Arndt-Corden Department of Economics
Crawford School of Public Policy
ANU College of Asia and the Pacific

Australian National University

How effective is capital flow management? The Indonesian experience

Wishnu Mahraddika
Arndt-Corden Department of Economics
Crawford School of Public Policy
Australian National University
and
Bank Indonesia
Jakarta
Indonesia
Wishnu.Mahraddika@anu.edu.au

July 2021

Working Papers in Trade and Development

No. 2021/15

This Working Paper series provides a vehicle for preliminary circulation of research results in the fields of economic development and international trade. The series is intended to stimulate discussion and critical comment. Staff and visitors in any part of the Australian National University are encouraged to contribute. To facilitate prompt distribution, papers are screened, but not formally refereed.

Copies are available at https://acde.crawford.anu.edu.au/acde-research/working-papers-trade-and-development

How effective is capital flow management? The Indonesian experience

Wishnu Mahraddika*

Abstract

This paper reviews capital flow management (CFM) policy in Indonesia and examines its effectiveness from 2000 to 2019. The methodology involves constructing a new capital flow management policy restrictiveness index (CFMIX) and examining impulse responses of these flows to CFMIX adjustments through structural vector auto-regression (SVAR) estimation. The index shows that the Indonesian CFM policy stance has been more accommodative of capital inflows and restrictive on outflows over time. The results indicate that capital inflows in the form of portfolio investment are significantly responsive to CFM measures. However, there is no evidence of significant impact of CFM policy on outflows.

Keywords: Capital flows, capital flow management, Indonesia

JEL classifications: F21, F32, F36, F41, G15

* This paper has greatly benefited from the guidance, suggestions, and helpful comments of Prema-chandra Athukorala

How effective is capital flow management? The Indonesian experience

Wishnu Mahraddika

1. Introduction

The Mundell-Fleming trilemma postulates that an economy cannot maintain sustainably independent monetary policy, fixed exchange rate and free capital mobility at the same time. The mainstream macroeconomic policy advocacy during the post-Bretton Woods era until the late 1990s therefore favoured exchange rate flexibility and monetary autonomy while opening the capital account. The appropriateness of this policy configuration has, however, come under reconsideration following the Asian Financial Crisis (1997-98) and the subsequent financial turmoil in other emerging and developing economies, which demonstrated that exposure to volatile capital flows makes countries with underdeveloped domestic financial markets vulnerable to financial crisis. Consequently, over the past two decades, there has been a tendency in these countries to adopt a 'middle ground' of the trilemma: maintaining a viable level of monetary independence, fine-tuning the flexibility of the exchange rate, and managing capital mobility through prudential capital flows management (Aizenman, 2019; Frankel, 1999). In the context of the ongoing process of financial globalisation, the effectiveness of capital flow management measures is a key determinant of the viability of this policy configuration. The purpose of this paper is to examine this issue through a case study of Indonesia.

Indonesia figures prominently in the policy debate on the sequencing of liberalisation reforms as a unique case of liberalising the capital account well before trade liberalisation and domestic financial sector reforms. During the 1970s and the first half of 1980s, capital account opening did not have a discernible impact on the macroeconomic performance because the Indonesian economy remained virtually detached from world capital markets at the time. However, the circumstances changed from about the late 1980s with the broad-based liberalisation reforms begun to expose the economy to financial globalisation. In the lead-up to the 1997-98 Asian financial crisis (AFC), 'the Indonesian private sector engaged in a short-term international borrowing binge' and capital exoduses contributed to huge depreciation of the rupiah and banking collapsed during the crisis (Corden, 2004, p. 204). This experience has resulted in a focus on prudential management of capital flows in the post-AFC macroeconomic policy debate in Indonesia (Warjiyo and Juhro, 2019, Chapter 15). With a relatively shallow domestic financial market, volatile capital inflows transmit shocks to the Indonesia economy from global financial markets through the exchange rate channel. Therefore, managing capital flows to maintain domestic macroeconomic stability has become an important policy focus.

The paper examines the impact of capital flows management (CFM) policy on the magnitude and the composition of capital flows in Indonesia. The empirical analysis involves constructing a quarterly CFM policy index (CFMIX) that capture the restrictiveness of policies on capital inflows and outflows implemented by the Indonesian authorities. The impact of the CFMIX adjustments on the dynamics of capital flows is examined based on the impulse

response function generated by structural vector auto-regression (SVAR) estimations that are applied to quarterly data covering the 2000 – 2019 period.

The movements of CFMIX for capital inflows indicate that the Indonesian policy stance was becoming more restrictive until about 2007 and then gradually becoming more open continuously since 2012. As for capital outflows, the index indicates that the policy was continually becoming less accommodative. Meanwhile, the results of SVAR analysis suggest that portfolio investment inflows significantly respond to adjustments of the CFM measures targeted for inflows. The analysis also suggests that increasing CFM restrictiveness for inflows decrease the share of short-term flows in the aggregate inflows, although the impact is not statistically significant. As for capital outflows, the analysis does not find any evidence on the effectiveness of the CFM measures.

The remainder of the paper is organised as follows: Section 2 reviews the literature on the capital account liberalization debate and provides an overview of recent policy responses of emerging economies related to capital mobility. The third section provides a chronological account of Indonesia's capital account policy evolution. The construction of the CFMIX, methodology and data are discussed in the fourth section. The fifth section examines the association between adjustments of CFMIX with capital flows. The key findings are summarised in the final section.

2. Literature review

2.1. Capital account liberalization

As postulated by the Mundell-Fleming model (Mundell, 1963; Fleming, 1962), in the context of financial globalisation, a small open economy is faced with the 'trilemma' of choosing two out of the three policy objectives: exchange rate stability, monetary policy autonomy, and full capital mobility. The theory implies that an economy that prioritizes fixed exchange rate regime and liberalized capital account cannot have monetary policy autonomy. This configuration is the present arrangement within the Euro area. If monetary policy autonomy and free capital mobility become the priority, the economy cannot maintain a fixed exchange rate regime, which is the current arrangement in advanced economies, excluding Euro countries. Finally, the economy cannot have full capital mobility by prioritizing monetary policy autonomy and exchange rate stability as applied during the Bretton Woods era.

The Bretton Woods system that governed international monetary relations during 1944 – 1971[1] was born out of a consensus among the major allied nations led by the UK and the USA that exchange rates coordination failure and frequent competitive devaluation of currencies among countries exacerbated political instability and disrupted international trade during the interwar years (League of Nations, 1944). Thus, the chief feature of the system was a 'fixed but an adjustable' exchange rate mechanism managed by the International Monetary Fund (IMF). Each member country of the IMF was required to peg its currency to the US$ (which fully convertible to gold for Central Bank transactions) and adopt a monetary policy that maintains the exchange rate within one percent band of the officially declared rate. The

[1] The agreement for establish the new monetary system was signed by representatives of 44 allied bastions on 22 July 1944 at a conference held in Bretton Wood, New Hampshire, the USA. On 15 August 1971, the US unilaterally terminated convertibility of the US$ to gold, effectively bringing the system to an end.

exchange rate was adjustable only in the context of a fundamental balance of payments disequilibrium and the adjustment is subject to the IMF's approval and monitoring (Williamson, 1985). Member countries were permitted to maintain capital controls as and when required to gain monetary policy autonomy required to maintain the exchange rate commitment. The prime objective of the system, based on the traumatic experience of the inter-war period, was to facilitate the smooth function of world merchandise trade under a predictable exchange rate system. Premature liberalizing capital controls without meeting this prerequisite was considered a precursor to exchange rate overvaluation, financial fragility, and subsequent economic crisis (McKinnon, 1993).

The collapse of the Bretton Woods system paved the way for a paradigm shift in favour of capital account liberalisation and monetary policy autonomy under free-floating exchange rate arrangements. Capital account liberalisation, analogous to the case for trade liberalisation, was assumed to deliver economic benefits by providing access to larger and cheaper funding for investment, facilitating technological and skill transfer, enabling consumption smoothing, providing diversification to minimize risk, enacting discipline for macro policy formulation (IMF, 2010: Box 1). The shift in policy focus in advanced economies was reflected in the decision to remove short-term flows from exclusion in the OECD's 1961 version of the Code of Liberalization of Capital Movements. The push for greater financial openness was also incorporated in policy advice to developing countries (Eichengreen, 2004; Fischer, 2005; Summers, 1998). In 1995, the IMF initiated an amendment to its articles to include capital account convertibility into its jurisdiction.

Following the AFC of 1997 – 1998 and a string of currency crises in other countries in the subsequent years, there have been questions on the benefits of having capital account convertibility and a swing of the pendulum in favour of prudential capital account management. The crisis led to a growing concern that financial liberalisation increases competition among financial institutions that could lead to excessive risk-taking behaviour in the form of moral hazard (Demirguc-Kunt and Detragiache, 1998). Volatile asset prices during buoyant periods wear down the ability to sufficiently collateralise the institutions' loans, while competition limits the adjustment of the risk premia on loans. In a liberalized capital account regime with inadequate regulations, currency crises may easily transform into financial crises.

The view that free capital mobility creates economic gains and benefits as in the case of trade liberalization is strongly criticized by Bhagwati (1998). In his paper, Bhagwati reiterates the warning of Kindleberger (1996) that capital flows are susceptible to panics and manias. As observed by Rajan (2011), to minimize risk due to differences in the financial system between advanced and developing economies, foreign investors tend to only be interested in short-term financing, denominated in the foreign currency and channelled through local banks to gain implicit protection from the government of the receiving country. Therefore, any global or domestic event that prompts significant capital reversal triggered sharp exchange rate depreciation that leads to an economic crisis.

Rodrik and Subramanian (1998) highlight the lack of evidence for the long-term benefit of opening the capital account, regardless of the liberalization sequencing, and argues that linking international financial markets with the domestic market comes with two major risks. First, the link-up would increase the availability of liquidity for borrowers that could significantly magnify the impacts of market sentiment turnaround. Second, the home country will be more exposed to contagion from one market to another. They also point out that even

consistent fiscal and macroeconomic policies cannot eliminate the likelihood of experiencing crises. Kaminsky and Reinhart (1999) analyse the associations between banking and currency crisis and find that financial liberalization often leads to banking crises, which then leads to a currency crisis. Their observation suggests that crises occur following a prolonged bullish period supported by capital inflows surge, high credit growth, and currency overvaluation.

Along with changes in the domestic political and economic setting driven by lessons from the episodes of economic crises, some emerging and developing economies have been adjusting their open macroeconomic policy configuration to achieve a balance between achieving domestic economic goals and maximizing the gains from accessing the international capital markets rather than going for the conventional corner solution. The choice of appropriate capital flows management (CFM) measures are an integral element of this policy configuration (Aizenman, 2019; Frankel, 1999).

2.2 Capital flow management

The term 'capital flow management (CFM) measures' refers to a set of policy that regulates international financial asset transactions and aims to mitigate the risks associated with surges and reversals of capital flows. In the context of an economy experiencing net capital outflows and in the absence of ample foreign exchange reserves, a sudden stop or capital reversal can cause the exchange rate to depreciate drastically thereby increasing inflation. The reduced supply of foreign exchange needed for international trade transactions and fulfilling international financing commitments could also cause economic activity to contract and disrupt economic stability. In the context of net capital inflows, excessive inflows (surges) could disrupt domestic financial and macroeconomic system stability. The surge could lead to increased asset price volatility and create asset price bubbles, stimulate excessive credit growth, and exchange rate appreciation.

CFM measures could be implemented for capital inflows and outflows. Implementation of measures to manage capital inflows could allow countries to obtain monetary policy independence and at the same time protect them from international speculation. Introducing measures on capital outflows could also be implemented as a way to slow down the shrinkage of international reserves, providing the needed window for authorities to implement sound policies and limit speculative transactions. These can be in the form of taxes, multiple exchange rates, and prohibitions of certain transactions (Edwards, 1999).

In the standard IS-LM-BP (Mundell – Fleming) model, net capital inflows is expected to appreciate the exchange rate and deteriorate the current account balance, which in turn reduces aggregate demand. However, empirical evidence from various developing economies shows that capital inflows have had a more expansive impact on economic activity through growth in domestic credit that led to the expansion of domestic consumption and investment activities (Caballero, 2016; Milesi-Ferretti and Tille, 2011; Reinhart and Reinhart, 2008). To identify feasible policies for managing the impact of capital mobility in the context of a developing economy, Ghosh et al. (2018, p.162) have modified the Mundell-Fleming model and show that policies that address the volume of foreign capital inflows such as capital control or sterilized intervention, as well as policies that could reduce domestic credit growth such as loan-to-value ratio policy, could help to dampen the expansive impact of capital

inflows. The implementation of capital control policies that impose an extra cost for the investor could reduce capital inflows, which then would limit domestic credit expansion and currency appreciation. However, this policy would come at the cost of forgone higher output level due to the reduction of net capital inflows.

The general view in the theoretical literature of prudential capital control is that in the absence of regulation, market participants could acquire excessive short-term foreign debt and issue risky financial instruments. For market participants, it is rational for them to not to internalize the effects of their decision that impose externalities on the economy through the increase of financial fragility. Therefore, liquidity requirements, sterilization of capital inflows and prudential measures on capital flows that are aimed to internalize the externalities and adjusted according to the riskiness, could lower the level of financial fragility (Caballero and Krishnamurthy, 2006; Korinek, 2011, 2018). Other than the positive effect on the financial stability dimension, countercyclical capital control policy could help to enhance macroeconomic adjustment in economies with suboptimal exchange-rate or monetary policy and nominal rigidities (Farhi and Werning, 2012; Schmitt-Grohé and Uribe, 2017).

Learning from the episodes of economic crisis associated with surges and reversals of capital flows, emerging economies have been experimenting with various measures to manage the capital flows (Ghosh et al., 2018). Most of the measures deal with the inflows, presumably because it is more manageable to deal with capital inflows early on rather than limiting the outflows. In the mid-2000s, several emerging and developing economies implemented inflows controls in response to surging capital inflows. Colombia and Thailand, for example, employed unremunerated reserve requirements (URR) with different ratios to dampen the appreciation pressure on their exchange rates. The similar policy was introduced in Croatia, where a marginal reserve requirement (MRR) was imposed on bank foreign financing. In the case of Brazil, although the stated aim was to increase fiscal revenue, the tax rate for foreign exchange transaction was increased. During the Global Financial Crisis (GFC) in 2008, some emerging and developing economies experienced sharp capital reversals. However, capital inflows to these economies quickly resurged in the second half of 2009 driven by better domestic growth prospects and supported by the accommodative monetary policy stances in the advanced economies. Responding to the surge of inflows, several countries adopted measures to manage the inflows directly or indirectly by using capital controls or currency-based prudential measures.

The strand of literature investigating the impact of implementing CFMs has continued to expand. A literature survey on the effectiveness of CFMs conducted by Magud and Reinhart (2006) shows that capital inflows control tends to make monetary policy more independent and shifts the composition of capital flows from short-term to longer-term. However, the survey cannot draw a firm conclusion on the impact of the application of CFM on the volume of capital flows and the dynamics of the real exchange rate.

Since the GFC, the case for weighing the actual benefits of having free capital mobility against financial fragility and prudential problems associated with the capital flows has become stronger (Grenville, 2014). Ostry et al. (2010,2011,2012) observed the performance of emerging economies by comparing countries that implemented capital control policies with those that did not before the GFC. Their observations show that countries with capital control policies have smaller output decreases and lower financial stability risk (in terms of portfolio debt in total external liabilities and foreign exchange lending by domestic banking systems) compared to countries that did not implement these policies when the GFC occurred. Multi-

country studies for emerging economies indicate that the application of capital control measures discourages capital inflows (Ahmed and Zlate, 2014) and plays a significant role in reducing financial fragilities (Forbes et al., 2015, 2016). The case for capital flow management policy has attracted increasing interest from the IMF. Known for its position in championing capital account convertibility, the IMF's recent institutional view expressed the organization's tolerance for the use of measures to limit the unwanted impacts of full capital mobility (IMF, 2012, 2016).

There has been a large literature on CFM policies in individual countries. with a heavy concentration of studies on the experiences of Chile and Malaysia covering the period before the GFC[2] . Following the GFC, the focus seems to shift to Brazil and South Korea. In the case of South Korea, the application of CFMs was associated with lower financial stability risks and lower volatility in capital flows (Ree et al., 2012; Kim, 2013; Bruno and Shin, 2014). Studies for Brazil indicate that prudential and control measures tend to be associated with higher monetary policy independence, significant decreases in capital inflows, and lower exchange rate appreciation pressures (Forbes et al., 2016; Chamon and Garcia, 2016).

Empirical studies on the effectiveness of CFM measures in Indonesia has been sparse. Park and Song (1998) examine the macroeconomic aspects of capital inflows and related policy responses taken in Indonesia covering the period of 1990-1995. Based on an analytical narrative they infer that monetary sterilization and measures to restrict the inflow of foreign capital were successful in moderating domestic demand. Using a structural vector autoregression approach, Jayasuriya and Leu (2012) assess the effectiveness of capital flows restrictions in Indonesia covering the period of pre and post AFC (1990 – 2010). Based on their inflow and outflow restrictions index, the authors find that restrictive policies had an adverse effect on FDI inflows but largely ineffective for portfolio capital inflows. However, for the period 2000 – 2010, the results indicate inflow restrictions have a short-term impact on inward portfolio investments and able to shift funds from short-term to long-term markets.

3. Capital account management policy in Indonesia

3.1. Pre AFC period

Since independence in 1945, Indonesia has experienced a series of economic crises and experimented with various policy configurations to maintain economic performance amid the changing political and global economic conditions. In the early period under the Soekarno regime, the economy was marked by lack of investment, macroeconomic instability and structural rigidity. Economic policies were directed to achieve economic sovereignty and maintain the political stability of the new state intact, rather than on growth and development. In this period, complex trade barriers, foreign exchange controls on current account transactions, and were maintained as part of an inward orientated development strategy (Dick, 2002; Hill, 2000).

Under the new order regime that replaced the Soekarno regime in 1967, there was a policy shift to restore the economy's internal and external balance. Given the domestic and international political economy setting at the time and the urgent need to close the foreign exchange gap, the government took a series of rapid macroeconomic stabilization policies in the form of balanced fiscal budget, managed money supply growth, removed the multiple

[2] Selected works on Chile see Edwards and Rigobon (2009), Gallego et al. (2002), De Gregorio et al. (2000), Laban and Larrain (1998), Laurens and Cardoso (1998), Valdés-Prieto and Soto (1998). For Malaysia see Athukorala (2001), Athukorala and Jongwanich (2012), De Kaplan and Rodrik (2002), Dornbusch (2001), and Tamirisa (2004).

exchange rates and floated the rupiah, and liberalize the capital account. The reforms started by permitting free convertibility of the Rupiah for currencies against the rupiah for current account transactions. In the same year, restrictions of inward FDI were lifted and profits and dividends remittances and capital repatriation were allowed. To attract domestic and foreign savings to the banking system, both residents and non-residents were permitted to borrow or open accounts in dollars and convert them to rupiah. The liberalization culminated with the decision to remove restrictions on capital outflows in 1970 (Bresnan, 1993; Chwieroth, 2010; Grenville, 1976; Mas'oed, 1983).

Liberalization of the capital account transactions continued in the 1980s in response to the significant decrease in the oil price, which was the country's main source of foreign exchange. Participation of foreign investors in the domestic stock market was allowed in 1987. In the following year, foreign investors were permitted to form joint-venture securities firms with residents and accommodate the existing foreign banks' branches to open sub-branches in six major cities. In 1992, non-residents were allowed to purchase the equity of domestic banks up to 49 per cent of the equity and domestic firms were allowed to list up to 30 per cent of their equity on foreign exchanges.

The conventional wisdom of sequencing economic liberalisation reforms, capital account opening needs to be undertaken after achieving current account convertibility and financial sector reforms (McKinnon, 1993). However, the liberalisation reforms in Indonesia was sequenced in the reversed manner: capital account liberalization in 1967, domestic financial market liberalization in 1983, and current account liberalization in 1986. Sustained high economic growth for more than a decade since the latter half of the 1980s has earned Indonesia a place as one of the high-performing Asian economies (HPAEs) (World Bank, 1993).

Before the AFC, some observers cited the Indonesian unconventional liberalisation ordering as a successful case. For instance, Cole and Slade (1996) observed that '[T]he Indonesian experience with implementing policies for the banking sector demonstrates that freeing up direct controls over prices, allocation and entry of new institutions need not lead to crises and chaos as it has in some countries, but instead can result in reasonably healthy growth, expanded services and improved efficiency' (Cole and Slade, 1996 p.140). According to Quirk and Evens (1995) 'Indonesia, ... is a longstanding example of a successful and sustained opening of the capital account in which capital liberalization took place, in 1971, before the financial sector was reformed' (Quirk and Evens, 1995 p.16).

The AFC served to reveal the fundamental flaw of the early 'success'. The notable macroeconomic performance prior to the AFC was simply a reflection of the financial underdevelopment of the economy. The domestic financial system has low global exposure and banks were owned by the government. There were no globally linked companies even in the real sector. Therefore, whether the capital account was opened or closed would have had virtually no impact on the exchange rate or domestic macroeconomic instability. Nonetheless, as the economy becomes increasingly integrated into the global economy through short-term international borrowing by the private sector, volatile capital flows had become to act as a destabilising factor. Worsening risk perception and rupiah devaluation reinforce capital outflows and the collapse of the domestic banking system lead to a full-scale economic crisis (Corden, 2004).

3.2. Post AFC period

To restore macroeconomic stability, in 1999 the Indonesian government has considered several alternative policy choices to manage its capital account. The alternatives being considered are controls on outflows (Malaysian-style), currency board, foreign exchange monitoring system, and capital inflow tax. Considering the institutional setting, resource availability, investor perception, and political considerations at the time, the government chose a foreign exchange and capital flows monitoring system as promulgated in the act number 24 of 1999 concerning the foreign exchange activities and the exchange rate system (Levinson, 1999 p.543-548). The law emphasizes that every resident may freely own and use foreign exchange and shall submit information and data concerning the foreign exchange transaction to the authority (the central bank, Bank Indonesia (BI))[3]. The political shift following the AFC has given autonomy to the central bank to achieve its objective of maintaining price stability. Under the IMF structural adjustment programme, the central bank operates based on monetary-base targeting between 1997 and 2000. In the following period of 2000-2004, BI gradually adopt inflation targeting by using both the monetary base and the central bank's certificate (SBI) interest rate as policy instruments. In 2005, the central bank fully adopts inflation targeting, using the SBI interest rate as a monetary policy instrument to manage aggregate demand.

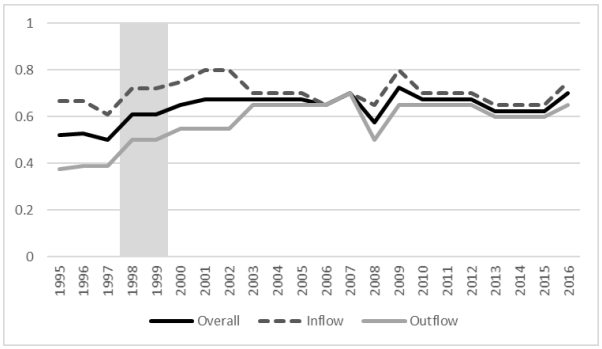
There is an indication that Indonesia's post-AFC capital account policy has become relatively more restrictive compared to the three preceding decades (Aizenman et al., 2013). Driven by the lessons learned from the impact of capital flow surges and reversals following the GFC in 2008, capital flow management is included as part of a policy mix encompassing interest rate, foreign exchange intervention, and macro-prudential policy (Warjiyo, 2013, 2014). Indonesia's capital flow management policy, as evolved during the post-AFC era, has the following features: First, the capital flow management policy is mainly aimed at mitigating the negative impact of capital flows on the volatility of exchange rates, monetary and financial systems as well as the overall macroeconomics stability. Second, the policies are applied selectively to short-term and speculative capital flows, while accommodating foreign direct investment and other long-term and productive capital flows. Third, the policy does not discriminate transactions based on the residential status of the investor (Warjiyo, 2014; Warjiyo and Juhro, 2019. p.411).

The following are highlights of the capital flow management policy implemented by Bank Indonesia after the GFC. Responding to the impact of quantitative easing policies in advanced economies that led to increased capital inflows, in 2010 the central bank imposed a six-months holding period for SBI transactions and implement a maximum limit of short-term foreign loans in the banking sector of 30% from the capital. The purpose of this policy is to reduce short-term capital inflows and increase the composition of long-term capital flows. Also, to manage the exchange rate risk, the loan restriction policy in the banking sector is aimed at reducing the risk stemming from maturity mismatch. In 2013, during the taper tantrum episode, foreign capital inflows to Indonesia has decreased and even reversed direction. Responding to the limited foreign capital inflows condition, the capital flow management was relaxed by reducing the holding period of SBI to one month and exempt some transactions from the calculation of short-term foreign bank loans limitations. The central bank also imposed regulations at the end of 2014 to strengthen the risk management for foreign debt. For example, for foreign debt in the banking sector, in addition to the foreign

[3] In the case the resident failed to provide the necessary information, Bank Indonesia can impose an administrative sanction in the form of a written warning or a fine, or a recommendation of revocation of business license by an authoritative agency. Additionally, to implement prudential principle, Bank Indonesia can prescribe provisions on foreign exchange transaction which is conducted through banks.

loan limitation previously discussed, a bank must obtain prior permission from the central bank for a foreign loan. For non-bank corporations, Bank Indonesia applies risk management provisions in the form of (i) minimum hedging obligations of 25% of net foreign currency liabilities that will mature in the next three and six months, (ii) maintaining a minimum liquidity ratio of 50% of net foreign exchange liabilities due within the next three and six months, and (iii) the company has a credit rating of at least one notch below investment grade (Bank Indonesia, various years).

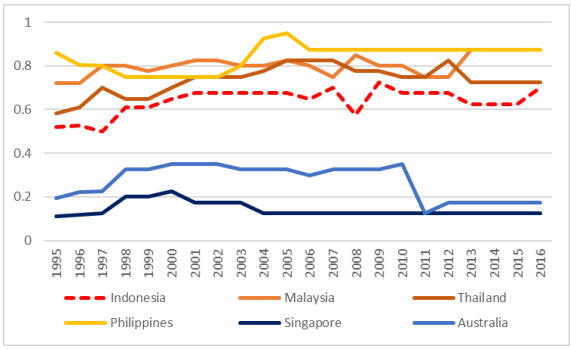
As depicted in Fig. 1, the capital account openness index compiled by Fernández et al. (2016) indicates that the number of measures employed in managing Indonesia's capital flows has increased after the AFC. The index for inflows has higher values compared to the outflows indicating there is more regulation in place for non-residents purchasing Indonesian financial assets compared to Indonesians purchasing foreign financial assets. Compared to the neighbouring countries, although not as liberalized as Singapore and Australia, the capital account openness index indicates that Indonesia's capital account regulation is more liberalized compared to Malaysia, Thailand and the Philipines (Fig. 2). However, in terms of foreign asset and liabilities to GDP ratio (as an indicator of *de facto* capital account openness), Fig. 3 indicates that the degree of Indonesia's *de facto* capital account openness is generally lower compared to Malaysia, Thailand and the Philippines.



Source: Fernandez et al. (2016)

Note: Capital account openness index uses the scale 0 to 1 where a lower value indicates more liberalized capital account.

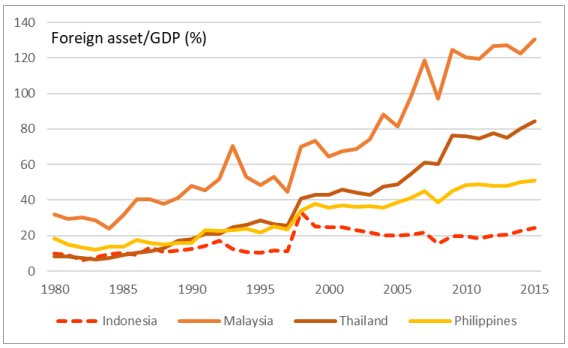
Figure 1. Indonesia capital inflow and outflow openness indices (1995-2016)

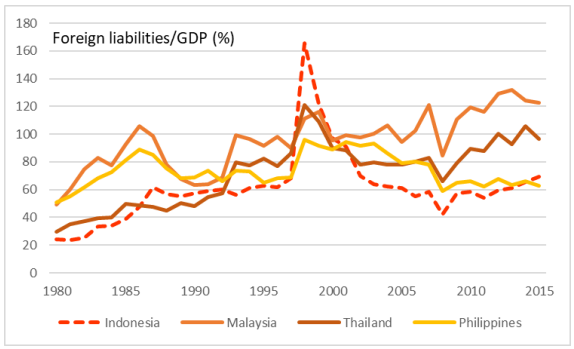


Source: Fernandez et al. (2016)

Note: Capital account openness index uses the scale 0 to 1 where a lower value indicates more liberalized capital account.

Figure 2. Regional *de jure* capital account openness comparison (1995-2016)





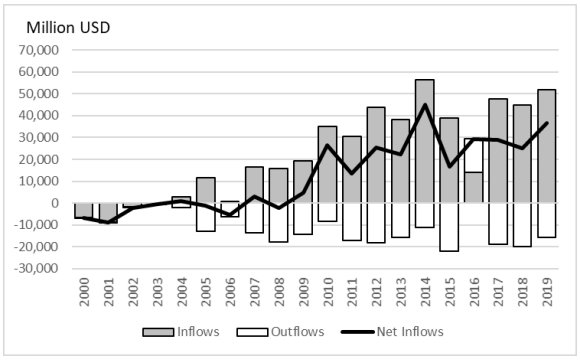
Source: Lane and Milesi-Ferretti (2018)

Figure 3. The ratio of foreign asset and liabilities to GDP (1980-2015)

3.3. Patterns of capital flows in Indonesia (2000 – 2019)

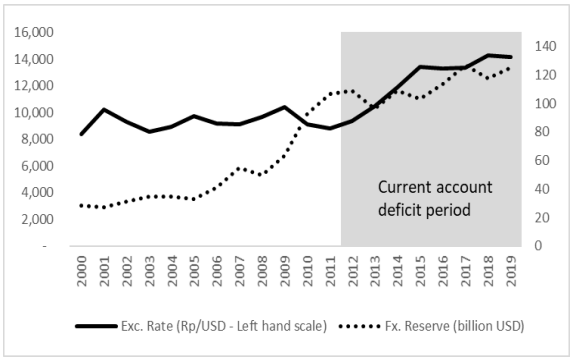
As in most developing countries. Indonesia's net capital flows are dominated by capital inflows (Fig. 4). From about 2004 capital inflows have increased continuously in-line with the recovery of the capital inflows to the region supported by the country's favourable growth prospect along with increasing commodity prices. There were some episodes of lower capital reversals related to the global financial crisis, however, lower growth prospect in advanced economies and accommodative global monetary policy stance has driven the recurrence of net capital inflows in the following year until mid-2011 when the US sovereign debt was downgraded, which prompted capital flight from Indonesia. In 2012 capital inflows resume an increasing trend until the federal reserves communicated the plan to adjust the quantitative easing policy that spurred the "taper tantrum" episode in 2013. After the tapering episode, inflows recurred until the mid-2015 when the prospect of China's lower growth and the federal reserves interest rate normalization has decreased the capital flows coming to Indonesia (Basri, 2017).

During 2008 – 2011, the foreign exchange reserve position increased rapidly driven by the positive balance in the financial and current account (Fig. 5). Since 2012, in line with increasing domestic economic activity, the current account balance has been negative. Therefore, although the financial account continually recorded positive net flows, the level of foreign exchange reserves started to plateau and the nominal exchange rate has been in a depreciative trend (Fig. 5).



Source: IMF

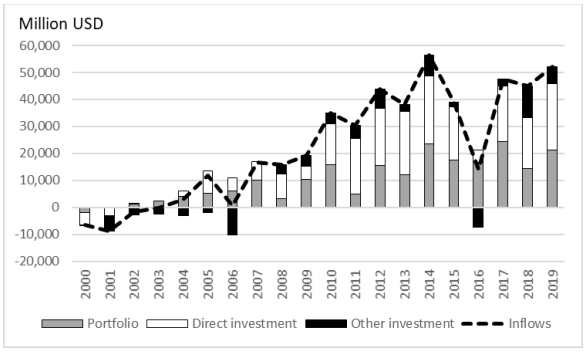
Figure 4. Indonesia's net capital flows



Source: IMF & Bank Indonesia

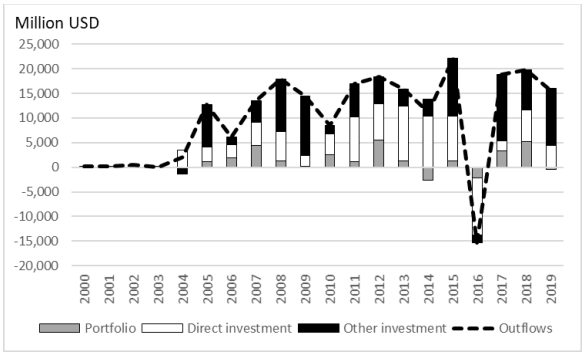
Figure 5. Indonesia's nominal exchange rate and foreign reserves

In the inflow (liabilities) side, foreign direct investment (FDI) dominates the country's financial account liabilities. In the sample period (2000-2019), FDI inflows on average contribute to almost 2% of GDP annually. Most of the FDI inflows are in the form of equity and distributed in the manufacturing, wholesale and retail trade, agriculture, transportation and communication, and mining sector. Another important type of investment in the liabilities side is portfolio investment (PI). The magnitude of PI to Indonesia is increasing overtime and getting closer to the magnitude of FDI. In the sample period, PI liabilities on average reaches 1.7% of GDP. Most of the PI is in the form of public debt securities (government bonds), followed by investment in the form of equity and debt securities in the private sector. Other investments (OI) that consist of currency and deposits, loans, trade credits, and other assets are relatively small compared to FDI and PI (Fig. 6). In the asset (outflow) side of the financial account, FDI contributes the largest share to the capital outflow, followed by OI in the form of currency and deposit, loans and trade credit from the private sector while PI only contributes modestly (Fig. 7).



Source: IMF

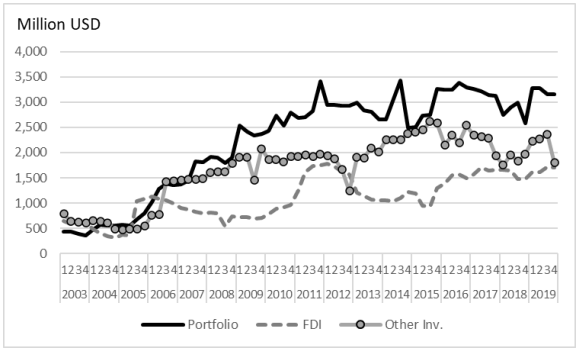
Figure 6. Capital inflows



Source: IMF

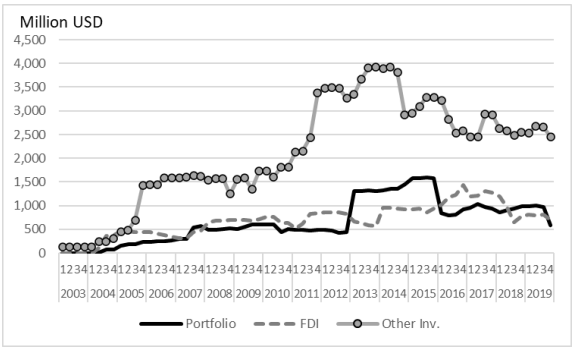
Figure 7. Capital outflows

To assess the capital flows' volatility, the 3-year rolling standard deviation for each type of inflows and outflows are depicted in Fig. 8 and Fig. 9. Foreign direct investment inflows have the lowest overall volatility compared to the portfolio and other investment[4] (Fig. 8). In the case of capital outflows, direct investment and portfolio outflows are less volatile compared to other investments outflows (Fig. 9).



Source: Author's calculation

Figure 8. Capital inflows volatility



Source: Author's calculation

Figure 9. Capital outflows volatility

4. Assessing the effectiveness of CFM policy

To examine the association between capital flows and CFM policy adjustments, which is represented by the capital flow management index (CFMIX), this section presents the methodology used to construct the index. The section also covers the discussion on model specification, data used for estimation and analysis, and econometric estimation method.

4.1. Capital flow management index (CFMIX)

The capital flow management index (CFMIX) is constructed based on policies that are related to capital flows and published in the central bank's annual reports. Policies applied based on both residency and currency involved in the transaction are included in the index calculation. Residency-based policies are measures affecting international financial transactions that discriminate based on residency (revisions on foreign investment negative list, taxes on transactions conducted by a foreigner, unremunerated reserve requirements, etc.). Currency-based policies refer to the currency used in the transaction regardless of the residency of the parties involved (foreign exchange reserve requirement ratio, regulations on bank's net open position, limitations on foreign exchange purchases without underlying documents, etc.). Based on these criteria, there are 55 policies included in the index calculation (available in Appendix 1) with their distribution presented in Fig. 10. The figure shows that most of the CFM measures taken are associated with capital inflows.

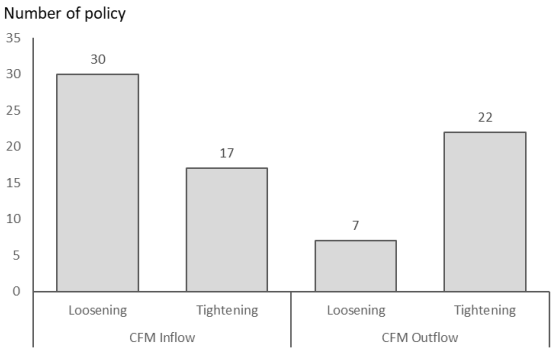
The CFM index is constructed following the methodology employed in recent IMF studies of capital flow management (Schindler 2009; Fernandez et al. 2016)[5]. According to this methodology value of '+1' is assigned for policies that aim to regulate capital flows and '-1'

[4] The rolling standard deviation calculation does not include the observation of 2016Q4 due to the implementation of tax amnesty policy that prompted liquidation of a special-purpose vehicle's stake and therefore reverse the pattern of capital flows significantly for this specific period.

[5] For recent applications of this index see Bhattarai et al. (2020), Bonciani and Ricci (2020), and Landi and Schiavone (2020).

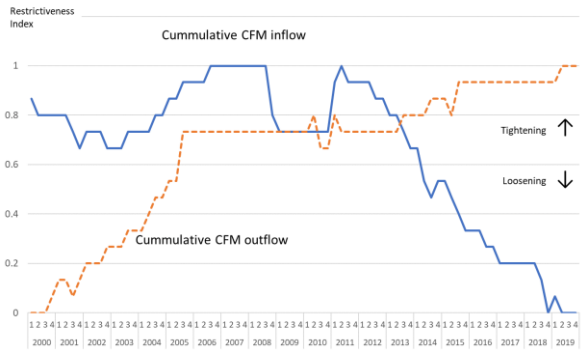
for policies that facilitate international transactions. The values for each CFM category are then summed sequentially and rescaled to values of 0 to 1 where a higher value indicates a more restrictive policy stance for capital flows. The construction of the CFMIX imposes a uniform weight for all the policies included to calculate the index. [6] Compared to the annual index used in the IMF studies, the CFMIX provides quarterly information on the dynamics of capital flows management policy.

The CFMIX relating to inflows and outflows is depicted in Fig. 11. The figure shows that the capital flows policies in Indonesia tend to be more directed to address capital inflows rather than outflows. The movement of the indices indicates that the CFM policy configuration was becoming more restrictive until about 2007 and then gradually becoming more open continuously since 2012. As for capital outflows, the index indicates that the policy was continually becoming less accommodative.



Source: Author's calculation

Figure 10. CFM policy category



Source: Author's calculation

Figure 11. The CFM Index

4.2. The model

The model used for examining the effectiveness of CFM is specified to capture both the push and pull drivers of capital flows (Calvo et al., 1993; Koepke, 2019). The push drivers are external factors which are represented in this study by the expected return of investment in external assets and global financial market condition. The pull drivers are the flows-receiving country-specific factors. In this study, the domestic factors are represented by domestic interest rate, domestic market risk, and the CFM restrictiveness. Adjustments in the push and pull drivers could signal investors to change their investment position in the country[7].

The model is estimated using structural vector autoregression (SVAR) with block exogeneity restrictions[8]. The choice of this approach is based on its capability to examine linear interdependencies between time-series variables that are hypothesized to affect each other

[6] Studies by Athukorala and Jongwanich (2012), Jayasuriya and Leu (2012), and Jongwanich (2017) assign different weighting for each type of CFM. However, this approach relies heavily on the subjectivity of the researcher and could introduce bias to the results. The use of uniform weighting avoids this subjectivity bias and the result can be interpreted as the average impact of CFM adjustments during the period of the study (Fernandez et al. 2016).

[7] The push and pull approach is also applied in works of Baek, 2006; De Vita and Kyaw, 2008; Koepke, 2018; Forbes and Warnock, 2012; Milesi-Ferreti and Tille, 2011; Ananchotikul and Zhang, 2014.

[8] The block exogeneity restrictions are imposed between external and domestic variables. The restrictions are imposed to enable external variables to affect domestic variables without any feedback effect, which is consistent with the small-open economy assumption.

intertemporally. Another advantage of using this method is that it can combine variables that are treated as endogenous and exogenous in a system. With the appropriate lags and variable sequencing, the use of this approach helps to address the reserve causation issue (Christiano, 2012; Sims, 1980).

The general specification of the model estimated using SVAR is illustrated using the following equation:

$$\beta_0 Y_t = \sum_{n=1}^{p} \beta_n Y_{t-n} + \rho D_t + u_t, \quad (1)$$

where Y_t is the vector of macroeconomic and policy variables that consist of foreign and domestic factors that affect capital flows. p is the lag chosen for the system. D_t is the vector time dummies. The vector of structural innovations is represented by u_t and assumed to be independent and serially uncorrelated. β_i is the matrix of structural coefficients for i = 0, 1, 2,…, p. The selection of macroeconomic and policy variables included in the system is based on their relevance with economic theory and empirical practice while trying to keep the specification parsimonious due to the limited number of observations.

The model is estimated separately for each type of capital inflows and outflows. The variables included in the model estimation are as follows:

1. CFM index
    a. CFM_IN = CFMIX for estimations on capital inflows
    b. CFM_OUT = CFMIX for estimations on capital outflows

2. Global risk factor
    VIX = Chicago Board Options Exchange's (CBOE) Volatility Index, a measure of the stock market's expectation of volatility based on S&P 500 index options.
3. Domestic risk factor
    ISX = Indonesian stock market price index volatility.

4. Real interest rate differential
    RRATE_DIF = Gap between the domestic and US real interest rate (per cent).

5. Capital flows (one set of SVAR is estimated for each type of flows using corresponding CFM inflows/outflows index)
    a. FA_LIAB = Aggregate capital inflows
    b. FA_AST = Aggregate capital outflows
    c. PI_LIAB = Portfolio investment inflows
    d. PI_LIAB_GD = Portfolio investment inflows –debt
    e. PI_LIAB_PD = Portfolio investment inflows – equity
    f. PI_AST = Portfolio investment outflows
    g. OI_LIAB = Other investment inflows
    h. OI_LIAB_G = Other investment inflows - banks
    i. OI_LIAB_G = Other investment inflows - public
    j. OI_LIAB_P = Other investment inflows - private
    k. OI_AST = Other investment outflows
    l. DI_LIAB = Direct investment inflows
    m. DI_ASST = Direct investment outflows

6. Time dummies that consist of:
    a. GFC = Global financial crisis (2007Q3 – 2009Q2)
    b. QE = Quantitative easing episodes (2008Q4 – 2010Q1), (2010Q4 – 2011Q2) and (2012Q3 – 2013Q4).
    c. TXM = Indonesian tax amnesty implementation (2016Q4)

4.3. Data

The model is estimated using quarterly data covering the period, 2000 – 2019. Capital flows data in current US dollar are compiled from the IMF's balance of payments database, which is based on the Balance of Payments and International Investment Position Manual – BPM6. Capital inflows are defined as the net purchases of domestic financial instruments by foreign residents. In other words, capital inflows are recorded as the difference between the increase of external liabilities (inflows with a positive sign) and the decrease of external liabilities (inflows with a negative sign). Capital outflows are defined as net purchases of foreign financial instruments by domestic residents.

The VIX index representing the global financial market risk condition is compiled from the FRED database (Federal Reserve Bank of St. Louis, 2020). The domestic financial market risk condition is represented by the Indonesian stock market price index volatility. This variable is calculated as the quarterly standard deviation of the stock market price index daily changes (Indonesia Stock Exchange, 2020). The real interest rate differential is calculated as the difference between the domestic real interest rate (the domestic cost of fund (compiled from Bank Indonesia's quarterly banking survey) adjusted for year-on-year inflation) and the US real interest rate (the US cost of fund (FreddieMac, 2020) adjusted for year-on-year inflation). The descriptive statistics of the data is provided in Table 1.

Table 1. Descriptive Statistics

No	Variable	Unit	Mean	Median	Maximum	Minimum	St.Dev
1	CBOE Volatility index (VIX)	Index	19.50	17.21	58.74	10.31	7.87
2	Real interest rate differential	Percent	0.61	0.80	9.28	-8.71	2.89
3	Domestic stock price index volatility	Percent	1.21	1.11	3.73	0.42	0.52
4	CFM inflows index	Index	0.66	0.73	1.00	0.00	0.29
5	CFM outflows index	Index	0.66	0.73	1.00	0.00	0.28
Inflows							
6	Capital inflows	Million USD	5,636	5,385	18,387	-10,599	6,086
7	Portfolio investment (PI)		2,580	1,803	11,489	-4,662	3,038
8	PI - equity		99	214	1,936	-2,154	893
9	PI - debt		2,480	1,869	11,464	-3,894	2,881
10	PI - private debt		481	0	6,655	-1,213	1,272
11	PI - public debt		1,999	1,472	7,213	-4,270	2,365
12	Foreign direct investment		2,776	2,770	8,097	-9,329	2,967
13	Other investment (OI)		280	-276	6,166	-4,959	2,023
14	OI – banks		208	88	2,770	-2,265	922
15	OI – private		414	235	3,171	-2,111	1,141
16	OI - public		-377	-283	4,607	-4,887	1,149
Outflows							

17	Capital outflows	Million USD	2,494	2,578	11,700	-18,259	3,741
18	Portfolio investment (PI)		293	64	4,855	-1,938	817
19	Direct investment		932	1,029	5,085	-12,870	1,876
20	Other investment (OI)		1,269	449	9,977	-5,344	2,579

Source: IMF, Federal Reserves of St. Louis, Author's calculation

4.4. Estimation method

To identify the parameter values for variables included in the SVAR system, the estimation applies the Cholesky orthogonalization (Sims, 1980). The use of this approach applies an assumption on the chronological order of the endogenous variables affecting each other.

Equation (2) expresses $\beta_0 Y_t$ from Equation (1) that displays the endogenous variables ordering assumption used in the SVAR model for aggregate capital inflow (*FA_LIAB*). The first row of the matrix $\beta_0 Y_t$ implies that the global financial market risk condition (VIX) does not respond contemporaneously to changes from other endogenous variables. The block exogeneity restriction is applied to this variable to prevent any adjustment of the global financial market risk condition driven by movements of lagged domestic variables included in the model. Therefore, the global risk factor is only determined by its lagged value, time dummies[9] and structural innovations. The domestic risk indicator (*IDX*) is placed after the external risk indicator. The policy variables (real interest rate differential - *RRATE_DIF* and CFM index - *CFM_IN*) are placed after the global risk factor with the assumption that these variables could respond contemporaneously to changes in the global and domestic risk indicator. The aggregate capital inflows (FA_LIAB) is placed as the most contemporaneously endogenous variable (located on the last row of Equation (2)) based on the assumption that capital flows are fickle and able to react at the same time to changes of other variables in the VAR system (Bluedorn et al, 2013; Eichengreen et al., 2018).

$$\beta_0 Y_t = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ * & 1 & 0 & 0 & 0 \\ * & * & 1 & 0 & 0 \\ * & * & * & 1 & 0 \\ * & * & * & * & 1 \end{pmatrix} \begin{pmatrix} VIX \\ IDX \\ RRATE\_DIF \\ CFM\_IN \\ FA\_LIAB \end{pmatrix} \quad (2)$$

The Augmented Dickey-Fuller (ADF) unit root testing is undertaken to check the stationarity of variables (Table 2). First differencing transformation is applied for variables with unit root properties[10]. The lag selection for the SVAR system is determined based on the info criterion test statistic, the properties of the residuals (normality and autocorrelation), as well as the stability of the system. Based on the factors considered in determining the lags, all the SVAR are estimated using two lags.

Different ordering of variables implemented in the system could yield different results. Therefore, the sensitivity of the results is tested using different sequences of variables. Based on the comparison of the impulse responses produced by a set of different variables ordering, the dynamic responses of each variable are generally similar with some variety in the level of significance of the responses[11]. This situation is expected given the limited observation available to estimate the SVAR system.

[9] Restrictions are also applied to the dummy variable where the time dummy for the implementation of tax amnesty policy only affect the capital flows variable.

[10] As shown in Table 2, CFMIX for inflows and outflows are non-stationary in levels, therefore the two variables are transformed to first difference and could be interpreted as CFM restrictiveness adjustment. The correlation matrix of the variables included in the SVAR estimation are provided in Appendix 2 to facilitate the interpretation of the results.

[11] The results are presented in the robustness checks subsection.

Table 2. Unit root test results

No	Variable	ADF test t-statistics	
		Level	1st difference
1	CBOE Volatility index - VIX (log transformed)	-3.05 **	-10.24 ***
2	Real interest rate differential	-3.80 ***	-6.83 ***
3	Domestic stock price index volatility	-5.98 ***	-10.58 ***
4	CFMIX inflows	0.65	-7.80 ***
5	CFMIX outflows	-2.54	-10.70 ***
Inflows			
6	Capital inflows	-4.02 ***	-8.03 ***
7	Portfolio investment (PI)	-6.05 ***	-8.03 ***
8	PI - equity	-7.39 ***	-13.90 ***
9	PI - debt	-5.68 ***	-8.45 ***
10	PI - private debt	-9.70 ***	-15.64 ***
11	PI - public debt	-5.63 ***	-7.93 ***
12	Foreign direct investment	-2.91 **	-8.56 ***
13	Other investment (OI)	-8.43 ***	-12.73 ***
14	OI - banks	-8.24 ***	-11.66 ***
15	OI - private	-4.80 ***	-9.93 ***
16	OI - public	-7.73 ***	-9.62 ***
Outflows			
17	Capital outflows	-7.66 ***	-10.11 ***
18	Portfolio investment (PI)	-6.54 ***	-10.96 ***
19	Direct investment	-6.39 ***	-9.72 ***
20	Other investment (OI)	-10.52 ***	-10.76 ***

Note: ***, **, * denotes 1%, 5%, and 10% level of significance for the t statistics rejecting the null hypothesis of a series with unit root property.

5. Results

The SVAR estimation results for capital flows and their components are reported in Table 3. However, the coefficients displayed in the table only represent the adjustment effect of lagged variables included in the estimation. To examine the full effect of CFM measures adjustments on capital flows, a series of accumulated impulse responses are generated from the estimated model. The impulse response traces the impact of innovation/shock on one variable to all endogenous variables in the system. The impact of CFM restrictiveness adjustments on capital inflows and outflows are discussed in that order in this section[12]. This is followed by a discussion based on variance decomposition analysis generated by the basic model estimation and a robustness check using different orderings of variables.

[12] All the accumulated impulse responses of capital flows components generated by shocks/innovations to each endogenous variable is provided in Appendix 3.

Table 3. SVAR estimates – capital flows equation

	Dependent variable: capital flows (billion USD)													
	Capital Inflows										Capital Outflows			
	Aggregate	Portolio Inv.	Direct Inv.	Other Inv.	Portfolio Pub. Debt	Portfolio Priv. Debt	Portfolio Priv. Equity	Other Inv. Banks	Other Inv. Public	Other Inv. Priv	Aggregate	Portolio Inv.	Direct Inv.	Other Inv.
Independent variables:														
VIX lag 1	-0.07	-0.03	-0.04	-0.03	-0.02	-0.03	0.03	-0.01	0.01	-0.04	-0.06	-0.01	-0.02	-0.03
	[-0.83]	[-0.48]	[-1.37]*	[-0.79]	[-0.39]	[-1.19]	[1.55]*	[-0.47]	[0.45]	[-1.73]*	[-1.06]	[-0.82]	[-1.07]	[-0.65]
VIX lag 2	-0.11	-0.10	-0.07	-0.03	-0.04	0.00	-0.02	-0.03	0.00	0.00	-0.06	-0.01	-0.04	0.00
	[-1.25]	[-1.56]*	[-2.15]**	[-0.62]	[-0.95]	[0.02]	[-0.81]	[-1.56]*	[0.14]	[0.23]	[-1.12]	[-0.77]	[-2.86]***	[0.05]
Indonesia stock market volatility lag 1	-0.15	0.10	-0.59	-0.68	0.67	-0.45	0.14	-1.04	0.41	0.18	-1.64	-0.35	-0.06	-0.77
	[-0.1]	[0.1]	[-1.04]	[-0.89]	[0.91]	[-0.87]	[0.38]	[-2.9]***	[0.98]	[0.46]	[-1.45]*	[-1.07]	[-0.2]	[-0.79]
Indonesia stock market volatility lag 1	-1.02	-0.39	0.11	-0.97	-0.44	0.08	0.20	0.07	-0.04	-0.65	0.13	-0.09	-0.01	0.14
	[-0.63]	[-0.35]	[0.18]	[-1.17]	[-0.54]	[0.14]	[0.52]	[0.18]	[-0.09]	[-1.56]*	[0.11]	[-0.26]	[-0.02]	[0.14]
Real interest rate differential lag 1	0.35	0.20	0.17	0.12	0.04	0.10	0.05	0.00	0.06	0.06	0.20	-0.05	0.04	0.23
	[1.29]	[1.05]	[1.71]*	[0.88]	[0.32]	[1.1]	[0.83]	[0]	[0.72]	[0.84]	[0.93]	[-0.78]	[0.76]	[1.26]
Real interest rate differential lag 2	0.14	0.01	0.06	0.10	0.06	0.03	-0.07	-0.02	0.14	-0.01	-0.01	0.04	0.03	-0.05
	[0.6]	[0.09]	[0.69]	[0.86]	[0.54]	[0.41]	[-1.25]	[-0.27]	[1.95]**	[-0.08]	[-0.08]	[0.7]	[0.69]	[-0.34]
Δ CFMIX lag 1	-10.45	-5.38	-2.27	-9.43	-5.69	-2.56	3.23	-4.77	-1.46	-2.31	-10.01	-2.18	1.70	-9.09
	[-1.24]	[-0.92]	[-0.73]	[-2.24]***	[-1.4]*	[-0.88]	[1.67]*	[-2.42]***	[-0.64]	[-1.1]	[-1.42]*	[-1.06]	[0.91]	[-1.49]*
Δ CFMIX lag 2	-10.55	-12.44	-3.62	-3.01	-10.75	2.92	-1.61	-0.06	-0.32	-1.76	3.66	-2.33	-0.47	4.73
	[-1.29]	[-2.19]***	[-1.19]	[-0.72]	[-2.68]***	[1.03]	[-0.83]	[-0.03]	[-0.14]	[-0.85]	[0.49]	[-1.09]	[-0.24]	[0.73]
Capital flows lag 1	0.31	0.16	0.34	0.02	0.16	-0.11	0.23	-0.02	-0.08	0.37	-0.05	0.18	0.16	-0.20
	[3.26]***	[1.38]*	[5.18]***	[0.19]	[1.51]*	[-0.87]	[2.01]**	[-0.22]	[-0.73]	[3.13]***	[-0.59]	[1.45]*	[3.55]***	[-1.89]**
Capital flows lag 2	0.20	-0.10	0.22	-0.13	0.20	0.01	0.01	-0.19	-0.23	0.12	0.04	-0.10	0.18	0.10
	[2.2]***	[-0.9]	[3.45]***	[-1.25]	[1.89]**	[0.1]	[0.13]	[-1.74]*	[-2.29]***	[1.08]	[0.53]	[-0.93]	[4.08]***	[1.00]
Constant term	6.02	4.74	3.25	1.03	2.28	1.19	-0.14	0.96	-1.12	0.82	4.93	0.81	1.74	2.02
	[3.49]***	[3.58]***	[5.39]***	[1.66]*	[2.48]***	[2.51]***	[-0.48]	[3.16]***	[-3.07]***	[2.52]***	[4.97]***	[2.71]***	[6.8]***	[2.47]***
GFC Dummy	-0.36	-0.93	0.50	0.45	-0.73	-0.26	-0.08	0.02	0.10	0.38	2.11	0.05	0.71	1.43
	[-0.23]	[-0.81]	[0.84]	[0.56]	[-0.85]	[-0.48]	[-0.22]	[0.06]	[0.23]	[0.94]	[1.76]*	[0.15]	[2.2]***	[1.38]*
Quant. Easing Dummy	2.40	1.05	1.32	1.07	0.91	0.07	-0.11	0.26	0.97	-0.12	1.27	0.31	0.92	-0.16
	[1.88]**	[1.18]	[2.8]***	[1.7]*	[1.38]*	[0.18]	[-0.37]	[0.91]	[2.77]***	[-0.4]	[1.38]*	[1.15]	[3.73]***	[-0.21]
Tax Amnesty dummy	-21.03	-4.20	-15.14	-2.20	-2.54	-1.99	-1.50	0.12	0.11	-1.63	-22.60	-0.16	-14.17	-8.23
	[-6.29]***	[-1.75]*	[-11.89]***	[-1.18]	[-1.42]*	[-1.67]*	[-1.76]*	[0.14]	[0.11]	[-1.67]*	[-8.41]***	[-0.19]	[-20.13]***	[-3.56]***
R-squared	0.65	0.29	0.80	0.26	0.36	0.16	0.16	0.20	0.26	0.39	0.52	0.17	0.86	0.25
Sum sq. resids	963.73	498.12	133.53	239.32	273.51	107.08	51.91	52.19	73.73	60.23	517.90	43.38	38.05	390.10
Mean dependent	5.92	2.70	2.92	0.30	2.09	0.50	0.11	0.23	-0.43	0.45	2.59	0.30	0.97	1.32
S.D. dependent	6.03	3.03	2.93	2.06	2.37	1.29	0.90	0.93	1.14	1.14	3.78	0.83	1.90	2.62

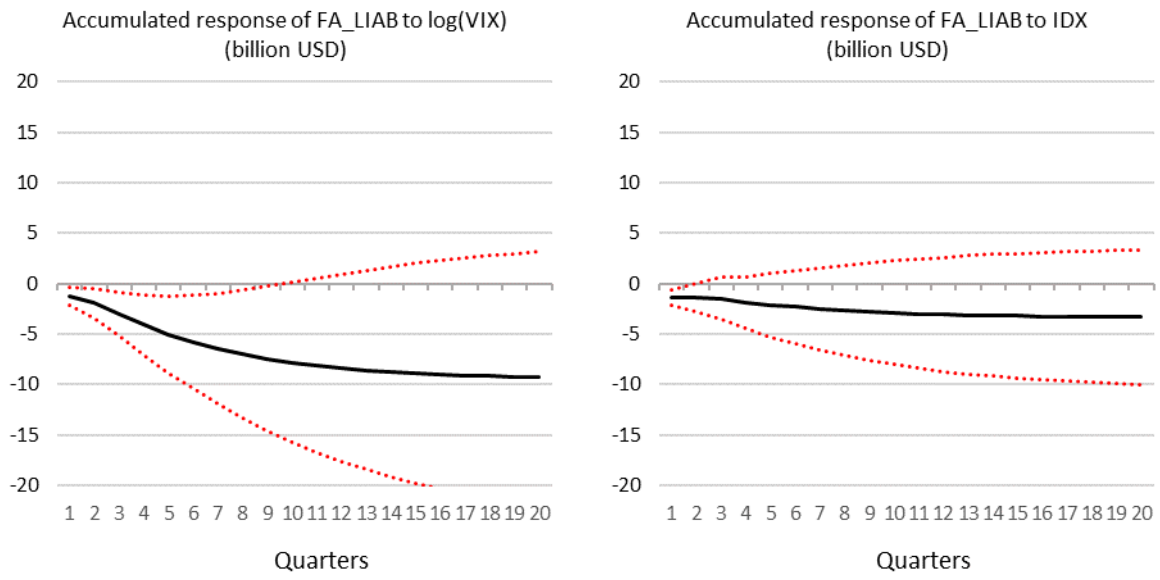
Note: The coefficients only indicate the adjustment effect of lagged variables on capital flows and its disaggregation. The type of lagged capital flows under the independent variables corresponds to the type of capital flows being estimated. For estimates on capital inflows (outflows), the CFM restrictiveness index is represented by CFMIX-inflow (CFMIX-outflow). Δ CFMIX is the first difference transformation of CFMIX. The value in parenthesis is the t-statistics where ***, **, * represents 5%, 10%, and 20% level of significance respectively.

5.1. Impulse responses

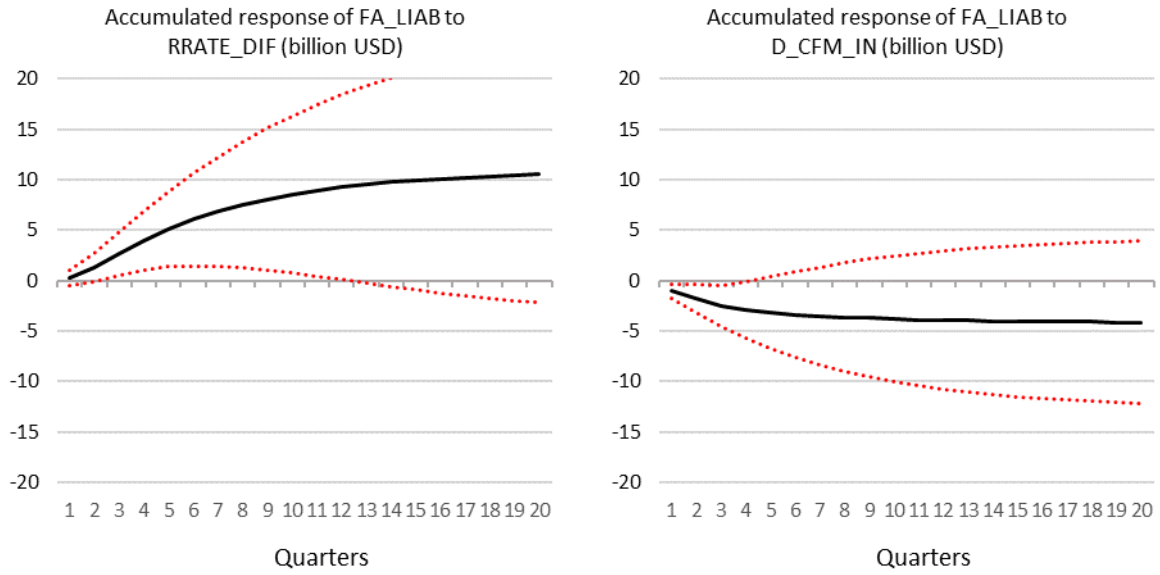
5.1.1. Capital inflows

The responses of capital inflows to a one standard deviation shock to other variables in the SVAR system are presented in Fig. 12. A worsening of global financial market risk condition (represented by a positive shock to the VIX) leads to statistically significant (at the 95% confidence interval) lower capital inflows (FA_LIAB), which is consistent with the theoretical framework and the empirical regularities. The pattern confirms the importance of global financial market risk condition as one of the push factors of capital flows. An increase in the domestic financial market risk condition (represented by an increase in the volatility of the domestic stock market price index (IDX)) also results in lower capital inflows, although the impact is not as significant as the one driven by the external shock[13].

As for the response of capital inflows to a shock to policy variables, as expected, capital inflows responded positively to an increase in the real interest rate differential (RRATE_DIF). By contrast, a tightening adjustment of the CFM measures restrictiveness for capital inflows (D_CFM_IN) leads to a statistically significant lower capital inflows. Based on the dynamics and the magnitude of the responses to both of these shocks, a policy mix that combines higher domestic interest rate and tightening on capital inflows regulation could help in addressing economic overheating and reducing the magnitude of capital inflows induced by the increase of the real interest rate.



[13] Estimations using alternative domestic financial market risk indicators (exchange rate volatility and sovereign credit default swap (CDS) premium) result in similar results. The use of domestic stock price index to reflect domestic financial market risk condition is preferred considering the tendency of the central bank to intervene to limit exchange rate volatility and the limited availability of CDS data.



Note: FA_LIAB represents aggregate capital inflows, VIX represents the global financial market risk condition, IDX represents the domestic financial market risk condition, RRATE_DIF represents the real interest rate differential, D_CFM_IN represents the adjustment in CFM-inflow restrictiveness. The solid line represents the accumulated impulse response; the dotted lines represent 2 analytic (asymptotic) standard error of the impulse response. The response is generated using Cholesky decomposition (degrees of freedom adjusted) with a one standard deviation shock of other variables.

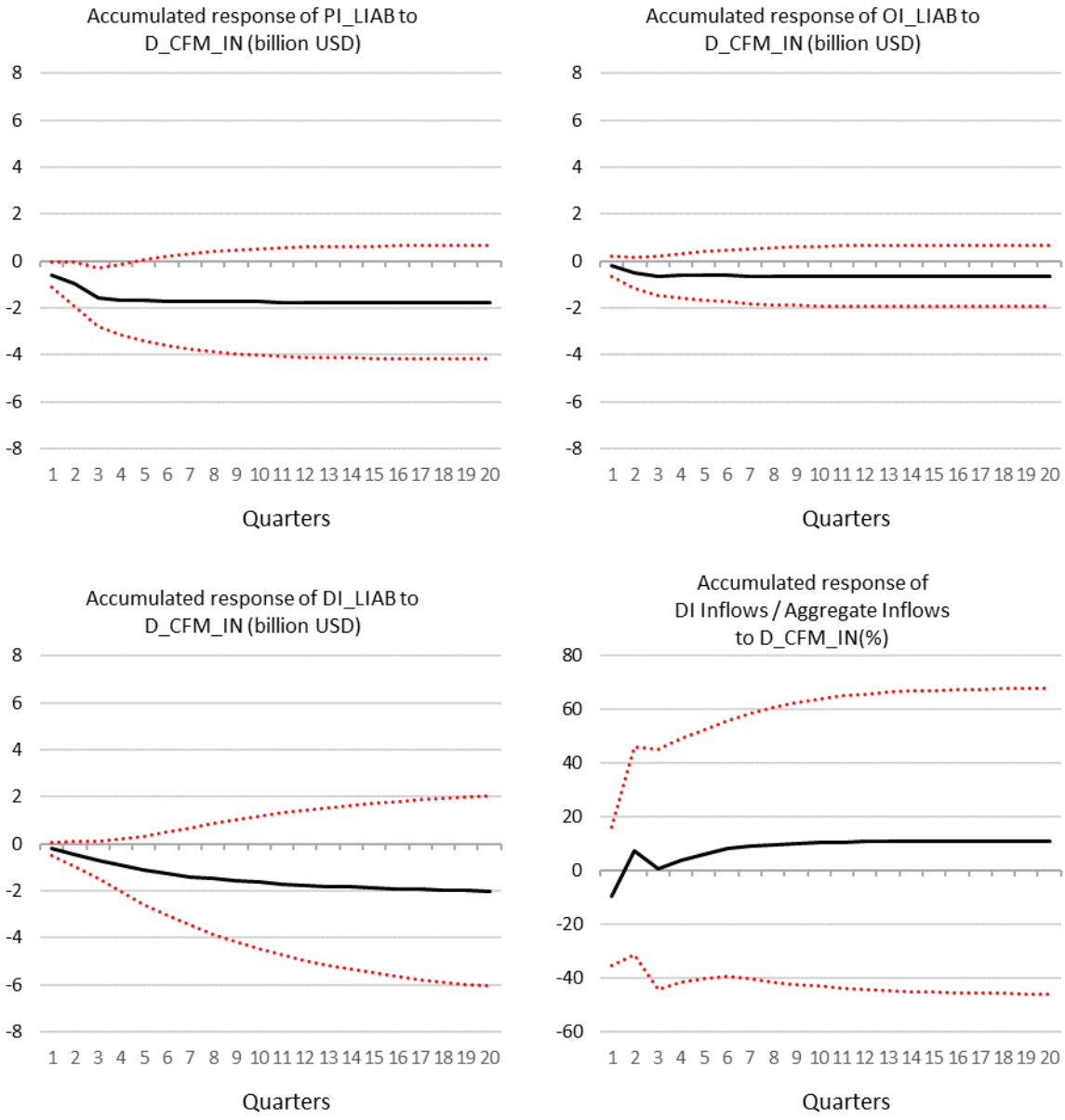
Figure 12. Accumulated impulse responses of capital inflows

The accumulated responses of disaggregated capital inflows and the composition of capital flows generated from CFM-inflow adjustment shock are plotted in Fig. 13. The impulse responses are generated by the same CFM-inflow adjustment shock and derived from the estimated SVAR for each type of capital flows. Among the three types of capital flows, portfolio investment (PI_LIAB) shows a significant reduction in response to an increase in CFM restrictiveness (top-left graph). Responses of other investment (OI_LIAB) (top-right graph) and direct investment (DI_LIAB) (bottom-left graph) are not statistically significant, even though the direction of the accumulated response is similar to the response of portfolio investment. The insignificant impact of the policy adjustment on other investment inflows is expected because this category contains both long and short-term capital, and dominated by transactions related to the public sector and trade credit. The public sector transactions recorded under other investments inflow mainly consist of government's debt payments and withdrawals, which is organized through government to government arrangement instead of through the financial market mechanism. Trade credit transactions are related to payment settlements of international trade instead of financial asset transactions.

The insignificant response of direct investment inflows is in line with one of the features of the CFM measures previously discussed where policies are applied selectively to short-term and speculative capital flows while accommodating foreign direct investment and other long-term and productive capital flows. This result also supports the previous finding in the literature on the characteristics and determinants of foreign direct investments. Unlike portfolio and other investments, both of which are short-term flows, foreign direct investments flows are relatively less volatile. This is related to the fact that foreign direct investment (FDI) is channelled directly to firms without going through the general financial market. The investment flows also becoming more stable once FDI firms are established and

generate earnings sustainably (Lipsey, 2000). In general, direct investment is driven by long-term fundamental factors such as relative wages, the strength of bilateral trade relations, and the conduciveness of the domestic business climate for international production (De Vita and Kyaw, 2008; Koepke, 2019). A study by Athukorala (2003) indicates that FDI flows to Indonesia is relatively stable during the AFC and plays an important part in supporting the economic recovery process by providing the needed investments.

The impact of CFM-inflow adjustment on the composition of capital inflows is presented in the bottom-right graph of Fig. 13. As discussed, increasing the restrictiveness of CFM-inflow is associated with statistically significant lower inflows of portfolio investment. This is consistent with the accumulated response in the graph that indicates that direct investment's share in total inflows slightly increases over time. However, as indicated by the distribution of the standard error, the effect is not statistically significant.



Note: PI_LIAB represents portfolio investments inflow, OI_LIAB represents other investments inflow, DI_LIAB represents FDI inflow, D_CFM_IN represents the adjustment in CFM-inflow restrictiveness. The solid line represents the accumulated impulse

response; the dotted lines represent 2 analytic (asymptotic) standard error of the impulse response. The response is generated using Cholesky decomposition (degrees of freedom adjusted) with a one standard deviation shock of CFM restrictiveness adjustment.

Figure 13. Accumulated impulse responses of disaggregated capital inflows

To shed further light on the effect of the adjustment of the CFM-inflow on portfolio and other investments, the response of the disaggregated of both flows are summarized in Table 4. In general, the accumulated response of the components of portfolio and other investments inflows are negative with varying degree of statistical significance. For portfolio investment flows, inflows to public and private sector debt instrument are negatively and significantly affected by the adjustment of CFM-inflow restrictiveness. Inflows to equity are not significantly affected by the adjustment of CFM policy. As for the subcomponents of other investment inflows, there is limited evidence that the flows are responding negatively to the CFM-inflow shock. However, none of the accumulated responses is statistically insignificant at the 95% confidence interval.

Table 4. Accumulated impulse responses of disaggregated portfolio and other investments inflows to CFM-inflow shock.

Type of capital inflow	Accumulated response at the corresponding quarter (billion USD)					
	1	2	3	4	8	16
Portfolio investment inflows						
Public sector debt	-0.13	-0.51*	-1.11**	-1.31**	-1.75*	-1.93*
Private sector debt	-0.31**	-0.40*	-0.25*	-0.30	-0.29	-0.28
Private sector equity	-0.15*	-0.03	-0.05	0.00	0.08	0.10
Other investment inflows						
Banking sector	-0.02	-0.16*	-0.11	-0.06	-0.03	-0.03
Public sector	-0.13*	-0.20*	-0.23*	-0.25*	-0.31*	-0.31*
Others	-0.02	-0.07	-0.17	-0.18	-0.20	-0.20

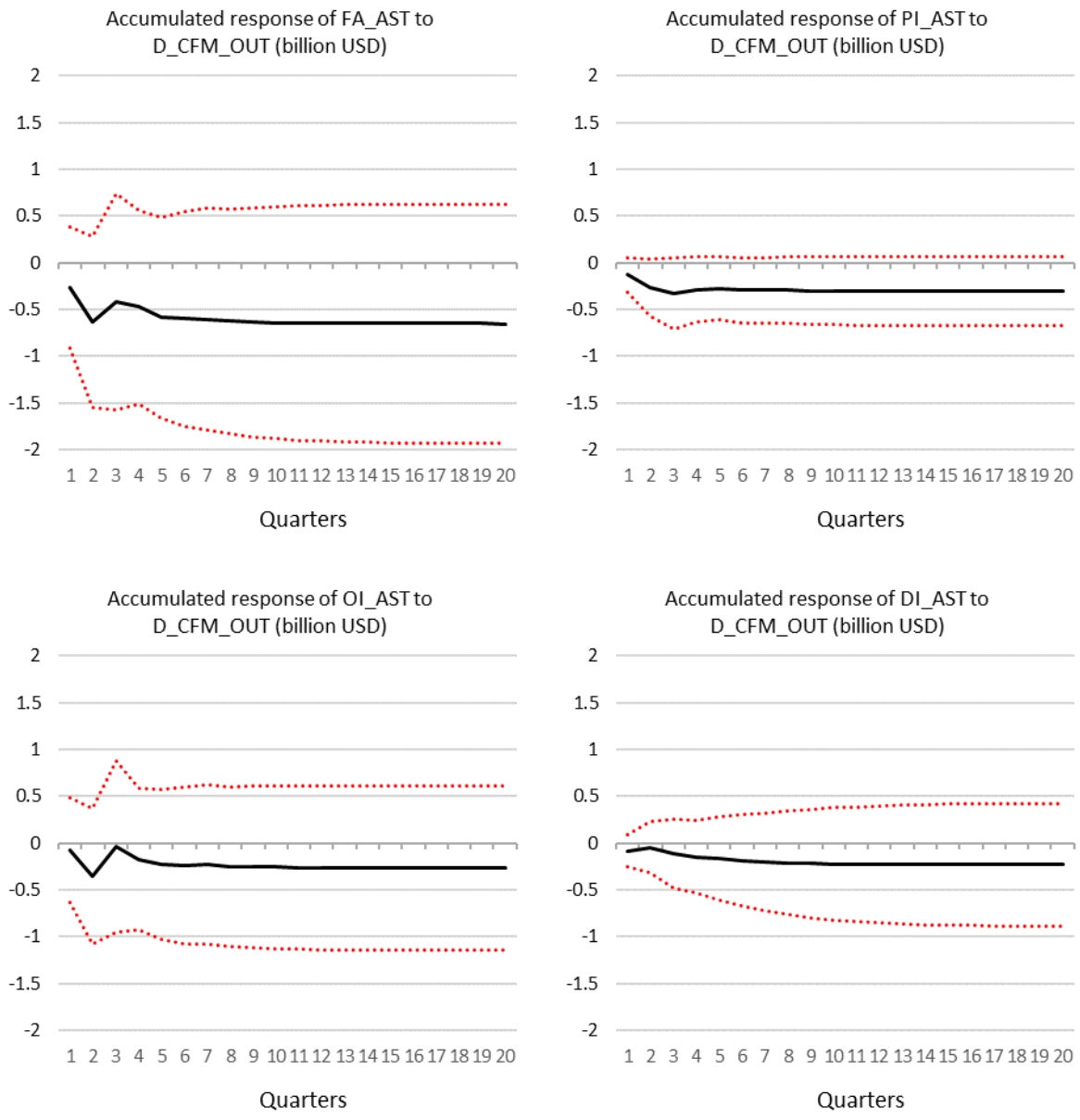
Note: ** and * indicates the significance of the accumulated impulse response at the 95% and 68% confidence interval.

5.1.2. Capital outflows

To assess the implication of the CFM-outflow policy changes towards the volume of outflows, several estimations using the CFM-outflow index for different categories of capital outflows are estimated. The approach is similar to what was done in the previous subsection where the model is estimated individually for the aggregate capital outflows (FA_AST) and its' component: portfolio investment (PI_AST), other investment (OI_AST), and direct investment (DI_AST).

The impulse responses of the capital outflows are generated by a one standard deviation increase on the CFM-outflow, which can be interpreted as an increase of capital outflow measures restrictiveness. Therefore, it is expected that capital outflows would respond negatively to this shock. The pattern of responses that are displayed in Fig. 14 indicates that CFM-outflows adjustment is associated with lower capital outflows. However, none of the accumulated response is statistically significant at the 95% confidence interval. In

other words, CFM measures for outflows in Indonesia are less effective compared to capital inflow measures, which is in line with the findings of Jayasuriya and Leu (2012).



Note: FA_AST represents aggregate capital outflow, PI_AST represents portfolio investments outflow, OI_AST represents other investments outflow, DI_AST represents direct investment outflow, D_CFM_OUT represents the adjustment in CFM-outflow restrictiveness. The solid line represents the accumulated impulse response; the dotted lines represent 2 analytic (asymptotic) standard error of the impulse response. The response is generated using Cholesky decomposition (degrees of freedom adjusted) with a one standard deviation shock of CFM restrictiveness adjustment.

Figure 14. Accumulated impulse responses of disaggregated capital outflows

The failure of the impulse responses to reflect significant impact of CFM measures on capital outflows is understandable given the nature of the data series. As discussed (Section 3.3), during the period under study, the size of aggregate capital outflows is relatively small and less volatile compared to aggregate capital inflows. The quarterly fluctuations of capital outflows are heavily driven by other investment flows (the largest component of outflows and has the highest volatility), which is not responsive to the adjustment of CFM for outflows. The limited effectiveness of capital outflow measures could also be related to various factors such as the ability of agents involved in the transaction under control to circumvent the regulation using various mechanisms (such as over-invoicing exports or under-invoicing imports). Problems related to the implementation of the policy due to institutional setting or the nature of regulation (through price or administrative mechanism) could also affect the effectiveness of the outflow management policies (Garber, 1998; Edwards, 1999). In the case of Indonesia, the capital account convertibility policy that was adopted relatively early might explain the limited institutional and mechanism support for imposing effective capital outflow restriction (Habermeier et al., 2011).

5.2. Variance decomposition

To measure the relative importance of CFM policies adjustments in affecting the capital flows, the magnitude of the variance explained by the innovation in the CFM index for each category of the flows are assessed using the variance decomposition. This approach indicates the amount of information each variable contributes to each other variables in the SVAR. In the context of this study, the variance decomposition measure how much of the forecast error variance of capital flows can be explained by exogenous shocks to the CFM restrictiveness. The entries given in Table 5 indicate the cumulative percentage of the variance of the first four quarters ahead, 8, 12, 16 and 20 quarters-ahead forecast error of the capital flows that are due to changes in the restrictiveness of the CFM measures.

The results confirm the previous inference that an adjustment of CFM restrictiveness resulted in changes in capital flows volume within the first four quarters. The first column in Table 3 indicates that adjustments from the CFM-inflow contributes around 8% of the portfolio investment inflows' variance in the first quarter, and then increase to around 9% in the following three quarters. After the fourth quarter, the CFM-inflow's contribution stabilizes at around 7% of the aggregate capital inflows' variance. Shocks from CFM-inflow contributes to around 8%, 3% and 5% for the inflows in the form of portfolio investment, other investment and direct investment.

As for the CFM-outflow, consistent with the impulse responses, the changes of outflow policies only contribute to a small portion of the variance for all class of flows. The largest contribution is on portfolio outflows, followed by other investments.

Table 5. Contribution of innovations in CFMIX on the variance of capital flows

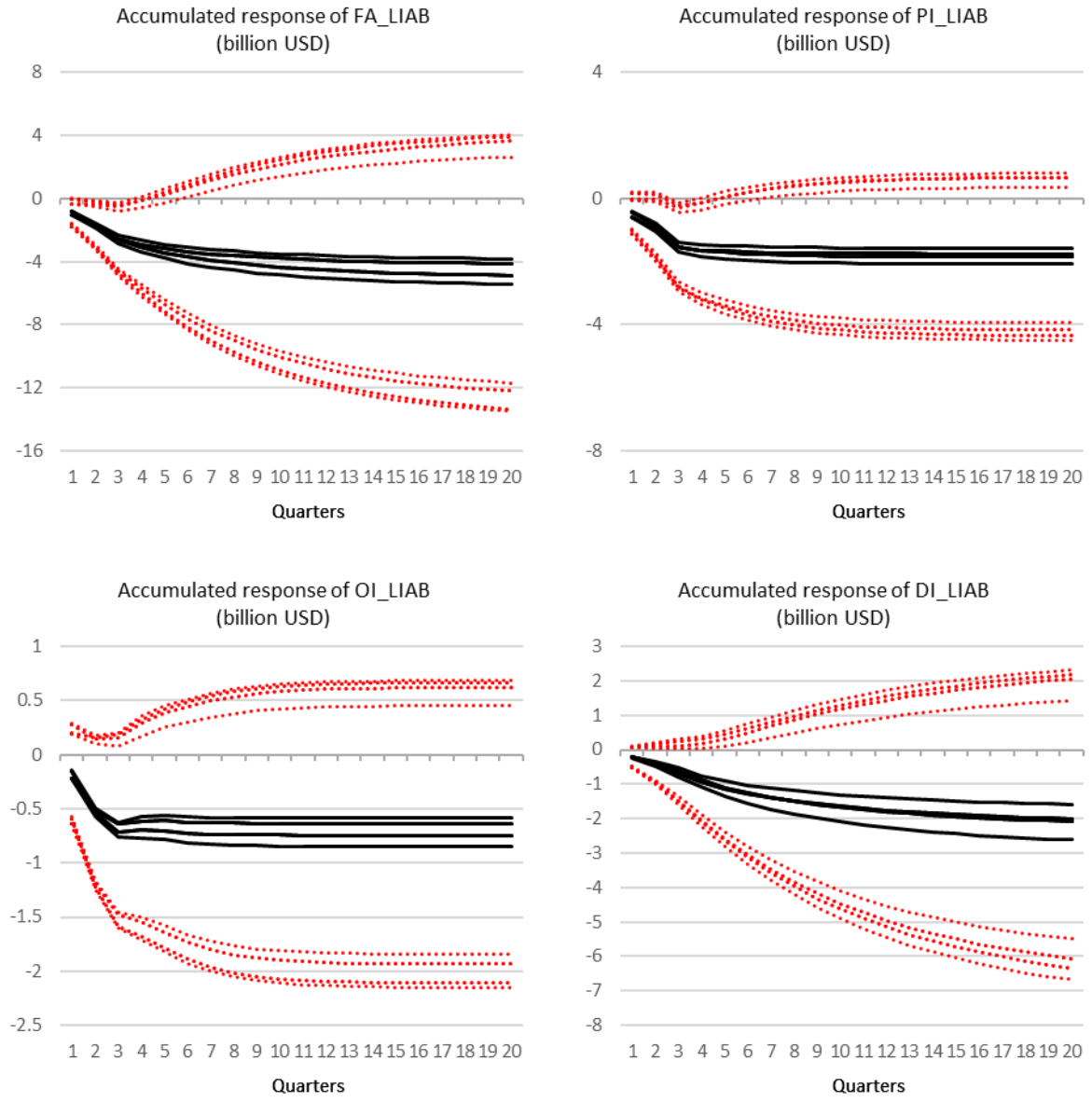
Period	Contribution of CFM inflows on inflows (%)				Contribution of CFM outflows on outflows (%)			
	Aggregate Inflow	Portfolio inv.	Other inv.	Direct Inv.	Aggregate Outflow	Portfolio inv.	Other inv.	Direct Inv.
1	7.66	4.28	1.25	2.11	0.85	2.42	0.09	1.17
2	9.13	5.78	3.26	3.34	2.30	4.80	1.24	1.35
3	9.77	9.00	3.28	4.02	2.69	5.10	2.56	1.72
4	8.87	8.84	3.15	4.72	2.67	5.26	2.77	1.69
8	7.44	8.59	3.11	4.63	2.74	5.24	2.79	1.55
12	7.16	8.57	3.11	4.50	2.74	5.24	2.79	1.54
16	7.10	8.57	3.11	4.47	2.74	5.24	2.79	1.54
20	7.08	8.57	3.10	4.47	2.74	5.24	2.79	1.54

Source: Author's calculation

5.3. Robustness checks

To examine the robustness discussed in Section 5.1, the impulse responses generated from modifications of the basic model are compared in Fig.15. The modification of the basic model specification is done by using different orderings of the endogenous variables. The basic model specification that is estimated to derive the results uses the following endogenous variables ordering: global financial market risk → domestic financial market risk → real interest rate differential → CFM policies → capital flows. The modification is done by using different orderings of domestic risk factor, real interest rate differential, and CFM policies. The assumption that global financial risk as the most exogenous variable and capital flows is the most endogenous variable (able to respond to adjustments of other endogenous variables contemporaneously) are maintained. The reason for this approach is based on the possibility that adjustments on the interest rate and CFM responds to changes in the domestic risk. There could be also situations where authorities choose to deploy CFM policies and then followed by the interest rate adjustment policy.

As shown by the charts in the figure, the use of different orderings of domestic risk and policy variables do not change the interpretation of the result generated from the estimation of the basic model. The direction and dynamics of the impulse response remain similar and differences in the standard error of the impulse response appear to be trivial.



Source: Author's calculation

Note: PI_LIAB represents portfolio investments inflow, OI_LIAB represents other investments inflow, DI_LIAB represents FDI inflow. The solid line represents the accumulated impulse response; the dotted lines represent 2 analytic (asymptotic) standard error of the impulse response. The impulse response is generated using Cholesky decomposition (degrees of freedom adjusted) with a one standard deviation shock of CFM-inflow restrictiveness adjustment. The impulse responses are generated using six estimations that includes the basic specification, five alternative orderings of endogenous variables.

Figure 15. Robustness check using different SVAR orderings

6. Conclusion

While advanced economies have embraced capital account opening and independent monetary policy as the preferred macroeconomic policy configuration, emerging and developing economies have been increasingly moving towards an 'intermediate regime', which involves fine-tuning the exchange rate and, maintaining a viable level of monetary policy autonomy combined with measures to regulate capital mobility. An important issue relating to this policy configuration is the effectiveness of capital flow management policy. The purpose of this paper has been to contribute to the fledgling literature on capital flow management effectiveness through a case study of Indonesia.

Indonesia is one of the countries that undertook capital account liberalization relatively early and before liberalizing international trade and reforming the financial sector. This reversed sequencing works adequately at a time when the domestic financial system was at the formative stage and the economy was not globally integrated. The traumatic experiences of the AFC have made the policymakers to realise the need to pay attention to the trilemma in macroeconomic management. Learning from the AFC and adapting the policy practices from peer countries, a series of CFM measures have been introduced to balance the need for accessing external financing and managing risks related to international capital flows.

The movement of CFMIX indicates that CFM policy in Indonesia has become less restrictive for inflows and more restrictive on outflows during the recent period. To investigate the association of the CFM policies with capital flows, the study applies the model of push and pull drivers of capital flows. As suggested by the impulse responses generated from the SVAR model estimations, an adjustment in the CFM restrictiveness on the inflow side results in a significant change of the size of capital inflows to debt instruments (portfolio flows). Additionally, the analysis points out the compatibility of capital inflow policy measures and interest rate policy to address domestic macroeconomic imbalances while managing potential externalities that originate from the volatility of portfolio capital flows. The analysis also suggests that increasing CFM restrictiveness for inflows increase the share of direct investment inflows in the aggregate flows. However, the impact is not statistically significant.

There is no statistically significant evidence on the effect of CFM policy on capital outflows. Allowing for the low level and limited variability of the capital outflow data series, this finding is in line with previous studies suggesting that policies to contain outflow have limited effectiveness. The limited effectiveness could be related to Indonesia's institutional setting that is not well equipped with the necessary mechanism to implement capital outflow controls.

The results suggest that, given the recent move towards relaxing CFM restriction on the capital inflows, Indonesia is at a higher risk of exposing itself to the volatile global market sentiment. To cushion the economy against the risk, it is important to combine this policy shift with strengthening balance sheets of the

domestic financial institutions, reducing restrictions on foreign direct investment, and maintaining foreign exchange reserves to match the increased exposure to capital exodus.

References

Ahmed, S. and Zlate, A., 2014. Capital flows to emerging market economies: A brave new world?. Journal of International Money and Finance, 48, pp.221-248.

Aizenman, J., 2019. A modern reincarnation of Mundell-Fleming's trilemma. Economic Modelling, 81, pp.444-454.

Aizenman, J., Chinn, M.D. and Ito, H., 2013. The "impossible trinity" hypothesis in an era of global imbalances: Measurement and testing. Review of International Economics, 21(3), pp.447-458.

Ananchotikul, N. and Zhang, M.L., 2014. Portfolio flows, global risk aversion and asset prices in emerging markets (No. 14-156). International Monetary Fund.

Athukorala, P.C., 2001. Crisis and recovery in Malaysia: the role of capital controls. Edward Elgar Publishing.

Athukorala, P.C., 2003. Foreign direct investment in crisis and recovery: Lessons from the 1997–1998 Asian crisis. Australian Economic History Review, 43(2), pp.197-213.

Athukorala, P. and Jongwanich, J., 2012. How effective are capital controls? Evidence from Malaysia. Asian Development Review, 29(2), pp.1-47.

Baek, I.M., 2006. Portfolio investment flows to Asia and Latin America: Pull, push or market sentiment?. Journal of Asian Economics, 17(2), pp.363-373.

Bank Indonesia, 2020, https://www.bi.go.id/id/statistik/seki/terkini/moneter/Contents/ Default.aspx. Accessed on 18 February 2020.

Bank Indonesia, various years. Economic Report on Indonesia. https://www.bi.go.id/en/publikasi/laporan-tahunan/perekonomian/Default.aspx

Basri, M.C., 2017. India and Indonesia: Lessons learned from the 2013 taper tantrum. Bulletin of Indonesian Economic Studies, 53(2), pp.137-160.

Bhagwati, J., 1998. The capital myth: the difference between trade in widgets and dollars. Foreign Affairs, pp.7-12.

Bhattarai, S., Chatterjee, A. and Park, W.Y., 2020. Global spillover effects of US uncertainty. Journal of Monetary Economics, 114, pp.71-89.

Bluedorn, M.J.C., Duttagupta, R., Guajardo, J. and Topalova, P., 2013. Capital flows are fickle: anytime, anywhere (No. 13-183). International Monetary Fund.

Bonciani, D. and Ricci, M., 2020. The international effects of global financial uncertainty shocks. Journal of International Money and Finance, 109, p.102236.

Bresnan, J., 1993. Managing Indonesia: The modern political economy. Columbia University Press.

Bruno, V. and Shin, H.S., 2014. Assessing macroprudential policies: case of South Korea. The Scandinavian Journal of Economics, 116(1), pp.128-157.

Caballero, J.A., 2016. Do surges in international capital inflows influence the likelihood of banking crises?. The Economic Journal, 126(591), pp.281-316.

Caballero, R.J. and Krishnamurthy, A., 2006. Bubbles and capital flow volatility: Causes and risk management. Journal of monetary Economics, 53(1), pp.35-53.

Calvo, G.A., Leiderman, L. and Reinhart, C.M., 1993. Capital inflows and real exchange rate appreciation in Latin America: the role of external factors. Staff Papers, 40(1), pp.108-151.

Chamon, M. and Garcia, M., 2016. Capital controls in Brazil: effective?. Journal of International Money and Finance, 61, pp.163-187.

Christiano, L.J., 2012. Christopher A. Sims and vector autoregressions. The Scandinavian Journal of Economics, 114(4), pp.1082-1104.

Chwieroth, J.M., 2010. How do crises lead to change? Liberalizing capital controls in the early years of new order Indonesia. World politics, 62(3), pp.496-527.

Cole, D.C. and Slade, B.F., 1996. Building a modern financial system: The Indonesian experience. Cambridge University Press.

Corden, W.M., 2004. Too sensational: on the choice of exchange rate regimes. Cambridge. MIT Press.

De Gregorio, J., Edwards, S. and Valdés, R.O., 2000. Controls on capital inflows: do they work?. Journal of Development Economics, 63(1), pp.59-83.

De Kaplan, E. and D. Rodrik, 2002. "Did the Malaysian Capital Controls Work?," in S. Edwards and J. Frankel, eds., Preventing Currency Crises in Emerging Markets, Chicago: University of Chicago Press for the NBER, 2002.

De Vita, G. and Kyaw, K.S., 2008. Determinants of FDI and portfolio flows to developing countries: A panel cointegration analysis. European Journal of Economics, Finance and Administrative Sciences, 13(13), pp.161-168.

Demirgüç-Kunt, A. and Detragiache, E., 1998. The determinants of banking crises in developing and developed countries. IMF Staff Papers, 45(1), pp.81-109.

Dick, H., 2002. Formation of the nation-state, 1930s-1966. The emergence of a national economy: An economic history of Indonesia, 1800-2000, pp.153-193.

Dornbusch, R., "Malaysia: Was It Different?," National Bureau of Economic Research Working Paper 8325, June 2001.

Edwards, S., 1999. How effective are capital controls?. Journal of Economic Perspectives, 13(4), pp.65-84.

Edwards, S. and Rigobon, R., 2009. Capital controls on inflows, exchange rate volatility and external vulnerability. Journal of International Economics, 78(2), pp.256-267.

Eichengreen, B.J., 2004. Liberalizing capital movements: some analytical issues. International Monetary Fund.

Eichengreen, B., Gupta, P. and Masetti, O., 2018. Are capital flows fickle? Increasingly? And does the answer still depend on type?. Asian Economic Papers, 17(1), pp.22-41.

Farhi, E. and Werning, I., 2012. Dealing with the trilemma: Optimal capital controls with fixed exchange rates (No. w18199). National Bureau of Economic Research.

Federal Reserve St. Louis, 2020. https://fred.stlouisfed.org/ Accessed on 18 February 2020.

Fernández, A., Klein, M.W., Rebucci, A., Schindler, M. and Uribe, M., 2016. Capital control measures: A new dataset. IMF Economic Review, 64(3), pp.548-574.

Fischer, S., 2005. IMF essays from a time of crisis: the international financial system, stabilization, and development. MIT Press Books.

Fleming, J.M., 1962. Domestic financial policies under fixed and under floating exchange rates. Staff Papers, 9(3), pp.369-380.

Forbes, K., Fratzscher, M. and Straub, R., 2015. Capital flow management measures: What are they good for?. Journal of International Economics, 96, pp.S76-S97.

Forbes, K., Fratzscher, M., Kostka, T. and Straub, R., 2016. Bubble thy neighbour: Portfolio effects and externalities from capital controls. Journal of International Economics, 99, pp.85-104.

Forbes, K.J. and Warnock, F.E., 2012. Capital flow waves: Surges, stops, flight, and retrenchment. Journal of international economics, 88(2), pp.235-251.

Frankel, J.A., 1999. No single currency regime is right for all countries or at all times (No. w7338). National Bureau of Economic Research.

FreddieMac, 2020. http://www.freddiemac.com/research/datasets/cofi.page. Accessed on 26 August 2020.

Gallego, F., Hernandez, L. and Schmidt-Hebbel, K., 2002. Capital controls in Chile: were they effective?. Banking, Financial Integration, and International Crises, pp.361-412.

Garber, P.M., 1998. Buttressing Capital-Account Liberalization with Prudential Regulation and Foreign Entry. Essays in International Finance, pp.28-33.

Ghosh, A.R., Ostry, J.D. and Qureshi, M.S., 2018. Taming the tide of capital flows: A policy guide. MIT Press.

Grenville, S., 1976. Money, prices and finance in Indonesia: 1960-74. PhD Dissertation. Australian National University

Grenville, S., 2014. Rethinking capital flows for emerging East Asia. In Reform of the International Monetary System (pp. 43-72). Springer, Tokyo.

Habermeier, M.K.F., Kokenyne, A. and Baba, C., 2011. The effectiveness of capital controls and prudential policies in managing large inflows (No. 11-14). International Monetary Fund.

Hill, H., 2000. The Indonesian Economy. Cambridge University Press.

Indonesia Stock Exchange, 2020. https://insights-ceicdata-com. Accessed on 18 February 2020.

International Monetary Fund., 2010. The Fund's Role Regarding Cross-border Capital Flows. Washington, DC: IMF

International Monetary Fund., 2012. The Liberalization and Management of Capital Flows: An Institutional View. IMF. https://www.imf.org/external/np/pp/eng/2012/111412.pdf

International Monetary Fund., 2016. Capital Flows – Review of Experience with the Institutional View. https://www.imf.org/en/Publications/Policy-Papers/Issues/2017/01/13/PP5081-Capital flows-Review-of-Experience-with-the-Institutional-View

International Monetary Fund., various years. Annual Report on Exchange Arrangements and Exchange Restrictions. https://www.elibrary-areaer.imf.org/Pages/Home.aspx

International Monetary Fund. International Financial Statistics. https://data.imf.org

Jayasuriya, S. and Leu, S.C.Y., 2012. Fine-Tuning an Open Capital Account in a Developing Country: The Indonesian Experience. Asian Development Review, 29(2), pp.136-182.

Jongwanich, J., 2017. Capital Mobility in Asia: Causes and Consequences. ISEAS-Yusof Ishak Institute.

Kaminsky, G.L. and Reinhart, C.M., 1999. The twin crises: the causes of banking and balance-of-payments problems. American economic review, 89(3), pp.473-500.

Kim, C., 2013, April. Macroprudential policies: Korea's experiences. In Rethinking Macro Policy II: First Steps and Early Lessons Conference, hosted by the International Monetary Fund, Washington, DC (pp. 16-17).

Kindleberger, C.P., 1996. Manias, Panics and crashes: a history of financial crises, New York: John Wiley & Sons.

Koepke, R., 2018. Fed policy expectations and portfolio flows to emerging markets. Journal of International Financial Markets, Institutions and Money, 55, pp.170-194.

Koepke, R., 2019. What drives capital flows to emerging markets? A survey of the empirical literature. Journal of Economic Surveys, 33(2), pp.516-540.

Korinek, A., 2011. The new economics of prudential capital controls: A research agenda. IMF Economic Review, 59(3), pp.523-561.

Korinek, A., 2018. Regulating capital flows to emerging markets: An externality view. Journal of International Economics, 111, pp.61-80.

Laban, R., and F. Larrain, 1998. "The Return of Private Capital to Chile in the 1990s: Causes, Effects, and Policy Reactions," Faculty Research Working Paper Series R98-02, JFK School of Government, Harvard University.

Landi, V.N. and Schiavone, A., 2020. The effectiveness of capital controls. Open Economies Review, pp.1-29.

Lane, P.R. and Milesi-Ferretti, G.M., 2018. The external wealth of nations revisited: international financial integration in the aftermath of the global financial crisis. IMF Economic Review, 66(1), pp.189-222.

Laurens, M.B. and Cardoso, M.J., 1998. Managing capital flows: lessons from the experience of Chile (No. 98-168). International Monetary Fund.

League of Nations., 1944. International Currency Experience: Lessons of the Interwar Period. Princeton: Princeton University Press.

Levinson, J., 1999. Fragile, Handle with Care: Indonesia and the Issue of Capital Controls in a Nation Facing Disintegration. Wisconsin International Law Journal, 17, p.529.

Magud, N. and Reinhart, C.M., 2006. Capital controls: an evaluation. In Capital Controls and Capital Flows in Emerging Economies: Policies, Practices, and Consequences. Edited by Sebastian Edwards, University of Chicago: University of Chicago Press, 2007.

Mas'oed, M., 1983. The Indonesian economy and political structure during the early new order, 1966-1971 (Doctoral dissertation, The Ohio State University).

McKinnon, R.I., 1993. The order of economic liberalization: Financial control in the transition to a market economy. JHU Press.

Milesi-Ferretti, G.M. and Tille, C., 2011. The great retrenchment: international capital flows during the global financial crisis. Economic policy, 26(66), pp.289-346.

Mundell, R.A., 1963. Capital mobility and stabilization policy under fixed and flexible exchange rates. Canadian Journal of Economics and Political Science/Revue canadienne de economiques et science politique, 29(4), pp.475-485.

Nuryakin, C., Yuan, E.Z.W. and Arsana, I.G.P., 2016. Portfolio Flows into Indonesia: Push or Pull?. Economics and Finance in Indonesia, 62(2), pp.121-126.

Obstfeld, M. and Taylor, A.M., 2005. Global capital markets: integration, crisis, and growth. Cambridge University Press.

Ostry, J.D., Ghosh, A.R., Chamon, M. and Qureshi, M.S., 2011. Capital controls: when and why?. IMF Economic Review, 59(3), pp.562-580.

Ostry, J.D., Ghosh, A.R., Chamon, M. and Qureshi, M.S., 2012. Tools for managing financial-stability risks from capital inflows. Journal of International Economics, 88(2), pp.407-421.

Ostry, J.D., Ghosh, A.R., Habermeier, K., Chamon, M., Qureshi, M.S. and Reinhardt, D., 2010. Capital inflows: The role of controls,". IMF Staff Position Note. International Monetary Fund, Washington, DC.

Park, Y.C. and Song, C.Y., 1998. Managing foreign capital flows: the experiences of the Republic of Korea, Thailand, Malaysia and Indonesia. In Capital Account Regimes and the Developing Countries (pp. 82-140). Palgrave Macmillan, London.

Quirk, P.J. and Evens, O., 1995. Capital Account Convertibility: Review of Experience and Implications for IMF Policies (Vol. 131). International Monetary Fund.

Rajan, R.G., 2011. Fault lines: How hidden fractures still threaten the world economy. Princeton University Press.

Ree, M.J., Yoon, M.K. and Park, M.H., 2012. FX funding risks and exchange rate volatility–Korea's case (No. 12-268). International Monetary Fund.

Reinhart, C.M. and Reinhart, V.R., 2008. Capital flow bonanzas: an encompassing view of the past and present (No. w14321). National Bureau of Economic Research.

Rodrik, D. and Subramanian, A., 2008. We must curb international flows of capital. Financial Times, 25.

Schindler, M., 2009. Measuring financial integration: A new data set. IMF Staff papers, 56(1), pp.222-238.

Schmitt-Grohé, S. and Uribe, M., 2017. Is optimal capital control policy countercyclical in open economy models with collateral constraints?. IMF Economic Review, 65(3), pp.498-527.

Sims, C.A., 1980. Macroeconomics and reality. Econometrica: journal of the Econometric Society, pp.1-48.

Summers, L.H., 1998. Building an international financial architecture for the 21st century. Cato J., 18, p.321.

Tamirisia, N., "Do Macroeconomic Effects of Capital Controls Vary by Their Type? Evidence from Malaysia," International Monetary Fund Working Paper 04/3, January 2004

Valdés-Prieto, S. and Soto, M., 1998. The effectiveness of capital controls: theory and evidence from Chile. Empirica, 25(2), pp.133-164.

Warjiyo, P., 2013. Indonesia: stabilizing the exchange rate along its fundamental. BIS Paper

Warjiyo, P., 2014. The transmission mechanism and policy responses to global monetary developments: the Indonesian experience. BIS Paper

Warjiyo, P. and Juhro, S.M., 2019. Central Bank Policy: Theory and Practice. Emerald Publishing Limited.

Williamson, J., 1985. On the system in Bretton Woods. The American Economic Review, 75(2), pp.74-79.

World Bank, 1993. The East Asian Miracle. Oxford University Press, New York.

World Bank. World Development Indicators.
https://datacatalog.worldbank.org/dataset/world-development-indicators.

Appendix 1. Policies included for CFM index calculation

No	Time	Policy	Classification
1	2000Q2	BI guarantees interbank foreign loans as stated in the master loan agreement	Inflow (Relaxation - R)
2	2000Q4	BI issues provisions on foreign debt reporting obligations	Inflow (Tightening - T)
3	2000Q4	ASEAN short-term liquidity support agreement to cover short-term balance of payments adjustments	Inflow (R)
4	2001Q1	Limiting the types of international transaction for domestic banks	Outflow (T)
5	2001Q3	Regulation on Interbank Debt Exchange Offer guarantee. Allows domestic banks to pay off all or part of their loans through prepayments and buybacks.	Inflow (R) Outflow (R)
6	2001Q4	The state sells some of its share on several large state-owned enterprises.	Inflow (R) Outflow (T)
7	2002Q1	Regulate foreign exchange transaction reporting for non-financial institution	Inflow (T) Outflow (T)
8	2002Q4	Refining open market operation regulation including facilitating the domestic securities transaction using foreign exchange.	Inflow (R) Outflow (T)
9	2003Q3	Domestic banks were required to maintain overall net open position (on and off balance sheet) maximum 20% of capital	Inflow (T) Outflow (T)
10	2004Q2	Simplification of FDI approval through one-roof service system (Presidential decree 29/2004)	Inflow (R)
11	2004Q2	Deposits in foreign currency were subject to a 3% reserve requirement (6/15/PBI/2004).	Inflow (T) Outflow (T)
12	2004Q3	Banks were required to maintain overall net open position (on and off-balance sheet) maximum of 20% of capital and a net open position for an on-balance-sheet maximum of 20% of capital in the middle and of the working day. (6/20/PBI/2004)	Inflow (T) Outflow (T)
13	2005Q1	Short-term offshore borrowings by banks were limited to 30% of bank capital. Long-term borrowings (maturities of over one year) by banks required approval by the central bank. (7/1/PBI/2005)"	Inflow (T)
14	2005Q1	Banks were prohibited from owning productive assets in the form of stock and securities with an underlying reference asset in the form of stock. (7/2/PBI/2005)	Outflow (T)
15	2005Q3	The limit on forward and swap transactions of banks with nonresidents without an underlying investment-related transaction was reduced to $1 million from $5 million (7/14/PBI/2005)	Inflow (T) Outflow (T)
16	2005Q3	Revision on the ratio of the bank's net open position (20% of capital - real-time). (7/37/PBI/2005)	Inflow (T) Outflow (T)
17	2005Q3	Domestic banks are allowed to conduct swap hedging transaction with the central bank (7/36/PBI/2005)	Inflow (R)
18	2005Q3	Limiting the loss from derivative transactions conducted by banks (10% of the bank's capital). Banks only allowed to conduct derivative transaction based on foreign exchange and interest rate. (7/31/PBI/2005)	Outflow (T)
19	2006Q3	The termination of interbank debt exchange offer program (EOP). The government no longer act as the guarantor for interbank offshore loan. (No. 8/11/PBI/2006)	Inflow (T)
20	2007Q3	Enactment of the use of foreign worker regulation in the banking sector (No. 9/8/PBI/2006)	Inflow (T)
21	2007Q3	Revision of investment negative list (Perpres 77/2007)	Inflow (R)
22	2008Q4	Increasing the availability of foreign exchange (FX) for domestic corporation beyond the market mechanism through USD repo transaction with BI (using banks as an intermediary) (10/22/PBI/2008)	Inflow (R)
23	2008Q4	Due to global financial crisis, there is a need to increase the sustainability of FX supply by not requiring banks to maintain the	Inflow (R)

		daily balance of short-term offshore loans ratio (30% of capital) (10/20/PBI/2008)	
24	2008Q4	Reducing the reserve requirement both in rupiah (7.5%) and foreign exchange (1%) (10/19/PBI/2008)	Inflow (R) Outflow (R)
25	2008Q4	The purchase of foreign currency against rupiah through banks exceeding $100,000 a month requires underlying document (No. 10/28/PBI/2008)	Outflow (T)
26	2009Q1	USD Repo transaction using USD denominated securities to Bank Indonesia with the obligation to repurchase at an agreed term and price were enabled. The securities intended are the global bonds issued by the Government of Indonesia (No. 11/4/PBI/2009)	Inflow (R)
27	2010Q2	Banks are required to only offer their customer products which are officially listed to the authority in the country of origin (12/9/PBI/2010)	Outflow (T)
28	2010Q3	Implementing a 1-month minimum holding period for Bank Indonesia's certificate (SBI) (12/11/PBI/2010)	Inflow (T) Outflow (R)
29	2010Q3	The on-balance-sheet NOP limit of 20% of the capital was abolished, however, the overall on and off-balance sheet combined - NOP was maintained at 20% of capital (12/10/PBI/2010)	Inflow (R) Outflow (R)
30	2011Q1	Bank Indonesia reinstated the limit of 30% of capital on the daily balance of banks' short-term external debt (PBI No. 13/7/PBI/2011).	Inflow (T) Outflow (T)
31	2011Q1	Revocation of Bank Indonesia Regulation number 10/22/PBI/2008 concerning Fulfillment of Domestic Corporation Foreign Exchange Requirement through Banks (13/4/PBI/2011)	Inflow (R)
32	2011Q1	The reserve requirement on deposit accounts in foreign exchange was raised to 5% from 1% (PBI No. 13/10/PBI/2011).	Inflow (T) Outflow (T)
33	2011Q2	The minimum holding period for SBI was lengthened from one month to six months (No.13/13/DPM)	Inflow (T) Outflow (R)
34	2011Q3	Issuance and Sale of Sharia Government Securities in Foreign Currency in the International Primary Market (No. 119 PMK.08 2011)	Inflow (R)
35	2012Q3	Allowing derivative transaction for the purpose of hedging at a period and an amount consistent with the underlying transaction (14/10/PBI/2012)	Inflow (R)
36	2013Q1	Revisions on the regulation concerning auctions of Government Bond in Rupiah and Foreign Currency in Domestic Primary Market (No.43/PMK.08/2013)	Inflow (R)
37	2013Q3	Introduce more flexibility to non-residents to deposit their proceeds from divestment in domestic currency or foreign currency (No.15/6/PBI/2013)	Inflow (R) Outflow (T)
38	2013Q4	Regulate hedging transaction facility to banks (No.15/8/PBI/2013)	Inflow (R)
39	2014Q2	Amendments of regulation No. 7/14/PBI/2005 to deepen the domestic foreign exchange market by giving flexibility to market, especially in hedging investments income.	Inflow (R)
40	2014Q2	Adding more exceptions in the calculation of a bank's foreign debt (more flexibility in the calculation of debt to capital ratio) (No. 16/7/PBI/2014)	Inflow (R)
41	2014Q3	Regulating foreign exchange transactions against rupiah between domestic banks and foreign parties (No. 16/17/PBI/2014)	Inflow (R)
42	2014Q3	Foreign exchange transaction above 100k USD must be supported with underlying documents. Transaction categories that are acceptable as underlying transactions for derivative transactions were expanded (No.16/16/PBI/2014)	Outflow (T)
43	2014Q4	Requiring nonbank corporation need to manage external debt based on prudential principles (No. 16/21/PBI/2014)"	Inflow (T)
44	2015Q2	Pension funds are allowed to invest abroad up to 5% of total investment (OJK Regulation No.3/POJK.05/2015)	Outflow (R)

45	2015Q2	Amendment in BI regulation No. 16/17/PBI/2014 to increase liquidity in the domestic foreign exchange financial market, by expanding the scope of transactions of foreign exchange derivative instruments to the Rupiah. The definition of derivative transaction in the new regulation not only covers forward, swap, option but also in the form of a cross-currency swap. This regulation also removes the minimum 1-week term requirement for derivative transactions. (No. 17/7/PBI/2015)	Inflow (R)
46	2015Q3	Lowering the threshold of spot transaction without underlying documents to US$25.000/month (No. 17/14/PBI/2015)	Outflow (T)
47	2015Q3	Shorten the minimum holding period from one month to one week	Inflow (R) Outflow (T)
48	2015Q4	Increasing the threshold for forward transactions from 1 to 5 million USD (No. 17/16/PBI/2015)	Inflow (R)
49	2016Q3	Revision on the regulation of FX transaction against Rp between banks and foreign party. This regulation also aims to increase the portion of derivative transactions on the domestic foreign exchange market. (No. 18/19/PBI/2016)"	Inflow (R)
50	2017Q1	Regulating the trading of deposit certificates in the money market. (19/2/PBI/2017).	Inflow (R)
51	2018Q3	Allowing the Bank to conduct domestic non-deliverable forward transactions. (No. 20/10/PBI/2018)	Inflow (R)
52	2018Q4	The reserve requirement ratio on deposits in foreign exchange were modified from 8% daily to 6% daily and 2% average.	Inflow (R) Outflow (R)
53	2018Q4	Adding domestic non-deliverable forward (DNDF) transactions as instruments for open market operations.	Inflow (R) Outflow (T)
54	2019Q1	Revision on domestic bank's foreign debt and other foreign exchange liabilities regulation.	Inflow (T)
55	2019Q2	Adding domestic non-deliverable forward (DNDF) transactions as instruments for open market operations.	Inflow (R) Outflow (T)

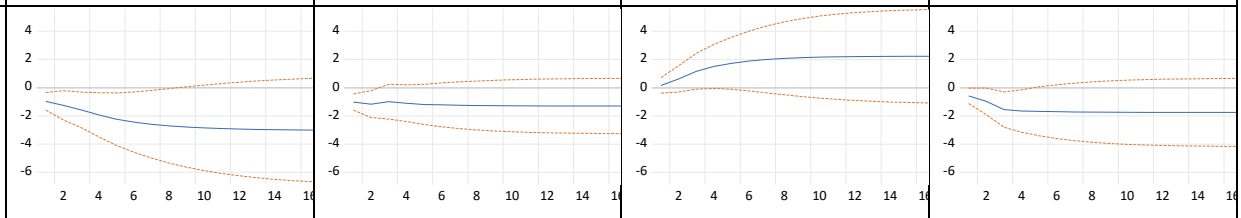
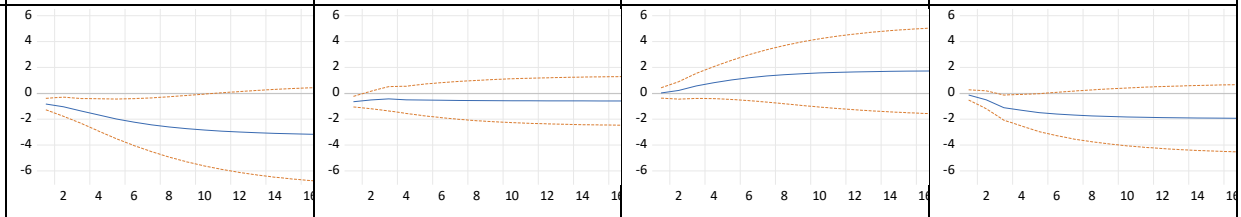
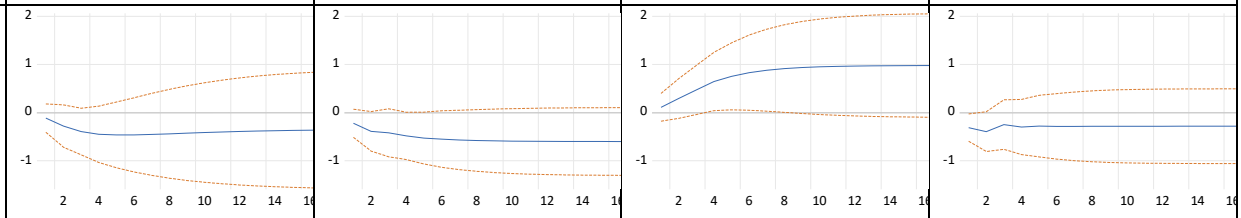
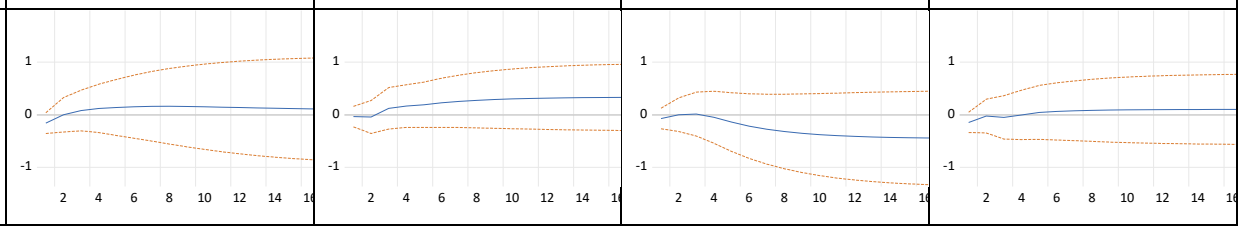
Source: Bank Indonesia's Economic Report on Indonesia (2000 – 2019)
https://www.bi.go.id/en/publikasi/laporan-tahunan/perekonomian/Default.aspx

Note: (R) represents policies that are interpreted to relax the capital account regulation or encourage capital account transactions. (T) represents policies that are interpreted to tighten the capital account regulation or discourage capital account transactions.

Appendix 2. Correlation matrix of variables

Variables	VIX	IDX_VOL	RRDIF	D(CFM_IN)	D(CFM_OUT)
Log of CBOE volatility index (VIX)	1.00				
Indonesian stock market price index volatility (IDX)	0.64	1.00			
Real interest rate differential (RRDIF)	0.00	-0.30	1.00		
CFMIX-inflow adjustment (D_CFM_IN)	-0.21	-0.24	-0.05	1.00	
CFMIX-outflow adjustment (D_CFM_OUT)	-0.05	0.16	-0.06	0.23	1.00
Aggregate capital inflows (FA_LIAB)	-0.36	-0.51	0.24	-0.15	-0.20
Portfolio investment inflows (PI_LIAB)	-0.45	-0.59	0.19	-0.05	-0.23
Other investment inflows (OI_LIAB)	0.06	-0.18	0.21	-0.18	-0.13
Direct investment inflows (FDI_LIAB)	-0.33	-0.31	0.15	-0.12	-0.09
Portfolio - public debt inst inflow (PI_LIAB_DPB)	-0.47	-0.59	0.16	0.03	-0.15
Portfolio - private debt inst inflow (PI_LIAB_DPR)	-0.20	-0.29	0.25	-0.17	-0.21
Portfolio - equity inflow (PI_LIAB_EQ)	0.00	-0.05	-0.11	-0.03	-0.11
Other inv. - banking sector (OI_LIAB_BNK)	-0.09	-0.05	0.08	-0.07	-0.18
Other inv. - public sector (OI_LIAB_PUB)	0.24	-0.06	0.15	-0.20	0.01
Other inv. - other sector (OI_LIAB_OTH)	-0.08	-0.23	0.15	-0.07	-0.10
Aggregate capital outflows (FA_AST)	-0.04	-0.01	-0.05	-0.13	-0.04
Portfolio investment outflows (PI_AST)	-0.10	-0.08	-0.03	-0.02	-0.10
Other investment outflows (OI_AST)	0.00	0.02	0.06	-0.13	0.01
Direct investment outflows (FDI_AST)	-0.03	-0.02	-0.17	-0.07	-0.04

Appendix 3. Accumulated impulse responses of capital flows to Cholesky one standard deviation innovations of other endogenous variables

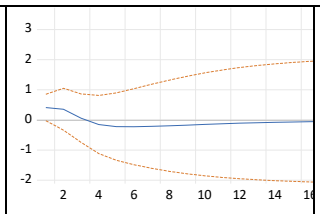
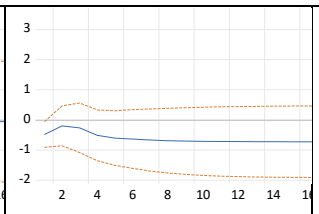
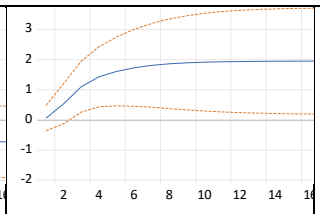
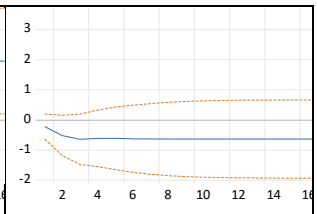
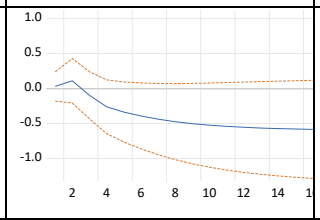
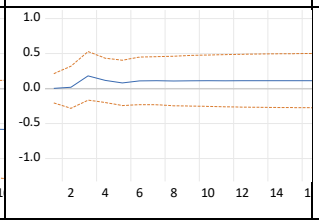
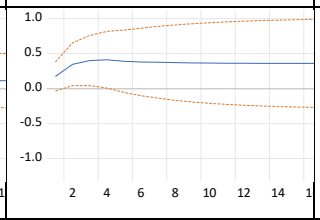
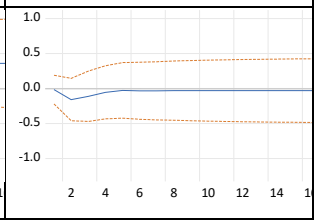
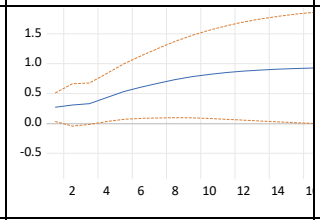
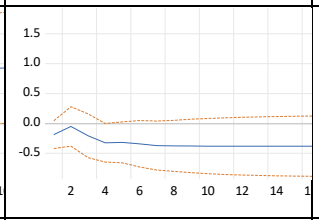
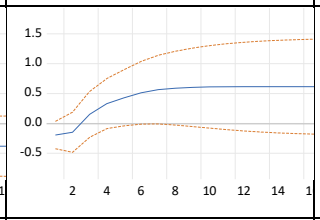
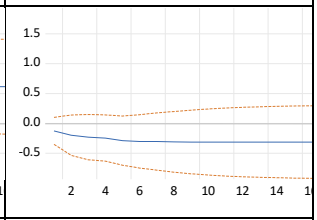
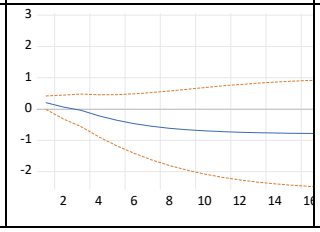
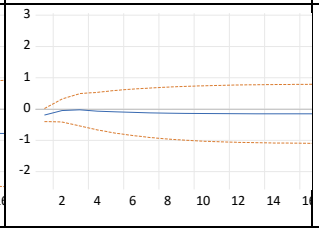
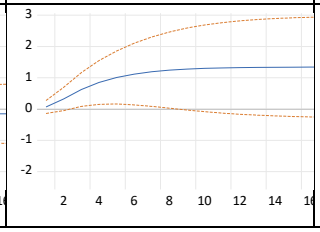
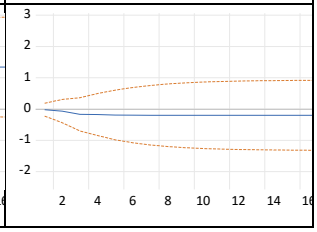
Capital inflows category	Log VIX	IDX	RRATE_DIF	D_CFMIX_IN
Portfolio inv. (PI)				
PI – public debt				
PI – priv. debt				
PI – equity				

Source: Author's calculation

Note: VIX represents the global financial market risk condition, IDX represents the domestic financial market risk condition, RRATE_DIF represents the real interest rate differential, D_CFM_IN represents the adjustment in CFM-inflow restrictiveness. The solid line represents the accumulated impulse response; the dotted lines represent 2 analytic (asymptotic) standard error of the impulse response. The response is generated using Cholesky decomposition (degrees of freedom adjusted) with a one standard deviation shock of other variables. The vertical axis is in billion USD, the horizontal axis represents time period (quarter).

Appendix 3. Accumulated impulse responses of capital flows to Cholesky one standard deviation innovations of other endogenous variables

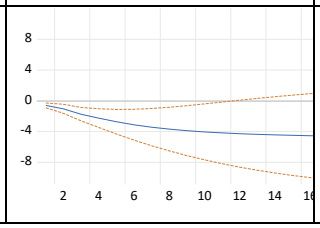
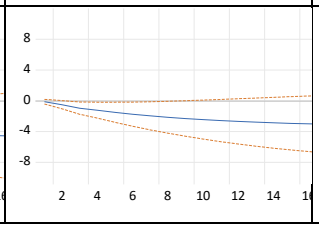
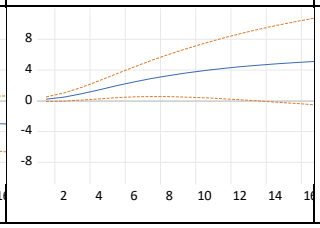
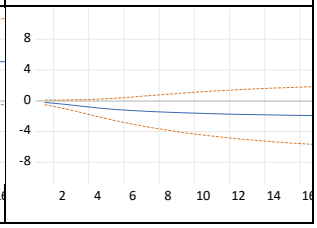
Capital inflows category	Log VIX	IDX	RRATE_DIF	D_CFMIX_IN

Other inv. (OI)				
OI – bank				
OI – public				
OI – other				

Source: Author's calculation

Note: VIX represents the global financial market risk condition, IDX represents the domestic financial market risk condition, RRATE_DIF represents the real interest rate differential, D_CFM_IN represents the adjustment in CFM-inflow restrictiveness. The solid line represents the accumulated impulse response; the dotted lines represent 2 analytic (asymptotic) standard error of the impulse response. The response is generated using Cholesky decomposition (degrees of freedom adjusted) with a one standard deviation shock of other variables. The vertical axis is in billion USD, the horizontal axis represents time period (quarter).

Appendix 3. Accumulated impulse responses of capital flows to Cholesky one standard deviation innovations of other endogenous variables

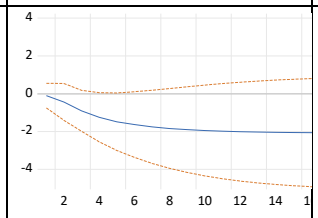
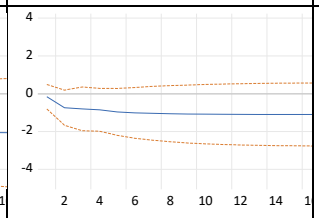
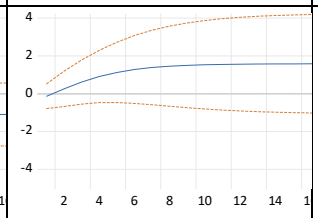
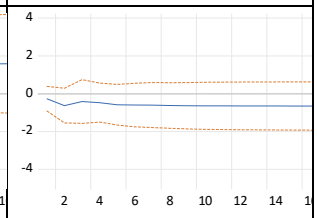
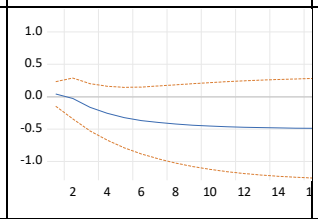
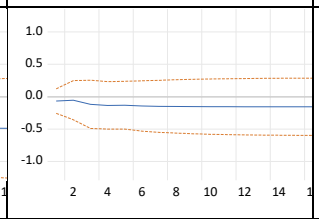
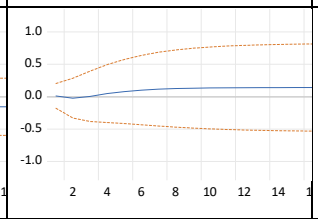
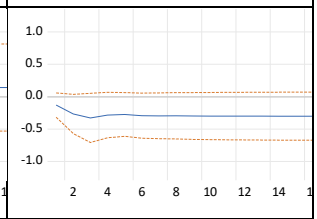
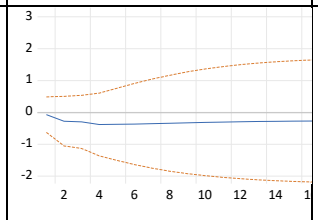
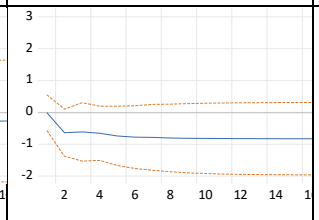
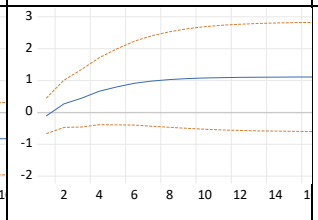
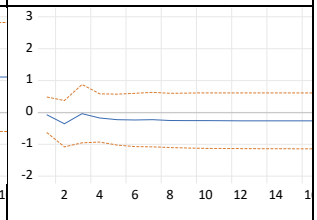
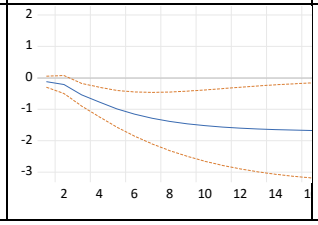
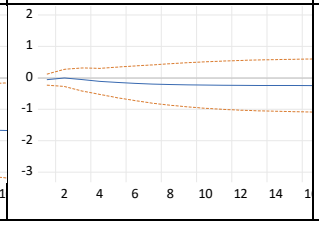
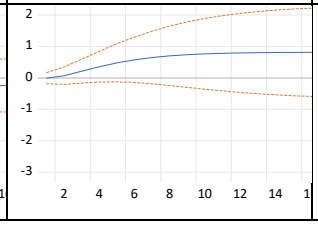
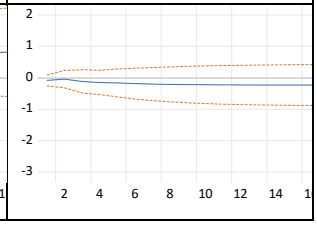
Capital inflows category	Log VIX	IDX	RRATE_DIF	D_CFMIX_IN
FDI				

Source: Author's calculation

Note: VIX represents the global financial market risk condition, IDX represents the domestic financial market risk condition, RRATE_DIF represents the real interest rate differential, D_CFM_IN represents the adjustment in CFM-inflow restrictiveness. The solid line represents the accumulated impulse response; the dotted lines represent 2 analytic (asymptotic) standard error of the impulse response. The response is

generated using Cholesky decomposition (degrees of freedom adjusted) with a one standard deviation shock of other variables. The vertical axis is in billion USD, the horizontal axis represents time period (quarter).

Appendix 3. Accumulated impulse responses of capital flows to Cholesky one standard deviation innovations of other endogenous variables

Capital outflows category	Log VIX	IDX	RRATE_DIF	D_CFMIX_OUT
Aggregate outflows				
Portfolio inv.				
Other inv.				
Direct inv.				

Source: Author's calculation

Note: VIX represents the global financial market risk condition, IDX represents the domestic financial market risk condition, RRATE_DIF represents the real interest rate differential, D_CFM_OUT represents the adjustment in CFM-outflow restrictiveness. The solid line represents the accumulated impulse response; the dotted lines represent 2 analytic (asymptotic) standard error of the impulse response. The response is generated using Cholesky decomposition (degrees of freedom adjusted) with a one standard deviation shock of other variables. The vertical axis is in billion USD, the horizontal axis represents time period (quarter)