

Jeong, Daehee

**Article**

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KDI Journal of Economic Policy

**Provided in Cooperation with:**

Korea Development Institute (KDI), Sejong

*Suggested Citation:* Jeong, Daehee (2022) : Estimating China's Capital Flows-at-risk: The Case of Potential US Financial Sanctions, KDI Journal of Economic Policy, ISSN 2586-4130, Korea Development Institute (KDI), Sejong, Vol. 44, Iss. 4, pp. 43-78, <https://doi.org/10.23895/kdijep.2022.44.4.43>

This Version is available at:

<https://hdl.handle.net/10419/267886>

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# Estimating China's Capital Flows-at-risk: The Case of Potential US Financial Sanctions<sup>†</sup>

By DAEHEE JEONG\*

*The arena of strategic competition between the US and China is expandable from international politics, trade and commerce to finance. What would happen if financial sanctions against China are imposed by the US? Would US financial sanctions lead to a sudden outflow of foreign capital and a liquidity crisis in China? We try to address these questions by estimating China's capital flows-at-risk with the CDS premium on Chinese sovereign funds. We follow Gelos et al. (2019) in setting up a quantile regression model from which China's foreign capital flow-at-risks are estimated. Based on our analysis of China's monthly capital flow data, we find that a rise in the CDS premium has statistically significant negative impacts on China's foreign capital flows-at-risk, mainly in banking flows. However, the analysis also found that due to favorable global conditions, an increase in the CDS premium is unlikely to trigger a shift to a sudden outflow of foreign capital at the moment. Meanwhile, this study found no statistically significant correlation between Korea's capital flows-at-risk and the CDS premium, suggesting that the negative impact of US financial sanctions on China would not increase the probability of capital flight from Korea in a significant manner.*

Key Word: Financial Sanctions, US-China Competition,  
Capital Flow-at-risk, Macro-prudential Policy,  
Quantile Regression

JEL Code: C21, F32, F51

## I. Introduction

US-China trade tensions under the Trump administration have clearly shown that strategic competition has become a feature of the two countries' relations. The US

\* Fellow, Korea Development Institute (E-mail: dhjeong@kdi.re.kr)

\* Received: 2022. 6. 10

\* Referee Process Started: 2022. 6. 15

\* Referee Reports Completed: 2022. 9. 19

<sup>†</sup> This paper is written based on Jeong (2021). I thank two anonymous referees and the Editor for their useful suggestions. Junseok Park provided excellent research assistance. All remaining errors are mine.

has begun to see China no longer as a partner but as a strategic rival or threat and China in the Xi Jinping era has relentlessly pursued its superpower dreams. The strategic competition between the US and China, which initially took the form of retaliatory tariffs on a wide range of goods imported from the other country or exports restrictions, is progressively growing in scope as it spills into areas such as supply chain policy for critical technologies of the future. Recently, following the listing of the Chinese platform company DiDichuxing on US stock exchanges, the cross-border movement of data has emerged as yet another contentious issue in US-China relations. Over concerns about potential data leaks, the Chinese government cracked down heavily on data security violations.

The strategic competition between the two countries is essentially competition over global influence, which goes far beyond short-term tensions arising from political decisions by two leaders. What is at play is a broader structural shift, potentially leading to a transfer of global supremacy (Walt, 2020). Tensions between the two countries are likely to persist for the foreseeable future. Therefore, it cannot be ruled out that these tensions will eventually extend beyond the realms of international politics, trade and commerce into areas such as finance.

However, a financial conflict between the US and China would be much more asymmetric than conflicts in other areas, as being the issuer of the global currency, the US has far more influence on international payments and financial transactions than China. As the US dollar accounts for the largest share of total foreign currency reserves of most countries while also being the most commonly used currency in international trade and cross-border financial transactions, the dollar payment network can be a powerful weapon to put pressure on China and, if necessary, to completely isolate it from the international community.

Therefore, should there be a financial conflict between the two countries, it will most likely take the form of sanctions from the US, such as blocking dollar payments banning loans or freezing assets, which will trigger widespread distress by weakening China's external financial condition. Moreover, as financial sanctions by the US most often include secondary sanctions (or secondary boycotts), which penalize third parties trading with sanctioned entities, such sanctions can have the effect of the *de facto* exclusion of the target country from the dollar payment network. To counter the overwhelming advantage of the US, Beijing passed the Anti-foreign Sanctions Law in June of 2021. This law, aimed at neutralizing US sanctions, provides a legal basis for the imposition of severe penalties on firms complying with any secondary boycott of Chinese companies.

This study attempts to assess the impact of sanctions by the US on the China's external balance by conducting an empirical analysis of foreign capital flows in China. Financial sanctions against China will make the country's US dollar-denominated external assets essentially useless and undermine its ability to meet its external payment obligations. As this reduces foreign capital flows into China, it will, in turn, cause the yuan to plummet in value, interest rates to surge, and the real economy to contract. For this empirical analysis, the capital flows-at-risk model proposed by Gelos *et al.* (2019) was used after making minor adjustments to the explanatory variables to reflect the special characteristics of foreign capital flows in China and the shock from financial sanctions.

The contributions of this study are threefold. First, domestic and global factors of

gross foreign capital flows in China are identified through an empirical analysis of monthly foreign capital flow data. Second, based on these factors, capital flows-at-risk and their characteristics by type are discussed. Third and finally, the impact of US financial sanctions on China's capital flows-at-risk as well as on Korean capital flows-at-risk is measured. Based on these findings, this study proposes policy implications to mitigate the impact of US sanctions on China.

The rest of this paper is organized as follows: In Section II, the existing literature on past financial sanctions by the US is reviewed, and the details of the Anti-foreign Sanctions Law, recently passed in China, are discussed. In Section III, the financial interdependence between the US and China is examined by looking at the balance of payments, the international investment position (IIP), and the locational banking statistics published by the BIS. Section IV describes the methodology used for the empirical analysis of the impact of US sanctions against China on its foreign capital flows. In Section V, the results of the empirical analysis are presented and policy implications are discussed. Finally, Section VI concludes this study.

## II. Related Literature

### A. Sanctions on Macao's Banco Delta Asia

According to Lim and Kuh (2019), the 2005 sanctions on Banco Delta Asia by the US Treasury Department<sup>1</sup> proved to be extremely effective against both North Korea and Macao owing to the successful exploitation of the bank's dependence on the US dollar and the strategic use of restrictive measures. In September of 2005, the US designated Banco Delta Asia to be a financial institution of a "primary money-laundering concern" pursuant to Section 311 of the Patriot Act.<sup>2</sup> This sparked a massive wave of withdrawals by its depositors, fearful that the bank may be excluded from the US dollar transaction network. To fend off a bank run, Macao's financial authority allowed a temporary suspension of payments by Banco Delta Asia on all of its deposits. The financial authority also issued an order that the bank stop all transactions with North Korea and freeze North-Korea-related accounts, with which it complied. Describing this move by the US as a classic example of the "kill the chicken to scare the monkey"<sup>3</sup> strategy, the authors stated that it has had important repercussions in making Chinese banks suspend transactions with North Korea and join international organizations for the prevention of money-laundering.

### B. Sanctions on Iran

Fardoust (2020) investigated the impact of the restoration of sanctions on Iran by

<sup>1</sup>For a detailed description of the US financial sanctions system, see the Appendix.

<sup>2</sup>Section 311 of the US Patriot Act empowers the Secretary of the Treasury to take actions against jurisdictions and financial institutions that are deemed to a "money-laundering concern," even if they are not actually engaged in money-laundering activities.

<sup>3</sup>In 2007, during his Congressional testimony, former State Department official David Asher stated that Banco Delta Asia was chosen as an example in the implementation of the "kill the chicken to scare the monkey" strategy, adding that the monkeys in this case were large Chinese banks dealing with North Korea (Blakeley, 2013).

the US. In May of 2018, the Trump administration unilaterally withdrew from the Iran nuclear deal<sup>4</sup> and reinstated previously lifted sanctions on Iran at the same time, as part of what was termed the “maximum pressure” strategy. The centerpiece to the US’s pressure strategy against Iran was secondary sanctions. As bilateral trade and financial transactions between the US and Iran were already reduced significantly, the effectiveness of any direct sanctions (primary sanctions) was bound to be minimal. The secondary sanctions that dealt the most severe blow to the Iranian economy were sanctions limiting Iran’s ability to export crude oil and engage in financial transactions. Sanctions on Iran’s oil exports consisted of financial restrictions that targeted the Central Bank of Iran, which collects payments for the country’s oil exports. Following the restoration of sanctions, Iran’s crude oil exports plummeted. As significant reduction exceptions (SRE), which are waivers introduced by the Obama administration to minimize the impact of oil sanctions on third countries, were also removed later, Iran’s oil exports were reduced to 0.5 million barrels per day (the daily average in May of 2020), which is one-fifth of the previous level before the restoration of the sanctions (daily average of 2.5 million barrels in May of 2016).

After the restoration of the sanctions, the financial sanctions were extended to Iran’s financial sector as a whole. Before the reinstatement of the sanctions (2006-2011), the financial sanctions only targeted a handful of Iranian banks with involvement in nuclear proliferation activities and support for international terrorism. As the sanctions are now extended to include the entire financial sector, this has completely severed Iran’s access to international financial markets. Following the restoration of the sanctions (2018-2019), Iran’s capital outflow increased to USD 11.1 billion and the Iranian rial lost 13.2% in value based on the real exchange rate. Meanwhile, the usable foreign reserves of the Central Bank of Iran fell from USD 109.3 billion before the restoration of the sanctions (average in 2016-2017) to USD 67.1 billion after the restoration of the sanctions (average in 2018-2019) and are expected to decline sharply to USD 9 billion in 2020.

### C. Sanctions on Russia

Mamonov *et al.* (2021) examined the impact the financial sanctions against Russia have had on the behavior of the country’s banks. Following Russia’s annexation of Crimea in 2014, several Western countries prohibited international transactions involving major banks and non-financial corporations with links to the Russian Federation<sup>5</sup>. What was notable about these sanctions was that they were implemented progressively over a five-year period between 2014 and 2019, in multiple successive phases. The authors found that while sanctioned banks reduced both their overseas assets and liabilities, banks that were slated for sanctions showed a tendency to reduce their overseas assets while increasing their liabilities. This behavior by banks designated for sanctions appears to be in anticipation of the deposit withdrawals that the sanctions will trigger.

<sup>4</sup>For details on the background of the US withdrawal from the Iran nuclear deal and the restoration of sanctions, see Lee *et al.* (2018).

<sup>5</sup>For a comprehensive discussion of western sanctions on Russia and their impact on the Russian economy, see Cho (2019).

### D. *Secondary Sanctions on Financial Institutions under the Hong Kong Autonomy Act*

The Hong Kong Autonomy Act, passed by the US Congress in July of 2020, was signed into law by President Donald Trump. The law empowers the US to impose sanctions on “foreign persons”<sup>6</sup> involved in the erosion of Hong Kong’s autonomy and financial institutions with significant business ties to them. The financial sanctions under this law are secondary sanctions, which are considered powerful and effective tools as they deny financial institutions with business relationships with sanctioned entities access to US financial markets. If a financial institution is deemed to have engaged in significant financial transactions with sanctioned foreign persons, this institution is no longer allowed to borrow from a US institution or issue bonds or stocks in the US market to raise funds. Such institutions are also barred from accessing the foreign exchange, bond, and stock markets in the US, as well as its payment and funds transfer systems. Restrictions are also imposed on the exports of financial commodities, software, and technologies to sanctioned institutions. Given their severity, entities designated for sanctions are given the possibility of avoiding them by implementing corrective measures within a year from the date of designation. The Hong Kong Autonomy Act requires the US Department of State to designate sanctioned foreign persons in consultation with the Department of the Treasury within 90 days from its enactment. This law also requires that financial institutions with business ties to sanctioned foreign persons be designated no later than 30 to 60 days after the date of designation of said foreign persons.

Although pursuant to this law, the US State Department designated ten foreign persons in October of 2020, and the investigation conducted by the Department of the Treasury in December of 2020 was unable to identify financial institutions with significant business relationships with them. In March of 2021, an additional 24 foreign persons were designated by the State Department, but the investigation by the Treasury Department again failed to identify any financial institutions with significant business relationships with them (US Treasury, 2021).

Ma *et al.* (2020) contended that of all punitive measures that Chinese banks designated for secondary sanctions may face, the denial of access to the US dollar capital market and dollar payment services is likely to be the one that will inflict the most pain. The authors also predicted that the impact of secondary sanctions will be comparatively greater on a number of non-financial corporations that are particularly heavily dependent on US dollars, along with local governments and Hong-Kong-based financial institutions serving as intermediaries for the supply of dollars. However, noting the fact that the opening of China to the global financial markets has taken place gradually and that important limitations still exist,<sup>7</sup> the authors estimated that the direct impact on Chinese banks, for which the US dollar accounts for less than 1% of total funding, is likely to be moderate.

<sup>6</sup>“Foreign persons” refer to both individuals and entities residing in a foreign country.

<sup>7</sup>Although China’s restrictions on capital transactions were gradually eased, the Qualified Foreign Institutional Investor (QFII) scheme and various stock market connect programs (Shanghai-Hong Kong Stock Connect, Shenzhen-Hong Kong Stock Connect, and Bond Connect) are used to limit foreign investors’ access to China’s domestic financial markets. See Habermeier *et al.* (2017) and Kang (2020) for details.

### *E. Chinese Response to Financial Sanctions by the US*

China responded to potential financial sanctions by the US by passing new legislation called the “Anti-foreign Sanctions Law.” This law, which was enacted in June of 2021, strengthens the existing regulations introduced by the Chinese Ministry of Commerce in January of 2021, entitled “Rules on Counteracting Unjustified Extraterritorial Application of Foreign Legislation and Other Measures.” The purpose and structure of this law are similar to those of the EU’s anti-US sanctions, known as “blocking statutes.” However, the scope of the Anti-foreign Sanctions Law is significantly broader, as its application is not limited to sanctions under US laws and regulations but extends to those under all foreign laws deemed unfairly to interfere with the external transactions of Chinese entities. According to Lovely and Schott (2021), this difference makes the Chinese Anti-foreign Sanctions Law a much more powerful countermeasure against secondary US sanctions than EU blocking statutes. Citing how the overseas branches of foreign firms that participate in US sanctions can be sued in a Chinese court and face fines or criminal penalties or even indemnification, which could result in the freezing and seizure of their assets, the authors estimated that firms with high reliance on the Chinese market will have no choice but to comply with the Anti-foreign Sanctions Law. The authors, furthermore, believe that if the US increases pressure on China and steps up sanctions against it beyond a certain level, this could act as disintegration pressure toward the decoupling of the Chinese economy from the US.

## **III. External Financial Transactions of the US and China**

### *A. China’s External Financial Transactions*

#### 1. External Financial Assets and Liabilities

The international investment position (IIP) is the balance sheet of a country’s external assets and liabilities. It provides an overview of total financial assets and liabilities at the national level, including their composition and types, and is therefore often used for assessing the external soundness of a country. Figure 1 shows the external financial assets and liabilities and the net external financial assets of China as reported in its international investment position. As of the end of the second quarter of 2021, China is a net external creditor with its external financial assets amounting to USD 9.0 trillion, which is in excess of its external liabilities of USD 7.0 trillion by USD 2.0 trillion.

Noteworthy, however, is the fact that China’s net external assets, which have been on an overall upward trend since 2011, fell sharply between the second quarter of 2014 and the third quarter of 2015, and between the third quarter of 2020 and the second quarter of 2021. As for the causes of this decline in China’s net external assets in 2014-15, it was the result of a massive reduction in China’s external reserve assets, which occurred during China’s process of responding to the outflow of foreign capital triggered by the normalization of the US monetary policy and a sharp decline in Chinese stock prices due to concerns about the hard landing of its economy.

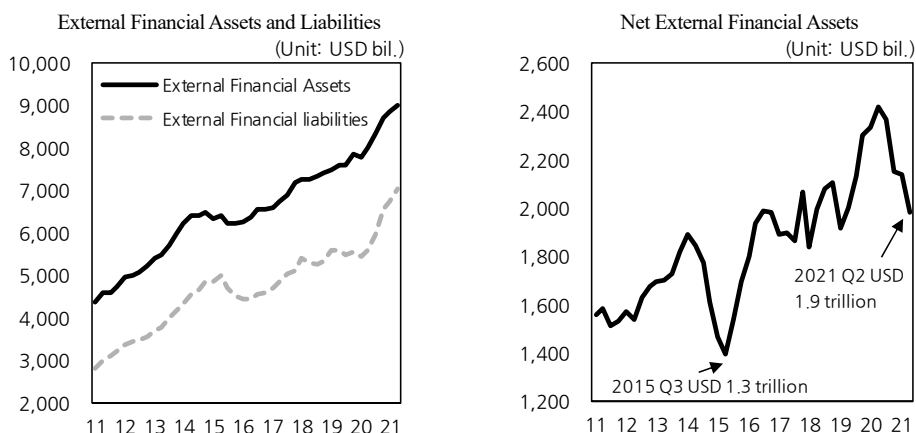


FIGURE 1. CHINA'S EXTERNAL FINANCIAL ASSETS, LIABILITIES, AND NET EXTERNAL FINANCIAL ASSETS AND LIABILITIES

Source: State Administration of Foreign Exchange of the People's Republic of China.

Meanwhile, during the period that began in the third quarter of 2020, the net external assets dropped due to the limited intervention in the foreign exchange market. The increased capital inflow without China's reserve accumulation contributed reducing its net external assets. During these two periods, China's net external assets fell by USD 496.6 billion and USD 432.2 billion, respectively, which represent 23-27% of the average net external assets since 2011 (USD 1.8573 trillion). What this suggests is that external and domestic shocks can cause sizeable changes in China's net external position.

## 2. Short-term External Debt

Figure 2 shows the short-term debt component of China's external liabilities.<sup>8</sup> At the end of the second quarter of 2021, China's short-term debt amounted to USD 1.5 trillion, representing 56.3% of its total external debt (USD 2.7 trillion). The share of short-term debt in China's total external liabilities has been on a steadily declining trend since the first quarter of 2015 (69.4% as of the end of the first quarter of 2015), pointing to a gradual decrease in the instability of its liability structure. However, unlike its ratio relative to total external liabilities, the ratio of short-term debt to reserves has been on a slow upward trend, standing at 46.9% at the end of the second quarter of 2021. This is an indication that growth in China's reserve assets is outpaced by the increase in short-term debt. In comparison, the share of short-term debt in Korea's total external liabilities and its share relative to the reserve assets amounted to 29.5% and 39.2%, respectively, at the end of the second quarter of 2021. Therefore, based on its composition and in terms of liquidity management, China's short-term debt can be considered to be more vulnerable than that of Korea.

<sup>8</sup>External financial liabilities include foreign direct investments, portfolio investments in stocks and bonds, and "other investments" such as deposits, loans, and trade credit and derivatives investment. Of these, debt-type liabilities are classified as "external debt."



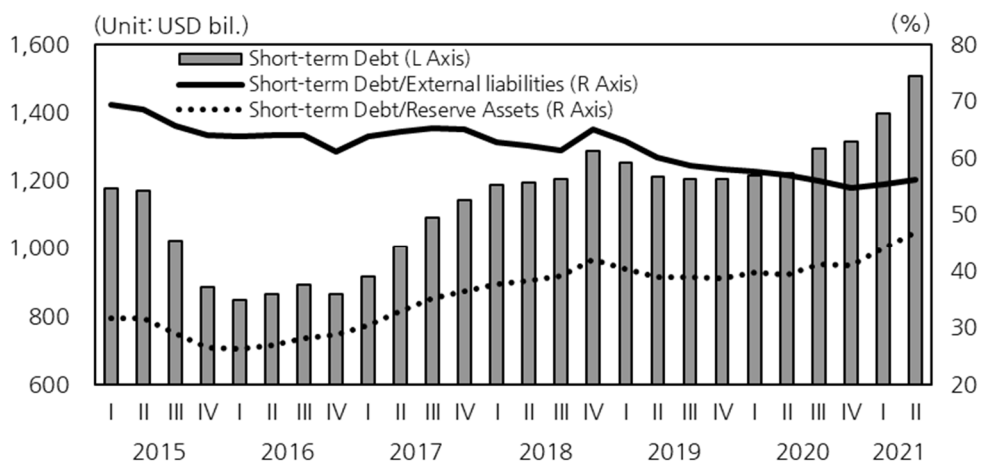


FIGURE 2. CHINA'S SHORT-TERM DEBT AND SHORT-TERM DEBT-TO-RESERVES RATIO

Source: State Administration of Foreign Exchange of the People's Republic of China.

For a closer examination of China's short-term external debt, its external debt types during the past one-year period were broken down by type of economic agent, maturity date, and currency. Table 1 lists China's external debt between the end of the second quarter of 2020 and the end of the second quarter of 2021 by type of economic agent and maturity date. By economic agent, 61.5% (USD 928.5 billion) of China's total short-term debt (USD 1.5079 trillion) at the end of the second quarter of 2021 was accounted for by banks. This amount is mostly made up of deposits (USD 605.3 billion) and loans (USD 232.4 billion), suggesting that Chinese banks' funding from global banks represents a substantial share of the country's short-term debt. The rest of the short-term debt obligations were mostly accounted for by trade credit, advance receipts, and other miscellaneous funding (USD 399.6 billion) by other sectors, including non-bank financial institutions and corporations. Meanwhile, compared to the end of the second quarter of 2020, China's total short-term debt increased by USD 284.5 billion, of which USD 164.2 billion was represented by increased bank deposits, indicating that funding through global banks is a key driver of the growth of China's short-term debt.

Table 2 shows the breakdown of China's external debt by currency.<sup>9</sup> At the end of the second quarter of 2021, the total value of US dollar-denominated debt stood at USD 1.2841 trillion, nearly one half of China's total external debt (USD 2.6798 trillion). The share of debt denominated in the euro, the Hong Kong dollar and SDR, and the Japanese yen only amounted to USD 105.8 billion, USD 90.6, and USD 30.2 billion, respectively, suggesting that an overwhelming share of China's external debt is denominated in US dollars. Given that Chinese banks' funding through global banks accounts for a substantial share of China's total short-term debt, as was established earlier, and that 50-60% of loans issued by global banks are dollar-denominated loans (ECB, 2020), there is a strong likelihood that a significant portion of its dollar-denominated external debt is made up of short-term loans. Meanwhile,

<sup>9</sup>Currency-specific Chinese external liabilities data by maturity bucket are unfortunately not available.

TABLE 1—CHINA'S EXTERNAL DEBT BY TYPE OF ECONOMIC AGENT AND MATURITY

(Unit: USD billion)

		2020			2021	
		Q2	Q3	Q4	Q1	Q2
Total	Subtotal	2,146	2,308	2,401	2,527	2,680
	Short-term	1,223	1,296	1,316	1,399	1,508
	Medium and long-term	909	999	1,084	1,128	1,172
Government and central bank	Subtotal	335	367	418	442	462
	Short-term	36	34	37	36	36
	Medium and long-term	299	333	380	405	425
Banks	Subtotal	994	1,078	1,092	1,168	1,255
	Short-term	737	785	776	845	929
	Deposits	441	487	505	556	605
	Bonds	50	61	63	66	73
	Loans	236	232	202	216	232
	Other	11	5	6	7	18
	Long-term	257	293	316	323	327
Other sectors	Subtotal	559	593	608	631	663
	Short-term	391	415	423	437	460
	Deposits	0	0	0	0	0
	Bonds	2	2	2	2	2
	Loans	49	47	39	49	58
	Other <sup>1)</sup>	340	366	382	387	400
Long-term	168	178	185	194	204	
Intercompany lending	Subtotal	258	270	283	286	300

Note: 1) Other types of debt including trade credit and advance payments.

Source: State Administration of Foreign Exchange of the People's Republic of China.

TABLE 2—CHINA'S EXTERNAL DEBT BY CURRENCY

(Unit: USD billion)

	2020			2021	
	Q2	Q3	Q4	Q1	Q2
Total	2,132	2,294	2,401	2,527	2,680
USD	1,116	1,174	1,176	1,211	1,284
CNY	804	897	1,001	1,085	1,169
Euro	93	112	112	115	106
HKD and SDR	93	84	84	87	91
JPY	27	28	28	29	30

Source: State Administration of Foreign Exchange of the People's Republic of China.

yuan-denominated liabilities amounted to USD 1.1691 trillion, representing the second largest share of China's total external debt.

This appears to have been due to a more active issuance of domestic currency-denominated bonds as part of an effort toward the internationalization of the yuan, the improvement of China's external position, and the reduction of its dependency on the US dollar.

### 3. Funding through Global Banks

The locational banking statistics published by the BIS (Bank for International Settlements) can be used to gain detailed insights into the funding activities of Chinese banks through global banks. The BIS locational banking statistics are statistics on banks' cross-border claims/liabilities compiled based on counterparty data provided by global banks. Unlike the international investment position, which records external transactions from the point of view of Chinese residents, the locational banking statistics are records of transactions in Chinese assets from the point of view of foreign investors. For the sake of simplicity, in this study, assets held in China by global banks were considered funding by Chinese residents from global banks.<sup>10</sup>

Figure 3 shows the currency composition of Chinese residents' funding from global banks and the breakdown of their US dollar funding by type of economic agent as of the end of the first quarter of 2021. The US dollar made up the largest share, at 45% in total funding by Chinese banks from global banks, with the euro (7%) and the British pound (2%) representing the second and third largest share, respectively. The US dollar therefore appears to be the single most important currency in Chinese residents' funding from global banks.<sup>11</sup> By type of economic agent, 57% of total funding activity from global banks was by the banking sector, with the non-financial and non-financial corporate sectors representing 23% and 12% shares of total funding, respectively.

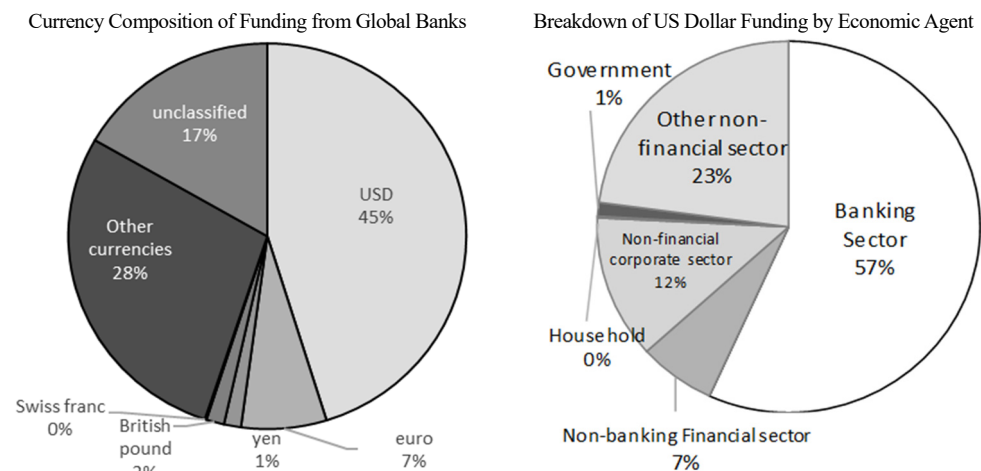


FIGURE 3. CHINA'S FUNDING FROM GLOBAL BANKS

Note: As of the end of the first quarter of 2021.

Source: BIS international locational banking statistics, author's calculations.

<sup>10</sup>As Chinese banks currently do not share cross-border transaction data with the BIS, the locational banking statistics does not include Chinese-side data on funding from global banks.

<sup>11</sup>As noted earlier, the ECB (2020) reported that 50-60% of all loans by global banks are those denominated in US dollars.

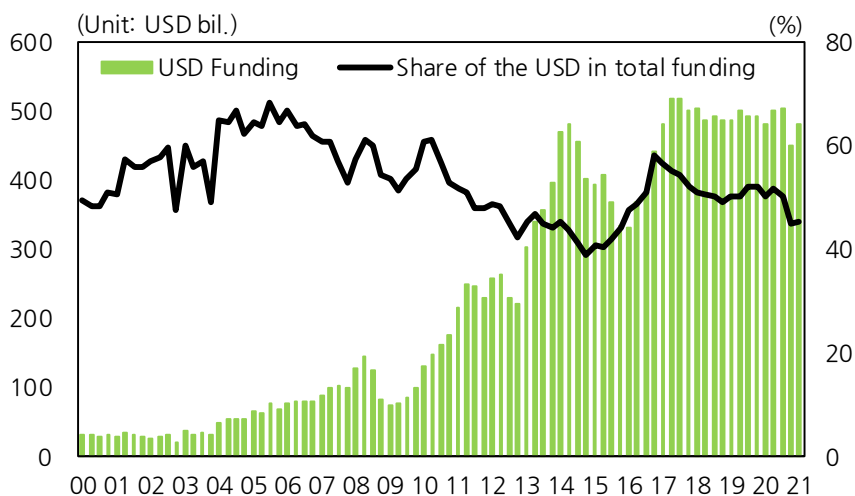


FIGURE 4. CHINA'S US DOLLAR FUNDING FROM GLOBAL BANKS AND SHARE OF THE US DOLLAR IN TOTAL FUNDING

Source: BIS international locational banking statistics, author's calculations.

It must be, however, noted that although the banking sector accounts for the largest share of total US dollar funding, as external liabilities make up a mere 0.6% of its total liabilities, potential financial sanctions by the US are unlikely to have an unduly severe impact on Chinese banks' funding activities. In fact, the impact of financial sanctions could be more substantial for non-financial corporations and other sectors than for the banking sector, and the negative impact could be particularly concentrated on sectors that are heavily dependent on the US dollar (Ma *et al.*, 2020).

Figure 4 provides a graph and a bar chart visualizing the share of the US dollar in the total amount of funding by Chinese residents from global banks. At the end of the first quarter of 2021, the value of funding by China from global banks stood at USD 1.0616 trillion, of which USD 479.7 billion (45%) was dollar-denominated funding. The share of dollar-denominated funding (solid line), which reached an all-time high of 68% during the third quarter of 2005, has since then been on a fluctuating downward trend, pointing to a reduction on China's reliance on the US currency in their funding activities from global banks. The amount of dollar funding increased continuously until 2017, except during times of foreign and domestic shocks, such as the global financial crisis and during the period between 2014 and 2016 (normalization of US monetary policy and a stock market crash amid worries about the hard landing of the Chinese economy). However, since 2017, growth in dollar funding has stalled and has been almost at a standstill. Given that President Trump was inaugurated in January of 2017, the Chinese government could have issued new guidelines around this time to curb their reliance on dollar funding from global banks.<sup>12</sup>

<sup>12</sup>Although there is no evidence that any government order to curb dollar funding to this effect was actually issued to banks by the Chinese government, their dollar funding from global banks decreased by USD 78.7 billion between the end of the second quarter of 2017 and the end of the first quarter of 2021, from USD 332.8 billion to USD 254.1 billion.

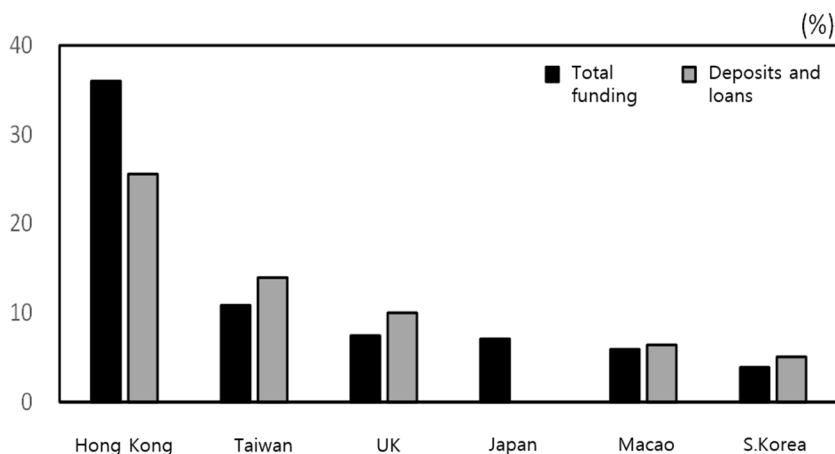


FIGURE 5. CHINESE BANKS' EXTERNAL FUNDING BY COUNTRY OF ORIGIN

Note: As of the end of the first quarter of 2021.

Source: BIS locational banking statistics, author's calculations.

International repercussions of potential US financial sanctions on China are expected to occur mainly through the counterparties of Chinese institutions. In order to assess international spill-over of sanctions, it is necessary to focus on China's funding from global banks that is accounted for by Chinese banks and their counterparties. Using the counterparty data provided in the BIS locational banking statistics, Chinese banks' funding from global banks<sup>13</sup> was classified by country of origin. Figure 5 visualizes the value of Chinese banks' funding from global banks by country of origin, showing that 36% and 11% of their total external funding, including deposits, loans, and bonds, were sourced from banks located in Hong Kong and Taiwan, respectively. The UK (7%) and Japan (7%) were the third and fourth largest sources of funding. Hong Kong (26%) and Taiwan (14%) accounted for an overwhelming share of Chinese banks' funding from foreign sources, even when the funds considered were limited to deposits and loans. This reveals a pattern in which Chinese banks mostly rely on countries in the Chinese sphere of influence for their external financial transactions. Hence, any adverse impact of US sanctions on China is also likely to be concentrated on these countries. Chinese banks' funding from Korean banks amounted to 4% of their overall external funding.

Meanwhile, the share of Chinese banks' external funding accounted for by Hong Kong appears to have declined somewhat since 2019. After peaking at 48% of total funding at the end of the first quarter of 2015, this figure dropped to 45% at the end of 2018 and has slipped to as low as 36% in recent years (see Figure 6). Although more than one factor appears to have been at play, this phenomenon is to a large extent explained by a succession of events related to the Hong Kong handover (transfer of sovereignty over Hong Kong), including anti-China protests in Hong Kong (June 2019), the passing of the Hong Kong National Security Law by China (June 2020), and the enactment of the Hong Kong Autonomy Act by the US (July

<sup>13</sup>To do this, the total value of global banks' Chinese assets was subtracted by the value of assets in non-bank entities.

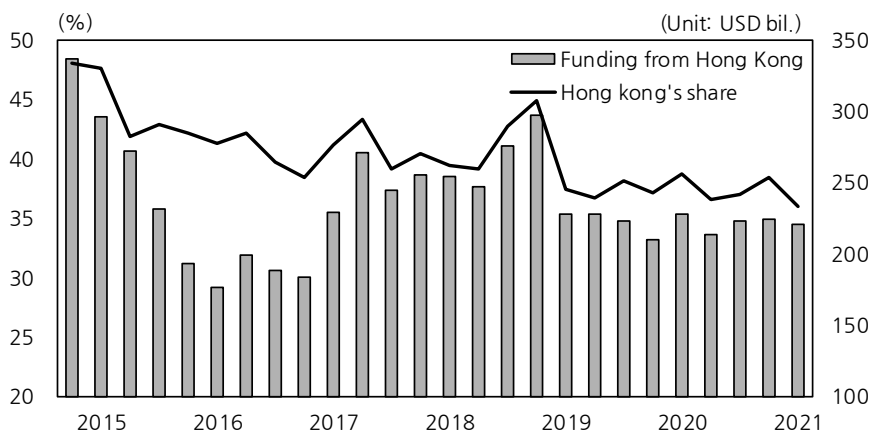


FIGURE 6. HONG KONG'S SHARE IN CHINESE BANKS' EXTERNAL FUNDING

Source: BIS locational banking statistics, author's calculations.

2020), which had the effect of shrinking the city's role as an international financial hub.<sup>14</sup>

## B. US Financial Transactions with China

### 1. Balance of Payments

In order to assess the level of financial interdependence between the US and China, the former's balance of payments with the rest of the world was examined by country. Figure 7 visualizes foreign capital flows of the US by country. Data on quarterly capital flows were smoothed into four-quarter moving averages and divided by the nominal GDP for a better comparison of long-term trends. The movement of Chinese capital, indicated in red, showed a continuous inflow until 2011, the immediate wake of the global financial crisis. After 2011, Chinese capital flows continued to oscillate between inflows and outflows until 2019. Since 2019 up to recent times, Chinese capital flows have shown a small outflow. With regard to the massive influx of Chinese capital into the US in the years leading up to the global financial crisis, the proponents of a "global saving glut" (e.g., Bernanke, 2005) explained this phenomenon as stemming from the underdevelopment of China's financial markets, causing the country's saving demand to flow into the US financial markets.

Others have explained it in the context of the Chinese export-led growth strategy as an attempt to devalue the yuan (e.g., Dooley, Folkerts-Landau, and Garber, 2004). While these arguments are somewhat weakened by the fact that capital inflows from China during this period were not as large as those from the UK or the Eurozone,<sup>15</sup>

<sup>14</sup>Kim and Lee (May 2021) also indicate the possibility of a political shock from the 2019 Hong Kong protests, which caused the escalation of US-China tensions and negatively impacted the city's financial markets, leading to the erosion of its status as a financial hub.

<sup>15</sup>Between 2003 and 2007, Chinese capital flowing into the US corresponded to 3.3% of the country's GDP, which is quite significant even if not as high a share of GDP as for capital flows from the UK (8.5%) or the Eurozone (4.0%).

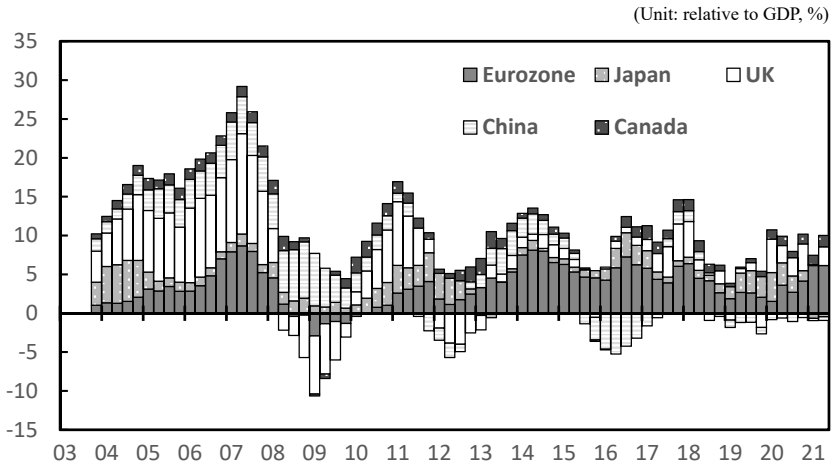


FIGURE 7. FOREIGN CAPITAL FLOWS OF THE US

Note: Four-quarter moving average data.

Source: Bureau of Economic Analysis.

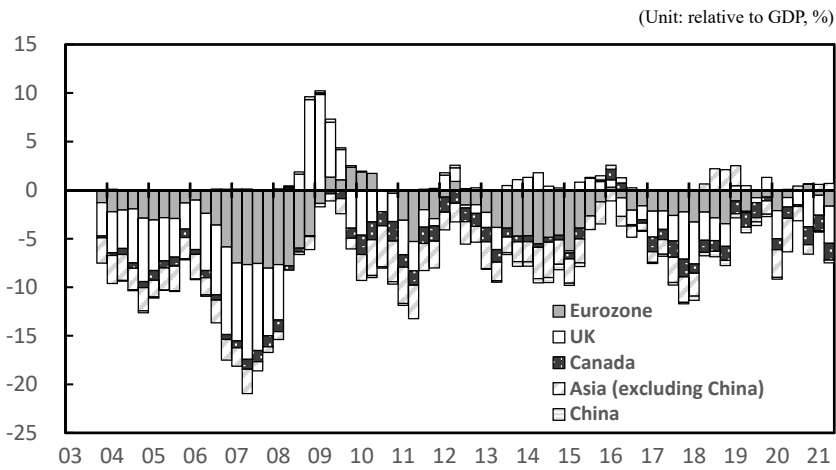


FIGURE 8. CAPITAL FLOWS BY THE RESIDENTS OF THE US

Note: Four-quarter moving average data.

Source: Bureau of Economic Analysis.

a substantial portion of Chinese capital that flowed into the US during these years is likely to have been the country’s reserve assets, supporting the argument of an export-led growth strategy.<sup>16</sup> At any rate, the fact remains that China’s financial transactions with the US are largely determined by the external policies of the Chinese government.

On the other hand, China’s share in total external investment flows by the US proved to be comparatively negligible. Figure 8 presents the external investments by

<sup>16</sup>Between 2003 and 2007, China’s reserve assets increased by USD 900 billion and the capital flow from China into the US during the same period amounted to approximately USD 700 billion.

residents of the US by destination country. Prior to the global financial crisis, the largest destinations for US external investments were the UK, the Eurozone, and Canada. Even after the global financial crisis, US investments continued to flow mainly into western countries. Since 2010, the size of US investment flows into China averaged 0.1% of its quarterly GDP, which is rather insignificant compared to the investment flows into the UK (1.3%), the Eurozone (2.1%), and Canada (1.1%), which together represent 4.5% of its GDP.

While a substantial portion of capital flows from China into the US is determined by demand related to US dollar-denominated asset holdings in China's reserve assets, Chinese assets make up only a tiny portion of total foreign investment by the US. This suggests that country-level financial sanctions on China would have only a minimal impact on the US. To put it more simply, the advantage of being able to freeze China's dollar-denominated assets, accumulated through years of continuous inflows of capital into the US, would outweigh any direct negative impact that<sup>17</sup> the US may suffer by suspending transactions with it.<sup>18</sup>

## 2. Interbank Transactions

A similar pattern can be observed in transactions between US and Chinese banks. An examination of locational banking statistics published by the BIS reveals that the value of assets US banks hold at Chinese banks<sup>19</sup> is only about one-fifth the value of Chinese banks' assets held at US banks. This means that in the event of a suspension of financial transactions between the two countries, US banks' risk exposure is only about one-fifth that of Chinese banks (see Figure 9).

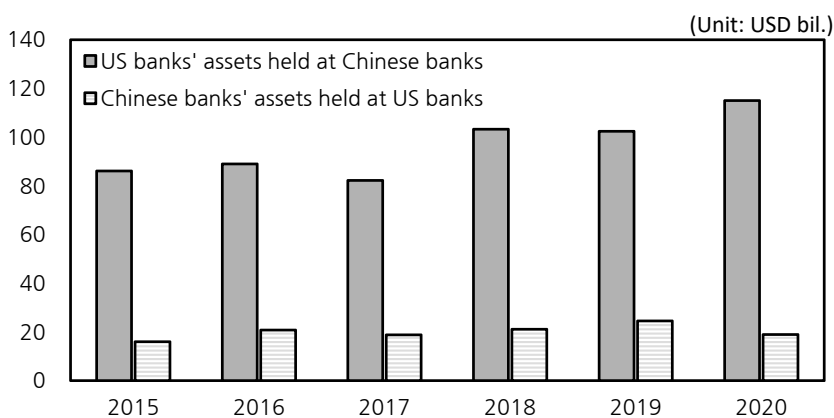


FIGURE 9. MUTUAL INVESTMENTS BETWEEN THE US AND CHINESE BANKING SECTORS

Source: BIS international locational banking statistics, author's calculations.

<sup>17</sup>As of 2016, the total value of foreign direct investment by US entities in joint venture firms in China stood at USD 643.0 billion with the combined sales of these firms amounting to USD 464.0 billion (Lovely, 2019).

<sup>18</sup>Realistically speaking, the odds of the US imposing sanctions targeting China's entire financial sector are very low. This is an extreme assumption for the sake of argument and simplicity.

<sup>19</sup>The value of US banks' assets held at Chinese banks was calculated by subtracting US banks' non-bank assets from their overall Chinese assets, using the same method used earlier. The value of Chinese banks' assets under management by US banks was calculated based on US banks' funding from Chinese banks (total funding from all Chinese sources – funding from non-bank sources).



## IV. Methodology

### A. Estimation of Capital Flows-at-risk

In order to assess the impact of potential financial sanctions against China by the US, we estimate the capital flows-at-risk (CaR) proposed by Gelos *et al.* (2019) using China's capital flow data to quantify capital outflows that may occur at a low probability level.

The CaR is similar to the growth-at-risk concept of Adrian *et al.* (2019) in that it is a quantile-regression-based approach. Unlike regular regression, quantile regression estimates the quantiles of the dependent variables rather than the mean. As the regression is performed on multiple quantiles, this allows us to determine how the probability distribution of the dependent variables changes in response to the explanatory variables. This method therefore makes it possible to analyze low quantiles of the dependent variables that have low probabilities. For example, Adrian *et al.* (2019) in their analysis of growth-at-risk found that worsening financial conditions cause the value of low percentiles of growth to decrease, meaning that a deteriorating financial condition amplifies downside risks to growth.

The CaR by Gelos *et al.* (2019) is focused on the flows of foreign portfolio investments proposed (or gross capital). A country's capital flows are most often measured through the netting flows of capital, as calculated by subtracting outbound flows by residents from inbound flows by nonresidents. However, since the global financial crisis, it has been reported in numerous studies (e.g., Borio and Disyatat, 2010; Obstfeld, 2012) that gross capital flows, either inbound or outbound are a more accurate measure of international financial transactions of interest. Accordingly, we use gross capital flow data.

Gelos *et al.* (2019) were only concerned with foreign portfolio investments excluding foreign direct investments (FDI).<sup>20</sup> This decision appears to have been based on the consideration that foreign portfolio investments react more sensitively to domestic and external conditions than foreign direct investments and that short-term changes tend to be rarer in foreign direct investments. In their analysis investigating both the short-term and medium-term behavior of capital flows, cumulative capital flows during one to two quarters were defined as short-term flows and cumulative capital flows during five to eight quarters were defined as medium-term flows, with quantile regressions performed on both types.

The quantile regression model used by Gelos *et al.* (2019)<sup>21</sup> has two types of explanatory variables: global factors (or push factors) and domestic factors (or pull factors). The global factors considered were the commodity price index, the US corporate BBB spread, the US 10-year Treasury yield, and the US dollar DXY index, with the short-term external debt-to-foreign exchange reserve ratio and GDP growth serving as the domestic factors.

This study differs from that of Gelos *et al.* (2019) with respect to the data used and the composition of the explanatory variables. We utilized China's monthly gross

<sup>20</sup>Foreign stock investments in which investors participate in the management of the company

<sup>21</sup>Gelos *et al.* (2019) analyzed both quarterly country-level panel data (excluding China) and country-level data (Chile and Turkey). The present study drew on the quantile regression model used for the country-level analysis.

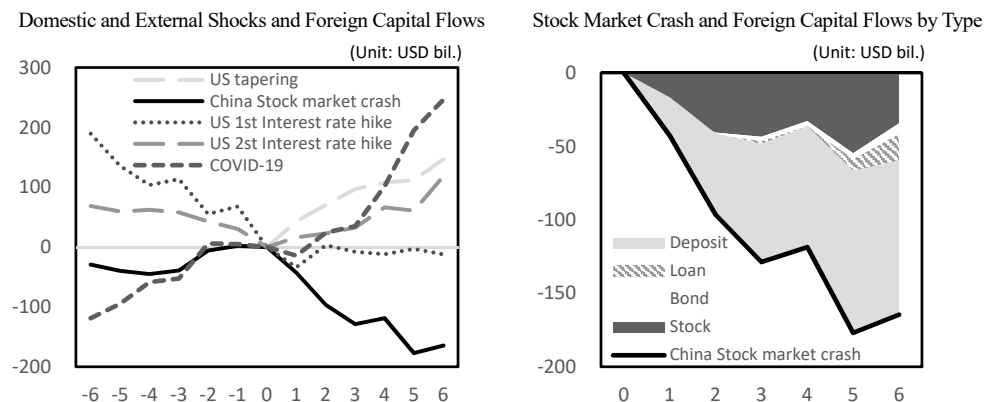


FIGURE 10. DOMESTIC AND EXTERNAL SHOCKS AND CHINA'S FOREIGN CAPITAL FLOWS

Note: 1) US tapering began in December of 2013, the stock market crash in China occurred in June of 2015, the first and second rounds of US interest rate hikes took place correspondingly in December of 2015 and December 2016, and the COVID-19 pandemic broke out in February of 2020, 2) The x axis represents the numbers of months that have elapsed since the shock.

Source: Bloomberg; People's Bank of China.

capital flow data, which are not limited to portfolio investments and which include items classified as other investments, such as deposits and loans. Monthly data were chosen based on the considerations that financial tensions between the US and China are likely to have a short-term impact on financial markets. Furthermore, all variables considered as global factors are at higher frequencies. Deposits and loans were included in addition to portfolio investments in consideration of the composition of capital outflows experienced by China in June of 2015 following the crash of its stock market. Contrary to what has been reported in previous studies on several emerging market countries, foreign capital outflows after the global financial crisis not only occurred in portfolio investments but also in deposits and other types of investments, which was the case during the capital flight experienced in China in 2015 (see Figure 10).

Meanwhile, it should be noted that China's gross monthly foreign capital flow data are slightly different in scope from its balance of payments data, which are published on a quarterly basis.<sup>22</sup> Given that balance of payments data are based on financial transactions by non-residents, investments in Chinese equities and bonds in offshore markets are also included in gross capital flows. The data utilized in this paper are "domestic RMB financial assets held by overseas entities" as published monthly by the People's Bank of China, excluding Chinese bonds and equities that are denominated in US dollars or issued in offshore markets.<sup>23</sup> However, using the monthly data from the People's Bank of China appears unlikely to pose a problem; the monthly capital flows published by the People's Bank of China, after summing

<sup>22</sup>Unlike in Korea where balance of payments levels, including gross monthly capital flows, are published on a monthly basis, no such monthly data are available with regard to China's balance of payments. These data are published on a quarterly basis instead.

<sup>23</sup>A well-known example of Chinese offshore bonds is Kungfu bonds (US-dollar-denominated bonds issued by Chinese firms and financial institutions in overseas markets).

to determine cumulative three-month values, are highly correlated with the quarterly gross foreign capital flows recorded in the balance of payments. Also, foreign investments in Chinese securities that are issued in overseas markets are generally considered to have little impact on capital flows, as most transactions are between non-residents.

The global and domestic factors used in Gelos *et al.* (2019) are combined with additional variables, including VIX (volatility index), measuring the level of risk in the global financial markets, and the CDS (credit default swap) premium on Chinese government bonds. As was said by Forbes and Warnock (2012) and others, VIX is widely regarded as the single-most important variable explaining sudden changes in international capital flows despite the fact that this index was not included among the explanatory variables in the CaR analysis by Gelos *et al.* (2019). The CDS premium is deemed to be a relevant indicator based on an examination of past financial sanctions by the US and the content of China's Anti-foreign Sanctions Law. US financial sanctions usually take the form of secondary sanctions to bar access by the target country to the dollar payment network and capital markets. As freezing the target financial institutions' assets located in the US or blocking their dollar payments ultimately reduces their ability to make external payments, this will cause a spike in CDS premia.<sup>24</sup>

In addition, China's Anti-foreign Sanctions Law could have the effect of further pushing up CDS premia on Chinese securities. Under this law, foreign firms investing in China can be sued in a Chinese court and face fines or criminal penalties or be ordered to pay indemnification, potentially leading to the freezing or seizing of their assets. Should there be financial sanctions against China by the US, this will contribute to the worsening of investor sentiment with regard to Chinese bonds by increasing doubts about the payment capacity of the issuers and heightening the perceived default risk and overall uncertainty, which will in turn exacerbate the surge in CDS premia. The CDS premium is, therefore, included as a variable reflecting the severity of the impact of US financial sanctions on China.<sup>25</sup>

In order to verify that the CDS premium is an adequate indicator of potential tensions between the US and China, the relationship between the shock of news about US-China trade tensions and CDS premium levels was analyzed using the local projection approach developed by Jordà (2005). The US-China trade policy news shock index is an index developed by the IMF (2020) to measure the economic impact of tensions between the two countries based on the compilation of news reports on trade barriers imposed by the US against Chinese imports. The relationship between this index and the CDS premium was analyzed to establish empirically that the CDS premium is a suitable variable for gauging the level of tension between the US and China.<sup>26</sup>

<sup>24</sup>Strictly speaking, credit default swaps (CDS) on China are a financial derivative to hedge against the risk of a default of Chinese government bonds. The CDS premium increases proportionally to the level of sovereign default risk. As few instruments are available to hedge against the default risk of private-sector bonds, the impact of US financial sanctions is expected to be concentrated on the CDS premium on Chinese sovereign debt.

<sup>25</sup>As this model does not include a variable that directly reflects financial sanctions, the estimated coefficient of the CDS premium has bias. However, as capital flows-at-risk are estimated by taking into account the effects of financial sanctions on the level of CDS premium, this is unlikely to lead to under/overestimation problems. Nevertheless, given the existence of bias, the estimated CDS premia should be interpreted with caution.

<sup>26</sup>The US-China trade policy news shock index measures the impact of direct trade measures on China by the

## B. Data

The VIX index, 10-year US Treasury yields, and the US dollar index, considered as global factors, and Chinese industrial production data and CDS premium data on Chinese sovereign debt, considered as domestic factors, are drawn from the Bloomberg Terminal. Chinese foreign capital flow data are obtained by extracting monthly data from the “domestic RMB financial assets held by overseas entities” published on the website of the People’s Bank of China, and dividing them by China’s quarterly nominal GDP (seasonally adjusted, annualized), as provided by Bloomberg. The results are multiplied by 100 to convert them into percentage values. The data period is the 90 months between January of 2014, when monthly Chinese capital flow statistics are first compiled, and June of 2021. The VIX and US dollar indices are used by taking natural logs. All other variables are divided by 100 to convert percentage values into decimals for ease of comparison with the estimated regression coefficients.

Table 3 provides the descriptive statistics of the variables used in the quantile regression. Between January of 2014 and June of 2021, the monthly flow of foreign capital into China relative to GDP averaged 0.087% (1.044% of GDP in annum based on the simple calculation multiplying the monthly value by 12). The minimum value was -0.552% (-6.624% in annum) with the 10% percentile value amounting to -0.109% (-1.308% in annum), representing a sizable outflow of capital in the historical distribution of foreign capital flows.<sup>27</sup>

TABLE 3—DESCRIPTIVE STATISTICS

	Mean	Std.	Min.	Quantile			Max.
				10%	50%	90%	
Foreign capital flows in China (%)	0.087	0.201	-0.552	-0.109	0.086	0.334	0.536
VIX	2.789	0.323	2.316	2.445	2.711	3.216	4.056
10-year US Treasury yields	0.021	0.006	0.006	0.009	0.022	0.029	0.032
US dollar index (DXY)	4.542	0.059	4.376	4.460	4.559	4.596	4.629
Chinese industrial production <sup>1)</sup>	0.067	0.045	-0.135	0.048	0.062	0.088	0.351
CDS premium on Chinese sovereign bonds	0.719	0.288	0.279	0.372	0.672	1.158	1.368

Note: 1) Industrial production is the year-on-year rate of increase from the same month of the previous year.

Source: Bloomberg; People’s Bank of China.

## V. Results

### A. Simple Regression Analysis

In order investigate to the statistical significance of the variables used in the analysis, simple regression results are compared using the global and domestic

US, which is likely to be somewhat different from that of financial sanctions. However, given that it was published during the Trump era while the so-called “maximum pressure strategy” was deployed against China and captures US-China tensions at the level of international politics, it was deemed that this index is useful for an analysis of financial conflicts between the two countries.

<sup>27</sup>For example, China’s nominal GDP was USD 14.7 trillion in 2020. 1.0% of this amount is USD 147.0 billion.

TABLE 4—RESULTS OF A SIMPLE REGRESSION ANALYSIS OF CHINA'S FOREIGN CAPITAL FLOWS

Variable	Baseline	Model (1)	Model (2)	Baseline – previous period	Baseline GDP
VIX	-0.14** (0.07)	-	-0.14** (0.07)	0.01 (0.07)	-0.14** (0.07)
10-year US Treasury yields	-9.17*** (3.41)	-4.99 (3.72)	-8.23** (3.95)	-5.21 (3.83)	-9.27*** (3.47)
US dollar index (DXY)	-1.37*** (0.31)	-1.28* (0.68)	-1.58*** (0.54)	-1.14*** (0.34)	-1.38*** (0.31)
Commodity price	-	-0.12 (0.29)	-0.11 (0.24)	-	-
US corporate bond spread <sup>1)</sup>	-	-0.07 (0.11)	-	-	-
Chinese industrial production	-0.02 (0.40)	0.07 (0.44)	0.03 (0.42)	-0.61 (0.45)	-
CDS premium on Chinese sovereign debt	-0.28*** (0.06)	-0.34*** (0.13)	-0.30*** (0.08)	-0.22*** (0.07)	-0.28*** (0.06)
China's short-term external debt ratio <sup>2)</sup>	-	-0.32 (0.52)	-	-	-
China's real GDP <sup>3)</sup>	-	-	-	-	-0.17 (0.53)
Lagged variable	X	X	X	O	X
Constant term	7.09*** (1.46)	7.01* (4.10)	8.60** (3.47)	5.54*** (1.60)	7.15*** (1.45)
Adj. R-squared	0.36	0.32	0.36	0.20	0.35
Number of observation	90	90	90	90	87

Note: 1) The US corporate bond spread was calculated by subtracting the yield on BBB-rated US corporate bonds from the yield on AAA bonds, 2) The short-term external debt ratio is the ratio of China's short-term external debt relative to its foreign exchange reserves, 3) For the monthly rate of GDP growth, the rate of growth for the corresponding quarter was used, 4) \*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively, 5) The values in the bracket are standard deviations.

Source: Bloomberg; People's Bank of China; author's calculations.

factors from Gelos *et al.* (2019) and additional selected variables. Model selection from simple regressions can be justified as it consists of examining the relationship at the mean level, which can be applied in other quantiles.

Table 4 provides the results of the simple regression analysis using the global and domestic factors. All global factors were found to have a statistically significant negative (-) coefficient, indicating that higher global risk, interest rates and the US dollar value lead to significantly lower China's foreign capital flows. The CDS premium coefficient also had a statistically significant negative value. What this means is that an increase in the CDS premium on Chinese sovereign debt statistically reduces foreign capital flows in China significantly. The estimated coefficient suggests that an increase in the CDS premium by one unit standard deviation (0.288) could cause China's foreign capital flows relative to GDP to decrease by 0.08%. Among the domestic factors, the estimated coefficient of the Chinese industrial production was found to be statistically insignificant.

Model (1) shows the estimation results of a model consisting of the global factors and the domestic factors, as in Gelos *et al.* (2019), and the addition variable of the CDS premium on Chinese sovereign debt. Among the global factors, the estimated

coefficients of the commodity price index, the US corporate bond spread, and the 10-year US Treasury yield are found to be statistically insignificant.

Between different model configurations, the coefficient of the US dollar index and the CDS premium have statistical significance in common, confirming that these two variables are important factors explaining foreign capital flows in China. The adj. R-squared of Model (1) was 0.32, lower than the corresponding value under the baseline model (0.36), indicating that this model has weaker explanatory power than the baseline. Model (2) excluded China's short-term external debt ratio, a variable found to have a low level of statistical significance, from Model (1) and replaced the corporate bond spread with the VIX coefficient. These results showed that the adjusted R-squared is higher than in Model (1) and that the VIX coefficient is statistically significant. Therefore, the decision was to keep the VIX index and exclude the commodity price index, the US corporate bond spread, and China's short-term external debt ratio from the variables; in other words, using the composition of variables in the baseline model is more feasible for identifying the determinants of China's foreign capital flows.

The CDS premium on Chinese sovereign bonds was found to be statistically significant both when all explanatory variables of the baseline model were estimated with a time lag of one month (baseline – previous period)<sup>28</sup> and when the baseline model was estimated by replacing the Chinese industrial production with China's GDP (baseline - GDP). These results strongly suggest that the US dollar index and the CDS premium are important global and domestic factors that should be considered for inclusion in quantile regressions of foreign capital flows in China.

### B. *Quantile Regression Analysis of China's Foreign Capital Flows*

The mean impact of the shock from US financial sanctions on China's foreign capital flows can be gauged through the simple regression analysis discussed earlier. A quantile regression analysis can help determine the extent to which "extreme" foreign capital flows are influenced in the event of such a shock, at a given probability level. For example, supposing that 10% (or 90%) is an "extremely" low (or high) level which is seldom observed, quantile regression allows the identification of global and domestic factors that influence such an extremely low (or high) probability value and how sensitively the extreme value responds to these factors.<sup>29</sup>

Figure 11 shows the level of sensitivity and the confidence interval of global and domestic factors, determined based on the results of a quantile regression at nine percentiles from the tenth to the ninetieth. The sensitivity of Chinese industrial production, which overall proved to be statistically insignificant, was not included

<sup>28</sup>The endogenous regressor problem is present in our regression because an unexpected shock to foreign capital flows can have an impact on the CDS premium. The coefficient estimate for the lagged CDS premium in the 'Baseline-previous period' is slightly smaller but still statistically significant, implying that the endogeneity problem is less severe in our analysis.

<sup>29</sup>To be more precise, a quantile regression analysis makes it possible to measure the sensitivity in different quantiles of the conditional probability distribution of foreign capital flows to the global and domestic factors described earlier. For reference, if an unconditional probability distribution is assumed, the tenth percentile value is -0.109%, which means a capital outflow, and the ninetieth percentile value is 0.0334%, which means a capital inflow (see Table 3).

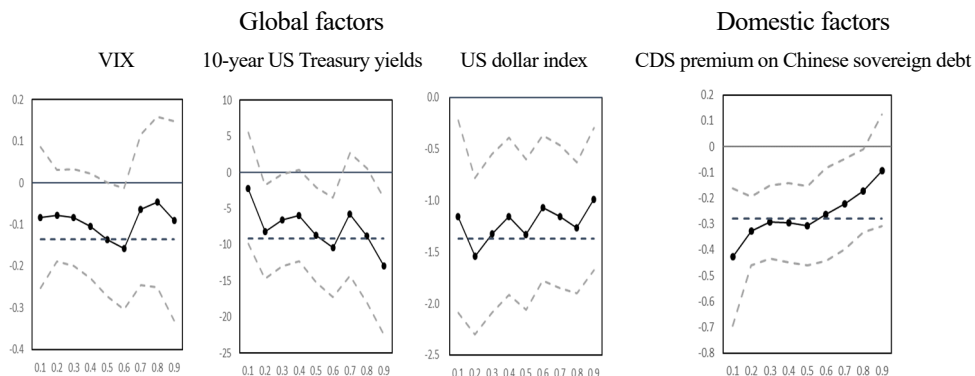


FIGURE 11. CHINA'S FOREIGN CAPITAL FLOW SENSITIVITY LEVELS AT DIFFERENT PERCENTILES BY FACTOR

*Note:* The black solid lines represent the estimated regression coefficients, the black dotted lines are the simple regression estimates, and the gray dotted lines denote the 90% confidence intervals of the quantile regression coefficients.

*Source:* Bloomberg; People's Bank of China, author's calculations.

in the graphs (for detailed results of the quantile regression analysis, see Appendix Table A1). Among the global factors, the US dollar index had a statistically significant negative coefficient also under the quantile regression model, across all percentiles, suggesting that the strength of the US dollar leads to an overall reduction in foreign capital flows in China. The estimated coefficient was -1.16 for the tenth percentile and -0.99 for the ninetieth percentile, indicating that the impact of the US dollar index was slightly greater at lower percentiles. VIX and the 10-year US Treasury yields were also found to have a statistically significant negative influence on foreign capital flows at some percentiles. The estimated coefficient of the CDS premium on Chinese sovereign debt had a large statistically significant negative value on low percentiles. The estimated coefficient was -0.43 for foreign capital flows at the tenth percentile and -0.09 for foreign capital flows at the ninetieth percentile, revealing a trend in which the level of sensitivity sharply increases as the percentile decreases. This implies that a rise in the CDS premium, which reflects the default risk of Chinese sovereign bonds, can lead to a more substantial decline at the lower percentiles of foreign capital flows and that such a rise can trigger a sudden outflow of capital, particularly in low-probability left tails. In concrete terms, this implies that an increase in the CDS premium by one unit standard deviation (0.29), for example, could lead to a decrease in the value of foreign capital flows at the tenth percentile by 0.12%p and that, if an unconditional probability distribution of foreign capital flows is assumed,  $\text{CaR}^{30}$  (-0.11%) could be reduced to -0.23% of GDP.

## 1. Sensitivity of Portfolio Investments and Other Investments

The same analysis was conducted by dividing China's foreign capital flows into two large categories, portfolio investments in stocks and bonds and other investments

<sup>30</sup>Here, capital flows at risk (CaR) are defined as capital flows with a low probability of occurrence (10% probability), following Gelos *et al.* (2019).

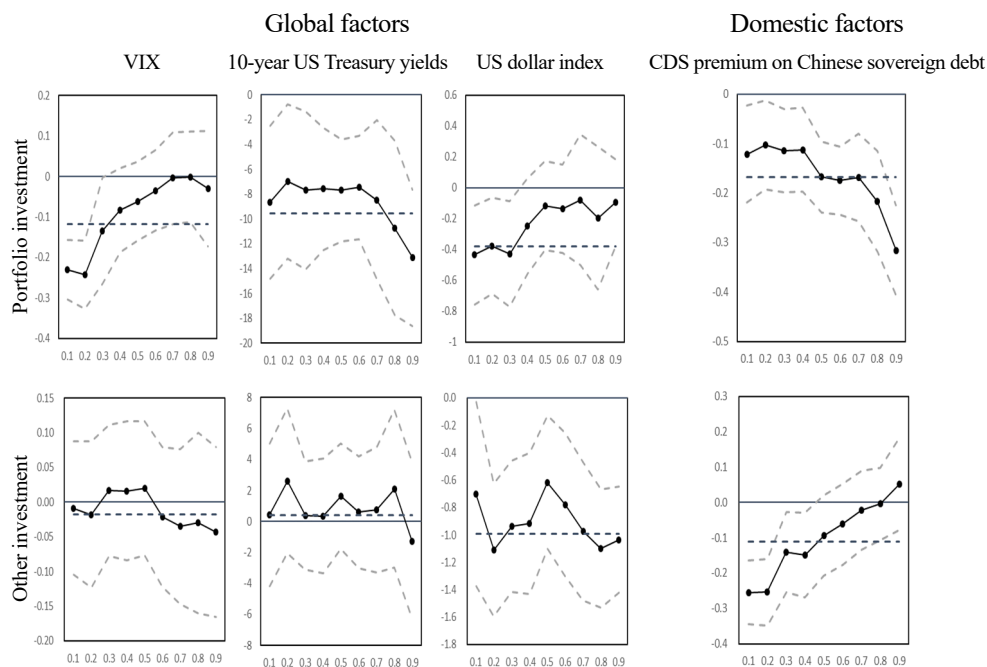


FIGURE 12. CHINA'S FOREIGN PORTFOLIO INVESTMENTS AND OTHER INVESTMENTS SENSITIVITY AT DIFFERENT PERCENTILES BY FACTOR

*Note:* The black solid lines represent the estimated quantile regression coefficients of each percentile, the black dotted lines are the simple regression estimates, and the gray dotted lines denote the 90% confidence intervals of the quantile regression coefficients.

*Source:* Bloomberg; People's Bank of China, author's calculations.

including loans to banks. As portfolio investments and other investments differ in terms of the types of investors, counterparties, as well as in maturity dates, a separate examination would help us to understand the effects of financial sanctions more accurately.

Figure 12 shows the estimation results of the quantile regression on portfolio investments and other investments. Interestingly, portfolio investments and other investments were found to differ significantly in their sensitivity to domestic and external factors. To begin with, while the lower percentiles of portfolio investment flows showed a statistically significant negative correlation with VIX, such a correlation was not observed in the case of other investments. This means that an increase in global risk causes portfolio investments at low percentiles to decrease, whereas it has no significant effect on other investments. This suggests that although a rise in global risk causes no real change in funding flows into Chinese banks, it could lead to a drop in portfolio investment flows, including capital flows into stocks and bonds, mainly at lower percentiles, potentially triggering capital outflows.

Similarly, the sensitivity to changes in the yield of 10-year US Treasury bonds was found to differ significantly between portfolio investments and other investments. The impact of rising global interest rates appeared to be greater on portfolio investments than on other investments, with a more marked difference observed at high percentiles. This means that a surge (drop) in global interest rates causes



portfolio investment flows to decrease (increase) with a sharper drop seen in unusually high portfolio investment flows (high quantile values). The impact of the US dollar index on portfolio investments was similar to that of the VIX coefficient. The rise in the value of the US dollar appeared to increase the risk of capital outflows by reducing portfolio investment flows, particularly at low percentiles. The sensitivity to the US dollar index was yet higher for other investments, suggesting that the decline in the flows of foreign deposits and loans into Chinese banks caused by the rise in the value of the US dollar is likely to be more extensive than that of portfolio investment flows.

Meanwhile, the effects of changes in the CDS premium on portfolio investment and other investment flows were significantly different between low and high percentiles. While in the case of portfolio investments, the CDS premium had a larger negative impact on high percentiles than on low percentiles, in the case of other investments, its impact was greater and showed a higher level of statistical significance at low quantiles. This means that much of the decrease in the value of foreign capital flows at low percentiles triggered by the surge in the CDS premium can be explained by the reduction in other investments. The results of the quantile regression analysis (see Table A3 in the Appendix) indicate that an increase in the CDS premium by one unit standard deviation (0.29) can lead to a drop of 0.07%p ( $= -0.25 \times 0.29$ ) in other investments at the tenth percentile, which represents as much as 58% of the total decline in all foreign investment flows of 0.12%p.

## 2. Predicting China's Capital Flows-at-risk

Using a model that considers both global and domestic factors, Gelos *et al.* (2019) estimated CaR with time lags to allow for simple predictions. In order to estimate CaR by country, the average foreign capital flow during two quarters was selected as the dependent variable, and global and domestic factors from two previous quarters served as the explanatory variables such that when the explanatory variables for the current quarter are determined, the model can predict the tenth percentile value of average foreign capital flows during the next two quarters. In this study, a similar approach is taken for monthly data; three- and six-month cumulative foreign capital flows are selected as the dependent variables and three- and six-month lagged variables of the global and domestic factors serve as the explanatory variables. Under this predictive CaR model, when external and domestic factors are determined for the current month, the tenth percentile value of foreign capital flows can be predicted for the three (or six) month period beginning with the next month.

Figure 13 shows the actual three-month and six-month cumulative flows in China and the corresponding estimated capital flows-at-risk.<sup>31</sup> After an outflow representing 1.0% of GDP in September of 2015, foreign capital flows in China fluctuated around 0.5% of GDP starting in April of 2017. More recently, amid rising volatility, capital inflows increased to about 1.0% of GDP. The three-month cumulative CaR turned negative in February of 2015, months before the Chinese stock market crash in June. In March of 2017, the three-month cumulative CaR hit an all-time low. It later improved and hovered around -0.2% after hitting the all-time low in March of 2017

<sup>31</sup>For the results of related regression analysis, refer to the Table A4 and Table A5 in the Appendix.

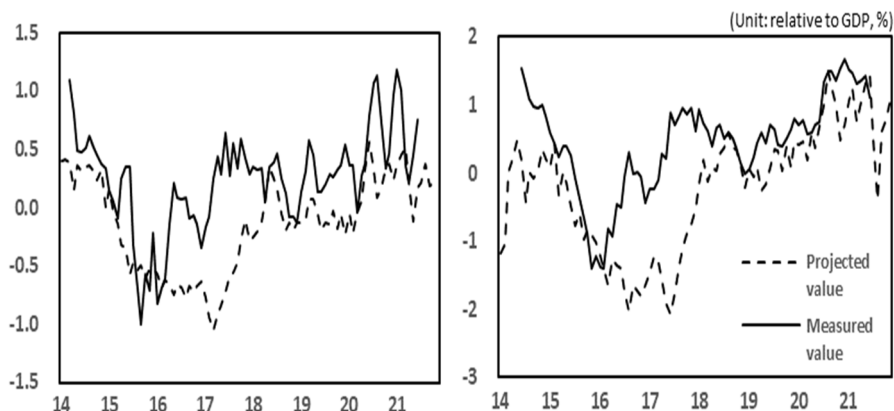


FIGURE 13. CAPITAL FLOWS-AT-RISK IN CHINA

*Note:* The solid lines represent three- or six-month cumulative foreign capital flows and the black dotted lines are the projected values of foreign capital flows-at-risk (forecasted tenth percentile value) predicted at different points in time.

*Source:* Bloomberg; People's Bank of China, author's calculations.

until 2020 before increasing to about 0.25% more recently (value for November of 2021, estimated using the explanatory variables of August of 2021). After the onset of the COVID-19 pandemic, despite the spike in global risk, the decline in global interest rates and the value of the US dollar, caused by aggressive US quantitative easing, led to improvements in global factors. The drop in the CDS premium on Chinese debt securities also appears to have contributed to the improvement of the CaR estimates. A similar trend is observed in the six-month cumulative estimates, which were estimated at 0.83% in November of 2021. With regard to the shift into negative territory of the three-month (or six-month) cumulative CaR in May of 2021 (or August of 2021), this could be explained by the sharp surge in 10-year US Treasury yields in early 2021 amid concerns about inflation.

How would a sudden imposition of financial sanctions by the US affect China's CaR? To answer this question, the response of CaR to external shocks was analyzed using the trade policy news shock index.<sup>32</sup> These results showed that an increase in the US-China trade policy shock by one unit standard deviation (2.73) leads to a rise in the CDS premium by 0.03, a response found to be statistically significant (see Figure A1). If one assumes that the shock of financial sanctions on China is quantitatively equal to the shock of trade policy news that pushed up the news shock index by 3.3<sup>33</sup> standard deviations, this will cause the CDS premium to rise by 0.10 from its current level and the value of the three-month cumulative CaR to drop by 0.09%p ( $=0.1 \times -0.88$ ), with the six-month cumulative CaR dropping by 0.28%p (see

<sup>32</sup>As the trade policy news shock index reflects the trade impact of the strategic competition between the two countries in trade, it cannot be considered to be a direct measure of the impact of US financial sanctions on China. Nevertheless, because the root cause of trade tensions is also the strategic competition between the US and China, the influence of trade tensions on the CDS premium on Chinese sovereign bonds would have a component, albeit limited, strongly related to US financial sanctions.

<sup>33</sup>The announcement by the Trump administration of trade measures against China in May of 2019 caused the news shock index to jump from 0.0 to as high as 9.0 (approximately 3.3 standard deviations).

Table A4 and Table A5 in Appendix). Given that China's three-month and six-month cumulative CaR outcomes, estimated in November of 2021, were 0.25% and 0.83%, respectively, US financial sanctions per se are unlikely to lead to a shift to a capital outflows.

However, these figures should be interpreted with caution insofar as only limited assumptions were made regarding their calculations. First, the possibility that the shock of a US announcement of financial sanctions on China will surpass in size the shock that triggered the sharp surge in the trade policy news shock index cannot be completely ruled out. In the case of financial sanctions, given that secondary sanctions can block China's external transactions, the magnitude and scope of such a shock could be substantially greater than the shock from the Trump administration's announcement of restrictions on exports to China and tariff hikes on imported Chinese goods. In addition, it is possible that the external and domestic factors determining foreign capital flows in China will worsen. As the normalization of US monetary policy together with rising global interest rates strengthens the US dollar, this will likely to push down the value of China's CaR below the current high estimate. Furthermore, this calculation did not take into account the shock to China's real economy. Chinese industrial production, considered in this study as a measure of the strength of China's real economy, was not reflected in the calculation of CaR, as this variable proved to be statistically insignificant, but the shock of financial sanctions, if effective, could trigger a domino effect and spread to the real economy. Finally, here, CaR values were estimated based on the response of the CDS premium to the shock of US-China trade tension, assuming that this shock is a one-time event. In reality, however, financial sanctions are likely to be imposed in successive rounds with increasing levels of intensity at each round or will last for an extended period of time as the US will seek to put effective pressure on China. It is therefore possible that minor decreases in foreign capital flows, as estimated above, will end up having a major impact if they accumulate over time. To sum up, the results above should be understood as a CaR estimate based on mild conditions with limited assumptions.

### *C. Impact on Foreign Capital Flows in Korea*

To determine the impact of potential financial sanctions on China by the US on Korea, Korea's foreign capital flows were analyzed with the same method used above. As was done in the analysis of foreign capital flows in China, VIX, 10-year US Treasury yields, and the US dollar index were selected as the global factors, and the Korean industrial production and the CDS premium on Chinese sovereign debt were considered as the domestic and Chinese factors, respectively.<sup>34</sup>

Figure 14 shows the results of the quantile regression analysis of foreign capital flows in Korea. Among the global factors, the US dollar index showed a statistically significant negative influence on foreign capital flows at low percentiles. VIX and global interest rates were found to have no statistically significant influence on foreign capital flows. What these results suggest is that the US dollar index is an

<sup>34</sup>Based on the results of the simple regression analysis, consideration of the CDS premium on Korean securities and on Chinese securities was deemed to interfere with an accurate assessment of the latter's impact. The CDS premium on Korean sovereign debt was therefore excluded from the model (see Table A6 in the Appendix).

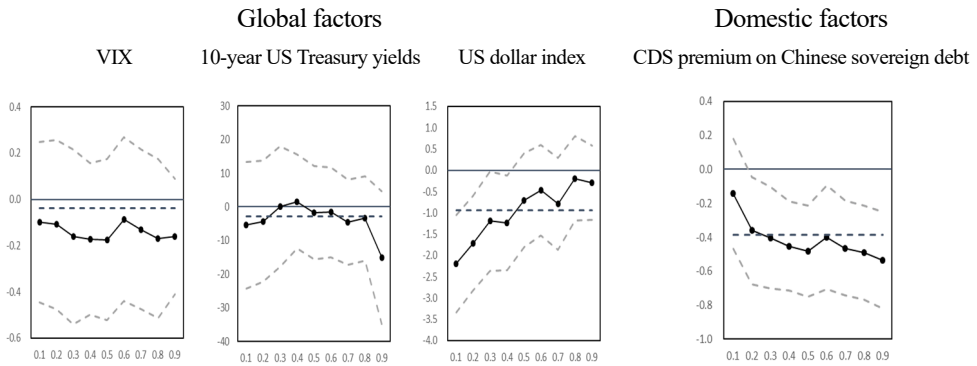


FIGURE 14. QUANTILES OF KOREA'S FOREIGN CAPITAL FLOWS AND SENSITIVITY BY FACTOR

*Note:* The black solid lines represent the estimated quantile regression coefficients of each percentile, the black dotted lines are the simple regression estimates, and the gray dotted lines are the 90% confidence intervals of each percentile.

*Source:* Bloomberg; Bank of Korea; People's Bank of China, author's calculations.

especially important global factor influencing CaR in Korea. The CDS premium on Chinese sovereign debt securities showed no statistically significant influence on Korea's CaR except at high percentiles, where its influence was significant as well as large in magnitude. These results can be interpreted to mean that a rise in the CDS premium on Chinese sovereign debt, although it may statistically significantly reduce average foreign capital flows in Korea,<sup>35</sup> may not necessarily increase the probability of extreme capital outflows.

#### D. Policy Implications

The results of the quantitative analysis in this section have several important policy implications. First, the exposure of Korean financial institutions to Chinese banks and financial institutions needs to be closely monitored. The findings here suggest that the intensification of the strategic competition between the US and China, if leading to the imposition of financial sanctions on China, can reduce the country's foreign capital flows-at-risk and can even cause a shift to a capital outflow should the sanctions be accompanied by deterioration in global and domestic conditions<sup>36</sup>. This study found that capital outflows are especially likely in other investment flows, i.e., in investments in the Chinese banking sector, which may experience liquidity shocks as a result. Liquidity shocks can spill over to Korean banks that have business relationships with Chinese banks. Accordingly, the level of exposure between Korea's domestic banks and Chinese financial institutions should be monitored so that counterparty risks can be managed.

<sup>35</sup>As the results of the analysis suggest that while there is little change in the probability of low capital flows, the probability of high capital flows decline significantly, indicating the possibility of a decrease in average capital flows.

<sup>36</sup>As observed in the case of the financial sanctions by the US and its allies on Russia for the Ukraine invasion, Russia's growth and trade as well as its global economic condition have experienced large negative impacts from the sanctions, meaning that US potential financial sanctions on China would have significant damage on the Korean economy via trade channels.

Second, Korea needs to work closely with the US in matters related to financial sanctions against China. Financial sanctions largely consist of secondary sanctions which have broad and far-reaching impacts. Hence, the US is likely to try to avoid as much as possible situations in which the sanctions have unintended consequences on its allies. Although Korea's foreign capital flows-at-risk were not found to respond statistically significantly to financial sanctions on China, as financial sanctions are expected to lead to stock price declines and a rise in both the value of the US dollar and long-term interest rates, it is important to anticipate such external shocks and disperse their impacts by working together with the US.

Third, financial authorities must implement macroprudential measures that allow effective responses to global factors. Monetary policies that pursue a strategy of aggressive easing in major countries since early in the COVID-19 pandemic have created an exceptionally accommodative financial environment by lowering global risk and bringing down interest rates and the value of the US dollar. The effect of such a financial environment can also be observed in the movement of China's foreign capital flows-at-risk. The analysis found that due to the accommodative global conditions, even a rise in the CDS premium on Chinese government bonds does not necessarily trigger a shift in the movement of foreign capital. However, as the global economic recovery picks up speed going forward, it will lead to the normalization of monetary and financial policies in major countries, causing global conditions to deteriorate and capital flows-at-risk to decrease. In Korea, especially, there is a tendency in which a rise in the US dollar index results in a statistically significant drop in foreign capital flows-at-risk. It is therefore critical for financial authorities to adopt macroprudential measures that flexibly respond to changing global conditions. For example, during periods in which global conditions are accommodative, the rate of "macro-prudential stability levies" paid by banks could be raised to set aside sufficient resources to respond to risks when global conditions worsen.

Fourth, the effort to expand the global financial safety network should be coupled with continuous efforts to strengthen the private sector's ability to manage foreign exchange risk. In the past, external shocks frequently resulted in shortages of US dollars among Korean financial institutions and increased volatility in the foreign exchange market. During the recent COVID-19 pandemic, a massive wave of margin calls on overseas ELS positions of Korean securities companies sparked a shortage of dollars. Hence, it is paramount for financial institutions to set up an internal control system and guidelines so that they can more effectively manage foreign exchange risk. Continuous efforts must also be made at the government level to build the capacity to respond to external shocks by participating in currency swap arrangements with central banks in developed countries and multilateral currency swap arrangements.

## VI. Conclusion

Considering the potential for the competition between the US and China to extend beyond the realms of international politics and trade and commerce and into finance, this paper measured the impact of a financial conflict between the two countries

through a quantitative analysis to derive policy implications.

The dollar as the dominant global currency gives the US considerable power in international politics, serving as a formidable tool for the US to exert influence on the global governance. The US has made skillful use of this tool when necessary to advance its interests. A telling instance of this is the so-called “kill the chicken to scare the monkey” strategy used against Banco Delta Asia. The US made an example of this small bank to deter larger institutions by providing them with a foretaste of the devastating impact that would befall them in the event of US financial sanctions. China responded by passing the Anti-foreign Sanctions Law to pressure foreign firms not to participate in US sanctions. Given that the strategic competition between the US and China is likely to be a lasting phenomenon, should the US decide to impose financial sanctions on China, it will be something of a “black swan” event.

In this study, in order to quantify the impact of potential US financial sanctions on China, China's foreign capital flows-at-risk were estimated. The results suggested that a rise in the CDS premium on Chinese sovereign debt has a statistically significant negative impact on its foreign capital flows-at-risk, mainly in banking flows. However, the analysis found that due to favorable recent global conditions, an increase in the CDS premium is unlikely to trigger a shift to a sudden outflow of foreign capital at that moment. Meanwhile, this study found no statistically significant correlation between Korea's capital flows-at-risk and the CDS premium on Chinese sovereign debt, suggesting that the negative impact of US financial sanctions on China will not increase the probability of capital flight from Korea significantly.

The risk of the strategic competition between the US and China spreading to the financial sector must be preemptively managed through policy efforts such as monitoring the degree of cross-border exposure between Korean and Chinese institutions, closely working together with the US in matters related to sanctions on China, adopting macroprudential measures to respond to changing global conditions, and strengthening the capacity and resilience to withstand external shocks.

## APPENDIX

*Institutions of US Financial Sanctions*

In addition to the White House and federal government agencies that are responsible for diplomatic, military, trade, and financial affairs, such as the Department of State, Department of Defense, Department of the Treasury, and the Department of Commerce, other agencies, including the Department of Homeland Security, the Department of Education, and the Federal Investigation Bureau (FBI), are also involved in the imposition of international sanctions. As sanctions are carried out at the level of individual agencies through legislation, executive orders, or regulations, they vary in their content as well as their methods of implementation.

However, as can be seen in the cases of the anti-money laundering program and the Hong Kong Autonomy Act, financial sanctions are overseen by the Office of Economic Sanctions Policy and Implementation under the Department of State. The Office of Foreign Asset Control (OFAC) of the Department of the Treasury establishes and manages the Specially Designated Nationals and Blocked Persons List (SDN), a list of individuals and of companies owned by or acting on behalf of targeted countries, and financial supervisory agencies including the Office of the Comptroller of the Currency (OCC) and the New York State Department of Financial Services (DFS) impose fines on financial institutions who commit violations or take other punitive measures such as restrictions on their business operations, in accordance with relevant legislation or executive orders. In other words, the Department of State has the primary responsibility of coordinating financial sanctions against foreign jurisdictions and entities, while the Department of the Treasury is responsible for establishing the list of sanction targets, with financial supervisory agencies actually implementing sanctions by imposing fines on institutions in breach of sanctions.

TABLE A1—RESULTS OF QUANTILE REGRESSION ON CHINA'S FOREIGN CAPITAL FLOWS

	Percentile								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
VIX	-0.08 (0.10)	-0.08 (0.07)	-0.08 (0.07)	-0.10 (0.08)	-0.14 (0.08)	-0.16* (0.09)	-0.06 (0.11)	-0.05 (0.12)	-0.09 (0.14)
10-year US Treasury yields	-2.18 (4.66)	-8.22** (3.91)	-6.60* (3.86)	-5.96 (3.83)	-8.65** (3.99)	-10.39** (4.15)	-5.81 (5.10)	-8.77 (5.61)	-12.97** (5.70)
US dollar index (DXY)	-1.16** (0.56)	-1.54*** (0.46)	-1.32*** (0.46)	-1.15** (0.46)	-1.33*** (0.44)	-1.07** (0.43)	-1.16*** (0.42)	-1.27*** (0.38)	-0.99** (0.42)
Chinese industrial production	0.13 (0.36)	-0.14 (0.28)	-0.06 (0.34)	0.13 (0.47)	0.37 (0.79)	0.59 (0.74)	0.45 (0.66)	0.64 (0.71)	-0.46 (1.31)
CDS premium on Chinese sovereign debt	-0.43*** (0.16)	-0.33*** (0.08)	-0.29*** (0.09)	-0.30*** (0.09)	-0.31*** (0.09)	-0.26** (0.11)	-0.22** (0.11)	-0.17* (0.10)	-0.09 (0.13)
Constant	5.74** (2.53)	7.60*** (2.08)	6.59*** (2.12)	5.90*** (2.11)	6.88*** (2.07)	5.80*** (2.00)	5.85*** (2.04)	6.35*** (1.91)	5.40 (2.09)

Note: 1) The values in the bracket are standard deviations, 2) \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Source: Bloomberg; People's Bank of China, author's calculations.

TABLE A2—RESULTS OF QUANTILE REGRESSION ON FOREIGN PORTFOLIO INVESTMENTS IN CHINA

	Percentile								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
VIX	-0.23*** (0.04)	-0.24*** (0.05)	-0.13* (0.08)	-0.08 (0.06)	-0.06 (0.06)	-0.03 (0.06)	0.00 (0.07)	0.00 (0.07)	-0.03 (0.09)
10-year US Treasury yields	-8.65** (3.70)	-6.98* (3.73)	-7.69** (3.84)	-7.57** (2.96)	-7.70*** (2.46)	-7.47*** (2.51)	-8.47** (3.86)	-10.74** (4.25)	-13.12*** (3.31)
US dollar index (DXY)	-0.43** (0.19)	-0.38** (0.19)	-0.43** (0.21)	-0.25 (0.19)	-0.12 (0.17)	-0.14 (0.17)	-0.08 (0.25)	-0.20 (0.28)	-0.10 (0.17)
Chinese industrial production	0.26 (0.19)	0.24 (0.25)	-0.08 (0.21)	0.16 (0.70)	0.42 (0.42)	0.52 (0.38)	0.19 (1.16)	-0.28 (1.28)	-1.00** (0.41)
CDS premium on Chinese sovereign debt	-0.12** (0.06)	-0.10* (0.05)	-0.11** (0.05)	-0.11** (0.05)	-0.17*** (0.04)	-0.17*** (0.04)	-0.17*** (0.05)	-0.22*** (0.06)	-0.32*** (0.05)
Constant	2.82*** (0.92)	2.58*** (0.97)	2.60** (1.06)	1.65* (0.95)	1.04 (0.87)	1.07 (0.87)	0.79 (1.34)	1.44 (1.47)	1.30 (0.84)

Note: 1) The values in the bracket are standard deviations, 2) \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Source: Bloomberg; People's Bank of China, author's calculations.



TABLE A3—RESULTS OF QUANTILE REGRESSION ON OTHER FOREIGN INVESTMENTS IN CHINA

	Percentile								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
VIX	-0.01 (0.06)	-0.02 (0.06)	0.02 (0.06)	0.02 (0.06)	0.02 (0.06)	-0.02 (0.06)	-0.04 (0.07)	-0.03 (0.08)	-0.04 (0.07)
10-year US Treasury yields	0.43 (2.77)	2.61 (2.82)	0.39 (2.10)	0.34 (2.23)	1.63 (2.04)	0.59 (2.18)	0.74 (2.43)	2.11 (3.06)	-1.26 (3.04)
US dollar index (DXY)	-0.70* (0.41)	-1.11*** (0.29)	-0.94*** (0.29)	-0.92*** (0.31)	-0.62** (0.29)	-0.78** (0.31)	-0.97*** (0.30)	-1.10*** (0.26)	-1.04*** (0.23)
Chinese industrial production	0.08 (0.17)	0.11 (0.24)	0.06 (0.17)	0.02 (0.19)	0.06 (0.19)	0.08 (0.20)	-0.02 (0.20)	-0.09 (0.19)	-0.21 (0.22)
CDS premium on Chinese sovereign debt	-0.25*** (0.05)	-0.25*** (0.06)	-0.14** (0.07)	-0.15** (0.07)	-0.09 (0.07)	-0.06 (0.07)	-0.02 (0.07)	0.00 (0.06)	0.05 (0.08)
Constant	3.28* (1.82)	5.13*** (1.31)	4.25*** (1.33)	4.18*** (1.43)	2.78** (1.34)	3.64** (1.45)	4.58*** (1.44)	5.12*** (1.27)	4.94*** (1.16)

Note: 1) The values in the bracket are standard deviations, 2) \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Source: Bloomberg; People's Bank of China, author's calculations.

TABLE A4—RESULTS OF QUANTILE REGRESSION ON THREE-MONTH CUMULATIVE FOREIGN CAPITAL FLOWS IN CHINA

	Percentile								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
VIX (-3)	0.55** (0.25)	0.24 (0.47)	0.18 (0.25)	0.25 (0.19)	0.22 (0.15)	0.26* (0.14)	0.23* (0.13)	0.30** (0.12)	0.36*** (0.12)
10-year US Treasury yields (-3)	5.93 (10.21)	0.22 (13.06)	-0.41 (7.35)	-3.01 (8.54)	-12.79 (9.62)	-14.18 (9.23)	-9.84 (9.13)	-16.95** (7.33)	-19.23** (8.73)
US dollar index (-3)	-4.47*** (0.80)	-4.02*** (0.94)	-2.30*** (0.81)	-2.73*** (0.81)	-2.45*** (0.82)	-2.10*** (0.76)	-1.47** (0.67)	-1.27** (0.59)	-2.10*** (0.72)
Chinese industrial production (-3)	-2.13** (1.07)	-2.05 (1.26)	-0.78 (0.75)	-0.60 (0.74)	-1.13 (0.90)	0.57 (1.84)	0.58 (1.68)	1.41 (1.51)	1.63 (1.44)
CDS premium on Chinese sovereign debt (-3)	-0.88*** (0.25)	-0.90*** (0.32)	-0.61*** (0.18)	-0.53*** (0.18)	-0.49*** (0.17)	-0.52*** (0.17)	-0.46** (0.18)	-0.38* (0.20)	0.06 (0.38)
Constant (-3)	19.25*** (3.45)	18.27*** (4.27)	10.56*** (3.63)	12.42*** (3.66)	11.49*** (3.81)	9.81*** (3.51)	6.92** (3.13)	5.94** (2.78)	9.42*** (3.39)

Note: 1) The values in the bracket are standard deviations, 2) \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Source: Bloomberg; People's Bank of China, author's calculations.

TABLE A5—RESULTS OF QUANTILE REGRESSION ON SIX-MONTH CUMULATIVE FOREIGN CAPITAL FLOWS IN CHINA

	Percentile								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
VIX (-6)	0.55** (0.27)	0.32 (0.21)	0.26 (0.21)	0.30 (0.22)	0.35* (0.19)	0.35* (0.18)	0.30* (0.17)	0.27 (0.17)	0.01 (0.18)
10-year US Treasury yields (-6)	-2.34 (14.42)	-25.64** (10.22)	-24.83** (10.29)	-28.09** (10.85)	-21.41** (9.39)	-17.95* (9.53)	-21.94** (9.87)	-29.18** (12.10)	-39.42*** (12.59)
US dollar index (-6)	-5.62** (2.36)	-5.71*** (1.37)	-4.67*** (1.49)	-4.82*** (1.52)	-4.29*** (1.23)	-4.29*** (1.16)	-3.75*** (0.98)	-2.77** (1.19)	-1.89* (0.96)
Chinese industrial production (-6)	-6.11*** (1.50)	-4.93*** (1.31)	-4.36*** (1.46)	-4.09** (1.57)	-3.70** (1.54)	-3.47** (1.42)	-3.17** (1.27)	-2.60* (1.44)	-3.27* (1.65)
CDS premium on Chinese sovereign debt (-6)	-2.82*** (0.52)	-1.78*** (0.29)	-1.61*** (0.29)	-1.55*** (0.31)	-1.06*** (0.28)	-1.08*** (0.28)	-0.67* (0.35)	-0.18 (0.69)	0.32 (0.65)
Constant (-6)	26.26** (10.84)	27.36*** (6.25)	22.71*** (6.80)	23.36*** (6.95)	20.47*** (5.62)	20.48*** (5.29)	18.04*** (4.45)	13.57** (5.51)	10.42** (4.57)

Note: 1) The values in the bracket are standard deviations, 2) \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Source: Bloomberg; People's Bank of China, author's calculations.

TABLE A6—RESULTS OF SIMPLE REGRESSION ON FOREIGN CAPITAL FLOWS IN KOREA

Variable	Model (1)	Model (2)	Model (3)
VIX	-0.08 (0.13)	-0.06 (0.13)	-0.04 (0.13)
10-year US Treasury yields	0.71 (6.75)	-0.07 (6.79)	-2.79 (6.52)
US dollar index	-1.40** (0.57)	-1.21** (0.60)	-0.94 (0.57)
Korean industrial production index	0.23 (1.27)	0.54 (1.31)	0.77 (1.30)
CDS premium on Korean sovereign debt	-0.85*** (0.25)	-0.54 (0.40)	-
CDS premium on Chinese sovereign debt	-	-0.19 (0.19)	-0.39*** (0.12)
Constant	7.06*** (2.65)	6.14** (2.79)	4.82* (2.63)
adj. R-squared	0.11	0.11	0.10
Number of observations	90	90	90

Note: 1) The values in the bracket are standard deviations, 2) \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Source: Bloomberg; People's Bank of China, author's calculations.

TABLE A7—RESULTS OF QUANTILE REGRESSION ON FOREIGN CAPITAL FLOWS IN KOREA

	Percentile								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
VIX	-0.10 (0.21)	-0.11 (0.22)	-0.16 (0.23)	-0.17 (0.20)	-0.18 (0.21)	-0.09 (0.21)	-0.13 (0.21)	-0.17 (0.21)	-0.16 (0.15)
10-year US Treasury yields	-5.46 (11.34)	-4.25 (10.86)	0.15 (10.77)	1.52 (8.41)	-1.72 (8.31)	-1.60 (8.08)	-4.51 (7.61)	-3.42 (7.52)	-15.02 (11.88)
US dollar index (DXY)	-2.20*** (0.69)	-1.72** (0.67)	-1.19* (0.70)	-1.24* (0.67)	-0.70 (0.67)	-0.47 (0.64)	-0.79 (0.65)	-0.19 (0.60)	-0.30 (0.52)
Korean industrial production	1.38 (1.69)	2.23 (1.92)	2.30 (2.22)	2.84 (2.06)	1.55 (2.33)	1.69 (2.34)	2.40 (2.16)	1.47 (2.28)	2.52 (2.15)
CDS premium on Chinese sovereign debt	-0.14 (0.19)	-0.36* (0.19)	-0.40** (0.18)	-0.45** (0.16)	-0.48** (0.16)	-0.40* (0.18)	-0.46*** (0.17)	-0.49*** (0.17)	-0.53*** (0.17)
Constant	10.20*** (3.10)	8.28*** (3.07)	6.04* (3.29)	6.39** (3.13)	4.17 (3.15)	2.87 (3.10)	4.57 (3.15)	2.07 (3.03)	2.84 (2.72)

Note: 1) The values in the bracket are standard deviations, 2) \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Source: Bloomberg; People's Bank of China, author's calculations.

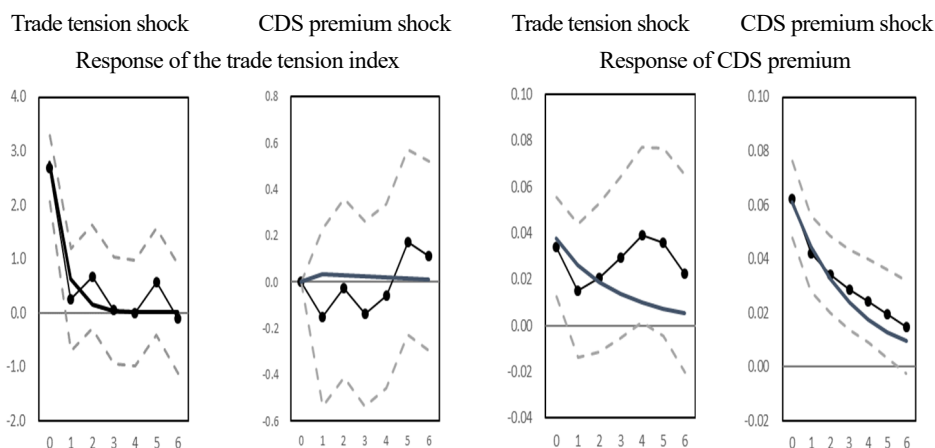


FIGURE A1. RESULTS OF AN IMPULSE RESPONSE ANALYSIS OF US-CHINA TRADE TENSIONS ON THE CDS PREMIUM ON CHINESE SOVEREIGN DEBT

Note: 1) Trade tension index data are available from January of 2017 to January of 2020, 2) After forming the vector time series (first for the trade tension index and then for the CDS premium), the impulse response function and the confidence interval were estimated using the local projection method, 3) The black dotted lines represent the local projection impulse responses and the black solid lines are the impulse responses calculated using the Cholesky decomposition.

Source: Bloomberg; IMF, author's calculations.

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