Bank (FRB) implemented a monetary easing policy after the global financial crisis of 2008. That policy triggered and then sustained a considerable financial boom in economically developing countries through bond issuance. Shin (2013) regards this as a "second phase of global liquidity." For these emerging economies, two important characteristics are apparent: offshore bond issuance by offshore affiliates of non-financial company and within-company flows to repatriate offshore funds to headquarters in the home country. Therefore, these constitute an important transmission channel of global liquidity shock to the home country.

In emerging economies, to circumvent capital restrictions in the home country, the use of offshore affiliates as financing vehicles for accumulating low-yield US dollar liabilities has become widespread[1]. In spite of strict financial restrictions, the outstanding amounts of offshore bond issuance of Chinese non-financial companies are overwhelming. Therefore, the analyses described in this paper specifically examine China. The purpose of having US dollar liabilities and holding the proceeds in domestic funds might be to take advantage of the interest rate differential between China and the US, by a so-called carry trade strategy. Bruno and Shin (2017) and Kim and Shin (2017)

[1] In section 2, using detailed figures, we describe details of offshore bond issuance.

report that non-financial corporations in emerging economies behave as financial intermediaries: co-movements in domestic financial assets and foreign liabilities have a positive sign. Therefore, offshore bond issuance might cause a financial boom in the domestic country. To assess this issue more deeply, using a method described by Hahm et al. (2013), we specifically examine noncore liabilities: an indicator of financial system vulnerability.

Using within-company flows to transfer funds from offshore affiliates to a headquarters in the home country to circumvent capital restrictions has become a widespread practice[2]. An important reason is that capital account transactions through banks can be tightly regulated, but the transactions of thousands of non-financial corporations generated in the international trade are much more difficult to monitor and regulate. This fact indicates that non-financial corporations act as surrogate intermediaries by issuing bonds at offshore affiliates and by transferring the funds to the headquarters in the home country (Bruno and Shin, 2017; Kim and Shin, 2017; McCauley et al., 2015; Serena and Moreno, 2016; Shin, 2013; Shin and Zhao, 2013).

Bruno and Shin (2017) and Avdjiev et al. (2014) explain an accounting convention

[2] Loopholes of various kinds exist to transfer funds from offshore affiliates to a headquarters in the home country. For example, according to Chui et al. (2014), the difference between China's reported copper imports and partner's reported copper exports to China become extremely wide after 2010. This over-invoicing by Chinese copper corporations indicates one capital inflow by non-financial corporation.

in the balance of payments (BOP) of the International Monetary Fund (IMF) that classifies borrowing and lending between affiliated entities of the same non-financial corporate as “direct investment.” Furthermore, such transactions are classified as “debt instrument” sub-items of direct investment. Therefore, in economies such as those of economically developing countries where capital flows are often restricted to some degree, FDI flow can turn out to be “hot” money that transmits global financial conditions to the segregated domestic economy. Consequently, these within-company flows will connect offshore bond issuance by offshore affiliates of non-financial company and noncore liabilities in the domestic economy.

Based on the two characteristics presented above, we analyze whether the increase of offshore bond issuance and within-company flow by affiliates of non-financial corporate can be a transmission channel of global liquidity shock on noncore liability in China. It is noteworthy that financing of banks and nonbank financial institutions through noncore liabilities constitutes shadow banking (Harutyunyan et al., 2014; Harutyunyan et al., 2015; International Monetary Fund, 2014), which has attracted particular attention in China. Our analysis can clarify shadow banking in China with consideration of offshore bond issuance and global liquidity shock. The shortcomings of shadow banking in China are not merely confined to the domestic economy: they also

constitute an important topic for international financial market stability.

Using firm-level micro data, Huang et al. (2018) find that non-financial companies that issue offshore bonds are more likely to become lenders in the shadow banking system. Especially, a positive relation between offshore bond issuances and within-company flows because of tightening the financial restrictions[3]. However, because the estimation of their study was conducted separately and statically, it is unsuitable for studying the dynamic interrelation of the variables. For example, although some relation is known to exist among offshore bond issuance, within-company loans, and shadow banking systems, we cannot ascertain which variable response first and which variable is second in response to it. Using dynamic methodology, the dynamic transmission channel of the effect of global liquidity shock can be analyzed. In addition, by particularly addressing the transmission channel, we can analyze details of the structure of offshore–onshore financial linkage in China. Results are expected to lead to more fruitful policy implications.

Different from the static method used for the studies explained above, we estimate a five-variable VAR model because VAR models provide a useful methodology: they are data-based with a few restrictions. The empirical framework is useful in documenting

[3] Strictly speaking, instead of within-company flows, Huang et al. (2018) use inter-firm loans.

empirical facts. Furthermore, the effects are expected to be inherently dynamic. For example, the global liquidity shock might affect offshore bond issuance. Then it might affect within-company flows and noncore liabilities with different timing. Actually, VAR models are useful for inferring dynamic effects. Especially, the fundamental shocks will spill over to diverse variables; feedback loop effects will amplify the initial shocks. Especially, our study is based on an earlier study by Kim and Shin (2017), who use the VAR model analyze the importance of offshore bond issuance as a transmission channel for global liquidity. Different from their study, we exclusively emphasize the role of within-company flows as a transmission channel of global liquidity shock.

Particularly, Bayesian structural VAR model with sign restriction was used, as explained by Uhlig (2005). This approach requires the imposition of only a few sign restrictions that have economically meaningful interpretations and which can avoid some identification difficulties arising from traditional models such as Cholesky decomposition and the long-run restriction of Blanchard–Quah decomposition. In line with this, studies that used a sign-restricted VAR approach to analyze the effect of capital flow shock include the following. Sa et al. (2014) report that capital-inflow shocks positively affect real credit and real house prices. Tillmann (2013) demonstrates that capital inflow shocks have a strong effect on the increase of house prices and equity

prices in Asian countries. Although causality between asset prices and the capital inflows remains controversial, Fratzscher et al. (2010) demonstrate that equity market shocks and housing price shocks are the salient determinants of the current account imbalance.

Finally, our sign-restricted VAR exercises complement firm-level micro data of Huang et al. (2018) and the VAR analysis of Kim and Shin (2017), indicating how offshore bond issuance, within-company flow and noncore liability are influenced by the global liquidity shock. The remainder of the paper is organized as follows. Section 2 presents a description of the trend behavior of three variables used for empirical analysis. Section 3 presents a data description and the methodology of sign restriction VAR. Section 4 presents empirical results. Based on the empirical results, we briefly discuss the stability of shadow banking in China associated with offshore bond issuance in section 5. Finally, we present conclusions in section 6.

2. Facts of offshore bond issuance, within-company flow and noncore liability

As described more precisely below, offshore bond issuance by non-financial companies in emerging countries increased dramatically after the 2008 financial crisis. Because of low interest rate policies imposed by the FRB after 2008, dollar borrowing

costs became extremely low. The stream of offshore bond issuance by non-financial corporations can be portrayed as Figure 1 (Chung et al., 2015; Shin, 2013). First, the offshore affiliate of a non-financial corporation issues US-dollar-denominated bonds. Then, through within-company flows, the offshore affiliates transfer funds to their headquarters in the home country. Subsequently, the headquarters in the home country will deposit the funds in a domestic bank. Thereby using an offshore affiliate to circumvent capital controls and market imperfections, the headquarters in the home country will accumulate low-yield, US-dollar-denominated debt, and high-yield claims of assets denominated in the domestic currency. The consequent increase of short-term assets might boost noncore liability.

<<insert Figure 1 here>>

No available data directly indicate offshore bond issuance by foreign affiliates. Therefore, one must conduct indirect estimation using existing data. As described herein, by referring to reports of earlier studies (Gruic and Wooldridge, 2015; McCauley et al., 2015; Shin, 2013), we use statistics of two types reflecting the net issuance of international debt securities: nationality-based and the residence-based measures. The

residence of the issuer is the country where the issuer is incorporated, whereas the nationality of the issuer is the country in which the issuer's parent is headquartered[4]. The amount of international debt issued by foreigners within the border of emerging countries is small. Therefore, we can assume that the nationality-based measure is the sum of onshore and offshore measures. Furthermore, we use the residence-based measure as the proxy for the onshore measure. Consequently, the difference between the nationality-based and the residence-based measures represents a proxy for the offshore measure.

In the following, we will describe offshore US-dollar-denominated bond issuance by international debt securities of non-financial corporations using data from the Bank for International Settlements (BIS)[5]. In the following, to emphasize the presence of offshore bond issuance of non-financial corporation in China, we make comparison with the other countries including BRICs countries. Figure 2 presents four variables: nationality or residence of the issuer and developing countries including or excluding BRICs countries. In fact, the difference between the nationality and residence of the issuer indicates offshore bond issuance by offshore affiliates of non-financial corporations.

[4] For example, the debts of a Hong Kong subsidiary of a Chinese company might be guaranteed by the parent company. Therefore, debt securities issued by the Hong Kong subsidiary of a Chinese company would be allocated to Hong Kong on a residence basis and to China on a nationality basis.
[5] Hereafter, unless otherwise noted, all data of offshore bond issuance used for these analyses are denominated in US dollars.

From this figure, we can infer that offshore bond issuance increased dramatically in BRICs countries after 2010. Offshore bond issuance of economically developing countries excluding BRICs is small, representing a stark contrast. Therefore, it can be said that the drastic rise of offshore bond issuance is a phenomenon that is specific to BRICs countries.

<<insert Figure 2 here>>

Next, we will find more details related to offshore bond issuance of the four BRICs countries. In Figure 3, offshore bond issuance of non-financial corporations in China, Brazil, Russia, and India is described. As this figure shows, the outstanding amounts of China are overwhelming. The figures for Brazil are also high[6].

<<insert Figure 3 here>>

After the issuance of offshore bonds by offshore affiliates, the funds must be repatriated to the headquarters in the home country. As described in Bruno and Shin

[6] The ratios of US-dollar-denominated bonds to total currency in 2017Q4 were 89.6% for China, 93.7% for Brazil, 72.7% for Russia, and 77.3% for India.

(2017), Kim and Shin (2017), and Huang et al. (2018), to circumvent capital restrictions, within-company flows are used to transfer funds from offshore affiliates to a headquarters in the home country. Therefore, as described herein, we specifically examine within-company flows.

Following the explanation offered by Avdjiev et al. (2014), data of within-company flows can be described as presented below[7]. An accounting convention in the BOP deems borrowing and lending between affiliated entities of the same non-financial corporate to be "direct investment." Specifically, such transactions are classified as "debt instruments," a sub-item of direct investment. Therefore, the foreign affiliate of a non-financial corporation might act as a surrogate intermediary by repatriating funds in economies such as those in emerging countries, where capital flows are often restricted to some degree. Moreover, even if capital account transactions through banks could be regulated tightly, the transactions of thousands of non-financial corporations generated in the international trade would be much harder to monitor and regulate.

Before examination of data of within-company flows, we describe the noncore

[7] According to Avdjiev et al. (2014), three channels of flow of funds exist between offshore affiliate and home country: (1) The company can lend directly to its headquarters. (2) Direct extension of credit by suppliers for transaction in goods and services. (3) Providing cross-border loans and deposits to headquarters in home country by non-financial corporation. In this paper, we define the first as within-company flow and the second as between-company flow. Because of data limitations, data of the third channel are no obtainable. In the robustness check test, instead of within-company flow, we use between-company flow.

liability of China here. During the financial boom, the pool of core liability such as household retail deposits from an ultimate domestic creditor is insufficient to fulfill demand from the financial sector[8]. Noncore liability from the wholesale market and the foreign sector is necessary. Therefore, it serves as a useful indicator of financial procyclicality and as an early warning indicator. Funding sources of the financial sector consist of (1) liability due to an ultimate domestic creditor, (2) liability due to a financial intermediary, and (3) liability due to a foreign creditor (Shin and Shin, 2011). Furthermore, they defined (1) as core liability and defined the remains as noncore liability. Based on this issue, we construct a noncore liability of China related to an earlier report by Hahm et al. (2013), who consider economically developing countries. The noncore liability is calculated as the sum of "liability of banks to the foreign sector" and "liability of banks to the nonbanking financial sector" in the International Financial Statistics (IFS) of the IMF.

Finally, to clarify the object and hypothesis of our study, we will describe the trend behavior of three variables described previously: within-company flows (WITHIN-COMPANY FLOW)[9], noncore liability (NONCORE), and offshore bond

[8] The growth of core liabilities is in line with the income of households.
[9] It is noteworthy that, because WITHIN-COMPANY FLOW is a flow of a new investment, to unify the terms used, we calculate backward difference of stock variables of both OFFSHORE BOND and NONCORE. Furthermore, all data are expressed in US dollars.

issuance by offshore affiliates of non-financial company (OFFSHORE BOND). These three variables are expected to be mutually interacting. Therefore, it is worth presenting them together in the same figure.

<<insert Figure 4 here>>

Figure 4 shows that the three variables exhibit very similar trend behavior throughout the sample periods. As described later, because noncore liability is similar to shadow banking, one can infer that the boom in shadow banking in China is fueled to some degree by offshore bond issuance by offshore affiliates. To analyze the linkage among these three variables more deeply, the analysis described above is insufficient. We must conduct empirical analyses.

3. Empirical methodology and data

3-1. Sign restriction VAR

From Figure 4 presented earlier, if a positive shock arises at the global financial market, then the offshore bond issuance will increase. Consequently, offshore affiliates will repatriate funds to headquarters in the home country by within-company flows.

Finally, noncore liability will increase because of accumulation of short-term assets denominated in the domestic currency.

As described in this paper, five-variable Bayesian VAR is estimated. This approach requires the imposition of only a few sign restrictions that have an economically meaningful interpretation. For example, a monetary easing shock is identifiable by imposing negative response of interest rates in the first several periods and positive response of money over the same period. In the following, by referring to an earlier report by Danne (2015), we briefly describe the methodology of Uhlig's (2005) rejection methods. Uhlig (2005) presents additional details.

The procedure can be summarized as the following seven steps: (1) Estimate unrestricted VAR and obtain the parameters using OLS. (2) Extract the orthogonal innovations from the model using a Cholesky decomposition[10]. (3) Calculate the resulting impulse responses from step 2. (4) Randomly draw an orthogonal impulse vector α. (5) Multiply the responses from step three times α and check if they match the imposed sign. (6) Check whether it meets the sign restrictions; if so, keep it, if not, reject it. (7) Repeat steps 2–6. It is noteworthy that these steps are based on a joint draw from a flat Normal Inverted-Wishart posterior for the VAR parameters and uniform

[10] Cholesky decomposition is merely a means of orthogonalizing shocks. Different ordering of the variables does not alter the results.

distribution for α.

3-2. Data and identification methodology

According to BIS (2011), the definition of global liquidity is “ease of financing” in the global financial market. Most global liquidity today is created privately through cross-border operations by banks and non-bank financial institutions. Specifically, several proxy variables exist as follows: Rey (2013) reports that uncertainty and risk aversion captured by VIX, which is volatility index implied by S&P 500 index options represents global liquidity. Gourinchas and Obstfeld (2012) specifically examine the rapid increase in leverage and an appreciation of domestic currency against the US dollar. Bekaert et al. (2013) describe that the cut in the Fed Funds rate and VIX index are major sources of global liquidity. Eichenbaum and Evans (1995) find that a contractionary shock to the Fed Funds rate engenders US dollar appreciation. Bruno and Shin (2015) use the Fed Funds rate, US broker dealer leverage, VIX and real exchange rate to analyze the global liquidity shock. Kim and Shin (2017) use domestic credit of the US as a source of global liquidity shock. Finally, BIS publishes a database of global liquidity indicators that consist from total credit to non-bank borrowers.

As described above, several candidates of global liquidity shock can be considered.

However, according to BIS (2011), these variables can be classified into price indicators and quantity measures. In fact, BIS (2011) notes that “Price indicators tend to provide information about the conditions at which liquidity is provided, while quantity measures capture how far such conditions translate into the build-up of potential risks.” Actually, VIX, the exchange rate, and the Fed Funds rate are classifiable as price indicators. Similarly, we can classify the leverage of US broker dealers, US domestic credit, and global liquidity indicators of BIS as quantity measures. According to BIS (2011), risk appetite is influenced by liquidity conditions. In turn, liquidity depends on the ability and propensity of investors to take risks. Therefore, because the relation between risk and liquidity is bi-directional, the dynamic interaction of price indicators and quantity measures are important in the identification of global liquidity shocks.

In spite of using all available sample periods, our sample period is from 2005Q2 to 2018Q1. We have an insufficient sample period. Therefore, we must use the minimized variables and identify the global liquidity shock. As described herein, we use VIX as a price indicator and global liquidity indicators of BIS as a quantity indicator and an identified global liquidity shock. The reason is the following. First, because we have no interest in the origin of global liquidity shock such as US monetary policy shock, we did not use the Fed Funds rate and US domestic credit. Different from this, whatever the

origin, we are striving to identify the global liquidity shock itself in the global financial market. Second, because the exchange rate system of China is similar to the peg system, the effect of the exchange rate on the balance sheet of the corporation is limited. For that reason, we did not use the exchange rate. However, a consensus exists of using VIX as a price indicator. For quantity measures, because the global liquidity indicator published by BIS, as its name suggests, directly indicates global liquidity we adopt this variable as a quantity measure. In the robustness check, instead of global liquidity indicators of BIS, we use the US broker dealer leverage.

As described in this paper, including the robustness check test, we estimate three models. The imposed sign restriction and estimated models are presented in Table 1. The main empirical model is the following. It is apparent that, to identify the positive global liquidity shock, we impose a negative sign on VIX. It is noteworthy that the decrease of VIX indicates stabilization of the global financial market. Additionally, we impose positive sign on global liquidity indicators of BIS (See MAIN in the Table 1). We set the period of the restriction to 12 quarters. The reason for this long-term restriction is the following. Because of self-reinforcing interaction of global liquidity shock, it has persistence characteristics. For example, Bruno and Shin (2015) show for nearly three years that global shocks affect their own components such as VIX and US

broker dealer leverage. Eichenbaum and Evans (1995) show that global liquidity shock effects persist for five years or more. Bekaert et al. (2013) demonstrate that the effect persists for two years or more.

<<insert Table 1 here>>

Once again, the variables used in the estimation are VIX, global liquidity indicators of BIS (BIS GLOBAL LIQUIDITY), OFFSHORE BOND, WITHIN-COMPANY FLOW, and NONCORE. The values of VIX are referred from the Chicago Board Options Exchange; BIS GLOBAL LIQUIDITY data are referred from BIS[11]. The sources of the remaining three variables were described in an earlier section. Finally, we take logarithms of all variables[12].

To confirm our empirical results, we conduct two robustness check tests. The first is that as an alternative to BIS GLOBAL LIQUIDITY, we use leverage of the US broker dealer sector (BD LEVERAGE) in the robustness check. We impose a positive sign on

[11] The relevant details are the following: the currency of denomination is the US dollar; borrowers' countries and sectors are all countries excluding residents and non-financial sectors; lending sectors are all sectors; and position types are cross-border and local in US dollars.

[12] Because the within-company flow is the flow of a new investment, negative values exist. To take log linearization, we accumulate FDI and convert to stock variable. Therefore, the stock variables are used in VAR estimation. The variables used in Figure 4 are flow variables.

BD LEVERAGE (See ROBUST 1 in Table 1). The data are published by the US Flow of Funds series of Federal Reserve serves[13]. The second is that, as an alternative to WITHIN-COMPANY FLOW, we use between-company flow (BETWEEN-COMPANY FLOW) in the robustness check (See ROBUST 2 in the Table 1). In BOP statistics, it is the sum of "trade credit and advances" and "other accounts receivable" in the category of other Investment. As described in footnote 7, according to Avdjiev et al. (2014), in the classification of BOP, trade credit is a direct extension of credit by suppliers for transaction in goods and service[14]. Therefore, our data do not include trade financing more broadly such as guarantees through banks and letters of credit.

4. Empirical results

4-1. Main results

This subsection describes the main results. The model has five variables; it consists from VIX, BIS GLOBAL LIQUIDITY, OFFSHORE BOND, WITHIN-COMPANY FLOW, and NONCORE. According to the Schwarz Criterion (SC), we set the lag length to one. From a dynamic perspective, the hypothesis of the timing of the transmission

[13] Leverage is obtained from (a) "total financial assets" (FL664090005.Q) and (b) "total liabilities" (FL664190005.Q) of the US broker dealer sector from the Financial Accounts. Leverage is defined as a/(a – b).

[14] Hardy and Saffie (2019) focus on trade credit as an important channel to repatriate offshore funds to headquarters in the home country.

channel is the following: First, the positive global liquidity shock has a positive effect on OFFSHORE BOND; then via the response of WITHIN-COMPANY FLOW, global liquidity shock has a positive effect on NONCORE.

The results of impulse–response functions of global liquidity shock to five variables are presented in Figures 5[15]. From this figure, by imposed sign restriction, VIX and BIS GLOBAL LIQUIDITY immediately respond negatively and positively. This response is a natural consequence. Actually, we are interested in the remaining three variables, which are not restricted by sign restriction. OFFSHORE BOND significantly and positively responded against global liquidity shock after five quarters. In response to it, WITHIN-COMPANY FLOW and NONCORE responded significantly and positively after twelve quarters. Therefore, the dynamic behaviors of the variables are in line with our hypothesis. A global liquidity shock that results from VIX and BIS GLOBAL LIQUIDITY affects OFFSHORE BOND. Then the offshore affiliate of a non-financial corporation might act as a surrogate intermediary by repatriating funds; NONCORE will increase. Especially when comparing the timing of the response of the variables, the difference between the initial response of OFFSHORE BOND (five quarters) and WITHIN-COMPANY FLOW (twelve quarters) is about seven quarters: a long period of

[15] Hereinafter, the figure of impulse-response functions plots the standard 68% error bands.

time. Therefore, repatriating funds to home countries by the offshore affiliate of a non-financial corporation takes quite a long period of time.

<<insert Figure 5 here>>

Noncore liability is similar to shadow banking. Shadow banking in China is influenced strongly by the shock occurring at the global financial market. Then how much of an effect does global liquidity shock have on noncore liability in China? To analyze this point, we calculate the forecast error variance decomposition (FEVD) of the variables against global liquidity shock. The selected variables of FEVD are presented in Table 2. At the initial stage, about 8% of the FEVD of NONCORE is explained by global liquidity shock. As time passes, the number increases. After 24 quarters, it becomes about 12%. For OFFSHORE BOND and WITHIN-COMPANY FLOW, after 24 quarters, it will become about 14%. Therefore, in spite of strict financial restriction, a non-negligible share of NONCORE is explained by a global liquidity shock.

<<insert Table 2 here>>

WITHIN-COMPANY FLOW is classified to FDI. Generally, compared to portfolio investment, earlier studies have relied on the assumption that FDI is more stable: it is less prone to financial booms and sudden stops. For example, Caballero (2016) and Ghosh et al. (2016) report that FDI flows are less likely to trigger a crisis. As a result, FDI flows into economically developing countries are often viewed as stable "cold" funding that is generated by long-term considerations. By contrast, portfolio flows are often regarded as unstable "hot" money, with movements triggered by short-term considerations. Contrary to that conventional view, in economies of emerging countries, where capital flows are often restricted, the offshore affiliate of a non-financial corporation can act as a surrogate intermediary by repatriating funds. Therefore, FDI can turn out to be "hot" money, which transmits the prevailing global financial conditions to the segregated domestic noncore liability.

4-2. Robustness check 1: BD LEVERAGE

To confirm our empirical results, we modified the identification of global liquidity shock by replacing BIS GLOBAL LIQUIDITY with BD LEVERAGE, which stands for leverage of the US broker dealer sector. Therefore, our model consists of VIX, BD

LEVERAGE, OFFSHORE BOND, WITHIN-COMPANY FLOW, and NONCORE. According to the Schwarz Criterion (SC), we set the lag length to one. The results of impulse–response functions of global liquidity shock to five variables are shown in Figure 6. From this figure, by the imposed sign restriction, VIX and BD LEVERAGE immediately respond negatively and positively. This is a natural consequence. The remaining variables, which are not restricted by sign restriction, are the following. OFFSHORE BOND significantly and positively responds against global liquidity shock after second quarters. In response to it, WITHIN-COMPANY FLOW and NONCORE significantly and positively responded after ten quarters. Therefore, the results are consistent with the main results.

<<insert Figure 6 here>>

4-3. Robustness check 2: BETWEEN-COMPANY FLOW

To confirm the channel of repatriate offshore funds to headquarters in the home country other than WITHIN-COMPANY FLOW, we use BETWEEN-COMPANY FLOW. Therefore, our model consists of VIX, BIS GLOBAL LIQUIDITY, OFFSHORE BOND, BETWEEN-COMPANY FLOW and NONCORE. According to the Schwarz

Criterion (SC), we set the lag length to one. The results of impulse–response functions of global liquidity shock to five variables are shown in Figures 7. From this figure, by the imposed sign restriction, VIX and BIS GLOBAL LIQUIDITY immediately respond negatively and positively. This is a natural consequence. Then OFFSHORE BOND significantly and positively responded against global liquidity shock after four quarters. In response to it, BETWEEN-COMPANY FLOW significantly and positively responded after six quarters. Finally, NONCORE significantly and positively responded after thirteen quarters. Therefore, the results are consistent with the main results. However, compared to two earlier results which use WITHIN-COMPANY FLOW, although it is significant, the response of BETWEEN-COMPANY FLOW is not strong and temporary. Therefore, offshore affiliates of Chinese non-financial corporations usually repatriate offshore funds to the home country via WITHIN-COMPANY FLOW.

<<insert Figure 7 here>>

5. Shadow banking and offshore bond issuance

Shadow banking has been identified as one cause of the global financial crisis in 2008. Therefore, it has attracted much attention in the United States. However, the term

only recently came into widespread use. No single consensus-based definition exists. Based on seminal work reported by Pozsar et al. (2010), researchers and regulators have proposed different definitions for shadow banking. For example, the Financial Stability Board of United States broadly describes shadow banking as “credit intermediation involving entities and activities outside the regular banking system.” Furthermore, financing of banks and nonbank financial institutions through noncore liabilities constitutes shadow banking (Harutyunyan et al., 2014; Harutyunyan et al., 2015; International Monetary Fund, 2014). That definition of noncore liability is based on an idea presented by Shin and Shin (2011). Therefore, we can associate our findings with shadow banking and provide some policy implications. Among economically developing and BRICs countries, growth in shadow banking in China stands out (International Monetary Fund, 2014).

Ehlers et al. (2018) regard the dominant role of commercial banks as one important feature of the shadow banking system in China. Contrary to this, securitization and market-based instruments play only a minor role. Actually, that study compares shadow banking in China to “shadow of the banks.” To confirm similarity between noncore liability used in our empirical analysis and actual shadow banking data, we can examine the trend behavior of both data as shown in Figure 8. Using various statistics and

indicators, several researchers and institutions have analyzed the volume and dynamics of shadow banking in China. Among them, we used “core shadow banking activity” from Moody’s quarterly China shadow banking monitor. This indicator is based on three sources: entrusted loans, trust loans, and undiscounted banker’s acceptances[16]. As the figure shows, we can confirm the core shadow banking indicator (CORE SHADOW) and NONCORE, which is used in the estimation exhibit similar trend behavior. Moreover, the outstanding amounts of the two variables are similar. Therefore, when assessing China, it is reasonable to treat noncore liability as shadow banking.

<<insert Figure 8 here>>

According to the figure, in 2018Q1, the stock of NONCORE is about $2.8 trillion and CORE SHADOW is about $4 trillion. Comparison with other estimates of the Chinese shadow banking sector shows that they range from $6.4 trillion (Ehlers et al., 2018; p.28 Table 1, creditor perspective) to $9.1 trillion (Ehlers et al., 2018, p.30 Table 3, borrower perspective). In contrast, as presented in the earlier Figure 3, the total stock of offshore bond liability of Chinese non-financial company was about $363 billion in

[16] Data are from Aggregate Financing to the Real Economy of the People's Bank of China.

2018Q1. Therefore, the offshore bond liabilities are somewhere between 4% and 6% of the shadow banking sector. In spite of this evidence, through offshore bond issuance, the global liquidity shock accounts for about 10% of the variation of noncore liability of China. Therefore, through a feedback effect from both domestic and international financial systems, the global liquidity shock will amplify and strongly affect noncore liability. In spite of strict financial restrictions, the domestic Chinese financial sector can be said to have become increasingly vulnerable to shocks from international financial markets.

The sudden sharp increase in shadow banking in China in recent years represents an important difficulty affecting financial stability. To mitigate the financial vulnerability, monetary authorities in China such as the People's Bank of China and China Banking Regulatory Commission are undertaking efforts to cut leverage in the financial system by issuing a flurry of regulations. These policies have pushed up corporate funding costs onshore. By contrast, although the FRB is set to raise interest rates, funding costs of US dollars will remain cheaper offshore. Therefore, Chinese non-financial corporations have strong demand to substitute low-yielding US dollar debt for higher-yielding Yuan assets. In spite of this attempt at management of the difficulties and strict capital controls, within-company flows between offshore affiliates and headquarters in the

home country can circumvent financial restrictions. As explained in the discussion presented above, if Chinese government policy is to divide offshore and onshore financial markets, then comprehensive financial regulation is needed.

6. Conclusions

In China, to circumvent capital restrictions, the use of offshore affiliates as financing vehicles for accumulating low-yield US dollar liabilities has become widespread. Furthermore, funds are repatriated from offshore affiliates to headquarters in the home country via within-company flows. To analyze this issue more deeply and dynamically, we specifically examine noncore liability, which is an indicator of financial system vulnerability. We analyze whether the increase of offshore bond issuance by offshore affiliates of non-financial corporations and within-company flow are a transmission channel of global liquidity shocks. From the impulse response function of VAR analysis, we ascertained that global liquidity shock has a positive effect on offshore bond issuance. Furthermore, then, through within-company flow, it will transmit to noncore liability.

Our study is based on those of Huang et al. (2018) and on Kim and Shin (2017). Using firm-level micro data, Huang et al. (2018) find that the non-financial companies

that issues offshore bonds are more likely to become lenders in the shadow banking system. However, because the estimation of their study was conducted separately and statically, it is unsuitable for studying the dynamic interrelation of the variables. We can analyze the structure of offshore-onshore financial linkage in China in greater detail if we specifically examine the transmission channel. Using the VAR model, the latter study identified the global liquidity shock and analyzed the response of offshore bond issuance and domestic interest. Particularly addressing within-company flow as a surrogate intermediary through fund repatriation, our VAR exercises complement work reported by Huang et al. (2018) and Kim and Shin (2017) demonstrating how offshore bond issuance and noncore liability are influenced dynamically by the global liquidity shock.

Generally, compared to portfolio investment, those earlier studies usually assumed that FDI is more stable and less prone to financial booms and sudden stops. Therefore, FDI flows into economically developing countries are often viewed as stable “cold” money generated by long-term considerations. By contrast, portfolio flows are often regarded as unstable “hot” money that moves according to short-term considerations. Contrary to the conventional view presented above, in economies such as those of emerging countries where capital flows are restricted, the offshore affiliate of a

non-financial corporation can act as a surrogate intermediary through fund repatriation. As described in Avdjiev et al. (2014), because of within-company flows, which are classified as a debt instrument of FDI, FDI can turn out to be “hot” money, thereby transmitting the global financial condition to a segregated domestic economy.

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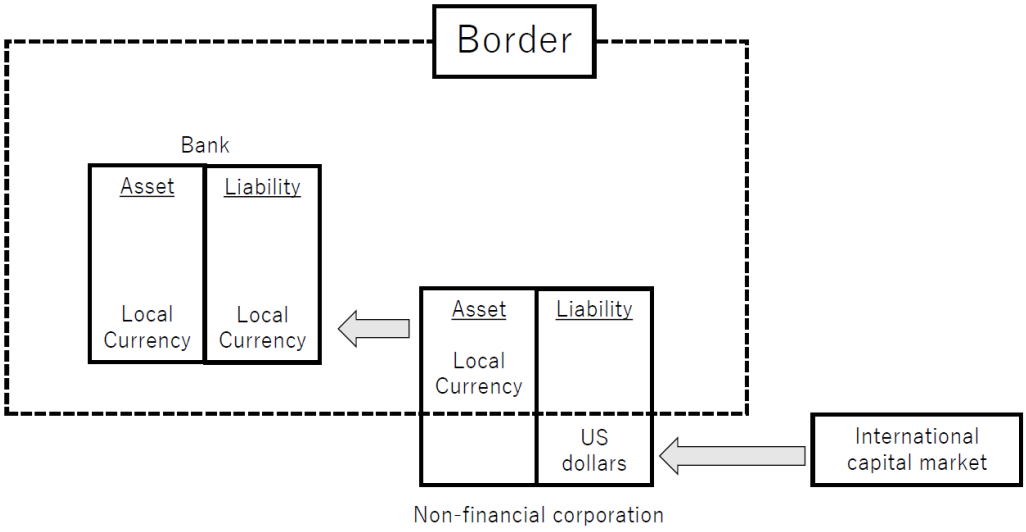
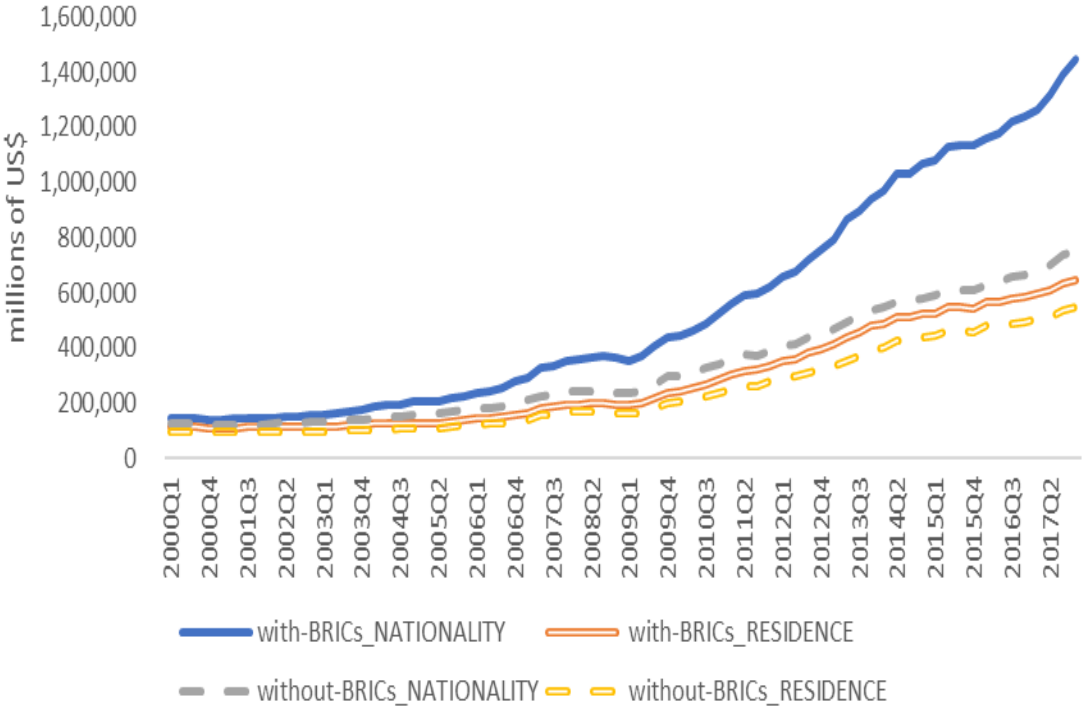
Figure 1: Non-financial corporations as a surrogate intermediary.



Sources: Shin (2013) and Chung et al. (2015)

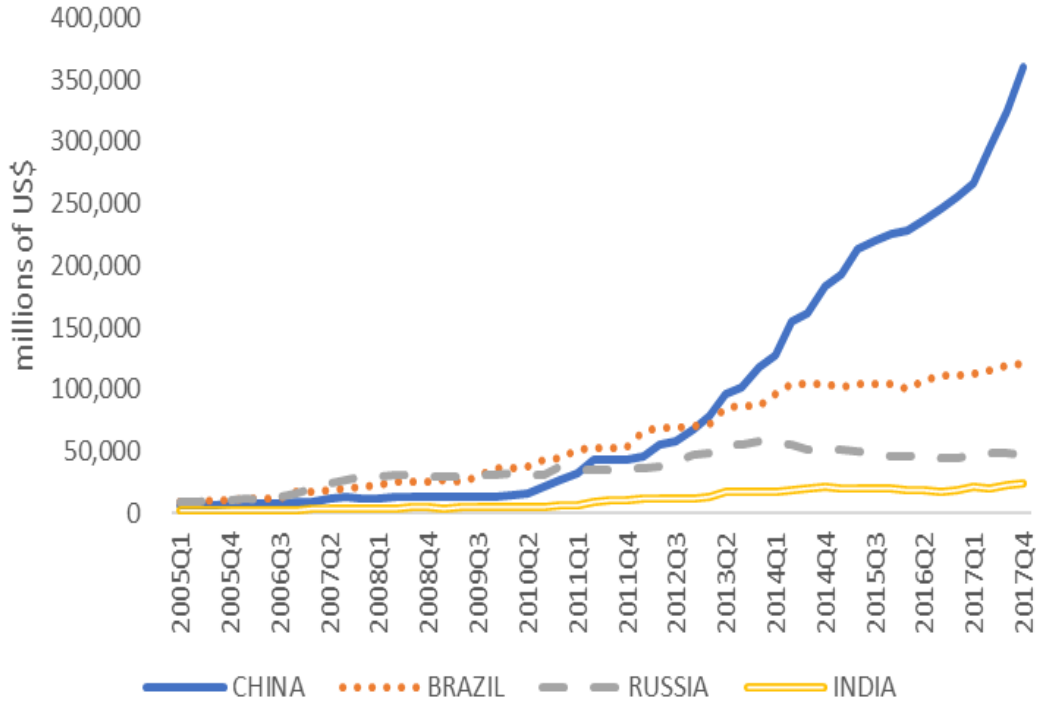
Figure 2: Nationality and residence of issuers with and without BRICs countries (million US dollars).



Note: The difference between "NATIONALITY" and "RESIDENCE" is offshore bond issuance: "with-BRICs" are economically developing countries including BRICs countries; and "without-BRICs" are economically developing countries, not including BRICs countries.

Source: BIS securities statistics

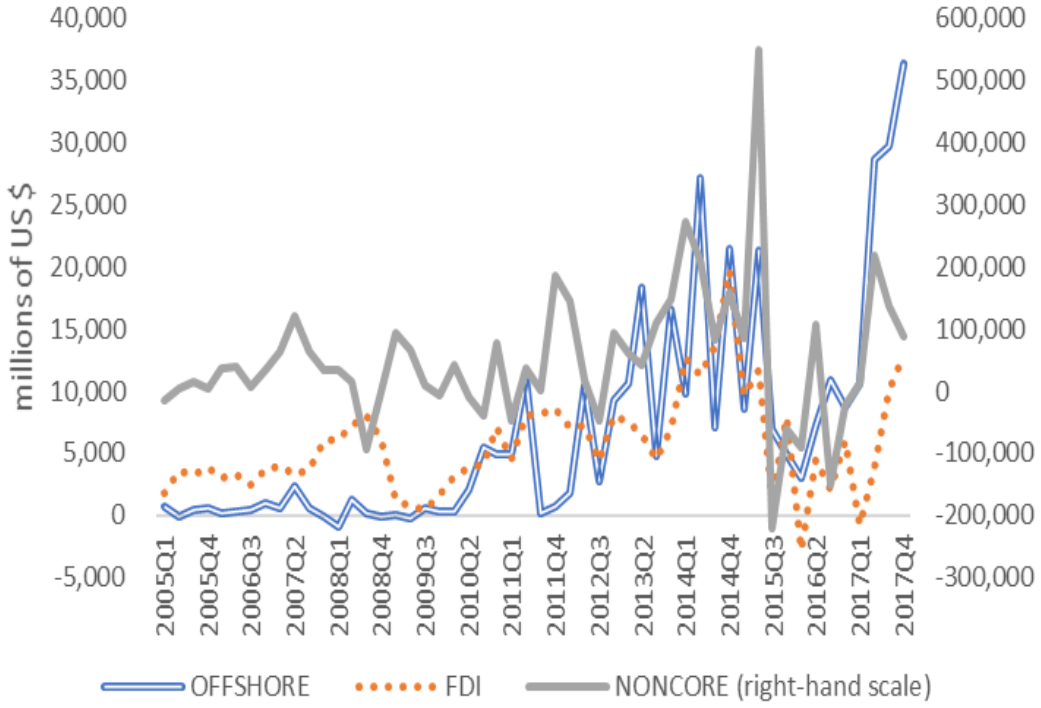
Figure 3: Offshore bond issuance by BRICs countries (million US dollars).



Note: The difference between nationality-based and the residence-based measures is a proxy for offshore bond issuance

Source: BIS securities statistics

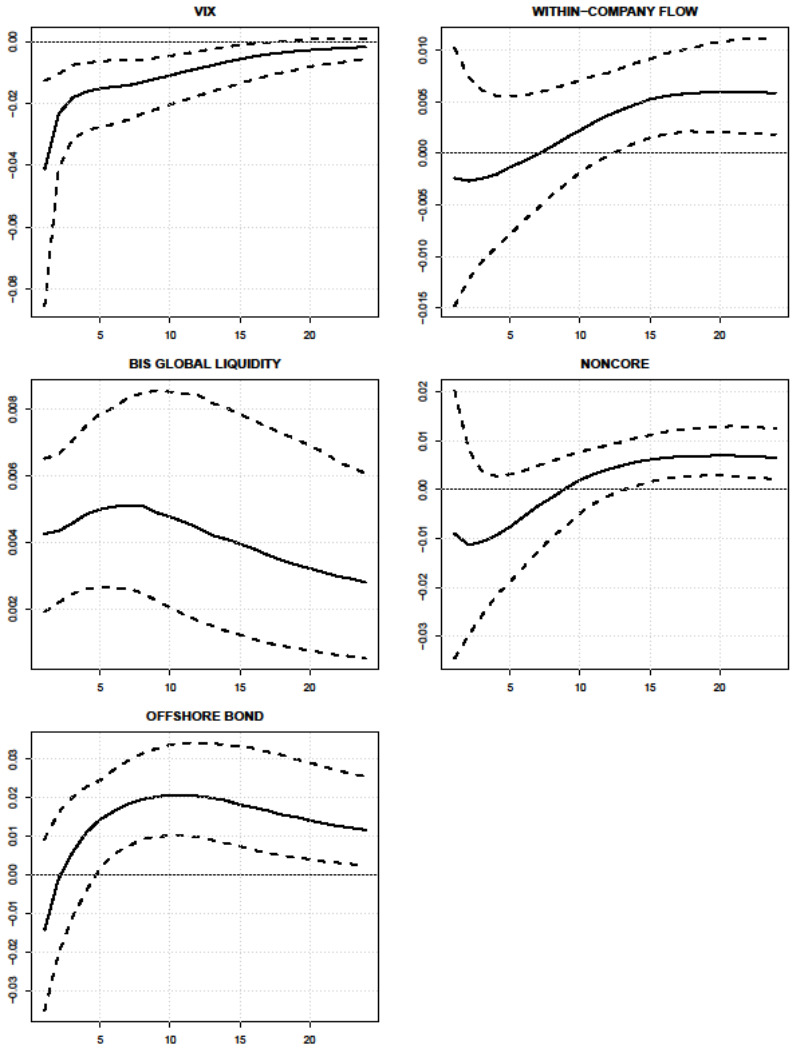
Figure 4: Offshore bond issuance, within-company flows, and noncore liability in China.



Note: Because FDI represents a flow of a new investment, to unify the terms used, we calculate the backward difference of stock variables of both OFFSHORE and NONCORE.

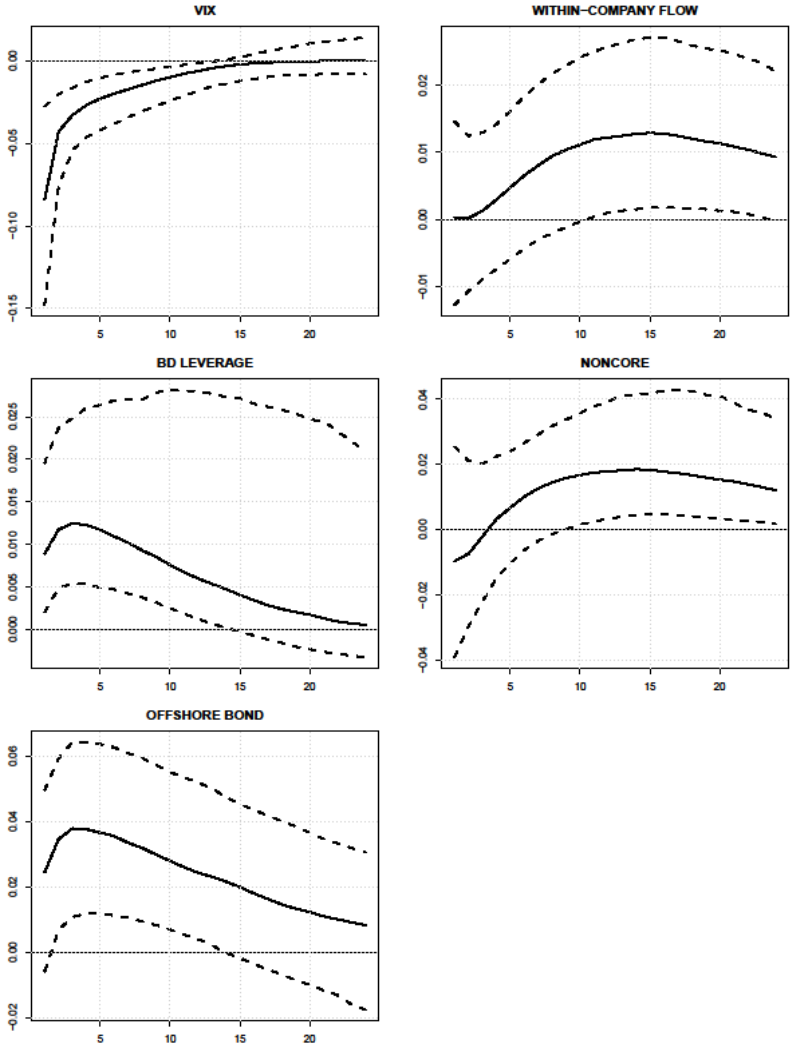
Sources: OFFSHORE is from BIS securities statistics; FDI is from BOP of the IMF; and NONCORE is from IFS of the IMF.

Figure 5: Impulse–response function of MAIN (per cent).



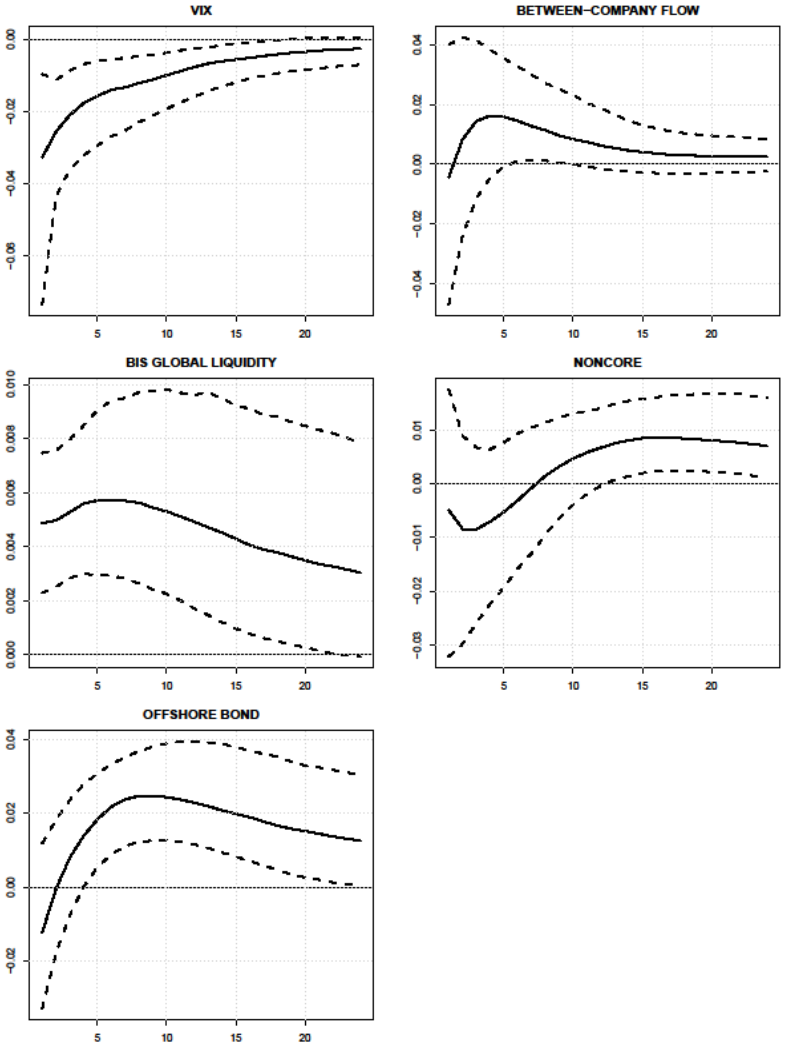
Note: To generate the impulse vectors, 200 draws from the posterior and 200 subdraws for each posterior draw are conducted.

Figure 6: Impulse–response function of ROBUST 1 (per cent).



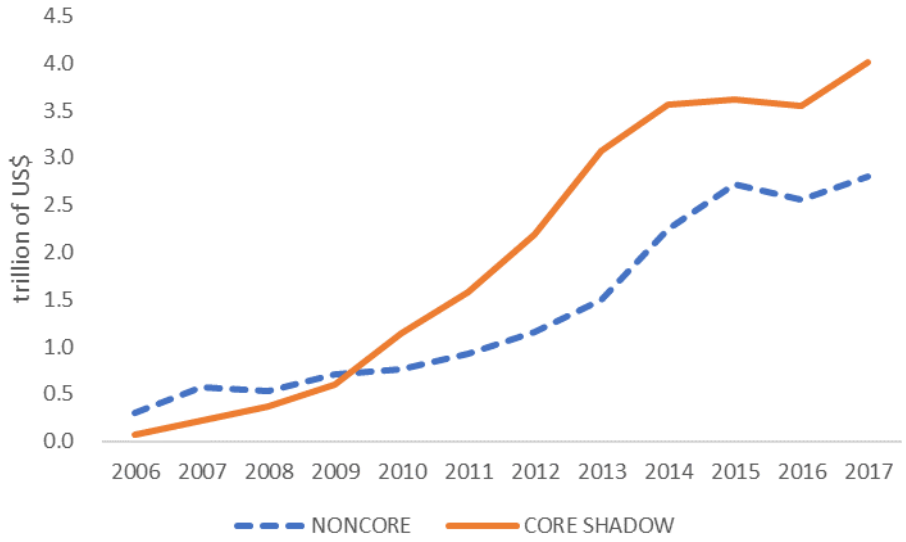
Note: To generate the impulse vectors, 200 draws from the posterior and 200 subdraws for each posterior draw are conducted.

Figure 7: Impulse–response function of ROBUST 2 (per cent).



Note: To generate the impulse vectors, 200 draws from the posterior and 200 subdraws for each posterior draw are conducted.

Figure 8: Noncore liability and core shadow banking activity (trillion US dollars).



Note: CORE SHADOW is based on the Moody's quarterly China shadow banking monitor.

Sources: NONCORE in domestic currency is from IFS of the IMF; CORE SHADOW is from the People's Bank of China.

Table 1: Used variables and sign restrictions

MODEL	VARIABLES						
	VIX	BIS GLOBAL LIQUIDITY	BD LEVERAGE	OFFSHORE BOND	WITHIN-COMPANY FLOW	BETWEEN-COMPANY FLOW	NONCORE
MAIN	<0	>0		NO REST	NO REST		NO REST
ROBUST 1	<0		>0	NO REST	NO REST		NO REST
ROBUST 2	<0	>0		NO REST		NO REST	NO REST

Note: Main denotes the model used in section 4-1. ROBUST 1 and ROBUST 2 are the model used in section 4-2 and 4-3. “<0” denotes negative sign restriction; “>0” denotes a positive sign restriction. NO REST denotes no sign restriction. The blanks represent variables that are not used.

Table 2: Forecast error variance decomposition (FEVD) of unrestricted variables

QUARTERS	OFFSHORE BOND	WITHIN-COMPANY FLOW	NONCORE
1	9.21	9.27	8.26
8	15.16	11.33	10.32
16	14.42	13.18	11.45
24	14.02	13.94	11.98