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Global Liquidity, Offshore Bond Issuance and Shadow Banking in China

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Abstract

In China, to benefit from abundant global liquidity, offshore affiliates of non-financial companies have been increasingly used as financing vehicles for accumulating low-yield US dollar liabilities. To elucidate this issue and its implications, we specifically examine offshore bond issuance, within-company flows, and shadow banking. Results indicate that a global liquidity shock will increase shadow banking, as represented by entrusted loans in China. In spite of strict financial restrictions, about 20% of the variance of shadow banking is explained by global liquidity shocks.

JEL classification: F3, F32, F34

Keywords: entrusted loan, global liquidity shock, non-financial company, offshore bond issuance, shadow banking, within-company flows

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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 (2013a) regards this as a “second phase of global liquidity.” 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. In spite of strict financial restrictions, the outstanding amounts of offshore bond debt of Chinese non-financial companies are overwhelming.

The sudden sharp increase in shadow banking in China in recent years represents an important difficulty that might affect financial stability¹. 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 served to push up onshore corporate funding costs. By contrast, although the FRB is set to raise interest rates, offshore funding costs of US dollars will remain cheaper. Therefore, Chinese non-financial companies face strong demand to substitute low-yielding US dollar debt for higher-yielding yuan assets.

An accumulation of both offshore and onshore debt is occurring simultaneously. Do they have any mutual relation? Do global liquidity shocks representing a “second phase

¹ Shadow banking is credit intermediation involving activities outside the traditional banking system. According to Ehlers et al. (2018), in China, the access to low-interest rate bank loans is restricted to large state-owned companies. In contrast, many small and medium-sized private companies have difficulty getting any bank loan. Therefore, by charging a high lending rate, shadow banking fills the gap. Using various statistics and indicators, Ehlers et al. (2018) analyzed the volume and dynamics of shadow banking in China. For example, their total lending is estimated as \$6.4 – \$9.1 trillion dollars.

of global liquidity” have some effect on shadow banking in China? This report explores answers to these questions. At the core of the questions is regulatory arbitrage that arises from regulatory differences between offshore and onshore financial markets. Because strict financial restrictions exist in China, access to cheap US dollars is difficult for banks and the financial sector. Therefore, non-financial companies behave as financial intermediaries. An important reason is that capital account transactions through banks can be regulated tightly, but the transactions of thousands of non-financial companies generated through international trade are much more difficult to monitor and regulate.

To assess this issue more deeply, we specifically examine within-company flows by non-financial companies. The findings indicate that non-financial companies act as surrogate intermediaries by issuing bonds at offshore affiliates and by transferring the funds to the headquarters in the home country² (Bruno and Shin, 2017; Huang et al., 2018; Kim and Shin, 2017; McCauley et al., 2015; Shin, 2013a; Shin and Zhao, 2013). Based on the characteristics presented above, we analyze whether the increase of offshore bond issuance and within-company flow by non-financial companies can serve as a transmission channel of global liquidity shocks to shadow banking in China. A close study was made by Huang et al. (2018), who reported that non-financial companies that issue offshore bonds are more likely to become lenders in the shadow banking system. Similarly, Bruno and Shin (2017) described that non-financial companies in emerging economies issue bonds denominated in US dollars and conduct financial intermediation activities similar to a carry trade.

² Loopholes of various kinds exist for transfer of 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 partners’ reported copper exports to China became extremely wide after 2010. This over-invoicing by Chinese copper corporations represents one instance of capital inflow by non-financial corporations.

However, because estimations in those studies were conducted statically and because they were based on micro-data, they are unsuitable for assessing the dynamic interrelation of the variables. It can be expected that the effects of global liquidity shocks on shadow banking are time-variant and that they might depend strongly on macroeconomic conditions. For example, after the global financial crisis of 2008, global liquidity shocks became negative, perhaps exerting negative effects on shadow banking. Alternatively, if China adopts strict financial restrictions on the shadow banking sector, then what will happen to the dynamic relation? By applying dynamic methods of a vector autoregression (VAR) analysis, one can analyze the time-varying effect of global liquidity shocks on shadow banking through narratives of macroeconomic conditions and macroeconomic policies. Then it is possible to complement the results of the preceding static micro-data studies. Results are expected to engender more fruitful macroeconomic policy implications.

Especially, the VAR model analytical framework is based on that presented by Bruno and Shin (2015), who analyze the propagation of US monetary policy shocks on cross-border bank flows. For their sample period of 1995–2007, they specifically examine the global banking sectors of the United States and European countries. Different from their study, we specifically examine the era of a “second phase of global liquidity” and economically developing countries. To model the circumvention of capital restrictions, our VAR model includes offshore bonds and within-company flows. Similarly to our motivation, Kim and Shin (2017) use the VAR model and analyze the importance of offshore bond issuance as a channel for transmission of global liquidity. However, different from their study, our study emphasizes the role of within-company flows as a transmission channel of global liquidity shocks. Additionally, different from

their study, we specifically examine shadow banking.

Particularly, a Bayesian structural VAR model with sign restriction was used for this study, 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 in identification arising from traditional models such as those of Cholesky decomposition and the long-run restriction of Blanchard–Quah decomposition. In line with this, studies using a sign-restricted VAR approach to analyze the effect of capital flow shock include the following. Sá 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 microdata of Huang et al. (2018) and the VAR analysis of Kim and Shin (2017), indicating how offshore bond issuance, within-company flows, and shadow banking are influenced by global liquidity shocks. The remainder of the paper is organized as follows. Section 2 presents a description of the trend behavior of the variables used for empirical analyses. Section 3 presents the methodology of sign restriction VAR and a data description. Section 4 presents empirical results. Based on those empirical results, we analyze the time-varying effect of global liquidity shock on shadow banking in section 5. Finally, we present conclusions in section 6.

2. Facts of Offshore Bond Issuance, Within-company Flows, and Shadow

Banking

Because of low interest rate policies imposed by the FRB after 2008, dollar borrowing costs became extremely low. Therefore, offshore bond issuance by non-financial companies in emerging countries increased dramatically after the 2008 financial crisis. The stream of offshore bond issuance by non-financial companies can be portrayed as Figure 1 (Chung et al., 2015; Shin, 2013a). First, the offshore affiliate of a non-financial company issues US-dollar-denominated bonds. Then, through within-company flows, the offshore affiliates transfer funds to their headquarters in the home country. Different from Shin (2013b), who specifically examines noncore liability of corporate deposits from non-financial companies, we specifically assess entrusted loans: an important component of shadow banking³. Entrusted loans are inter-company loans between non-financial companies. Direct borrowing and lending between non-financial companies is restricted. Therefore, it is facilitated by a financial institution. Subsequently, the headquarters in the home country will engaged in entrusted loans and lend to the other non-financial companies.

<<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

³ Financing of bank and nonbank financial institutions through noncore liabilities constitutes shadow banking (Harutyunyan et al., 2014; Harutyunyan et al., 2015). Therefore, we can associate our findings with noncore liability.

et al., 2015; Shin, 2013a), we use statistics of two types reflecting the net issuance of international debt securities: nationality-based measures and the residence-based measures. The issuer residence is the country in which the issuer is incorporated, whereas the issuer nationality is the country in which the issuer's parent is headquartered⁴. We can assume that the amount of international debt issued by foreigners within the borders 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 describe offshore US-dollar-denominated bond issuance by international debt securities of non-financial companies using data from the Bank for International Settlements (BIS)⁵. Figure 2 presents the stock of offshore bond issuance of non-financial companies in China (CHN_OFF) and the sum of remaining 3 BRICs countries (Brazil, Russia, India) (WITHOUT_OFF). As this figure shows, the outstanding amounts of China are overwhelming.

<<insert Figure 2 here>>

After offshore affiliates issue offshore bonds, the funds must be repatriated to the headquarters in the home country. To circumvent capital restrictions, within-company

⁴ For example, 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 Hereinafter, unless otherwise noted, all data of offshore bond issuance used for these analyses are denominated in US dollars. 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.

flows are used to transfer funds from offshore affiliates to a headquarters in the home country. By doing so, even if capital account transactions through banks are regulated tightly, the transactions of thousands of non-financial companies generated through international trade would be much more difficult to monitor and regulate. Following the explanation offered by Avdjiev et al. (2014), data of within-company flows can be described as presented below⁶. An accounting convention in the balance of payments (BOP) used by the International Monetary Fund (IMF) deems borrowing and lending between affiliated entities of the same non-financial companies as “direct investment.” Specifically, such transactions are classified as “debt instruments”: a sub-category of direct investment.

According to Avdjiev et al. (2014) and Hardy and Saffie (2019), non-financial companies have other means to repatriate funds to the home country. In this case, the lender and the borrower non-financial companies differ; they conduct so-called between-company flows⁷. Such flows are captured through trade credit in BOP statistics. According to the BOP manual, trade credit is a direct extension of credit by suppliers for transactions in goods and services. Therefore, our data do not include trade financing more broadly such as guarantees through banks and letters of credit. As described in this paper, using trade credit in BOP statistics, we construct data of between-company flows, and make comparisons with results that use within-company flows.

⁶ According to Avdjiev et al. (2014), three fund flow channels exist between the offshore affiliate and the home country: (1) direct lending to the 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 a non-financial company. For this paper, we define the first as a within-company flow and the second as a between-company flow. Because of data limitations, data of the third channel are not obtainable.

⁷ In the terminology of Avdjiev et al. (2014), this is between-company trade credit.

Here, we describe the trend behavior of three previously described variables: The differences among offshore bond issuance, within-company flows, and between-company flows⁸. These three variables are abbreviated as DIF_OFFSHORE, WITHIN, and BETWEEN as shown in Figure 3, which depicts that offshore bond and within-company flow data exhibit very similar trend behavior throughout the sample periods. However, between-company flows do not exhibit similar trend behavior. Offshore bond issuance and within-company flows show similar trend behavior.

<<insert Figure 3 here>>

Finally, we describe the shadow banking of China. Among several shadow banking types, we specifically examine entrusted loans. According to Huang et al. (2018), by conducting entrusted loan activity, non-financial companies eliminate interest rate differences between offshore and onshore markets through arbitrage. The loans have attracted much attention. Recently, in addition to Huang et al. (2018), entrusted loans have been studied by many researchers such as Allen et al. (2019) and Chen et al. (2018). Hereinafter, with comparison of the offshore bond issuance of China, one can find a trend for behavior of entrusted loans from the earlier Figure 2. Data are taken from the CEIC database⁹. As the figure shows, shadow banking (SHADOW), and offshore bond issuance of China exhibit similar trend behavior¹⁰. One can infer that the

⁸ It is noteworthy that, because within-company flows and between-company flows are flows of new investment, to unify the terms used, we calculate the backward difference of stock variables of offshore bond. All data are expressed in US dollars.

⁹ Because entrusted loans are flows of new investment, we convert to stock variables to unify the terms used in Figure 2.

¹⁰ On January 2018, the China Banking Regulatory Commission put new curbs on the entrusted lending business. Therefore, especially after 2018, shadow banking is showing decreasing trend

boom in shadow banking in China is fueled to some degree by offshore bond issuance by offshore affiliates. Empirical analyses must be conducted to analyze linkages among these variables more deeply.

3. Empirical Methodology and Data

3-1. Sign restriction VAR

If a positive shock arises in global financial markets, then offshore bond issuance will increase. Consequently, offshore affiliates will repatriate funds to headquarters in the home country through within-company flows. Finally, shadow banking 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, monetary easing shocks are identifiable by imposing negative responses of interest rates in the first several periods and a positive response of money over the same period. In the following, we briefly describe the methodology of used for the study by Uhlig (2005).

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 Cholesky decomposition¹¹. (3) Calculate the resulting impulse responses from step 2. (4) Randomly draw an orthogonal impulse vector α . (5) Multiply the responses from step 3 times α and confirm that they match the imposed

behavior. Associated with empirical results presented in section 4, we address this topic again in section 5.

¹¹ Cholesky decomposition is merely a means of orthogonalizing shocks. Different ordering of the variables does not alter the results.

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 distribution for α .

3-2. Data and identification methodology

According to BIS (2011), the definition of global liquidity is “ease of financing” in global financial markets. Specifically, several proxy variables exist as follows: Rey (2015) reports that uncertainty and risk aversion captured by VIX, which is a volatility index implied by S&P 500 index options, represents global liquidity. Gourinchas and Obstfeld (2012) specifically examine the rapid increase in leverage and appreciation of the 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 the real exchange rate to analyze global liquidity shocks. 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 of total credit to non-bank borrowers.

According to BIS (2011), these variables are classifiable into price indicators and quantity measures. In fact, BIS (2011) states 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. Because our sample period is 2005Q1 – 2019Q2, not many sample periods are available. Therefore, we must use the minimized variables to 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. The reason is the following. We have no interest in the origin of a global liquidity shock, such as US monetary policy shock. Therefore, we did not use the Fed Funds rate or US domestic credit. A consensus exists for using VIX as a price indicator. For quantity measures, we adopt this global liquidity indicator published by BIS as a quantity measure because it directly indicates global liquidity. It is noteworthy that we did not use this variable because US broker dealer leverage is a source of funds for wholesale funding for economically developed countries such as the United States and United Kingdom.

Including the robustness check test and the additional analysis, we estimate four models. Table 1 presents the imposed sign restriction and estimated models. The main empirical model is Model 1, which consists of five variables. To identify the positive global liquidity shock, we impose a negative sign on VIX. The decrease of VIX indicates global financial market stabilization. Additionally, we impose a positive sign on global liquidity indicators of BIS (GLOBAL LIQUIDITY). 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) later demonstrate that the effect persists for two years or more. After identifying global liquidity shock, we will analyze the response of offshore bond issuance (OFFSHORE BOND), within-company flows (WITHIN-COMPANY FLOW), and shadow banking (SHADOW BANKING). The values of VIX are referred from the Chicago Board Options Exchange. GLOBAL LIQUIDITY data are referred from BIS¹². The sources of the remaining three variables were described in an earlier section. Finally, we take logarithms of all variables¹³.

<<insert Table 1 here>>

Next, to confirm our empirical results, we conduct two robustness check tests. First, based the variables used in Model 1, we impose an additional positive sign restriction on OFFSHORE BOND because we want to identify a global liquidity shock that is also originated from OFFSHORE BOND. Second, because most offshore bonds of China are denominated in US dollars, the exchange rate fluctuation severely affects the behavior of non-financial companies; we therefore add the US dollar exchange rate to that of the Chinese yuan (EXCHANGE RATE) in Model 1. This is emphasized especially by Bruno and Shin (2015, 2019). Therefore, Model 3 consists of six variables: VIX, GLOBAL LIQUIDITY, EXCHANGE RATE, OFFSHORE BOND, WITHIN-

¹² 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. Position types are cross-border and local in US dollars.

¹³ Because the original data of within-company flows, between-company flows, and shadow banking are flows of new investment, negative values exist. To take log linearization, we accumulate these variables and convert them to stock variables. Therefore, the stock variables are used in VAR estimation. It is noteworthy that the variables used in Figure 2 are stock variables. Those in Figure 3 are flow variables. In addition, we did not take logarithms to these variables in Figures 2 and 3. Finally, GLOBAL LIQUIDITY and OFFSHORE BOND are stock variables from the beginning.

COMPANY FLOW, and SHADOW BANKING. The rise of EXCHANGE RATE represents Chinese yuan devaluation. The data are taken from International Financial Statistics of IMF. However, one must keep in mind that because our sample period is not long, inclusion of the additional variables in the model might decrease the estimation accuracy. Finally, the sign restriction is the same as that of Model 1.

To conduct additional analysis, as an alternative to WITHIN-COMPANY FLOW, we use between-company flows (BETWEEN-COMPANY FLOW) and analyze the transmission channel through BETWEEN-COMPANY FLOW. This is designated as Model 4, for which the remaining variables and sign restrictions are the same as those of Model 1. Therefore, Model 4 consists of five variables: VIX, GLOBAL LIQUIDITY, OFFSHORE BOND, BETWEEN-COMPANY FLOW, and SHADOW BANKING. The sources of BETWEEN-COMPANY FLOW are described in an earlier section.

4. Empirical Results

4-1. Main results

This subsection presents a description of the main results. Model 1 has five variables: VIX, GLOBAL LIQUIDITY, OFFSHORE BOND, WITHIN-COMPANY FLOW, and SHADOW BANKING. According to the Schwarz Criterion, we set the lag length to 1.

Results of impulse-response functions of global liquidity shock to the five variables are presented in Figure 4¹⁴. From the figure, by imposed sign restriction, VIX and GLOBAL LIQUIDITY immediately respond negatively and positively. This response is

¹⁴ The solid line is the median of the posterior distribution and the dashed lines respectively represent the 16% and 84% quantiles.

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 three quarters. In response to it, WITHIN-COMPANY FLOW and SHADOW BANKING responded significantly and positively after 9 and 4 quarters. Although Bruno and Shin (2015) and Kim and Shin (2017) did not consider WITHIN-COMPANY FLOW and SHADOW BANKING, our results are consistent with theirs in that global liquidity shocks have a positive effect on capital inflows.

<<insert Figure 4 here>>

From a dynamic perspective, the hypothesis of the timing of the transmission 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, a global liquidity shock has a positive effect on SHADOW BANKING. However, from Figure 4, the response of SHADOW BANKING apparently precedes that of WITHIN-COMPANY FLOW. Onshore headquarters and offshore affiliates of non-financial companies are the same companies. For that reason, they need not repatriate funds immediately. For example, because non-financial companies are conducting merger and acquisition activity in international markets, the headquarters will consider the timing of fund repatriation according to international investing activities. Therefore, if prospects of receiving funds from offshore affiliates rise, the headquarters in the home country will conduct financial activities and increase SHADOW BANKING without receiving funds.

As the results demonstrate, shocks occurring in global financial markets strongly influence shadow banking in China. How much of an effect does a global liquidity shock have on shadow banking in China? To analyze this point, we calculate the forecast error variance decomposition (FEVD) of the variables against a global liquidity shock. The variables constituting FEVD are presented in Figure 5. At the initial stage, about 18% of the FEVD of SHADOW BANKING is explained by a global liquidity shock. As time passes, the number increases. After 20 quarters, it becomes about 21%. For OFFSHORE BOND, after 20 quarters, it will become about 20%. Therefore, in spite of strict financial restrictions, a non-negligible share of FEVD of SHADOW BANKING is explained by a global liquidity shock. In the case of WITHIN-COMPANY FLOW, at the initial stage, about 17% of the FEVD of WITHIN-COMPANY FLOW is explained by a global liquidity shock. As time passes, the number increases. Especially, six quarters later, the effect of global liquidity shock increases, which is in line with the lagging response of WITHIN-COMPANY FLOW of the preceding Figure 4.

<<insert Figure 5 here>>

In section 5, using this Model 1, we conduct historical decomposition analysis. Finally, one must reconsider the characteristics of foreign direct investment (FDI). WITHIN-COMPANY FLOW is classified as 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 company 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 shadow banking sector.

4-2. Robustness check

To check the robustness of our result, we conduct two robustness check tests. First, the impulse-response of Model 2 is shown in Figure 6. As described before, we identified a global liquidity shock originating from OFFSHORE BOND. Therefore, we add an additional positive sign restriction on OFFSHORE BOND. As the figure shows, the result is consistent with the earlier presented Figure 4 of Model 1.

<<insert Figure 6 here>>

Next, to control the exchange rate channel, we include the additional variable of EXCHANGE RATE into Model 1. Consequently, our model consists of VIX, GLOBAL LIQUIDITY, EXCHANGE RATE, OFFSHORE BOND, WITHIN-COMPANY FLOW, and SHADOW BANKING. According to the Schwarz Criterion, we set the lag length to 1. The results of impulse-response functions of global liquidity shock to six variables are presented in Figure 7. As shown in this figure, by the imposed sign restriction, VIX

and GLOBAL LIQUIDITY respectively respond immediately as negatively and positively. This is a natural consequence. Then OFFSHORE BOND significantly and positively responds against global liquidity shock after five quarters.

<<insert Figure 7 here>>

The response of EXCHANGE RATE is specially described. The rise of the value indicates devaluation of the Chinese yuan. As the figure shows, against positive global liquidity shock, the response of EXCHANGE RATE is significantly negative, which indicates appreciation of yuan against the positive global liquidity shock. That result is in line with that reported by Bruno and Shin (2015) who used a VAR model and analyzed the effect of a US monetary shock on the exchange rate. Therefore, appreciation of yuan against the US dollar can be expected to mitigate the burden of US dollar denominated debt of non-financial companies. In response to it, WITHIN-COMPANY FLOW significantly and positively responded after seven quarters. Finally, SHADOW BANKING significantly and positively responded after one quarter.

However, the response of SHADOW BANKING precedes both WITHIN-COMPANY FLOW and OFFSHORE BOND. Therefore, as described before, when global liquidity shocks erupted, before receiving funds through WITHIN-COMPANY FLOW, the domestic headquarters in China will foresee fund repatriation and will conduct shadow banking activity before receiving funds. Furthermore, because EXCHANGE RATE is included in Model 3, because of yuan appreciation, the expectation of improvements in the balance sheet will also accelerate an immediate response of SHADOW BANKING.

4-3. Additional analysis

To confirm the channel of repatriation of offshore funds to headquarters in the home country, instead of WITHIN-COMPANY FLOW, we use BETWEEN-COMPANY FLOW. Therefore, our model consists of VIX, GLOBAL LIQUIDITY, OFFSHORE BOND, BETWEEN-COMPANY FLOW and SHADOW BANKING. According to the Schwarz Criterion, we set the lag length to 1. The results of impulse-response functions of global liquidity shock for five variables are shown in Figure 8.

As shown in this figure, by the imposed sign restriction, VIX and GLOBAL LIQUIDITY respectively respond immediately negatively and positively. This is a natural consequence. Then OFFSHORE BOND significantly and positively responded against global liquidity shock after two quarters. This result is the same as those obtained with Models 1, 2, and 3. However, the response of BETWEEN-COMPANY FLOW is not significant. Therefore, the response of SHADOW BANKING is also not significant. Therefore, offshore affiliates of Chinese non-financial companies usually do not use BETWEEN-COMPANY FLOW channels for repatriation of offshore funds to the home country.

<<insert Figure 8 here>>

5. Shadow Banking and Macro-prudential Policies in China

How important were global liquidity shocks on shadow banking during our sample period of 2005–2019? It can be expected that the effects of global liquidity shock on shadow banking are time-variant and that they might depend strongly on external and

internal macroeconomic conditions. Usually, macroeconomic conditions are not the same throughout the period. After the global financial crisis of 2008, and the continuing European debt crisis, global liquidity became persistently negative. Alternatively, after 2016, because of attempts to contain financial risks and to slow an explosive build-up in debt without stunting economic growth, the monetary authorities of China, including the People's Bank of China, have pursued a deleveraging policy.

Therefore, assessment of the relative importance among structural shocks and how this evolved over time necessitates the use of historical decomposition (HIST) analysis.¹⁵ The analysis provides an interpretation of historical fluctuations in the modelled time series through the lens of the identified structural shocks. Results obtained from HIST reveal what portion of the deviation of the variables from its unconditional mean is attributable to the shocks. In this section, by applying a HIST approach to Model 1, we can analyze the time-varying effect of global liquidity shock through narratives of particular historical episodes of macroeconomic conditions. The response of WITHIN-COMPANY FLOW provides valuable information. Therefore, we will also specifically examine this variable.

The results from a HIST examination of global liquidity shocks on WITHIN-COMPANY FLOW and SHADOW BANKING are shown in Figures 9 and 10¹⁶. As the global financial crisis in 2008 began, the negative global liquidity shock (GL_SHOCK), exerted a negative effect on both WITHIN-COMPANY FLOW (DT_WITHIN), and SHADOW BANKING (DT_SHADOW), as the figure shows. The negative effect

¹⁵ Historical decomposition is obtained using the structural moving average representation to separate series in the components (mutually orthogonal) attributable to the different structural shocks. Doan (2009) presents related details.

¹⁶ Both variables are detrended using a Hodrick–Prescott filter.

persisted until 2013. During this period, the European debt crisis also made global financial conditions worse and persistent. Therefore, in spite of rising debt amounts of the shadow banking sector in China, the contribution of global liquidity shocks was negative during this period.

<<insert Figure 9 here>>

<<insert Figure 10 here>>

Nevertheless, to recover economic growth and employment after the global financial crisis of 2008, the Chinese government deployed a stimulus package. Therefore, the growth rates of M2 of China in 2009 and 2010 were, respectively, 26.4% and 20.8%. According to Chen et al. (2020), excess liquidity and the stimulus package contributed to the rise of the shadow banking sector.

After 2014, as global financial conditions improved, the global liquidity shock became positive. In fact, it turned out to have a positive effect on both WITHIN-COMPANY FLOW and SHADOW BANKING, as the figure shows. At the same time, as shown in Figure 2 earlier, offshore bond issuance of China rose steeply. The amount has come to exceed the sum of the other three BRICs countries. Therefore, one can say that, after 2014, the global liquidity shock has contributed to the rise of the shadow banking sector.

By contrast, the growth rate of M2 of China decreased from 12.7% in 2014 to 8.8% in 2018 because, to prevent overheating of the credit boom and to mitigate the accumulation of potential financial distress, the Macro Prudential Assessment framework was launched on 2016. The financial deleveraging policy has pushed up

money market rates, bond yields, and corporate funding costs as the broad M2 money supply growth has decreased. Therefore, the domestic credit shortage will engender a rise in the importance of repatriating cheap offshore funds to headquarters in the home country through entrusted loans. This result roughly matches that produced by Allen et al. (2019) who argue that entrusted loans are fundamentally a market reaction to credit shortages. Furthermore, according to Chen et al. (2018), contractionary monetary policy caused shadow banking loans to rise rapidly, offsetting the expected decline of traditional bank loans and hampering the effectiveness of monetary policy for total credit in the banking system.

Finally, we specifically examine the year of 2018 when the China Banking Regulatory Commission put new curbs on entrusted lending. During this period, Figure 2 shows that although offshore bond issuance still has an upward trend, a sudden decrease exists in shadow banking. From Figure 10, the effect of global liquidity shocks on SHADOW BANKING vanished after 2018. As shown in Figure 9, the effect of global liquidity shock on WITHIN-COMPANY FLOW persists. Moreover it has an upward trend. Therefore, Chinese non-financial companies are still issuing bonds in offshore markets and are transferring the funds to the home country through something other than entrusted loans. Therefore, one can reasonably infer that the restriction policy on entrusted loans can not fully prevent the effects of global liquidity shocks on the domestic economy. Although we are interested in the whereabouts of the funds, that issue is beyond the scope of this paper.

6. Conclusions

In China, offshore affiliates are increasingly used as financing vehicles to

circumvent capital restrictions by accumulating low-yield US dollar liabilities.

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 shadow banking. We analyze whether the increase of offshore bond issuance and within-company flows are important transmission channels of global liquidity shocks. From the impulse-response function of VAR analysis, we ascertained that global liquidity shocks have a positive effect on offshore bond issuance.

Furthermore, through within-company flows, the funds will be transmitted to shadow banking.

Our study is based on that of Huang et al. (2018). Using firm-level micro data, they find that non-financial companies that issue offshore bonds are more likely to become shadow banking system lenders. In our study, we analyze the time-varying effect of global liquidity shock on shadow banking through narratives of macroeconomic conditions. According to our results, global liquidity shocks on shadow banking depend on external and internal macroeconomic conditions. For example, as described by Chen et al. (2018), because of offshore funds, contractionary monetary policy causes shadow banking loans to rise rapidly, consequently hampering the effectiveness of monetary policy. Alternatively, when the China Banking Regulatory Commission put new curbs on the entrusted lending in 2018, although effects of global liquidity shocks on entrusted loans vanished, offshore funds are still inflowing to the home country through some mode other than entrusted loans.

In addition, using the VAR model, Kim and Shin (2017) identified global liquidity shocks and analyzed the respective responses of offshore bond issuance and domestic interest. Particularly addressing within-company flows as a surrogate intermediary

through fund repatriation, our VAR exercises complement their interesting work.

Generally, compared to portfolio investment, those earlier studies 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. Contrary to that conventional view, in economies such as those of emerging countries where capital flows are restricted, the offshore affiliate of a non-financial company can act as a surrogate intermediary through fund repatriation. As described in Avdjiev et al. (2014), via within-company flows, FDI can turn out to be “hot” money, thereby transmitting global financial conditions to a segregated domestic economy.

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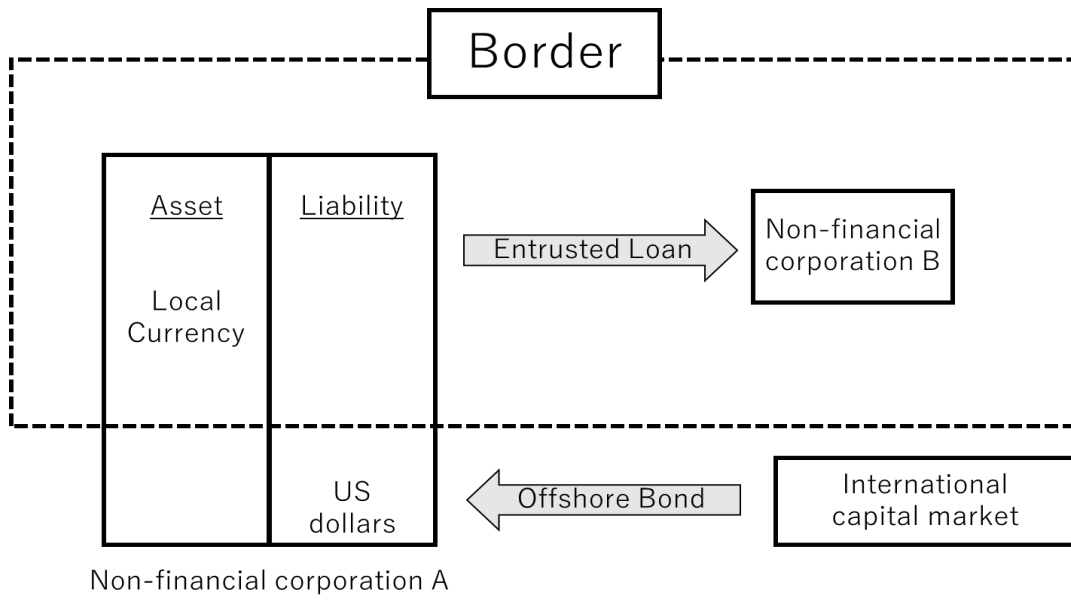
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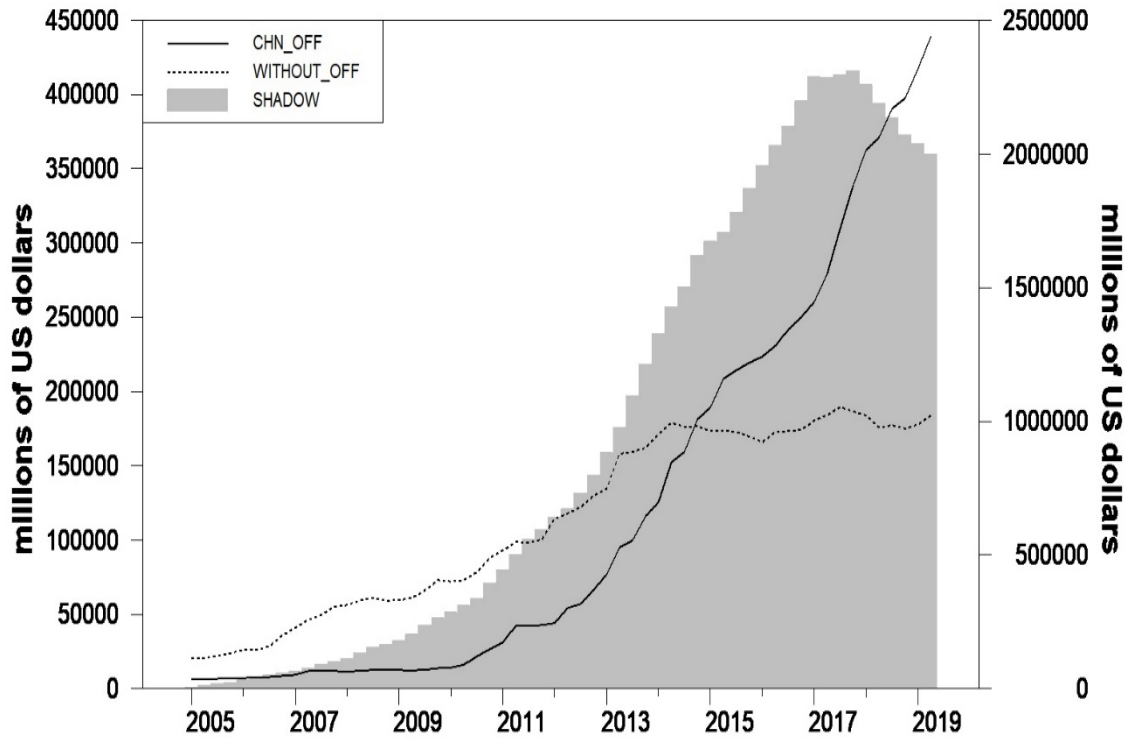
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Figure 1: Non-financial company as a surrogate intermediary.



Note: We make a change to figures presented by Shin (2013a) and Chung et al. (2015).

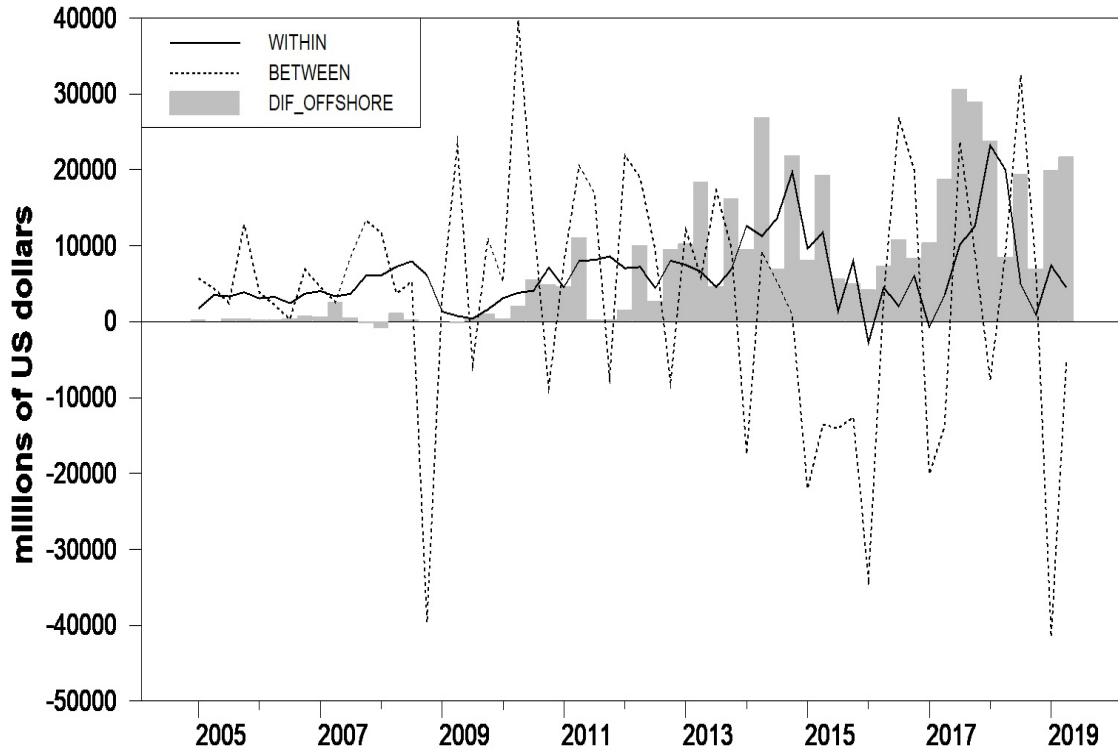
Figure 2: Offshore bond issuance and shadow banking.



Note: CHN_OFF and WITHOUT_OFF denote the offshore bond issuance of China and the sum of the remaining three BRICs countries (Brazil, Russia, India). SHADOW is entrusted loans of China, for which the axis is at the right-hand side. It is noteworthy that, because entrusted loans represent a flow of a new investment, we convert to stock variable to unify the terms.

Source: CHN_OFF and WITHOUT_OFF are from BIS; SHADOW is from CEIC.

Figure 3: Differences of offshore bond issuance, within-company flows and between-company flows.

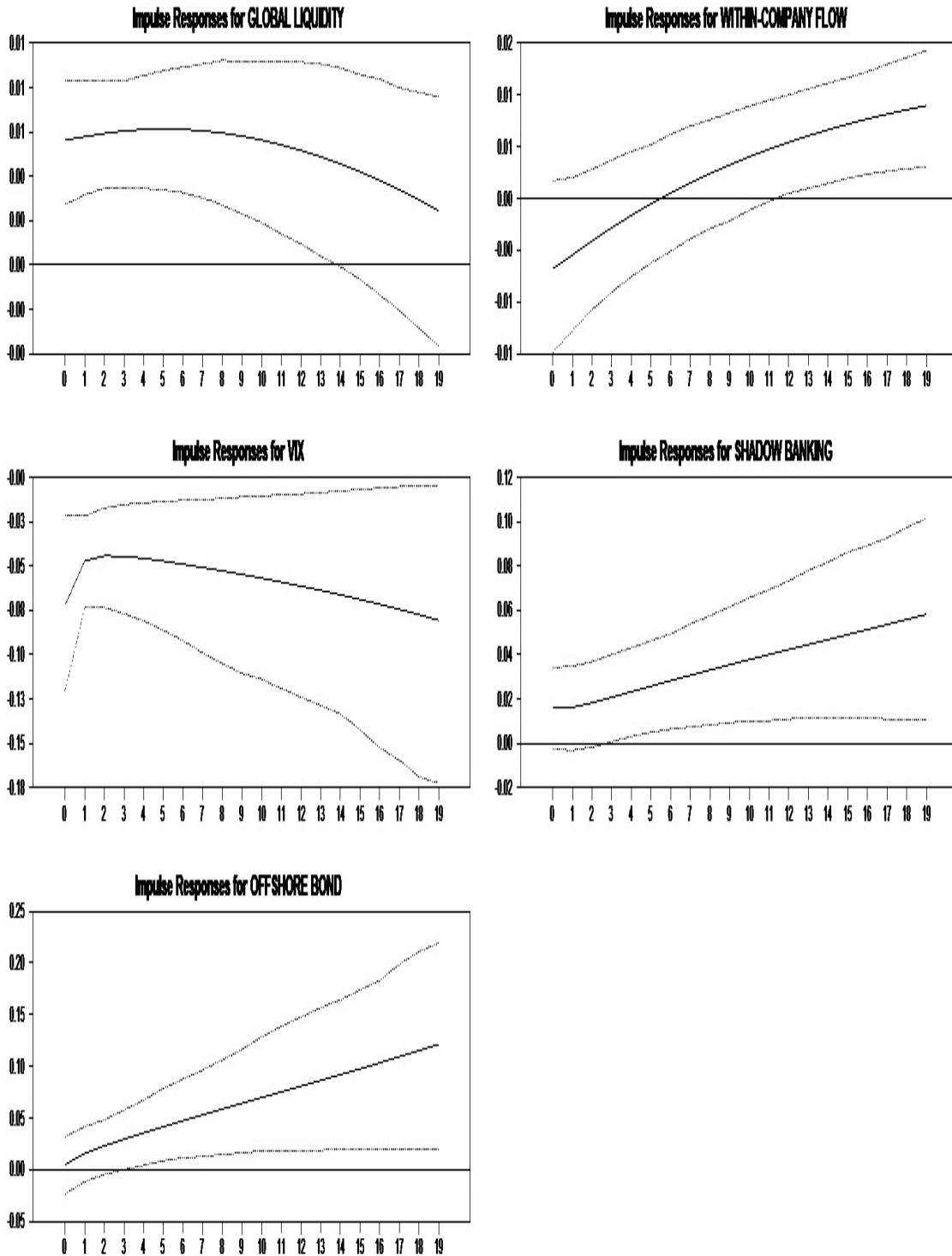


Note: WITHIN denotes within-company flows; BETWEEN denotes between-company flows.

Because these variables are flows of new investment, to unify the terms used, we calculate DIF_OFFSHORE by the backward difference of stock variables of offshore bond issuance.

Sources: WITHIN and BETWEEN are referred from BOP of the IMF; DIF_OFFSHORE is referred from BIS securities statistics.

Figure 4: Impulse–response function of Model 1 (per cent).



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

Figure 5: Variance decomposition of Model 1 (per cent).

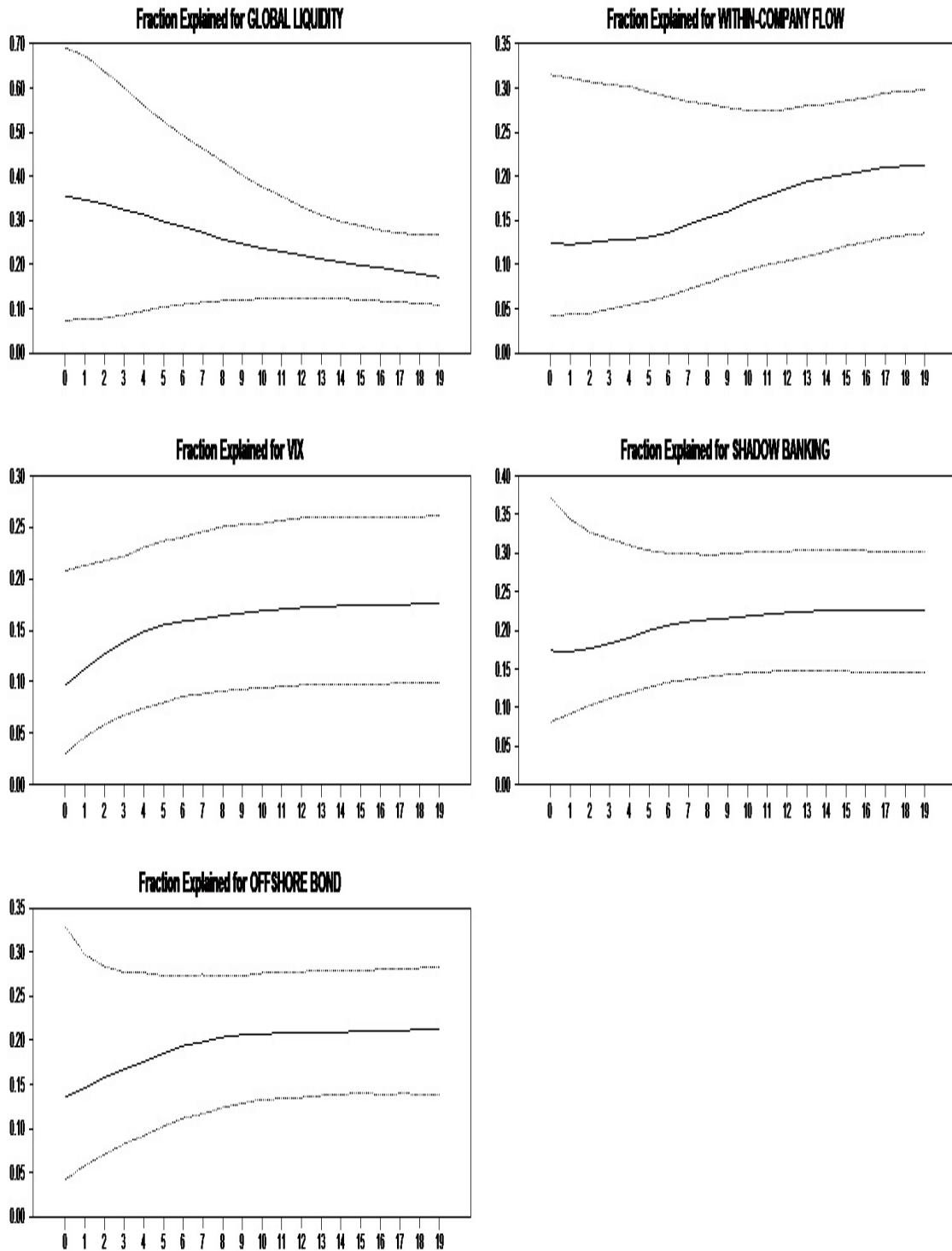
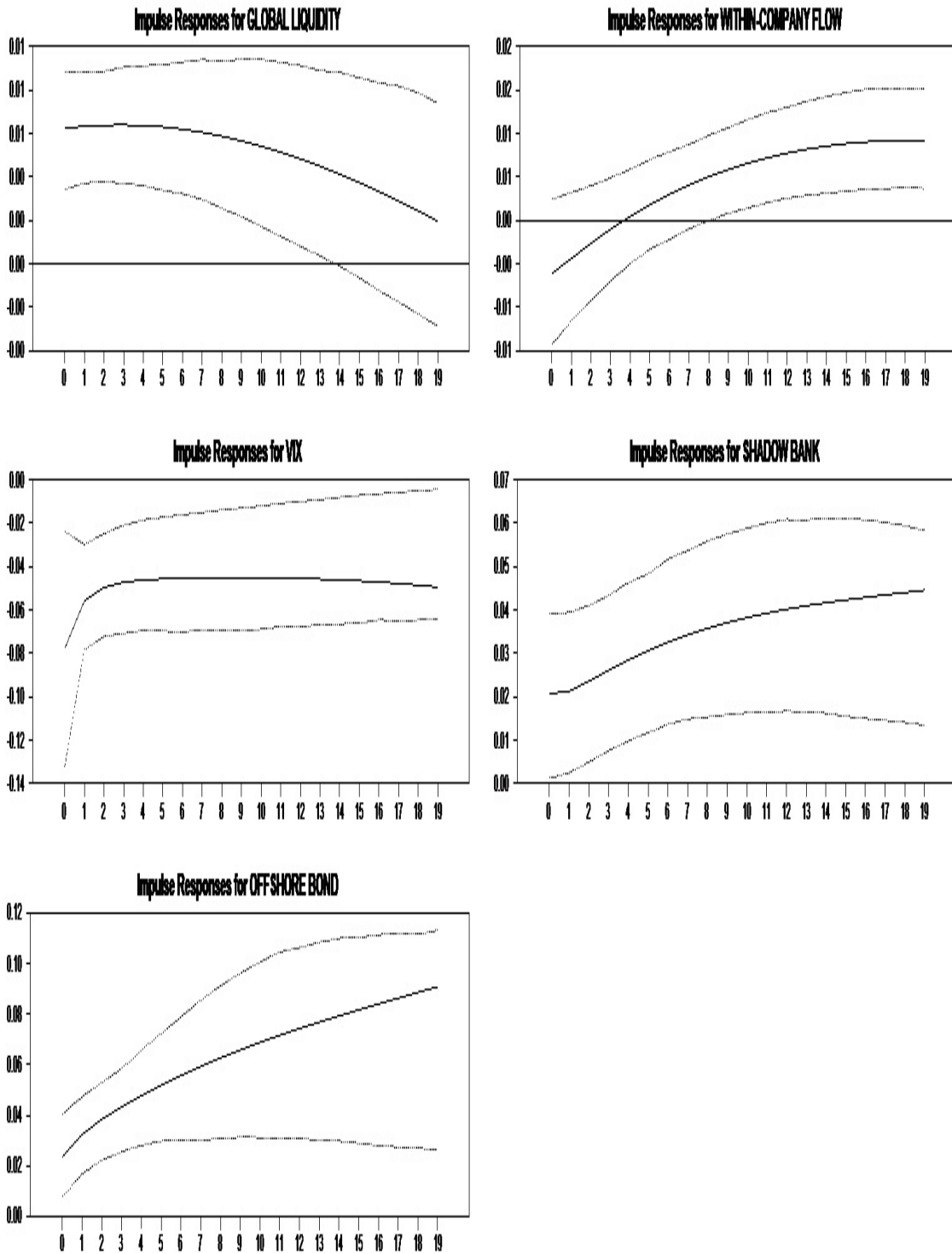
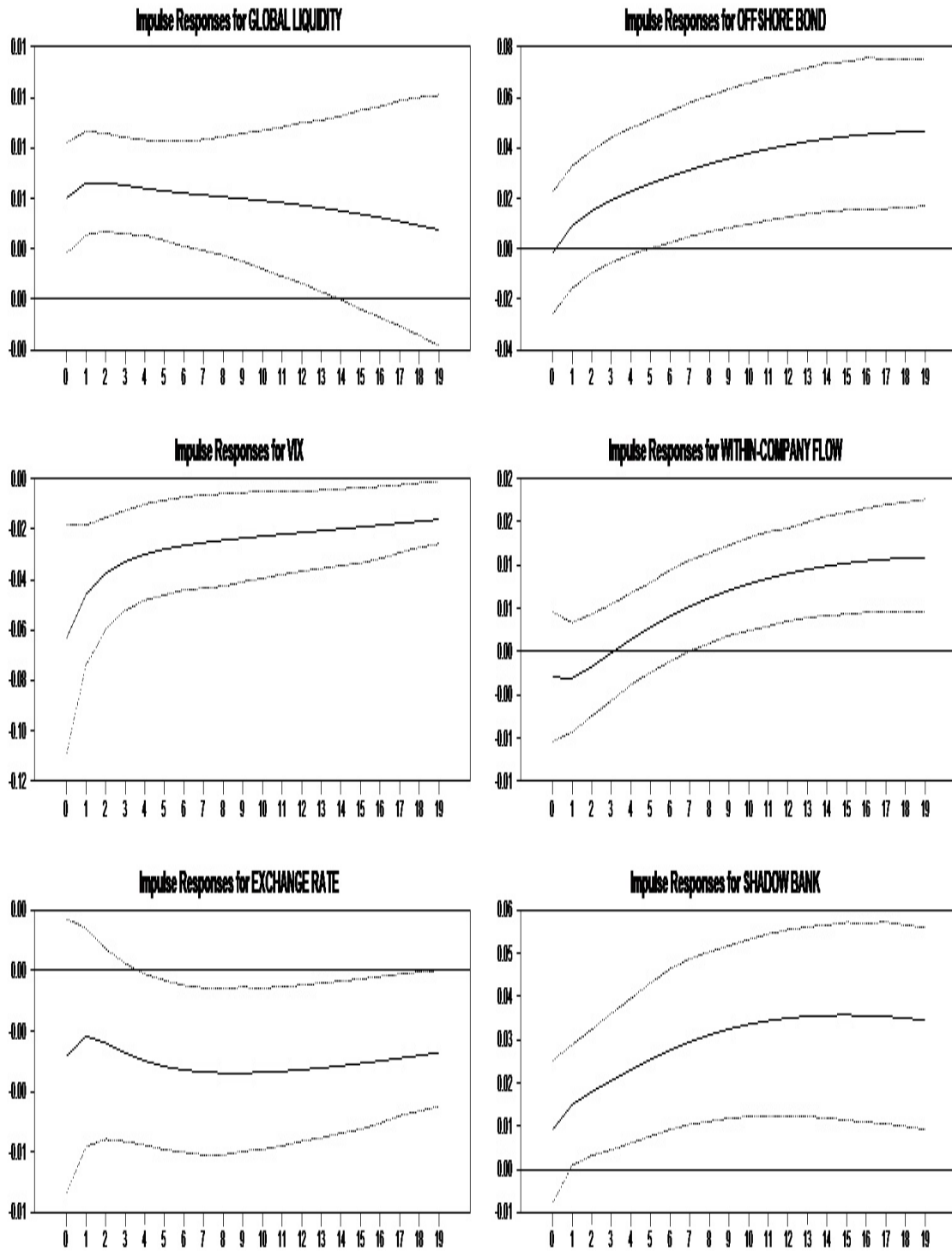


Figure 6: Impulse–response function of Model 2 (per cent).



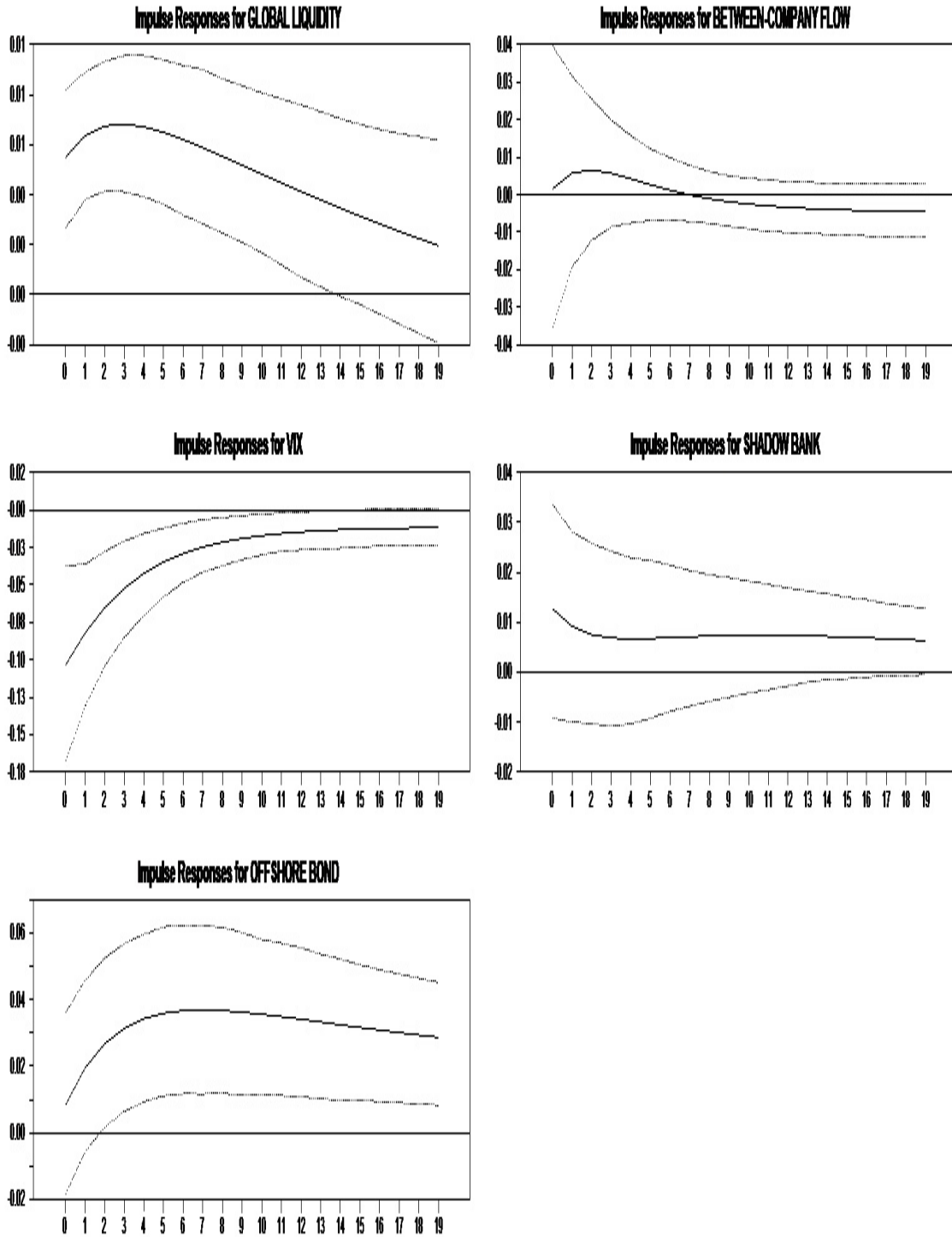
Note: To generate the impulse vectors, 200 draws from the posterior and 200 subdraws for each posterior draw were conducted.

Figure 7: Impulse–response function of Model 3 (per cent).



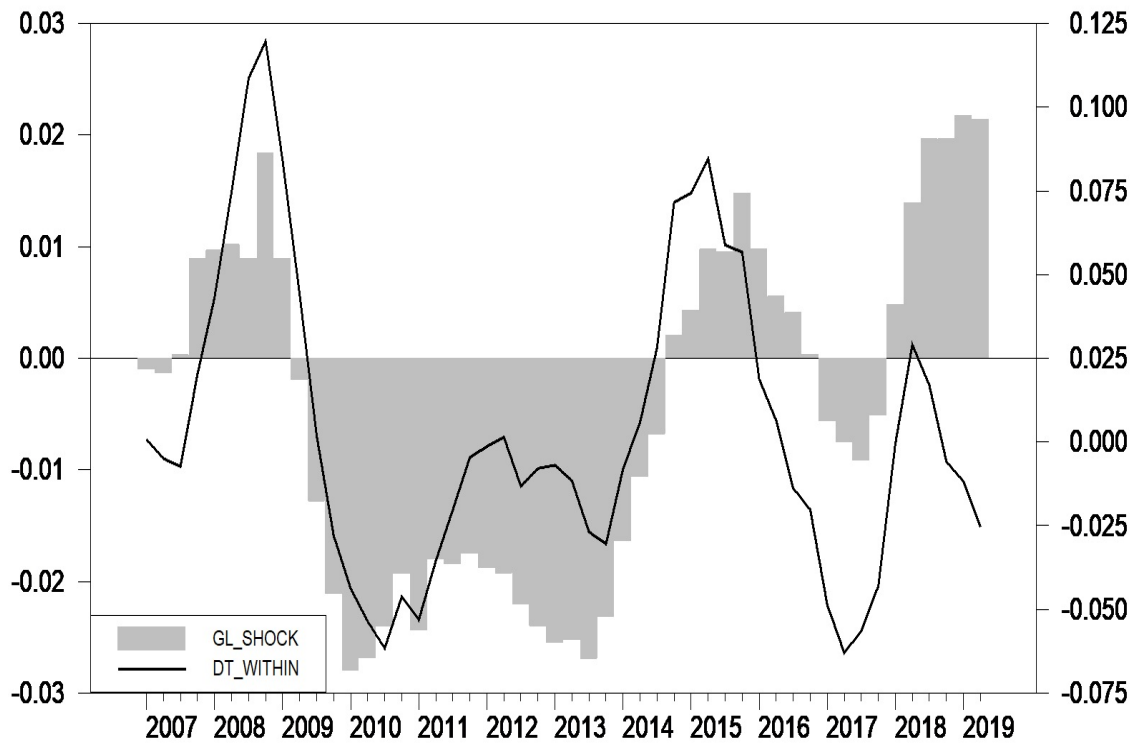
Note: To generate the impulse vectors, 200 draws from the posterior and 200 subdraws for each posterior draw were conducted.

Figure 8: Impulse–response function of Model 4 (per cent).



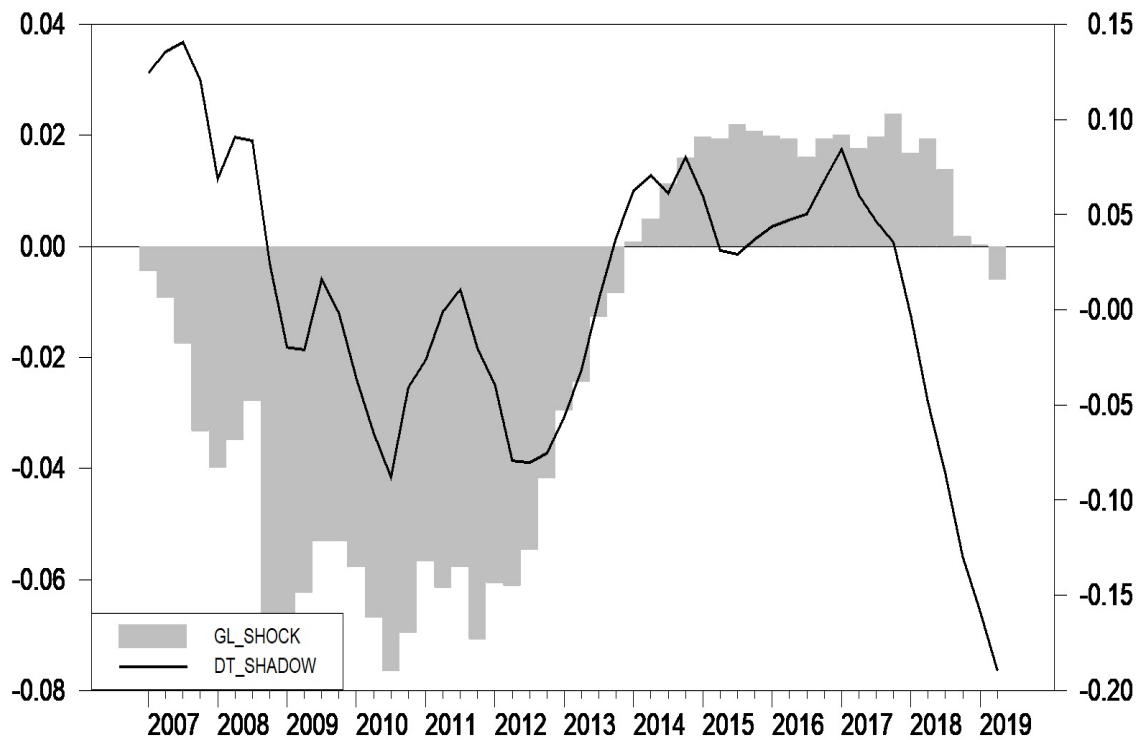
Note: To generate the impulse vectors, 200 draws from the posterior and 200 subdraws for each posterior draw were conducted.

Figure 9: Historical decomposition of WITHIN-COMPANY flow.



Note: GL_SHOCK is global liquidity shock on WITHIN-COMPANY FLOW. DT_WITHIN is detrended using a Hodrick–Prescott filter to WITHIN-COMPANY FLOW. The axis is at the right-hand side.

Figure 10: Historical decomposition of SHADOW BANKING.



Note: GL_SHOCK is the global liquidity shock on SHADOW BANKING. Also, DT_SHADOW is detrended using a Hodrick–Prescott filter to SHADOW BANKING. The axis is at the right-hand side.

Table 1: Used variables and sign restrictions

MODEL	VARIABLES						
	GLOBAL LIQUIDITY	VIX	EXCHANGE RATE	OFFSHORE BOND	WITHIN- COMPANY FLOW	BETWEEN- COMPANY FLOW	SHADOW BANKING
Mode 1	>0	<0	-	NO REST	NO REST	-	NO REST
Mode 2	>0	<0	-	>0	NO REST	-	NO REST
Mode 3	>0	<0	NO REST	NO REST	NO REST	-	
Mode 4	>0	<0	-	NO REST	-	NO REST	NO REST

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