



Effects of China's capital controls on individual asset categories

Shigeto Kitano^{a,*}, Yang Zhou^b

^a RIEB, Kobe University, Japan

^b Graduate School of Economics, Kobe University, Japan

ARTICLE INFO

JEL classification:

F38
F32
G15

Keywords:

Capital controls
China
Local projection

ABSTRACT

We empirically assess the effects of China's capital controls on individual asset categories by using the local projection method. Our results show stark differences among individual asset categories. Capital controls on equity and financial credits affect the corresponding net inflows significantly, whereas those on the other three asset categories (bonds, commercial credits, and direct investment) do not.

1. Introduction

After the 2008 global financial crisis, emerging economies struggled with unprecedented capital inflows due to the unconventional monetary policies of advanced countries. In response to massive capital inflows, some emerging economies (e.g., Brazil, Indonesia, Taiwan, and Thailand) have deployed capital controls. More policymakers and researchers, including the IMF, have begun to recognize that capital controls can be an appropriate policy tool under certain circumstances, despite the primary principle of financial liberalization. This background stimulates research to analyze the effectiveness of capital controls.¹ However, the literature using cross-country data provides mixed results. While some studies suggest that capital controls affect capital inflows (e.g., [Ostry et al., 2012](#); [Ahmed and Zlate, 2014](#); [Nispi Landi and Schiavone, 2021](#)), other empirical studies suggest limited effectiveness of capital controls on capital inflows (e.g., [Forbes and Warnock, 2012](#); [Forbes et al., 2015](#); [Frost et al., 2020](#)).²

Regarding capital controls specific to China, most previous studies examined the effectiveness of capital controls by evaluating if covered interest parity (CIP) holds or not (e.g., [Ma and McCauley, 2008](#); [Cappiello and Ferrucci, 2008](#); [Otani et al., 2011](#); [Cheung and Herrala, 2014](#)).^{3,4} Although the approach using the CIP is useful for testing the effectiveness of capital controls as a whole, it is not useful for examining the specific effectiveness of implementing capital controls on individual asset categories. The CIP approach may have another problem because it is a *de facto* measurement of capital controls. As [Quinn et al. \(2011\)](#) argue, *de facto* measures are not perfectly related to a government's policy stance.

* Corresponding author.

E-mail address: kitano@rieb.kobe-u.ac.jp (S. Kitano).

¹ Regarding theoretical studies, many of them suggest that capital controls are a potentially useful policy tool. See, for example, the literature review in [Kitano and Takaku \(2018\)](#) and [Kitano and Takaku \(2020\)](#).

² Regarding the literature on capital outflows, see for example [Gkillas et al. \(2016\)](#).

³ In economies with open capital account and efficient financial markets, the CIP should hold so that the difference between forward rate and spot rate is equal to the interest rate differential between home and foreign currencies. If there are deviations from the CIP, it implies that there may be arbitrage opportunities due to capital controls.

⁴ An exception is [Fu and Cao \(2020\)](#) that examined the effect of capital controls on trade by using *de jure* data from [Fernández et al. \(2016\)](#).

Table 1
Expected signs for impulse responses of capital controls on net inflows.

		Nonresidents		Residents
eq	eq_plbn	–	eq_pabr	+
	eq_silbn	+	eq_siabr	–
bo	bo_plbn	–	bo_pabr	+
	bo_silbn	+	bo_siabr	–
cc	cci	–	cco	+
fc	fci	–	fco	+
di	dii	–	dio	+

In this study, we use the dataset of [Chen and Qian \(2016\)](#), which quantifies the intensity of the changes in China's capital controls in various asset categories. Using the *de jure* measurement of capital controls, we analyze the effectiveness of capital controls on individual asset categories. To the best of our knowledge, this is the first study to distinguish individual asset categories and examine how corresponding capital controls affect capital flows in China. In addition, we use a smooth local projection (SLP) estimation methodology proposed by [Barnichon and Brownlees \(2019\)](#) to estimate the marginal effect of capital control policy actions.⁵ This method inherits the characteristics of robustness to the misspecification of local projection (LP) by [Jordà \(2005\)](#) and also addresses the large variability problem of the LP estimator by using B-spline smoothing.

We find that there exist stark differences among individual asset categories. Our results indicate a significant influence of capital controls on net inflows in some asset categories (equity and financial credits) but not in the other asset categories (bonds, commercial credits, and direct investment).

2. Data

We use index data constructed by [Chen and Qian \(2016\)](#) to measure the changes in China's capital controls. Compared to the other capital-control indices (e.g., [Chinn and Ito, 2006](#); [Schindler, 2009](#); [Quinn et al., 2011](#); [Klein, 2012](#); [Fernández et al., 2016](#)), [Chen and Qian \(2016\)](#)'s index indicates more frequent changes in China's capital controls. [Chen and Qian \(2016\)](#)'s dataset properly captures the variation in China's capital controls by extracting detailed information from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) and some supplementary material from other sources. They add 1 if capital control tightens and subtract 1 if it loosens. Their dataset covers 1999–2018.⁶ We use the subcategories of equities (eq), bonds (bo), commercial credits (cc), financial credits (fc), and direct investment (di). More specifically, “eq”, “bo”, “cc”, “fc”, and “di” indicate controls on shares or other securities of a participating nature, bonds or other debt securities, commercial credits (trade credits), financial credits (mainly bank loans), and direct investment, respectively.⁷

For the subcategories of “eq” and “bo”, there exist four types of controls that affect corresponding net inflows.⁸ As for transactions by nonresidents, “eq_plbn” signifies controls on “purchase locally by nonresidents”, which implies that an increase in “eq_plbn” is expected to reduce net inflow of equity. In contrast, “eq_silbn” signifies controls on “sale or issue locally by nonresidents”, which implies that an increase in “eq_silbn” is expected to increase net inflow of equity. As for transactions by residents, “eq_pabr” signifies controls on “purchase abroad by residents”, which implies that an increase in “eq_pabr” is expected to increase net inflow of equity. In contrast, “eq_siabr” signifies controls on “sale or issue abroad by residents”, which implies that an increase in “eq_siabr” is expected to reduce net inflow of equity. In terms of bonds, “bo_plbn”, “bo_silbn”, “bo_pabr”, and “bo_siabr” correspond to “eq_plbn”, “eq_silbn”, “eq_pabr”, and “eq_siabr”, respectively. Therefore, “bo_plbn”, “bo_silbn”, “bo_pabr”, and “bo_siabr” are expected to affect net inflow of bonds in a similar way as “eq_plbn”, “eq_silbn”, “eq_pabr”, and “eq_siabr” affect net inflow of equity.

For the subcategory of commercial credits (“cc”), “cci” signifies controls on transactions by nonresidents, which implies that an increase in “cci” is expected to reduce net inflow of commercial credits. In contrast, “cco” signifies controls on transactions by residents, which implies that an increase in “cco” is expected to increase net inflow of commercial credits. Similarly, “fci” and “fco” signify controls on transactions for financial credits, and “dii” and “dio” signify controls on transactions for direct investment.

[Table 1](#) summarizes the expected signs for the impulse responses of an increase in capital control indices on net inflows in the individual asset categories, which is implied by the above argument. We will use [Table 1](#) to check if the empirical results are in line with our expectation in [Section 3](#).

We obtain the corresponding quarterly flow data of liabilities and assets from the CEIC database, and calculate the net inflows corresponding to “eq”, “bo”, “cc”, “fc”, and “di”.⁹ We use China's central bank policy rate (in real terms), US central bank policy rate (in real terms), China's (real) GDP growth rate, CPI inflation rate, and growth rate of real effective exchange rate as control

⁵ More recent studies employ this method (e.g., [Franta and Gambacorta, 2020](#); [Funashima, 2021](#)).

⁶ Their original coverage was from 1999 to 2012. They updated the data to 2018, which are available on their websites.

⁷ We converted the original monthly data of [Chen and Qian \(2016\)](#) into quarterly data.

⁸ Net inflows are defined as net purchases locally by nonresidents minus net purchases abroad by residents.

⁹ More specifically, we use “equity”, “debt securities”, “trade credit”, “loan”, and “direct investment” in CEIC China data. The original source of the CEIC China data is the Balance of Payments Department of the State Administration of Foreign Exchange.

variables in Section 3. We obtain real values by deflating nominal values with CPI inflation. The US central bank policy rate and CPI are taken from the IMF database. The China's GDP and CPI are taken from the China Time Series by [Chang et al. \(2015\)](#). The China's central bank policy and effective exchange rates are taken from the BIS database. All the data used in our analysis are quarterly. The sample periods are from 1999:Q2 to 2018:Q4.

3. Empirical specification

We study the path of each type of net inflows conditional on the implementation of corresponding capital controls and macroeconomic control variables. In this context, we consider the following set of h -periods ahead of predictive regressions:

$$NIF_{t+h} = \alpha^h + \beta^h CC_t + \sum_{i=0}^p \gamma_i^h w_{t-i} + u_{t+h}^h, \quad (1)$$

where $h = 1, \dots, 12$ and $p = 4$. The term NIF_{t+h} denotes the h -periods ahead conditional forecast of net inflow to GDP ratio, which is the response variable of interest. The term CC_t represents the corresponding index of capital controls. For example, when NIF is the net inflow of equity, CC denotes the four types of capital controls on equity ("eq_plbn", "eq_silbn", "eq_pabr", and "eq_siabr"). The term CC_t is defined such that policy-tightening is associated with an increase in CC_t . Therefore, β^h denotes the marginal effects of tightening capital controls on the net inflow to GDP ratio h periods ahead. The 6×1 vector w_{t-i} contains control variables: the current and lag values of net inflow to GDP ratio, the US's central bank policy rate (in real terms), China's central bank policy rate (in real terms), China's (real) GDP growth rate, China's CPI inflation rate, and China's growth rate of real effective exchange rate with i -period lags.¹⁰ The maximum lag period p is set to 4 quarters. The term u_{t+h}^h denotes the prediction error where $\text{var}(u_{t+h}^h) = \sigma_h^2$.

We estimate the marginal effect of capital controls using smooth local projections, a method proposed by [Barnichon and Brownlees \(2019\)](#) that extends the local projections of [Jordà \(2005\)](#). Local projection estimators tend to suffer from large variability. Smooth local projections based on B-spline smoothing provide smoother impulse responses, balancing the trade-off between estimator variability and bias.¹¹

4. Results

[Fig. 1](#) displays impulse responses of equity net inflow to tightening related control indices. The shaded area presents a 90% confidence interval. Comparing the impulse responses in [Fig. 1](#) to their corresponding signs in [Table 1](#), you see that the impulse responses to tightening "eq_plbn", "eq_silbn", "eq_pabr", and "eq_siabr" are in expected directions. Tightening "eq_plbn" reduces equity net inflow to GDP ratio by 0.05% in the sixth quarter. Tightening "eq_silbn" increases equity net inflow to GDP ratio by 0.07% in the first quarter. Tightening "eq_pabr" increases equity net inflow to GDP ratio by 0.04% in the fourth quarter. Tightening "eq_siabr" reduces equity net inflow to GDP ratio by 0.08% in the first quarter. In summary, our analysis finds that capital controls related to equities are effective in controlling the volume of equity flows in China.

[Fig. 2](#) displays impulse responses of bond net inflow to tightening related control indices. Comparing the impulse responses in [Fig. 2](#) to their corresponding signs in [Table 1](#), you see that the results are ambiguous. The panel of "bo_plbn" shows that tightening "bo_plbn" reduces bond net inflow in the expected direction, but slightly only in the first quarter. The panel of "bo_silbn" shows that changing "bo_silbn" does not affect bond net inflow significantly. The panel of "bo_pabr" shows that tightening "bo_pabr" affects bond outflows after the tenth quarter, but in the opposite direction to the expected. The panel of "bo_siabr" shows a mixed result: until the eighth quarter, the response is in the opposite direction to expected, but after the tenth quarter, it is in the expected direction. To summarize on bond markets, we cannot find evidence that capital controls related to bond markets are effective in controlling bond flows in China.

[Fig. 3](#) displays impulse responses of commercial-credit, financial-credit, and direct-investment flows to tightening the related control indices. The upper panels of [Fig. 3](#) show that neither "cci" nor "cco" influences commercial-credit net inflows. The middle panels of [Fig. 3](#) show that the impulse responses of "fci" and "fco" are in the expected directions (shown in [Table 1](#)). Tightening "fci" reduces financial-credit net inflows to GDP ratio by 0.47% in the sixth quarter.¹² Tightening "fco" increases financial-credit net inflows to GDP ratio by 0.28% in the first quarter. The left lower panel of [Fig. 3](#) shows a mixed result. Until the third quarter, the response of direct-investment net inflows to "dii" is in the expected direction, but in the period from the sixth to eleventh quarters the direction of response is opposite to expected. The lower right panel of [Fig. 3](#) shows that "dio" does not influence direct-investment net inflows. To summarize on these three assets, capital controls on financial credit are effective in controlling the financial credit flows in China. However, we cannot find any evidence that capital controls related to commercial credit and direct investment are effective in controlling the corresponding flows.

¹⁰ [Olea et al. \(2021\)](#) show that lag-augmented local projections with normal critical values are asymptotically valid uniformly over both stationary and non-stationary data.

¹¹ Following [Barnichon and Brownlees \(2019\)](#), we choose a smoothing parameter via cross-validation.

¹² As for "fci", the impulse response by local projections is displayed rather than the smoothed one, since the former is more evident than the latter.

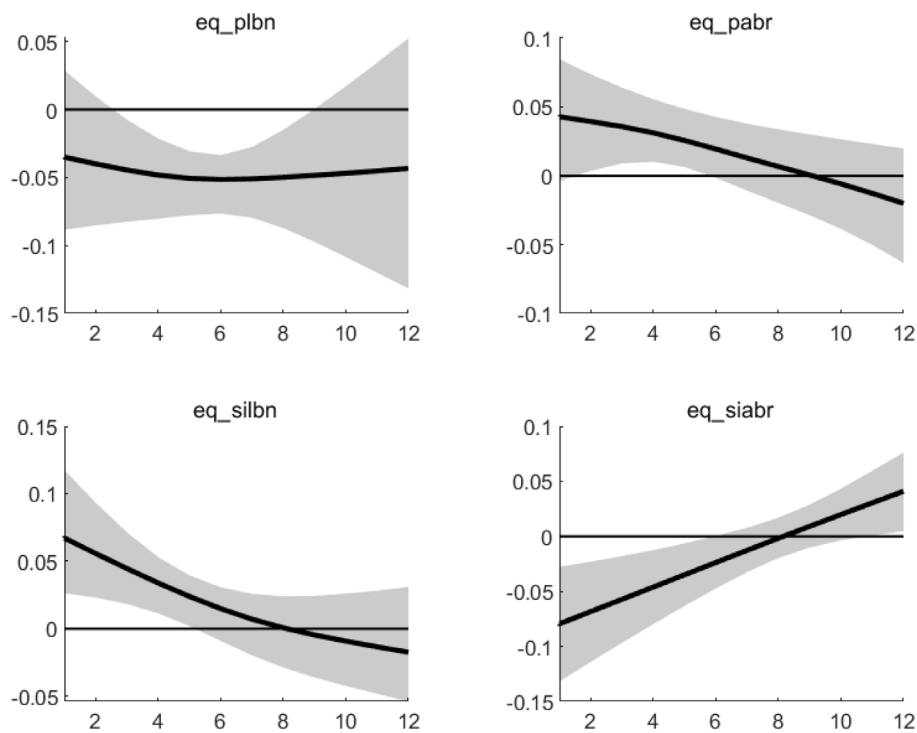


Fig. 1. Responses of equity net inflow to tightening equity capital controls. Note: The y-axis indicates the change in GDP ratio (%). The shaded area denotes a 90% confidence interval.

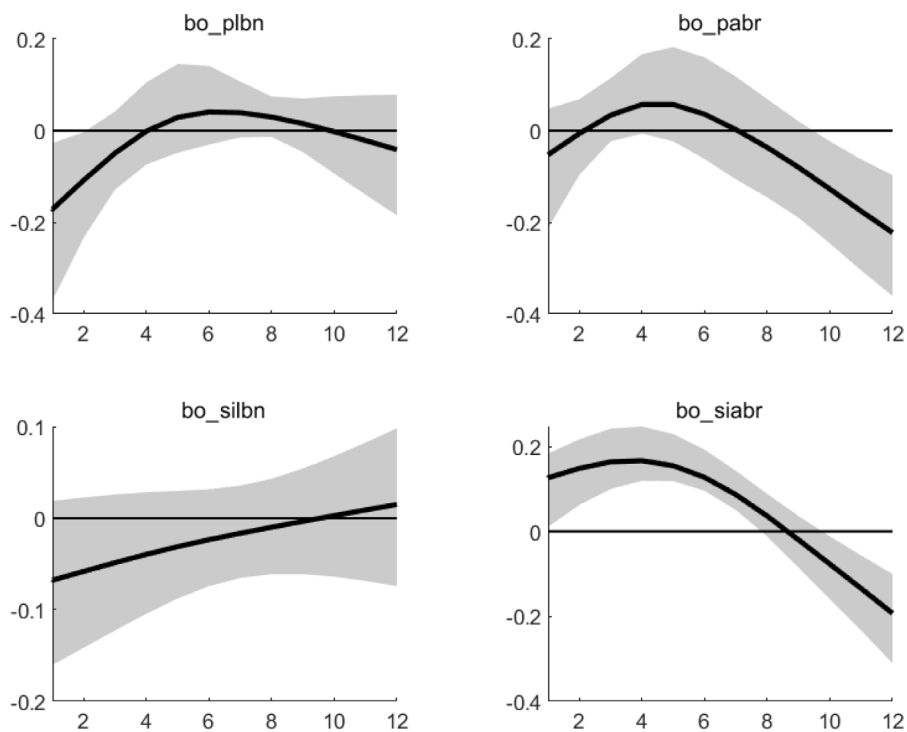


Fig. 2. Responses of bond net inflow to tightening bond capital controls. Note: The y-axis indicates the change in GDP ratio (%). The shaded area denotes a 90% confidence interval.

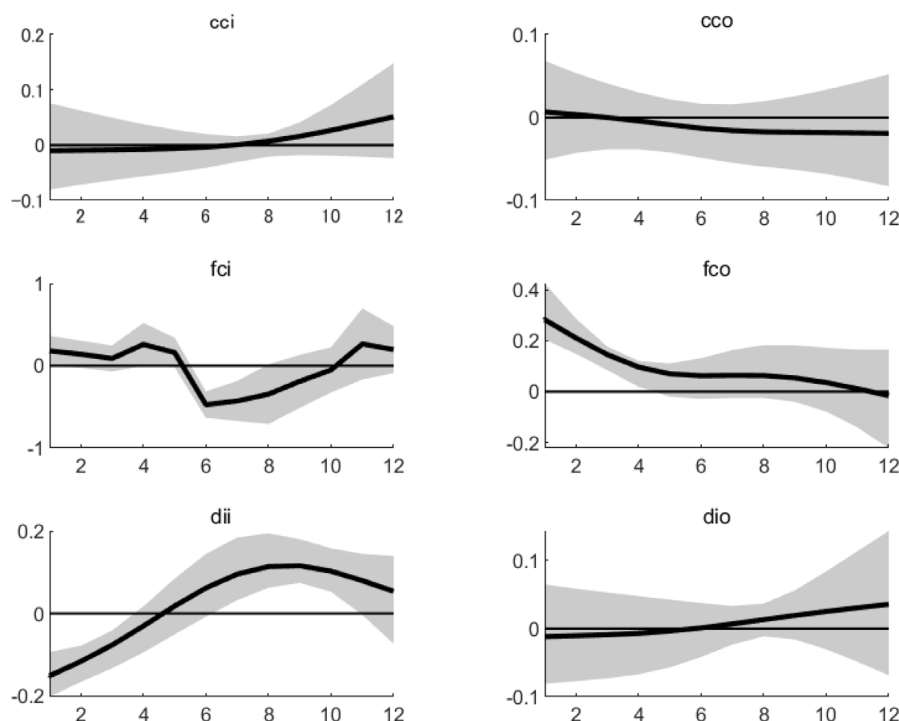


Fig. 3. Responses of commercial-credit, financial-credit, and direct-investment net inflows to tightening corresponding controls. Note: The y-axis indicates the change in GDP ratio (%). The shaded area denotes a 90% confidence interval.

5. Conclusions

Using the elaborate dataset of [Chen and Qian \(2016\)](#) and the local projection method, we explored the impact of capital controls on corresponding flows in individual asset categories in China. To the best of our knowledge, this study is the first to distinguish individual asset categories and examine how changes in corresponding capital controls affect net inflows of individual asset categories in China. Our results reveal stark differences among the individual asset categories. Capital controls on equity (shares or other securities of a participating nature) and financial credits (mainly bank loans) affect the corresponding capital net inflows, whereas those on the other asset categories (bonds, commercial credits, and direct investment) do not.

Although this is beyond the scope of this study, further analysis is needed to explain the stark differences among individual asset markets. Some preliminary inferences are still possible. The government can control financial credits (mainly bank loans) more effectively, potentially because the banking sector is one of the most regulated sectors and the government can supervise banks more directly compared to the other asset market players. In contrast, it is widely perceived that trade misinvoicing (i.e., under- and over-invoicing exports and imports) is a main channel of capital flight in China ([Cheung and Qian, 2010](#); [Cheung et al., 2016](#)). The prevalence of capital flight through trade misinvoicing in China is consistent with our result that capital controls on commercial credits (trade credits) are ineffective. From this perspective, further analysis on individual asset categories in connection with capital flight would be fruitful. This should be examined in future research.

It would be interesting to separate the sample period into two intervals (e.g., before and after the global financial crisis) and examine whether the effectiveness of capital controls differs between them. Although it is beyond the scope of this study due to the small sample size problem, it would be possible if we extend this study to cross-country analysis. We leave this for future research.

Acknowledgments

We are grateful to Kazuyuki Inagaki, and two anonymous referees for their helpful comments. This work was supported by JSPS, Japan KAKENHI (20K01744, 20H05633).

References

- Ahmed, Shaghil, Zlate, Andrei, 2014. Capital flows to emerging market economies: A brave new world? *J. Int. Money Finance* 48 (Part B), 221–248.
- Barnichon, Regis, Brownlees, Christian, 2019. Impulse response estimation by smooth local projections. *Rev. Econ. Stat.* 101 (3), 522–530.
- Cappiello, Lorenzo, Ferrucci, Gianluigi, 2008. The Sustainability of China's Exchange Rate Policy and Capital Account Liberalisation. In: *Occasional Paper Series*, vol. 82, European Central Bank.

- Chang, Chun, Chen, Kaiji, Waggoner, Daniel F., Zha, Tao, 2015. Trends and cycles in China's macroeconomy. In: NBER Macroeconomics Annual 2015, Volume 30. University of Chicago Press, pp. 1–84.
- Chen, Jinzhao, Qian, Xingwang, 2016. Measuring on-going changes in China's capital controls: A de jure and a hybrid index data set. *China Econ. Rev.* 38, 167–182.
- Cheung, Yin-Wong, Herrala, Risto, 2014. China's capital controls: Through the prism of covered interest differentials. *Pacific Econ. Rev.* 19 (1), 112–134.
- Cheung, Yin-Wong, Qian, XingWang, 2010. Capital flight: China's experience. *Rev. Dev. Econ.* 14 (2), 227–247.
- Cheung, Yin-Wong, Steinkamp, Sven, Westermann, Frank, 2016. China's capital flight: Pre- and post-crisis experiences. *J. Int. Money Finance* 66, 88–112.
- Chinn, Menzie D., Ito, Hiro, 2006. What matters for financial development? Capital controls, institutions, and interactions. *J. Dev. Econ.* 81 (1), 163–192.
- Fernández, Andrés, Klein, Michael W., Rebucci, Alessandro, Schindler, Martin, Uribe, Martín, 2016. Capital control measures: A new dataset. *IMF Econ. Rev.* 64 (3), 548–574.
- Forbes, Kristin, Fratzscher, Marcel, Straub, Roland, 2015. Capital-flow management measures: What are they good for?. *J. Int. Econ.* 96, S76–S97.
- Forbes, Kristin J., Warnock, Francis E., 2012. Capital flow waves: Surges, stops, flight, and retrenchment. *J. Int. Econ.* 88 (2), 235–251.
- Franta, Michal, Gambacorta, Leonardo, 2020. On the effects of macroprudential policies on Growth-at-Risk. *Econom. Lett.* 196, 109501.
- Frost, Jon, Ito, Hiro, van Stralen, René, 2020. The Effectiveness of Macroprudential Policies and Capital Controls Against Volatile Capital Inflows. Technical report, Bank for International Settlements.
- Fu, Dahai, Cao, Li, 2020. How do capital controls affect international trade? *Econom. Lett.* 186, 108761.
- Funashima, Yoshito, 2021. Effects of unanticipated monetary policy shocks on monetary policy uncertainty. *Finance Res. Lett.* 102326.
- Gkillas, Konstantinos, Tsagkanos, Athanasios, Siriopoulos, Costas, 2016. The risk in capital controls. *Finance Res. Lett.* 19, 261–266.
- Jordà, Òscar, 2005. Estimation and inference of impulse responses by local projections. *Am. Econ. Rev.* 95 (1), 161–182.
- Kitano, Shigeto, Takaku, Kenya, 2018. Capital controls, monetary policy, and balance sheets in a small open economy. *Econ. Inquiry* 56 (2), 859–874.
- Kitano, Shigeto, Takaku, Kenya, 2020. Capital controls, macroprudential regulation, and the bank balance sheet channel. *J. Macroecon.* 63, 103161.
- Klein, Michael W., 2012. Capital controls: Gates versus walls. *Brook. Pap. Econ. Act.* 43 (2), 317–367.
- Ma, Guonan, McCauley, Robert N., 2008. Efficacy of China's capital controls: Evidence from price and flow data. *Pacific Econ. Rev.* 13 (1), 104–123.
- Nispi Landi, Valerio, Schiavone, Alessandro, 2021. The effectiveness of capital controls. *Open Econ. Rev.* 32 (1), 183–211.
- Olea, Montiel, Luis, José, Mikkel, Plagborg-Møller, 2021. Local projection inference is simpler and more robust than you think. *Econometrica* 89 (4), 1789–1823.
- Ostry, Jonathan D., Ghosh, Atish R., Chamon, Marcos, Qureshi, Mahvash S., 2012. Tools for managing financial-stability risks from capital inflows. *J. Int. Econ.* 88 (2), 407–421.
- Otani, Ichiro, Fukumoto, Tomoyuki, Tsuyuguchi, Yosuke, et al., 2011. China's Capital Controls and Interest Rate Parity: Experience During 1999-2010 and Future Agenda for Reforms. Bank of Japan Working Paper Series, No. 11-E-8.
- Quinn, Dennis, Schindler, Martin, Maria Toyoda, A., 2011. Assessing measures of financial openness and integration. *IMF Econ. Rev.* 59 (3), 488–522.
- Schindler, Martin, 2009. Measuring financial integration: A new data set. *IMF Staff Pap.* 56 (1), 222–238.