Fine-Tuning an Open Capital Account in a Developing Country: The Indonesian Experience

SISIRA JAYASURIYA AND SHAWN CHEN-YU LEU

Indonesia has operated a liberal capital account permitting relatively free flow of international non-FDI flows since the early 1970s. In this paper, we review the Indonesian experience and the effectiveness of capital restrictions during 1990–2010 using a SVAR model of the Indonesian economy. Because of severe data problems in the pre-1997 period and because the Indonesian monetary policy and broader macroeconomic regime underwent fundamental changes since the 1997 crisis, we also estimated a model separately for the 2000–2010 period. Both sets of results suggest that inflow and outflow restrictions have been effective for FDI but largely ineffective for portfolio capital. However, the 2000–2010 model results indicate not only that restrictions on inflows have a short-term impact on restricting portfolio flows, but also suggest that controls on inward portfolio investments have some ability to shift funds from short-term to longer-term markets, though the impact is short-lived.

JEL classification: F30; F41

I. INTRODUCTION

Indonesia offers an interesting contrast in many ways to most Asian economies in terms of its experience with capital controls. It is often described as one of the few developing countries to have had a liberalized capital account since the early 1970s and as a country that went against conventional wisdom about the optimal sequencing of trade and capital account liberalization, opening the capital account well before serious liberalization of the trade regime which started only in the 1980s.[1] It abolished most direct exchange controls in 1970, unified the exchange rate, and permitted Indonesian firms to borrow directly from foreign banks. In the subsequent four decades, it resisted imposing direct exchange controls despite experiencing major macroeconomic turbulence and political convulsions, including episodes of massive capital flight as had occurred during the 1997 Asian financial crisis and, more recently, surges in capital inflows.

[1] See Hill (2000).

Sisira Jayasuriya is Professor, Department of Economics, Monash University, Melbourne, Australia. Shawn Chen-Yu Leu is Senior Lecturer, School of Economics, La Trobe University, Melbourne, Australia.

The Indonesian capital account was not "fully open" in the early 1970s as there remained many regulatory restrictions on overseas bank borrowings and foreign direct investment (FDI) despite removal of direct exchange controls.[2] Controls on FDI were progressively removed from the late 1980s onwards, but there had been measures taken from time to time to restrict short-term capital movements. Overall, it seems appropriate to describe the specific regulatory measures Indonesia implemented to influence cross-border capital flows as attempts to fine-tune an open capital account, as it clearly had a much more open capital account since the early 1970s compared with most of its neighbors in developing Asia.

In this paper, we describe and evaluate the effectiveness of measures to control cross-border capital movements in Indonesia during 1990–2010. The paper is structured as follows. In Section II, we present a brief review of the macroeconomic history and context, highlighting the major changes in economic circumstances and macroeconomic policy framework before and after the 1997 crisis, and a qualitative analysis of the most important capital control measures adopted in 2003–2004. In Section III, we describe the construction of a capital restriction index based on the methodology outlined in Schindler (2009) and elaborated in Jongwanich, Gochoco-Bautista, and Lee (2011). Section IV describes the specification of a structural vector autoregression (SVAR) model, while Section V discusses some major data issues and limitations, the empirical estimation and diagnostics of the reduced-form VAR model, and impulse response functions to a number of macroeconomic shocks. In Section VI, we discuss dynamic responses to various capital flow restrictions, including some robustness checks to explore the effectiveness of capital control measures. Section VII concludes with a summary of the main findings.

II. BACKGROUND ON CAPITAL CONTROLS

From the mid-1970s to the 1997 crisis, Indonesia's balance of payments (BOP) and overall macroeconomic developments were dominated by the oil discoveries that made Indonesia an important oil exporter. Oil revenues provided the government with a huge revenue base, eased BOP pressures that had been a persistent feature in previous times, and enabled the government to undertake large-scale expenditure on infrastructure investments as well as support expansion of import-competing manufacturing industries, which were often dominated by politically favored private interests. Trade liberalization was discouraged as Dutch Disease effects from the oil boom generated political pressure for protection of these import-competing industries as well as the more traditional

[2]From time to time, regulatory measures were taken to constrain cross-border flows. See Arndt (1974) and Grenville (1976) for more details.

export sectors, resulting in an escalation of trade barriers.[3] The availability of oil funds also meant there was less need for reliance on foreign investments. Restrictions on FDI increased beginning the mid-1970s and further tightened in 1982–1986 (Fane 1999, Hill 1988). Though exchange controls were removed in the early 1970s, the highly regulated domestic financial system limited integration with the global capital market.

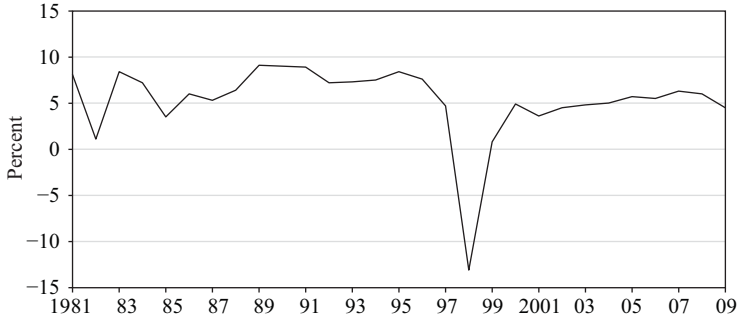
A. Trade, Investment, and Financial Sector Reforms

An important shift in Indonesian trade and investment policies occurred around the mid-1980s.[4] In early 1985, some major trade reforms reduced average tariffs by around a third and set in motion a process that continued over the following years. This opened up the trade regime substantially, though such liberalization had been quite discriminatory as "business ventures connected with the President's family or associates received some spectacular privileges" (Fane 1999, 660). The reform process broadened with the sharp fall of oil prices in 1986 when the government recognized the need for foreign investment to maintain growth momentum and started to open up most sectors of the economy to FDI (except for traditional handicrafts). There were also important financial sector deregulation measures in 1988 that eased domestic and international market integration.

In the context of a stable exchange rate, a conservative fiscal stance, and what appeared to be a very stable authoritarian pro-western government, these reforms facilitated a continuation of rapid economic growth from the late 1980s until 1997, when it was interrupted dramatically by the Asian financial crisis (Figure 1). Between 1989 and 1996, Indonesia was one of the region's fastest growing economies, with average annual growth of 7.2%, relatively low inflation (below 10%), and unemployment below 5%. Per-capita GDP had risen from $596 in 1990 to $1,155 in 1996 (Goeltom 2008). Figure 1. Indonesia Annual GDP Growth, 1981–2009

[3] See Warr (1986) for an analysis of Indonesia's Dutch Disease.
[4] See Fane (1999) for a discussion of the reform process.

Figure 1. **Indonesia Annual GDP Growth (%): 1981–2009**



Source: World Bank.

Indonesian authorities were generally able to exercise a significant degree of monetary policy independence despite having a fixed exchange rate and virtually open capital account in the 1970s and 1980s. This was only possible in practice because the domestic financial market was only weakly integrated to global markets. Domestic market regulations and imperfections meant that capital movements were dominated by government borrowings and FDI. This started to change from the late 1980s however when private capital flows, often unrecorded and nontransparent, started to increase. Such inflows, which included large-scale foreign borrowings by the Indonesian corporate sector, began to play a larger role by the 1990s (Grenville 2004).

Indonesia shifted from a positive list to a negative list for FDI in 1989. This list was shortened during the early 1990s further expanding the sectors open to foreign investment. Private capital movements sensitive to interest differentials tended to increase beginning the late 1980s. As domestic interest rates were typically much higher than foreign interest rates—though part of this reflected inefficiencies in the domestic financial sector—there were inducements for foreign borrowing and capital inflows, though these were tempered by expected rupiah depreciation and country risk considerations. Indonesian authorities acted to impede capital inflows and offshore commercial borrowing induced by such interest rate differentials following rapid growth of money supply in 1989 and 1990, which fueled inflation and led to the so-called shock treatment and "tight money policy" adopted beginning March 1991. Measures put in place to curb the level of short-term capital account transactions included tighter restrictions on foreign borrowings, e.g., re-imposing limits on short-term and medium-term borrowings by banks and requiring approval for foreign borrowings of investors for any project connected with state enterprises.

There were several major crises in the banking system involving bank insolvency and bank collapses between 1990 and 1992 and also problems of mismanagement, manipulation, and fraud in the Jakarta Stock Exchange. In 1993 and early 1994, Bank Indonesia (BI) vigorously attempted to sterilize large

disturbances to base money caused by volatile capital flows that were influenced by a rapidly changing differential between domestic and foreign interest rates, shifting expectations about the future value of the rupiah (given volatility in oil prices), growing concerns over the soundness of the banking system, and a rapidly expanding stock market. BI's net foreign assets increased by Rp5.2 trillion from October 1993 to February 1994, then fell sharply over the next three months by Rp7.3 trillion (Pangestu 1994).

BI regulations were at best poorly enforced in practice. This was certainly the case for politically favored institutions. A thriving offshore market in rupiah in Singapore enabled spot and swap transactions with international currencies such as the US dollar, affecting domestic interest rates.[5] Such markets had been widely utilized by politically powerful corporations and individuals, and BI would have been able to exercise little or no control over them even if it wanted to. BI itself had no political independence, as the governor was appointed directly by the President. Pangestu (1994, 30) drew the following conclusion from a comparison of various data sources and the different "adjustments" made to the valuation of foreign reserves by BI: "These comparisons would appear to confirm that international capital mobility has a much stronger impact on Indonesia's international reserves than is apparent from official figures." At the same time, as McLeod (1993, 25) observed, measures to control short-term private capital movements and transactions were "not totally effective."

Indonesia enjoyed a boom in FDI in 1995–1996, with a doubling of such flows over the previous year. Portfolio inflows also started to increase rapidly with foreign inflows accounting for about 70% of the trading volume of the Jakarta Stock Exchange in 1995–1996. Recognizing the limitations of monetary policy in the context of a fixed exchange rate regime and an open capital account, BI moved to widen the exchange rate band to gain some policy flexibility.

Large short-term private capital flows in the context of a weak and crisis-ridden banking system and an open capital account held the potential for a crisis in the event of a major shock. This seemed to be on the horizon as concerns about political instability emerged in the mid-1990s with rising speculation that the Suharto presidency would soon come to an end.[6] In August 1996, Manning and Jayasuriya (1996, 11) observed that: "With a very open capital account, Indonesia can be vulnerable to destabilizing capital movements caused by changes in investor confidence, the result of actual or potential (even imaginary!) political crises."

The crisis came in mid-1997, though the trigger was not a domestic political crisis but a financial crisis in Thailand. By July 1997, Indonesia was

[5] For a detailed discussion, see Fane (2005).

[6] Almost no one envisaged at the time that a popular uprising would throw out President Suharto. The post-Suharto scenarios were generally predicated on a Suharto "retirement" at a time of his choosing.

caught up in a contagion with devastating consequences for the economy, effects of which are still being felt.

B. 1997–1998 Crisis and the Aftermath

The 1997 crisis marked a watershed in Indonesian economic and political development. Indonesia was the worst affected country among its neighbors and took the longest time to recover, but it has by and large retained a basic commitment to a liberal economic policy regime and maintained a commitment to open trade policy and a liberalized capital account. The one major change in its external economic policy brought about by the 1997 crisis had been a shift to a floating exchange rate regime (albeit with substantial interventions) from the previous fixed exchange rate regime where the currency was effectively pegged to the US dollar.

In the immediate aftermath, Indonesia had to battle persistent political and economic instability, as it attempted to restore battered financial and banking systems, recover investor confidence, and regain growth momentum. Until 2004, Indonesian macroeconomic policies were tightly constrained by agreements with the IMF. Until the second half of the decade, it experienced persistent capital outflows, inflationary pressures, downward pressure on the exchange rate, and high exchange rate volatility. The situation started to change from the second half of the decade, as Indonesia began to reap the rewards of the transition to a functioning democracy that re-established financial and banking institutions and began a slow but steady economic recovery. The economy proved to be surprisingly resilient when confronted by the global financial crisis of 2008. It has been growing strongly since 2009 and even grappling with surging capital inflows. Although managing such flows poses complex problems, this represents a welcome change from the many years of persistent capital outflow pressures that characterized the post-1997 crisis period.

The 1997 crisis had been triggered by massive capital flight and led to the floating of the rupiah in August that year, in turn leading to further capital flight and rapid currency depreciation. High interest rates failed to arrest capital flight but contributed to a banking crisis and liquidity squeeze. We will not discuss the causes and consequences of the 1997–1998 crisis in any detail, as there is a huge and well known literature on this topic with continuing debates about the factors that contributed to the financial crisis becoming transformed into a catastrophic economic collapse.

We note several crisis-related developments of direct relevance to subsequent macroeconomic policy developments, all relating to a series of agreements contained in IMF Letters of Intent (LOIs). First, Indonesia did not follow its neighbor Malaysia in imposing capital controls to stem capital flight but instead maintained an open capital account. However, it did issue a regulation to

restrict indirect lending by onshore banks to nonresidents through the swap market. Second, Indonesia shifted from a dollar-pegged fixed rate and undertook the "orthodox" IMF policy prescription of floating the exchange rate, allowing authorities to use market-based monetary policy instruments (i.e., interest rate policies). (In practice, the shift to a floating exchange rate regime did not imply a free float as the exchange rate, particularly the US dollar–rupiah rate, became a very politically sensitive indicator of the underlying health of the economy and investor confidence). Third, as part of a comprehensive institutional restructuring, Indonesia enacted legislation to establish the independence of BI, thus creating some unexpected problems in the early post-Suharto years. Fourth, Indonesian macroeconomic policies were quietly and tightly constrained by the IMF LOIs until the end of 2003. These included targeting base money as a key plank of BI monetary policy with the objective of controlling inflation.

The debate over the IMF-supported policy responses to the Indonesia crisis, including the opposition to any form of capital controls, continues to this day. Reportedly, Indonesian authorities seriously considered some form of capital control in early 1998 as the rupiah continued to slide. The government, however, backed off under intense pressure from the IMF. In June 2000, the Indonesian officials again considered controls to stabilize the rupiah but were compelled to reject such a measure under direct pressure from the IMF.[7]

On the other hand, as can be seen in Appendix A, the desire to attract FDI (not only to traditional economic sectors such as plantations but also to the banking sector which was in dire need of recapitalization) led to a series of measures in 1998 and 1999 that further relaxed or removed regulations hindering the inward flow of FDI. By 2000, Indonesia was much more open to FDI than prior to the crisis, though this did not succeed in inducing significant inflows. Instead, net private investment flows of all types continued to be negative.

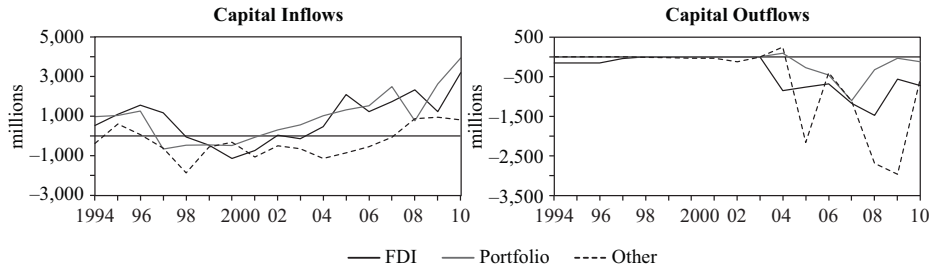
C. Early Post-Crisis Period: Persistent Capital Outflow Pressures

The early post-crisis years were characterized by continuing political instability, persistent net private capital outflows (both portfolio and FDI), inflationary pressures, and exchange rate volatility. The importance of the level of the nominal ($/Rps) exchange rate as a confidence factor meant that frequent BI interventions were necessary to maintain the level within "acceptable" bounds. As

[7]The following was reported in The New York Times (06 June 2000): "The IMF's chief, Horst Kohler, emerged from a breakfast meeting with President Abdurrahman Wahid and briskly dispelled speculation that the IMF would agree to an Indonesian effort to defend its faltering currency, the rupiah, by placing controls on the currency. 'The president and I fully agreed that the introduction of capital controls would be counterproductive,' said Mr. Kohler, who was making his first visit to Jakarta as IMF director. 'He feels that it would be the wrong decision, and I agree, because such a decision would deter foreign investors.' Later in the day, a senior economic adviser to President Wahid, Sofyan Wanandi, said: 'It's over. It's not going to happen.'" (http://www.nytimes.com/2000/06/06/business/international-business-imf-warns-indonesia-against-capital-controls.html).

mentioned in the previous section, capital controls were effectively ruled out under IMF pressure.

Figure 2. **Capital Flows in Indonesia: 1994–2010 (Bank Indonesia)**



FDI = foreign direct investment.
Source: Bank Indonesia.

In early January 2001, BI announced one of the few capital control measures enacted since the crisis. "On 15 January 2001, Bank Indonesia surprised the business community in Indonesia and Singapore by announcing a complex regulation to curb the supply of rupiah to foreigners and offshore accounts. Rupiah transactions with foreigners or Indonesians permanently residing overseas were prohibited, and allowable forward currency transactions and bank positions were reduced from $5 million to $3 million, except for investment hedging. Parties were allowed until 7 February to settle outstanding positions. The rationale was to restrict speculation against the rupiah. Some speculation had been occurring because the very low foreign currency spreads in Singapore enabled anyone with substantial rupiah deposits to make money by forward swaps against small day-to-day movements in the rupiah" (Dick 2001, 14). However, while this created initial consternation among the investors, there was no evidence that the measure was strictly enforced or that it had any major impact. It had been announced during the last period of the outgoing government in the midst of considerable political instability and uncertainty.

Writing in mid-2001, after the election of a new government, Pangestu and Goeltom (2001, 15) emphasized the continuing pressure on the rupiah in this context of fragile confidence, high inflation, and open capital account: "Moreover, holding rupiah is currently unattractive, since the covered interest rate differential is negative, that is, the swap premium is so high as to more than offset the differential between rupiah and foreign currency interest rates. On the supply side this is evident also in a reluctance on the part of exporters to convert their revenues to rupiah." Though political pressures against raising domestic interest rates reduced room for maneuverability and capital control measures would have appeared attractive, such instruments were not considered as the IMF grip on domestic policymaking remained very strong (though the government repeatedly

failed to meet many targets) while the new Megawati government had been keen to regain IMF trust.

D. Regulations on Commercial Banks' Net Open Positions as a Capital Control Measure

Though Indonesia signed another LOI with the IMF in March 2003, a nationalist reaction was developing against perceived over-reliance on IMF policies which had served the country poorly (MacIntyre and Resosudarmo 2003). Inflationary pressures had been contained while the rate of private capital outflows had decelerated, but investor sentiment remained volatile, banking sector problems persisted, and the currency continued to be under pressure. In July 2003, BI issued a regulation on net open positions of commercial banks that obliged the latter to maintain a net foreign currency position on an overall basis (i.e., on-balance and off-balance sheet) up to a maximum of 20% of bank capital. However, the impact of this measure on commercial banks' ability to engage in foreign currency transactions was limited as they were able to use swap markets to get around the intent of the regulation.[8]

These conditions continued through 2004 when the currency again started to slide rapidly, prompting BI to attempt to restrain "currency speculation."[9] In May 2004, it was reported that the BI governor had written to four foreign banks warning them to refrain from speculating against the rupiah (*Jakarta Times* 14 May 2004). These were followed later in the year by the rupiah stabilization policy package of June 2004. The new prudential regulations on net open foreign exchange positions of commercial banks substantially hindered their ability to trade in the swap market (Fane 2005). In its *Economic Report on Indonesia 2004*, BI presented data on volume of swap transactions and rupiah volatility following this measure to demonstrate that these measures achieved some success in increasing the depth (liquidity) of the spot market and reducing its volatility and also boosted domestic interbank swap transactions helping to deepen the foreign currency market.

When the global financial crisis erupted in the second half of 2008, deteriorating export prospects and changing risk perceptions placed renewed pressure on the rupiah and the currency traded down to Rp12,000 per US dollar. As part of its policy response, after initial steps taken to increase access to foreign currency, BI implemented restrictions on "speculative transactions," apprehensive of further destabilizing capital outflows. By 2009, however, it was facing a very different problem.

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[8] See Fane (2005) for a detailed discussion of this issue.

[9] According to BI's *Economic Report on Indonesia 2004*, "depreciation pressures on the rupiah reached a peak in early May 2004, as short-term foreign capital outflows surged and expectations of further weakening prompted foreign currency purchases by domestic players (a bandwagon effect)."

E. Coping with Short-Term Capital Inflows: 2009–2011

After the initial shock, the Indonesian economy rebounded and proved surprisingly resilient, registering solid economic growth throughout 2009. As with other parts of Asia, Indonesia now became an attractive destination for global investors looking for profitable investment opportunities. In 2009, large inflows of portfolio capital drove the Indonesian stock market up 87%. After battling downward pressures on the currency for many years after the 1997–1998 crisis, Indonesia now found itself having to cope with surging capital inflows and real exchange rate appreciation. The issue of capital controls resurfaced but this time because of concerns about excessive short-term inflows. Some new control measures, primarily prudential regulations directed at impeding short-term interest arbitrage transactions (mainly swap transactions) and shifting inflows into longer maturity assets were put in place. An interesting new development is that private international investors moved into purchases of government bonds and BI securities, adding a volatile new element and complicating attempts at stabilizing short-term capital flows. The policy response included offer of longer maturity securities, minimum holding periods, and nontradable deposits. As capital flows have been subject to frequent external shocks, it is difficult at this stage to isolate and assess the impact of these policy measures.

III. CAPITAL CONTROL INDICES

We used information on changes to capital account restrictions from published material from the Bank of Indonesia as well as the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* and constructed capital restriction indexes following the methodology outlined in Schindler (2009) as elaborated in Jongwanich, Gochoco-Bautista, and Lee (2011). In this procedure, capital restriction measures are first divided into two categories, those affecting net capital inflows (liabilities) and those affecting net capital outflows (assets). Within these two categories, the flows are further disaggregated into four types: FDI, equity securities, debt securities, and other investment flows.

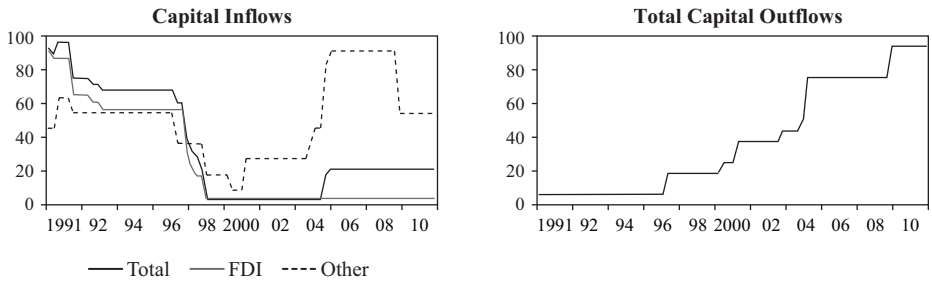
The capital control indices are constructed by assigning +1 or –1 to each announced measure. Any measure that relaxes inflows and facilitates outflows is assigned +1 regardless of the source of the flows, whether residents or nonresidents. Any measure that restricts inflows as well as outflows is assigned –1. The number is scaled by different weights based on direct and indirect impact criteria. The weight is set at between 0 and 2—the higher the weight, the more severe the measure, especially from policymakers' point of view. For example, a measure designed to directly relax or block capital flows greater than $50 million is given a weight of 2; if the flow is less than $5 million, the weight assigned is

0.5. In addition, a weight of 0.25–0.5 is given when the central bank changes the regulation slightly, seeks the cooperation of, or provides a particular option for investors, including financial institutions. The weight is increased to 1 when the central bank requests and/or requires investors or financial institutions to undertake certain measures. A weight of 2 is assigned when the central bank imposes a tax, unremunerated reserve requirements (URR), a two-tier market, or lifts certain policy measures.

Once a number (+1 or –1) and weight have been assigned to each measure, the numbers are sequentially accumulated over time to arrive at the indexes for each asset class.[10] The indexes are rescaled to lie between 0 and 100 to be able to compare them with Schindler (2009) so that 100 represents capital restrictions and 0 represents capital liberalization. The capital restriction indexes are constructed based on monthly information and the simple average over 3 months is calculated to generate quarterly indexes.[11]

A chronology and description of capital restriction and liberalization measures adopted in Indonesia during 1990–2010 is given in Appendix A. Due to data limitations, we constructed three capital restriction indexes: total flows, FDI, and "other flows" drawing on both published material and on the judgments of several Indonesian analysts familiar with BI activities in assigning weights to particular measures. The last category consists of private short-term capital flows dominated by portfolio type flows. The indexes are presented in Figure 3.

Figure 3. **Capital Restriction Indexes**
(An increase in the index number indicates tighter capital controls)



FDI = foreign direct investment.
Source: Authors' calculation.

[10] Note that to be able to compare the control indexes across the asset types, the maximum accumulation value of a particular asset type is used as a base for the index.

[11] We have used a scale of 0–100 rather than 0–1.

IV. AN SVAR MODEL OF CAPITAL CONTROL

To assess the effectiveness of capital control measures in Indonesia, we set up the following SVAR model and organize the contemporaneous structural macroeconomic relationships in a recursive fashion:

$$\Gamma_0 X_t = \mu + \Phi D_t + \sum_{i=1}^{m} \Gamma_i X_{t-i} + \sum_{j=0}^{n} \Lambda_j Z_{t-j} + \varepsilon_t \tag{1}$$

where $X_t = \left(y_t, rr_t, q_t, cf_t, ci_t\right)'$ is the endogenous variable vector, where y_t represents real output, rr_t denotes the differential between domestic and foreign real interest rates, q_t represents the real exchange rate defined as the foreign goods cost of one unit of domestic goods (i.e., a rise in the value of q_t represents real appreciation), cf_t denotes capital flows (we consider measures of net aggregate inflows and outflows), and ci_t denotes the capital restriction index (which is constructed separately for inflow restrictions and outflow restrictions). The contemporaneous recursive structure is summarized in the matrix Γ_0 as follows (with zeros above the diagonal suppressed):

$$\Gamma_0 X_t = \begin{bmatrix} 1 & & & & \\ * & 1 & & & \\ * & * & 1 & & \\ * & * & * & 1 & \\ * & * & * & * & 1 \end{bmatrix} \begin{bmatrix} y_t \\ rr_t \\ q_t \\ cf_t \\ ci_t \end{bmatrix} \tag{2}$$

where an asterisk indicates that the variable is present in the equation. We assume that real output reacts to the fluctuations of other macroeconomic variables in the system with a lag due to the time required to adjust for production cost and schedule in the goods market. Hence, y_t is placed first in the recursive ordering. The real interest rate differential (rr_t) is taken to approximate the monetary policy stance in the domestic economy and is assumed to respond to contemporaneous movements in output. The real exchange rate (q_t) and capital flows (cf_t) are treated as financial variables in the system. Capital flows are ordered after the real exchange rate on the basis that movements of international capital are sensitive to real exchange rate fluctuations, directions and changes in the real interest rate differential, and the level of economic activity.

Though Indonesia did not resort to capital controls during the period of massive capital flight in the 1997–1998 crisis due to IMF pressure, our discussion of the historical evolution of capital controls in Indonesia supports Edwards (1999a), who argued that in most emerging market economies the extent and coverage of capital control measures have been adjusted in response to changes in

the magnitude of capital flows. Hence we place the capital restriction index variable (ci_t) last in the recursive system to reflect this endogeneity.[12]

A constant (μ) is included in each endogenous variable equation. In the deterministic variable vector, three seasonal dummies and a dummy variable that covers the period of the Asian financial crisis (Q3 1997 to Q4 1998) are included in D_t.[13] Given that Indonesia is a small open economy, we include two foreign variables to capture the interaction between the domestic and world economies. These enter into the SVAR system as exogenous variables, $Z_t = \left(y_t^*, sp_t^*\right)'$, where y_t^* represents foreign real output and sp_t^* the foreign real share price index.

To complete the description of the SVAR model, the structural disturbances, $\varepsilon_t = \left(\varepsilon_t^y, \varepsilon_t^{rr}, \varepsilon_t^q, \varepsilon_t^{cf}, \varepsilon_t^{ci}\right)'$, are assumed to be white noise processes.

V. DATA AND EMPIRICAL RESULTS

In estimating and using the model to study the impact of capital restriction measures in Indonesia, we were conscious of the severe data problems relating to capital flows in Indonesia, particularly for the pre-2000 period. As Mcleod (1993), Pangestu (1994), Hill (2000), and many others have pointed out, the capital flow statistics provided by BI, particularly short-term capital flows and private foreign debt, are extremely unreliable and inaccurate. Many "hot money" flows were not reported at all in the official statistics, and there are huge discrepancies between the rupiah values of foreign reserves reported in BI's balance sheet and the dollar values reported in *Indonesian Financial Statistics.* It is widely believed that BI deliberately misreported the true value of reserves because of concerns about the possibility of large scale capital flight.[14] Further, BI had poor administrative capacity for effective monitoring and supervision of the banking sector and political considerations precluded closer monitoring of the activities of politically well-connected financial institutions and banks.[15] Some of these limitations also apply to IMF data, particularly to data on capital flows.

The data we use are quarterly and range from Q1 1991 to Q3 2010. The financial data are obtained primarily from the International Financial Statistics (IFS) database to ensure consistency except for the capital restriction index which

[12] We also considered the placement of the capital restriction index variable first in the recursive ordering as in Edwards (1999a) for the purpose of generating a contemporaneously exogenous policy shock on the rest of the macroeconomic variables in the system. This alternative decomposition scheme is not reported as the results did not generate sensible impulse response functions.

[13] The inclusion of the seasonal dummies intends to deal with potential seasonal effects as we use seasonally unadjusted data (e.g., Indonesian manufacturing output).

[14] Mari Pangestu (1994, 31), currently Indonesia's minister for trade, noted that "the figure for 'errors and omissions' in the 1993–1994 BOP was of a similar size to that of the recorded current account deficit!"

[15] Hill (2000, 91), for example, points to the "implausibility" of BI data that indicates no significant increase in Indonesia's short-term debt during 1991–1995.

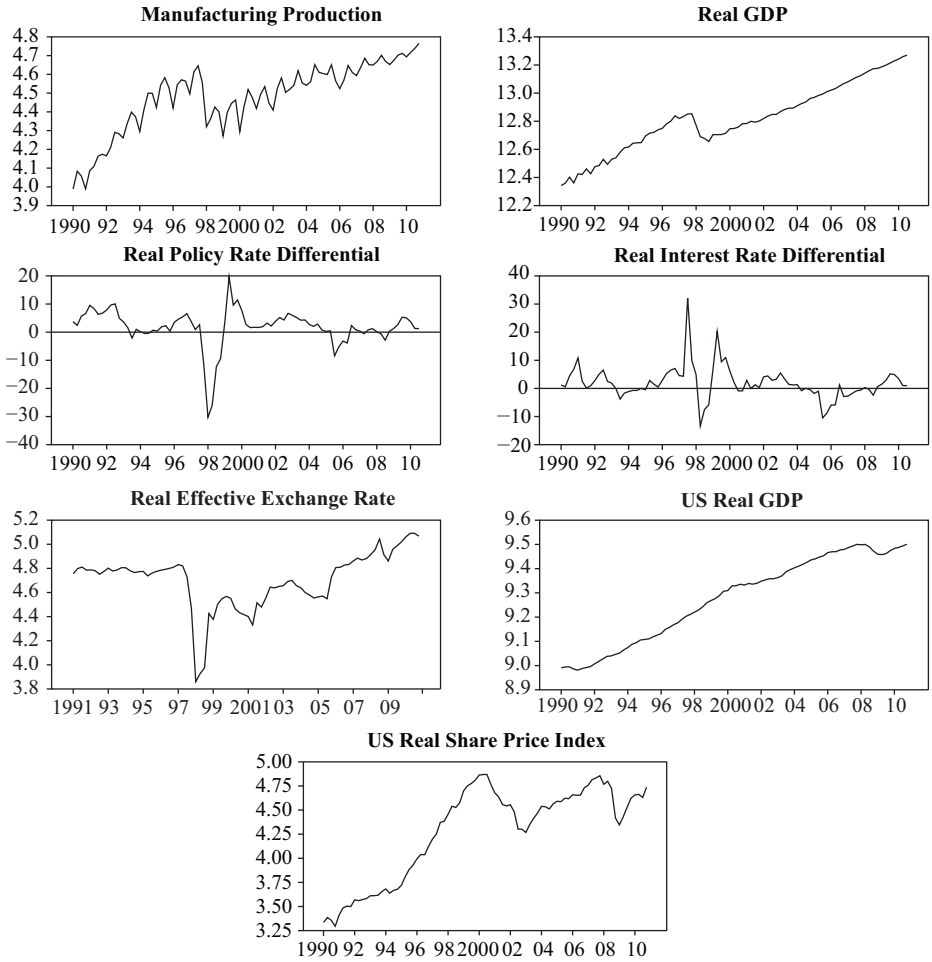
we constructed and the real effective exchange rate which we extracted from the World Bank database. For real output, we estimate the SVAR model using real manufacturing output (from IFS data) and real GDP data (obtained from BI sources) for comparison. The differential between domestic and foreign real interest rates is computed in two ways: the first is the difference between the Indonesian central bank policy rate and the US federal funds rate (labeled as the real policy rate differential in the impulse response analysis) and the other is the difference between the Indonesian money market rate and the US Treasury bond rate (labeled as the real interest rate differential). The real interest rate is the nominal rate less the inflation rate, i.e., $r_t = i_t - \pi_{t+1}$, where inflation is calculated as the annual change in the log of the CPI.[16]

Since the capital control measures implemented by BI aimed at either influencing capital inflows or outflows (see Appendix A for the description of the capital control measures implemented during the sample period), we consider the effectiveness of capital restrictions on the two types of flows. That is, we examine the impact of tighter capital inflow restriction on the aggregate level of net inflows and the impact of tighter capital outflow restriction on the aggregate level of net outflows. We further examine the effectiveness of capital controls on the three types of flows, i.e., FDI, portfolio investment, and "other investment".[17] All of the capital flow measures are expressed as percentages of GDP for estimation. For foreign variables that proxy the global influences on the Indonesian economy, we use US real GDP and the US real share price index (Figure 4).

[16]We also tried current inflation and inflation lagged one period but found that this specification gives the most sensible impulse response functions, suggesting that inflationary dynamics in Indonesia may be forward-looking.

[17]We could not compute the dynamic response of portfolio investment outflow with respect to tighter outflow restriction because there are only 28 observations available for this outflow category (from Q1 2004 to Q3 2010).

Figure 4. **Other Primary Macroeconomic Variables**



Source: IFS database; World Bank database.

A. Diagnostics of the Reduced-Form VAR

The examination of the SVAR model through impulse response functions is preceded by performing a battery of diagnostic tests to check the statistical adequacy of the reduced form (Spanos 1990).

The benchmark specification uses manufacturing output for y_t, total net capital inflow (as a ratio to GDP) for cf_t, and the capital inflow restriction index for ci_t. For rr_t, we use both the real policy rate differential and the real interest rate differential for comparison purposes. We use the benchmark specification and its impulse response analysis with manufacturing output in the model estimated for

the entire period because when we used the real GDP data to estimate the SVAR model we obtained explosive dynamic responses of real output to various macroeconomic shocks in the system.[18] We note here that quarterly GDP data come from constructed series and are subject to the limitations inherent in such series. As will be seen later, we do not encounter this problem when the model is estimated for the post-2000 period.

The lag orders of the endogenous and exogenous variables are allowed to differ.[19] The dynamic structure used for estimation is three lags of the endogenous variables and one lag of the exogenous variables.[20] The results of the diagnostic tests on the reduced-form benchmark VAR(3,1) are reported in Table 1a. These residual diagnostic tests cannot reject the null hypotheses of no serial correlation and the absence of ARCH effects at the 5% significance level except for the presence of ARCH effects in the capital flow equation. Apart from the output equation, non-normality is detected in the remaining equations (but not for the real exchange rate equation when real interest rate differential is used). When the results are assessed together, there is general support for the statistical adequacy of the model.[21]

Table 1a. **Reduced-form Diagnostics on the Aggregate Inflow VAR (rr_t = real policy rate differential)**

	y_t	rr_t	qt	cf_t	ci_t
Q(1)	0.42	1.23	0.82	2.97	2.38
	(0.52)	(0.27)	(0.37)	(0.09)	(0.12)
Q(3)	4.79	6.43	1.60	4.08	6.38
	(0.19)	(0.09)	(0.66)	(0.25)	(0.09)
ARCH(3)	3.57	0.96	8.00	27.1	0.56
	(0.31)	(0.81)	(0.05)	(0.00)	(0.90)
J-B	0.34	11.3	76.7	154	1568
	(0.84)	(0.00)	(0.00)	(0.00)	(0.00)

Source: Authors' calculations.

[18] Hence when we refer to "output" in the following discussions, we mean "manufacturing output."

[19] Keating (2000) termed this approach 'asymmetric VAR' which permits greater flexibility in specifying the dynamics.

[20] Given the quarterly data and its relatively small sample size, the upper bound was initially set at 4 lags for both the endogenous and exogenous variables. The Akaike information criterion selected VAR(1,1). However, we tested further to seek a specification that better captures the dynamics of the multivariate system. Using the likelihood ratio test where the null is VAR(1,1) against the alternative of VAR(3,1), the test statistic is $\chi^2(50) = 100.8$ with p-value = 0.00, hence the test rejects the null in support of the alternative hypothesis.

[21] Based on Bayesian inference, our estimation procedure without differencing is valid given our computation method for confidence intervals, though it is generally the case that the order of integration of the variables in the VAR system should be checked and variables transformed as appropriate to explore potential long-run cointegrating relationships that may emerge from I(1) variables. We thank Professor Soyoung Kim for clarifying this point.

Table 1b. **Reduced-form Diagnostics on the Aggregate Inflow VAR (rr_t = real interest rate differential)**

	y_t	rr_t	q_t	cf_t	ci_t
Q(1)	0.06	0.19	0.14	0.02	3.27
	(0.80)	(0.66)	(0. 71)	(0.89)	(0.07)
Q(3)	3.76	1.42	0.55	0.39	5.93
	(0.29)	(0.70)	(0.91)	(0.94)	(0.12)
ARCH(3)	1.23	0.46	5.55	12.3	3.09
	(0.75)	(0.93)	(0.14)	(0.00)	(0.38)
J-B	0.15	94.1	2.96	1.83	1600
	(0.93)	(0.00)	(0.23)	(0.40)	(0.00)

Note: P-values are reported in parentheses for the diagnostic tests. The univariate tests are the JB test statistic that conducts the Jarque-Bera test for non-normality, ARCH(3) gives the F-test statistic for heteroscedasticity with 3 lags, and Q(1) and Q(3) are the Ljung-Box tests based on serial correlation with 1 and 3 lags, respectively.

Source: Authors' calculation.

B. Impulse Response Functions

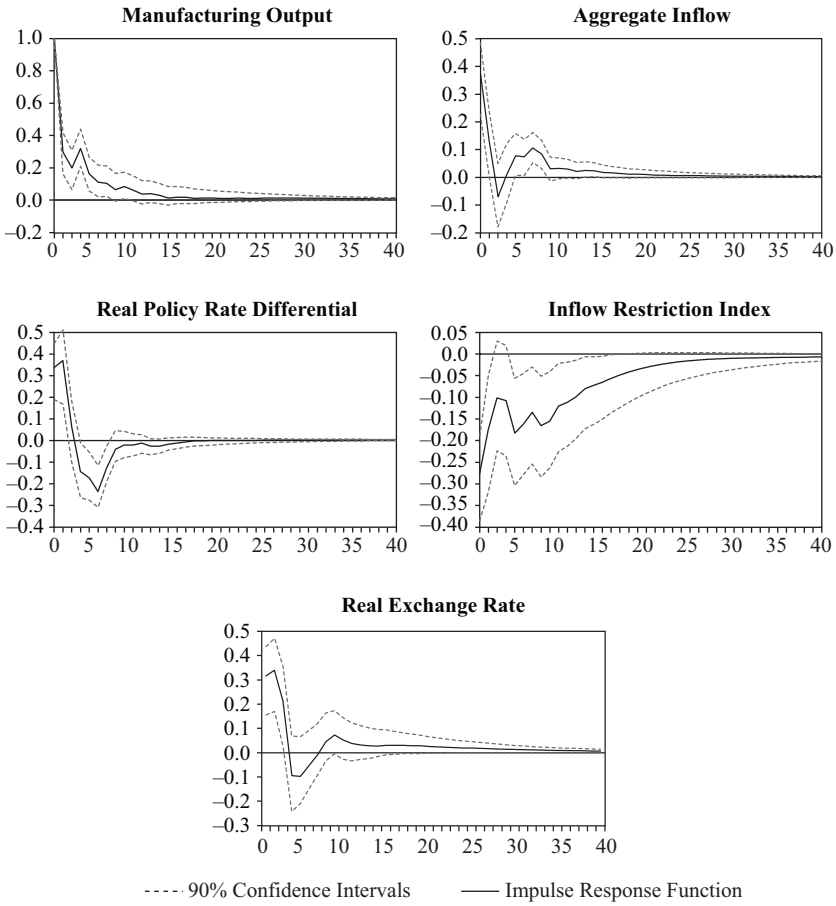
Given the recursive identifying assumptions (2) imposed on the SVAR model, we examine the dynamic responses of the macroeconomic variables subject to five structural shocks, i.e., real output, real rate differential (policy rate and market rate differentials), real exchange rate, capital flow (the nature of the shock depends on the definition), and capital restriction shocks (either restrictions on inflows or restrictions on outflows). The impulse response functions are reported in Figures 5–9 with 90% confidence intervals.

All responses show mean-reversion which reflects the stationary properties of the SVAR model. The estimated dynamic responses based on the real market rate differential exhibit greater cyclical variations. The impulse response functions of the first four structural shocks allow us to analyze the macroeconomic dynamic behavior of the estimated SVAR model. The impulse response functions associated with the capital restriction shocks (shown in the next section), which can be regarded as the monetary authority imposing tighter controls on inward or outward capital movements, meanwhile allow us to assess policy effectiveness of capital control measures.

Figure 5 presents the impulse responses after a one-standard-deviation real output shock. The increase in the level of real economic activity leads to a rise in the real interest rate differential in favor of the domestic interest rate, the real exchange rate appreciates, and there is a surge in the capital inflow upon impact. After two quarters, the upward pressure from the domestic interest rate eases and the real exchange rate depreciates. As a result, the initial capital inflow is reversed before experiencing a few quarters of a small rebound, while the positive effect on output gradually dissipates.

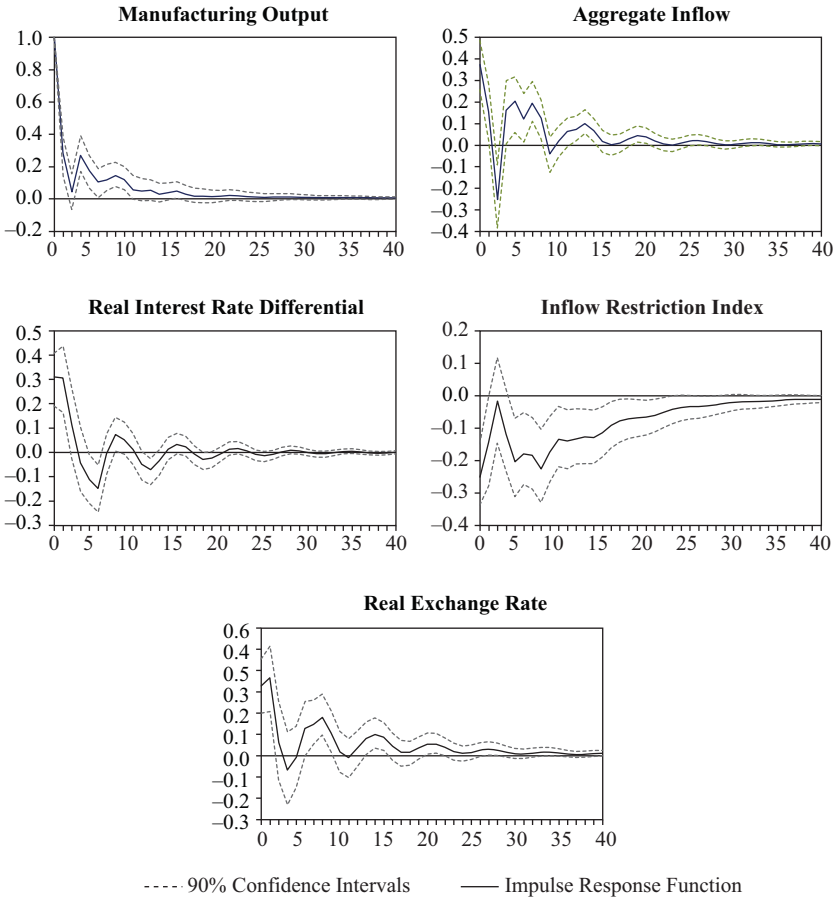
Dynamic Responses to One S.D. Manufacturing Output Shock

Figure 5a. **Real Policy Rate Differential = Indonesian Policy Rate – Federal Funds Rate**



Source: Authors' calculation.

Figure 5b. **Real Interest Rate Differential = Indonesian Money Market Rate – US Treasury Bond Rate**

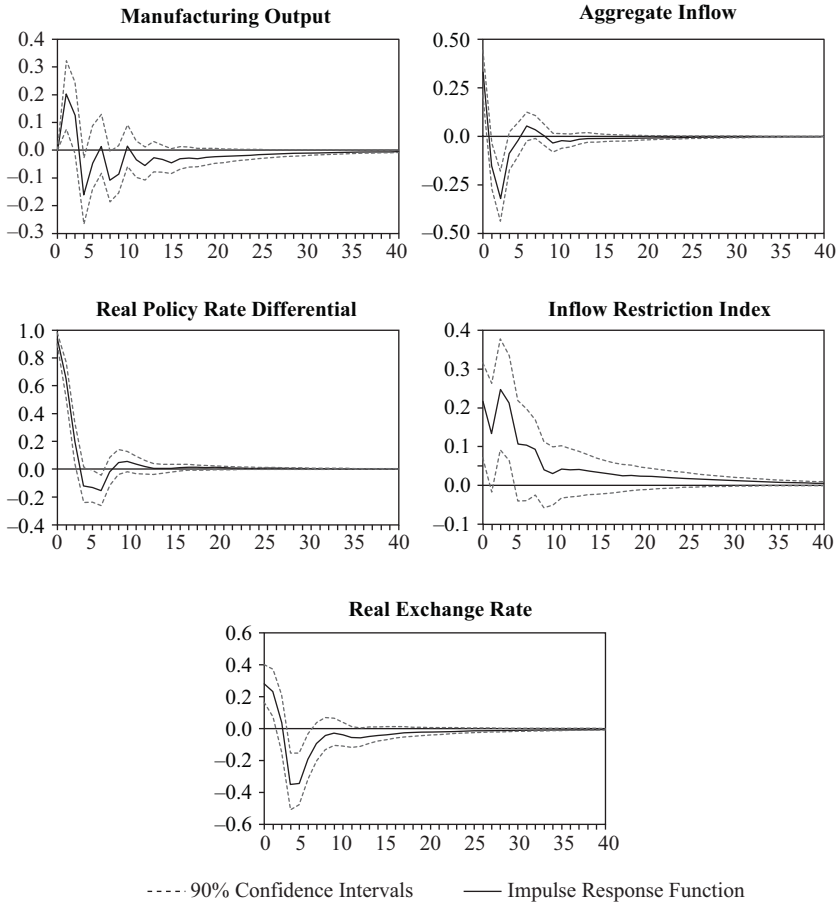


Source: Authors' calculation.

Figure 6 presents the impulse responses to a positive shock to the real interest rate differential, which can be thought of as (approximating) monetary tightening in the domestic economy that initially contributes to an appreciation in the real exchange rate. We observe an impact real depreciation when using real market rate differential (though this is not significant given that the confidence interval contains the value zero) and a surge in capital inflows. Real output rises with a lag due to the increase in capital inflows. The boost in output lasts for two quarters before the effects from the monetary tightening (and also the real appreciation) lead to output contraction.

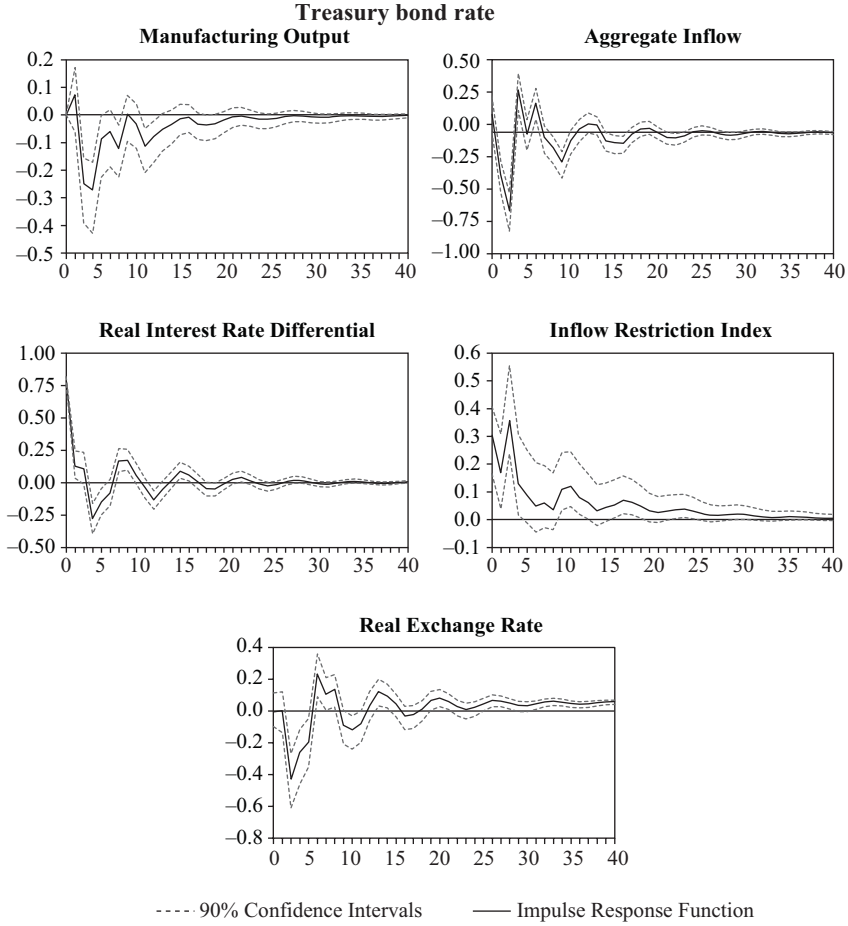
Dynamic Responses to One S.D. Real Interest Rate Differential Shock

Figure 6a. **Real Policy Rate Differential = Indonesian Policy Rate – Federal Funds Rate**



Source: Authors' calculation.

Figure 6b. **Real Interest Rate Differential = Indonesian Money Market Rate – US Treasury bond rate**



Source: Authors' calculation.

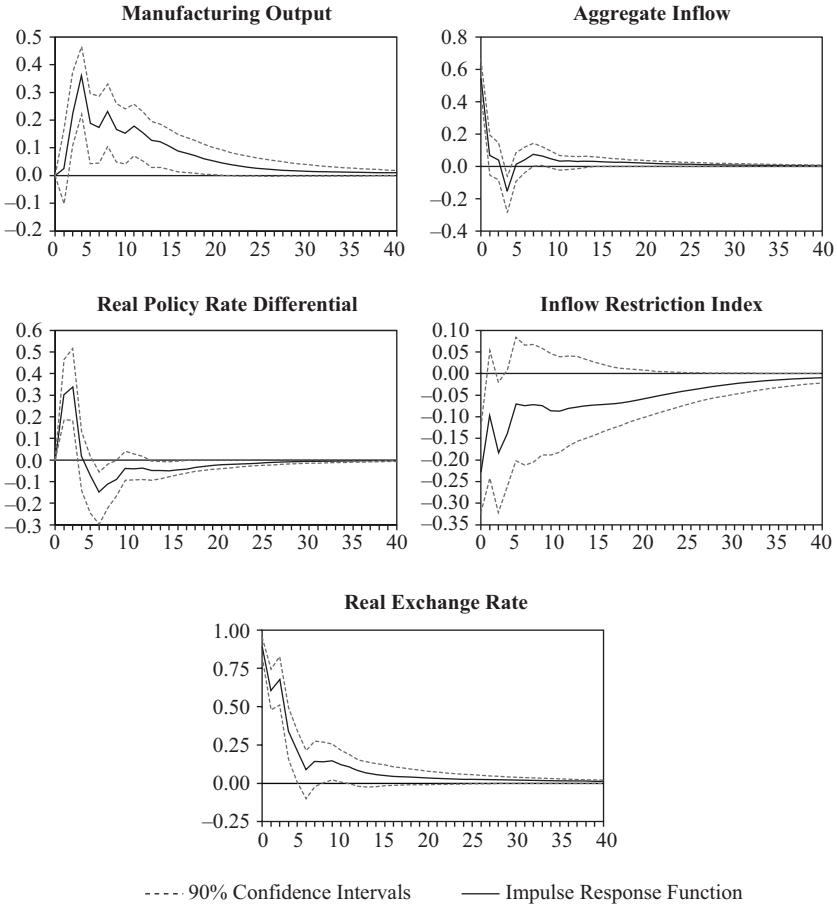
In Figure 7, a positive shock to the real exchange rate (a real appreciation shock) leads to higher capital flow into the domestic economy. As a result, the level of real output picks up with a lag. The real interest rate differential rises as domestic monetary conditions become tighter. After two quarters, the domestic real interest rate declines. The real exchange rate depreciates and returns to the equilibrium level. Capital inflows fall quickly in the short run after the initial rise and stabilize around equilibrium in quarter 10. Real output reaches its maximum in quarter 3 and takes a long time to return to equilibrium.

The effects of a positive capital inflow shock are shown in Figure 8. The dynamic responses are similar to those discussed for the real exchange rate shock. Over time, all cyclical fluctuations gradually disappear as the effect of the inflow

shock peters out. We also observe that the real economy requires more time to return to equilibrium than the financial markets.

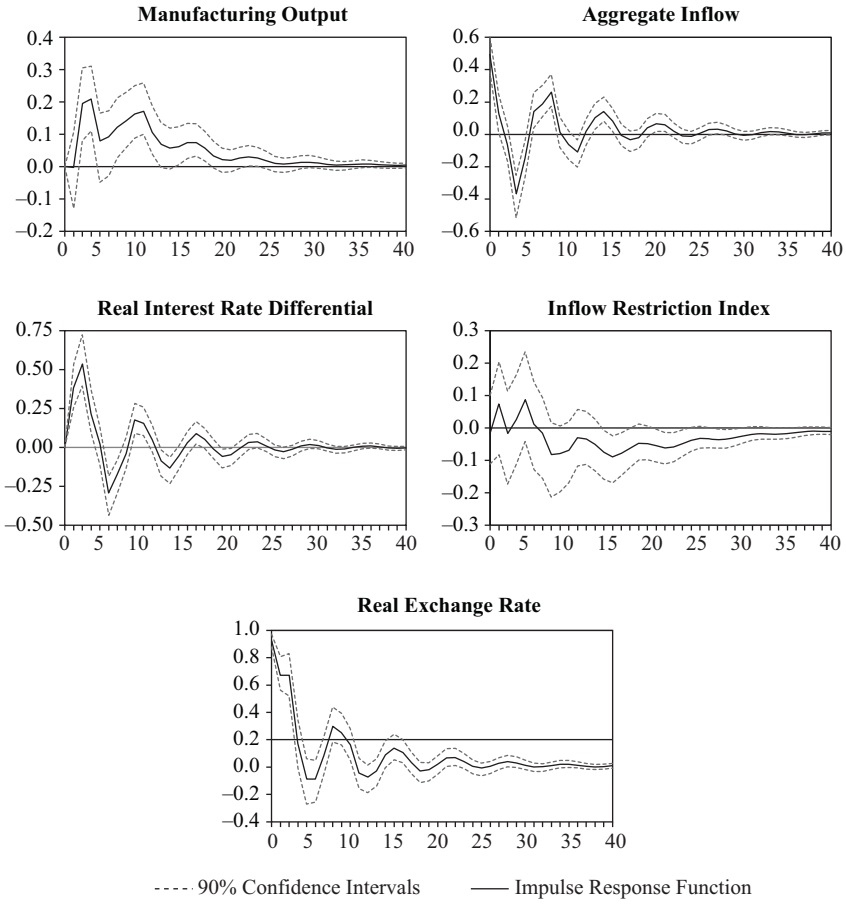
Dynamic Responses to One S.D. Real Exchange Rate Shock

Figure 7a. **Real Policy Rate Differential = Indonesian Policy Rate – Federal Funds Rate**



Source: Authors' calculation.

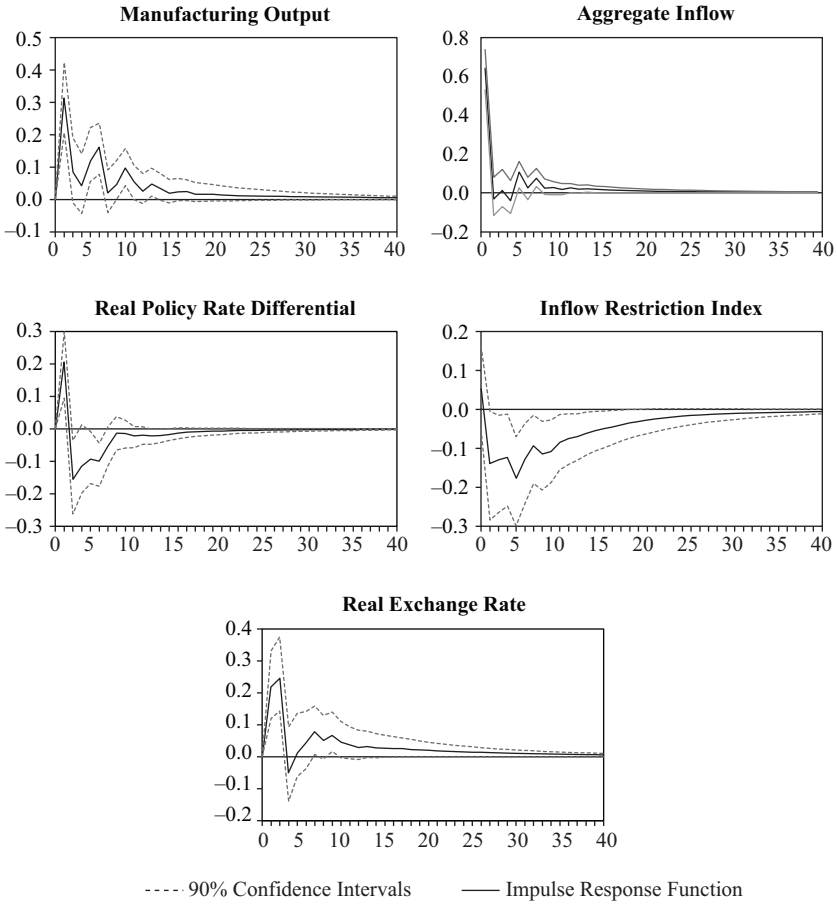
Figure 7b. **Real Interest Rate Differential = Indonesian Money Market Rate – US Treasury Bond Rate**



Source: Authors' calculation.

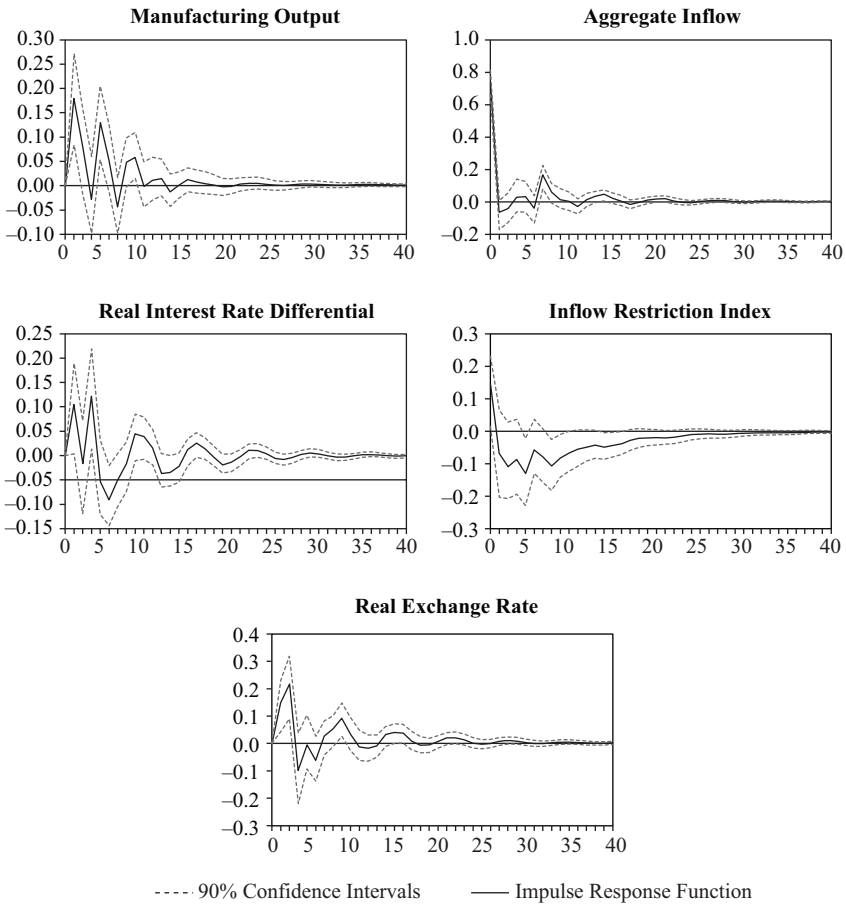
Dynamic Responses to One S.D. Aggregate Inflow Shock

Figure 8a. **Real Policy Rate Differential = Indonesian Policy Rate – Federal Funds Rate**



Source: Authors' calculation.

Figure 8b. **Real Interest Rate Differential = Indonesian Money Market Rate – US Treasury Bond Rate**



Source: Authors' calculation.

VI. DYNAMIC RESPONSES TO CAPITAL RESTRICTION SHOCKS

We now use the model to explore the main issue of interest in this study and examine the dynamic responses of capital flows to shocks to capital restriction indexes.

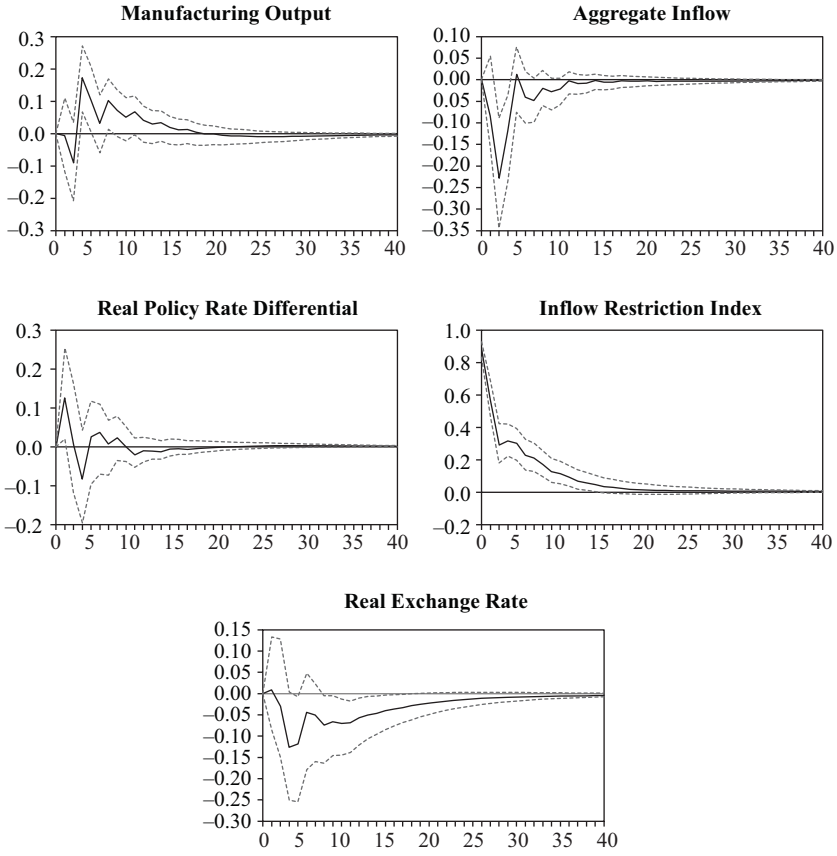
A. Capital Inflow Restriction Shocks

Figure 9 summarizes the dynamic responses to a one-standard-deviation shock to the capital inflow restriction index (i.e., more stringent controls on capital inflows into the domestic economy). We observe that tighter controls are

able to reduce the level of net inflows with the maximum effect at quarter 2. The negative impact on the inflows remains for some time before settling back to equilibrium at quarter 10. In the short run, there is output contraction although output expands again after two quarters of decline (in contrast the real market rate differential result suggests a slight pickup). The real interest rate differential rises as the lower net capital inflows lead to tighter domestic monetary conditions. There is persistent real depreciation in the short run which helps real output move towards a quick recovery from the initial slump in the goods market.

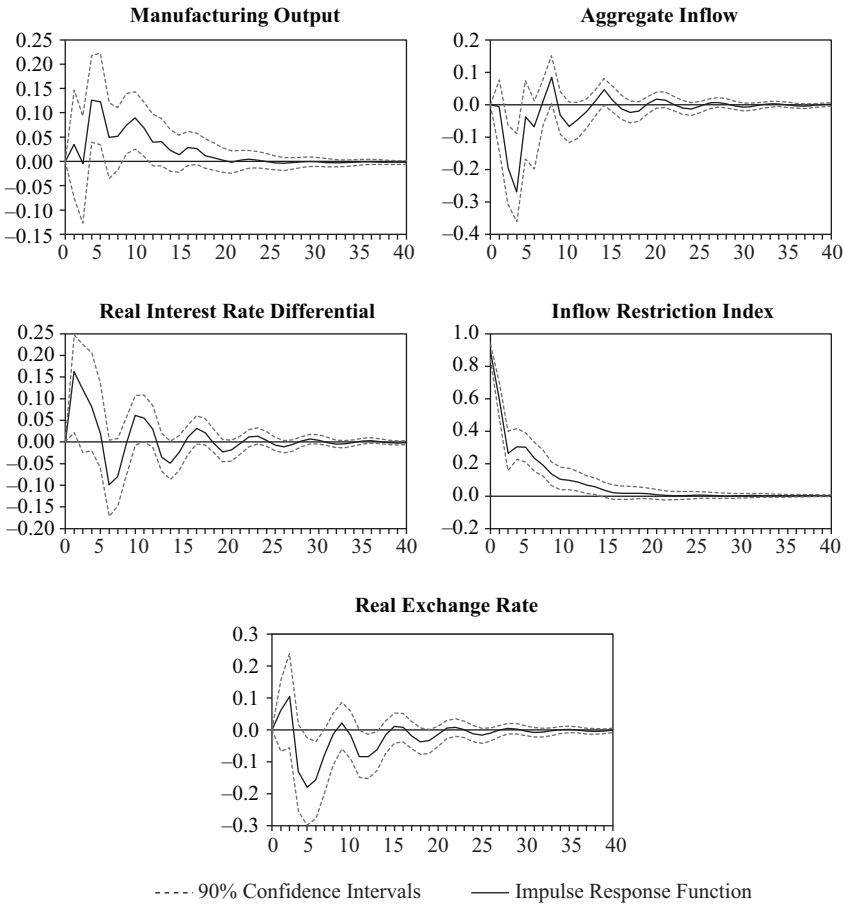
Dynamic Responses to One S.D. Inflow Restriction Shock

Figure 9a**. Real Policy Rate Differential = Indonesian Policy Rate – Federal Funds Rate**



Source: Authors' calculation.

Figure 9b. **Real Interest Rate Differential = Indonesian Money Market Rate – US Treasury Bond Rate**



Source: Authors' calculation.

In examining the effectiveness of higher capital restrictions on the disaggregated measures of the inflows (Figure 10), tighter capital controls are shown to reduce inflows of FDI, portfolio investment, and other investment in the short run. Comparing the dynamic effects of the capital inflow restriction shocks on the three measures, FDI shows the largest reduction in level, while other investment inflows take the longest to return to equilibrium. In contrast, the impulse response function of portfolio inflows suggests that harsh capital control regulation is ineffective, as we observe a (small) rise in portfolio inflows straight after the implementation of the policy. However, this is followed by a series of interchanging rises and falls in the level of portfolio inflows with the maximum decline taking place immediately after the initial rise. Reflecting the speculative

nature of the portfolio movements, this capital flow experiences the smallest fall in the short run compared to the other two inflow categories and requires the least amount of time to complete the cyclical adjustment following the restriction shock.

Dynamic Responses to One S.D. Inflow Restriction Shock
(capital inflow = FDI, portfolio, and other investment)

Figure 10a. **Real Policy Rate Differential = Indonesian Policy Rate – Federal Funds Rate**

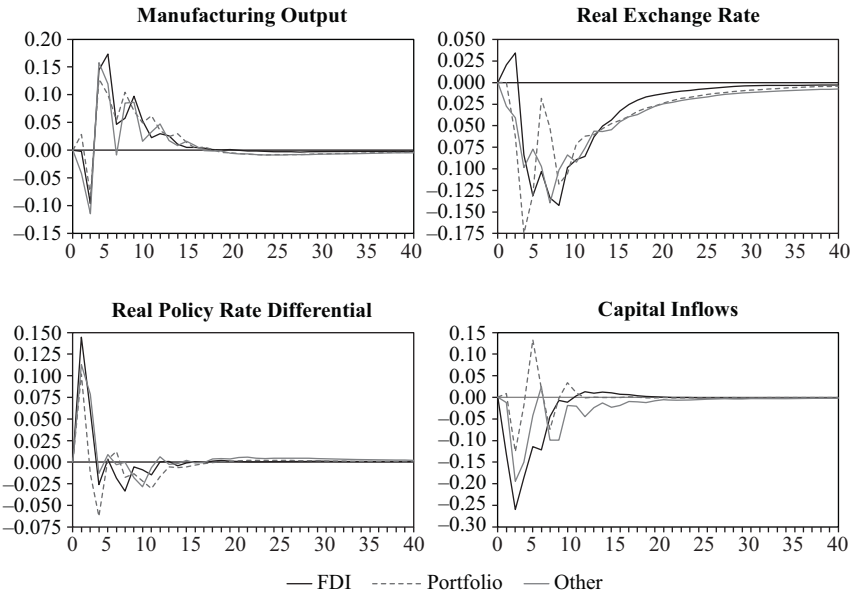
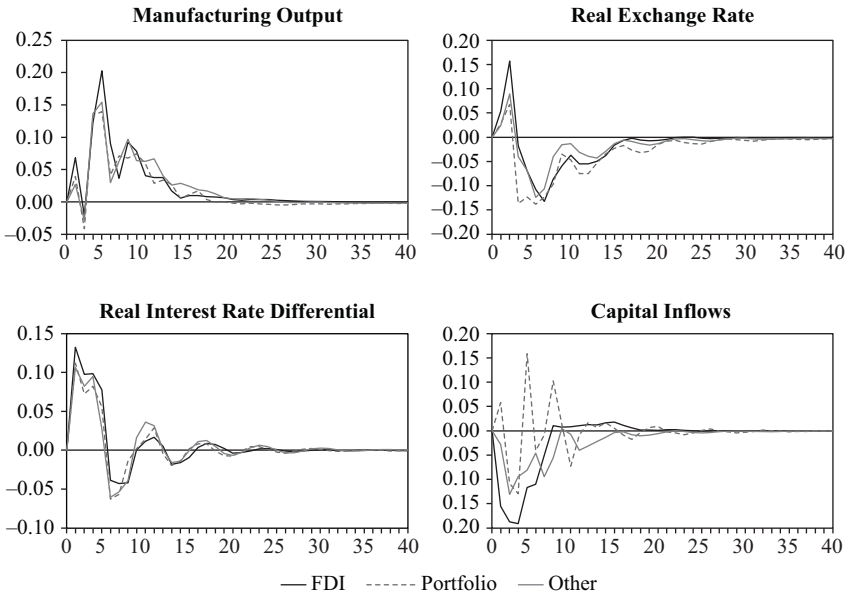


Figure 10b. **Real Interest Rate Differential = Indonesian Money Market Rate – US Treasury Bond Rate**



Source: Authors' calculation.

B. Capital Outflow Restriction Shocks

Would we observe similar impacts if the central bank imposed restrictive measures on capital outflows? A SVAR model is estimated where we use the total net capital outflow (as a ratio to GDP) for cf_t and the capital outflow restriction index for ci_t. Because of limited data observations for the three outflow measures that we use in estimation, i.e., the aggregate, FDI, and other investment outflows, the lag order for the outflow SVAR model is unity for the endogenous variables and the exogenous variables as chosen by the Akaike information criterion. The reduced-form diagnostics are presented in Table 2.

Table 2a. **Reduced-form Diagnostics on the Aggregate Outflow VAR (rr_t = real policy rate differential)**

	y_t	rr_t	q_t	cf_t	ci_t
Q(1)	2.07	0.04	0.05	0.30	0.99
	(0.15)	(0.84)	(0.82)	(0.60)	(0.32)
ARCH(1)	0.10	1.01	0.05	0.17	0.23
	(0.76)	(0.31)	(0.82)	(0.68)	(0.63)
JB	0.81	6.75	71.1	146	15.3
	(0.67)	(0.03)	(0.00)	(0.00)	(0.00)

Table 2b. **Reduced-form Diagnostics on the Aggregate Outflow VAR (rr_t = real interest rate differential)**

	y_t	rr_t	q_t	cf_t	ci_t
Q(1)	1.95	0.79	0.26	0.00	1.38
	(0.16)	(0.37)	(0.61)	(0.98)	(0.24)
ARCH(1)	0.15	0.05	0.00	0.32	0.27
	(0.70)	(0.82)	(0.97)	(0.57)	(0.60)
JB	0.92	59.1	63.8	173	20.3
	(0.63)	(0.00)	(0.00)	(0.00)	(0.00)

Note: P-values are reported in parentheses for the diagnostic tests. The univariate tests are the JB test statistic that conducts the Jarque-Bera test for non-normality, ARCH(1) gives the F-test statistic for heteroscedasticity with 1 lag, and Q(1) is the Ljung-Box test based on serial correlation with 1 lag.
Source: Authors' calculation.

The dynamic responses of the three outflow categories to an outflow restriction are presented in Figure 11. A more stringent control is effective in reducing the level of the aggregate and FDI outflows where the negative impact lasts for three quarters. However, the same policy measure is not effective in dampening other investments as we observe a short-run rise in the level of flows. For the other macroeconomic variables, following the outflow restriction shock, real output rises responding to the negative net outflows. As a result, the domestic monetary stance becomes tighter which leads to a real exchange rate appreciation.

Dynamic Responses to One S.D. Outflow Restriction Shock
(capital outflow = total, FDI, and other investment)

Figure 11a. **Real policy rate differential = Indonesian policy rate – Federal funds rate**

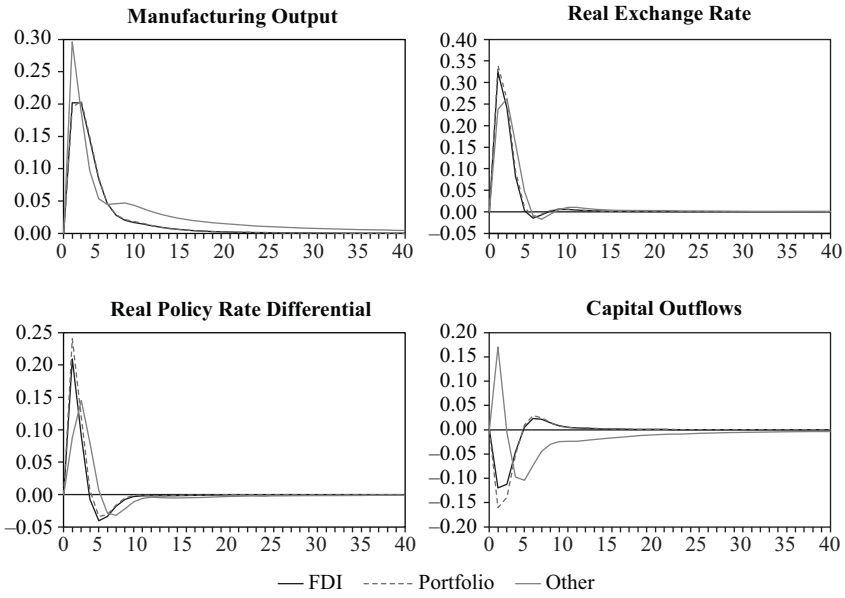
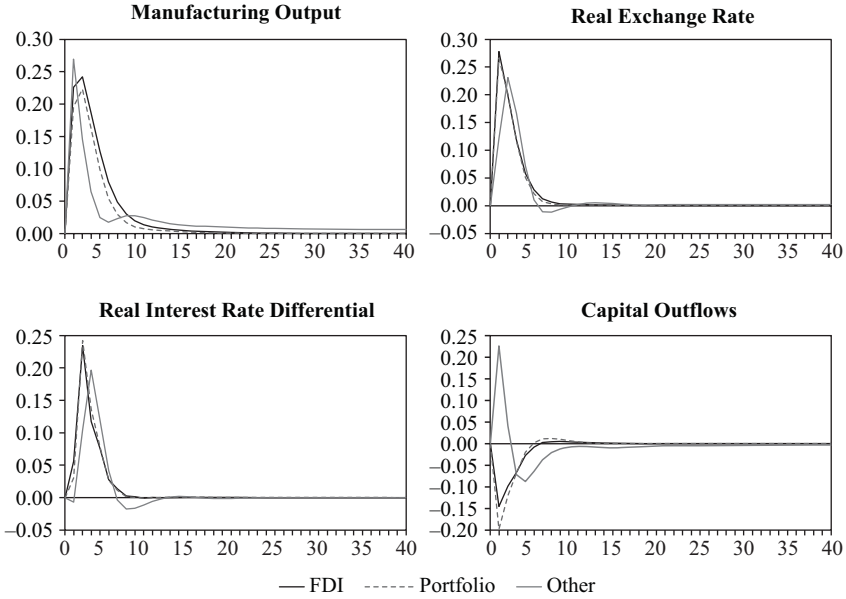


Figure 11b. **Real Interest Rate Differential = Indonesian Money Market Rate – US Treasury Bond Rate**



Source: Authors' calculation.

C. Robustness Checks of Capital Control Effectiveness: 2000-2010 Period

To check for robustness of our results on capital control effectiveness, we estimated the SVAR model from Q1 2000 to Q3 2010. Our earlier discussion indicates that the Indonesian economy experienced some structural and regime changes in the 1990s that culminated in the Asian financial crisis. This in turn led to a sharp change in the macroeconomic policy regime, the quality of data, and the objectives of capital control measures. Focusing on the post-crisis period does not only entail the use of more reliable data but can also provide policy insights likely to be more useful.

We use the estimation results from this period to examine if: (i) tighter controls on portfolio investments reduce the level of portfolio inflows and outflows, and (ii) more stringent restriction measures are effective against aggregate inflows and outflows (including FDI and other investments). For each set of dynamic responses shown in Figures 12–15,[22] we compare two variations of the dynamic responses where the real output variable is either real manufacturing output or real GDP.

As shown in Figure 12, tighter controls on inflows significantly reduce the level of inward portfolio investments upon impact. However, the policy effectiveness is short-lived and lasts for only one quarter. This compares with the full-sample result where a higher capital restriction standard is ineffective in reversing the surge of portfolio inflows.

We know that the monetary authority focused more intensely on regulating portfolio flows during the 2000s. But how effective are the same capital control measures on non-portfolio investments? Figure 13 shows that subject to an inflow restriction shock, the aggregate inflow (which includes FDI and other investments) increases significantly for one quarter. This is the opposite of the full-sample result where the aggregate inflow, FDI, and other investments all decline in response to more stringent capital control measures. While a sudden surge in capital inflows may worry policymakers, closer attention is usually paid to inward portfolio movements owing to its speculative nature. Our results are consistent with the view that capital controls on portfolio investments are successful in shifting funds from short-term to longer-term markets thus reducing the level of volatility in the economy. However, the policy effects are temporary as portfolio inflows bounce right back after one quarter.

[22]The results are not qualitatively different when real policy rates are used to compute the differential.

Dynamic Responses to One S.D. Inflow Restriction Shock (2000Q1–2010Q3)
(capital flow = portfolio inflow)

Figure 12a**. Real Output = Manufacturing Output**

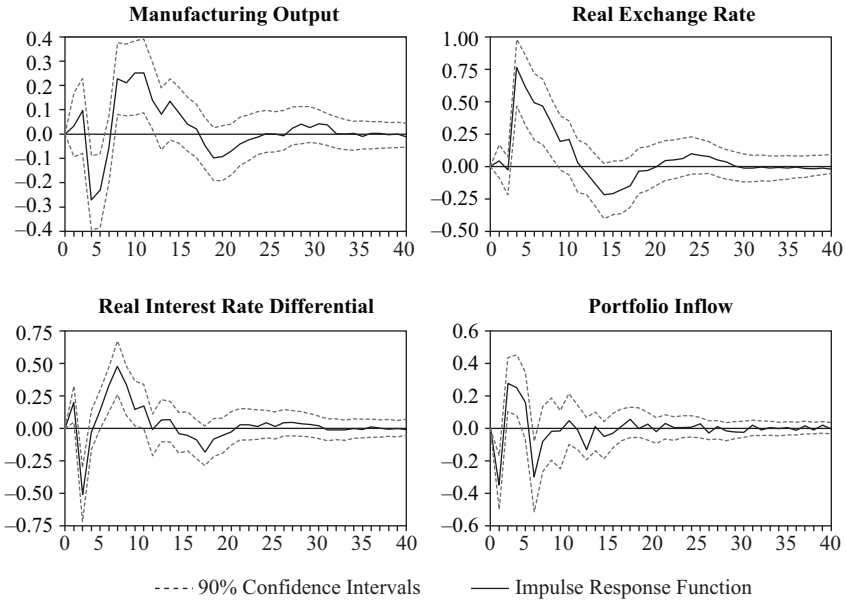
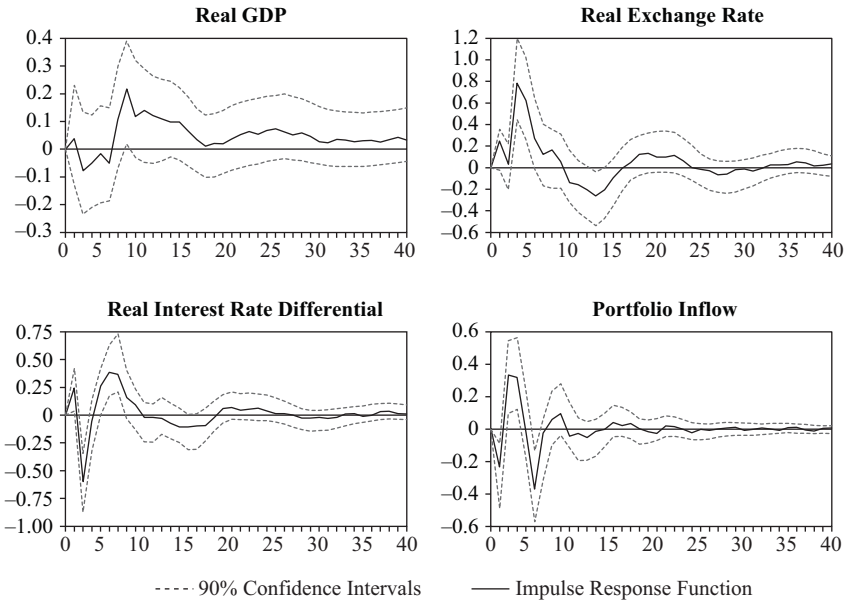


Figure 12b. **Real Output = Real GDP**



Source: Authors' calculation.

Dynamic Responses to One S.D. Inflow Restriction Shock (2000Q1–2010Q3)
(capital flow = total inflow)

Figure 13a**. Real Output = Manufacturing Output**

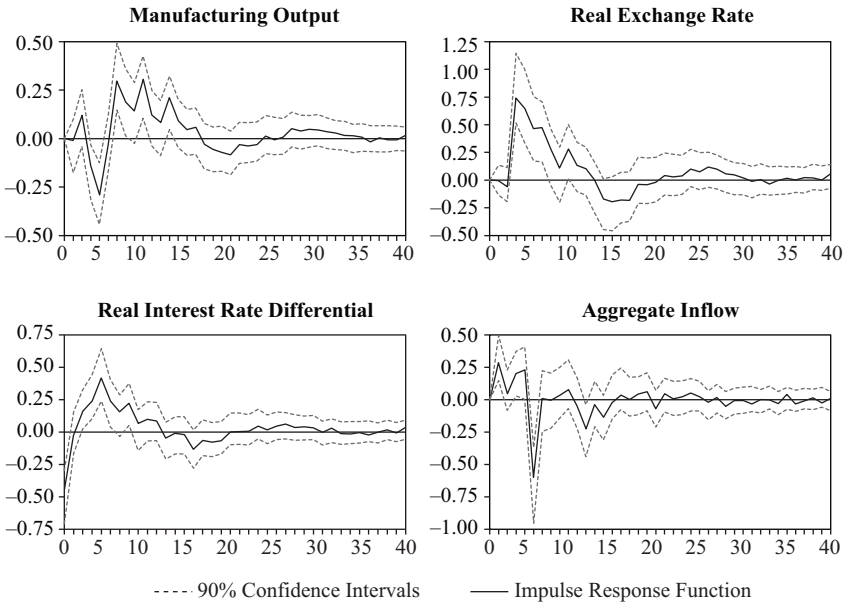
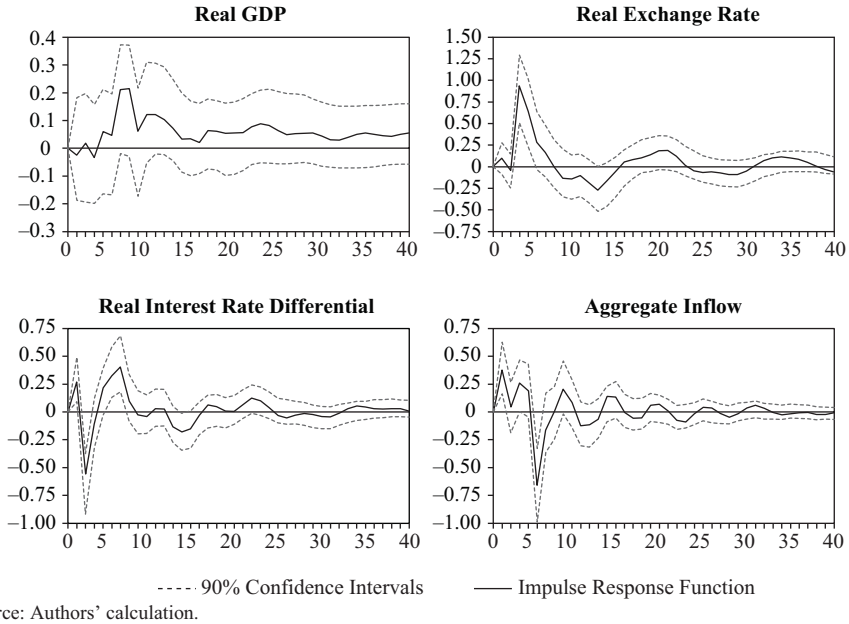


Figure 13b**. Real Output = Real GDP**



Source: Authors' calculation.

Turning our attention to outflow restrictions, Figures 14 and 15 show that tighter controls on outflows are able to reduce the outgoing level of portfolio and aggregate investments. Although the impulse response function for portfolio outflows when real GDP is used for output indicates that there is negative portfolio outflow, these results should be treated with caution given the small number of observations available for estimating the capital outflow SVAR. Wide confidence intervals around the point estimates of aggregate and portfolio outflow dynamic responses suggest weak policy effectiveness of capital outflow restrictions in the 2000s.

Dynamic Responses to One S.D. Outflow Restriction Shock (Q1 2000–Q3 2010)
(capital flow = portfolio outflow)

Figure 14a. **Real Output = Manufacturing Output**

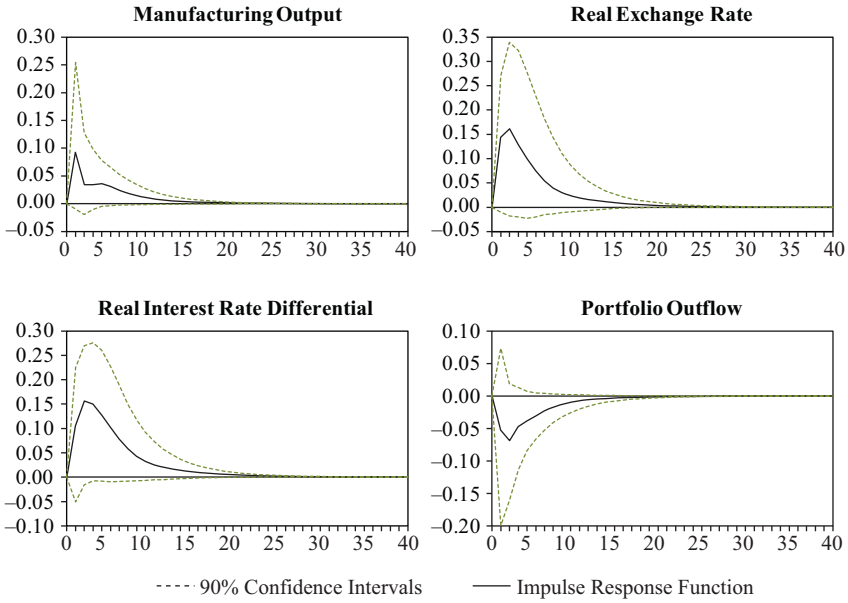
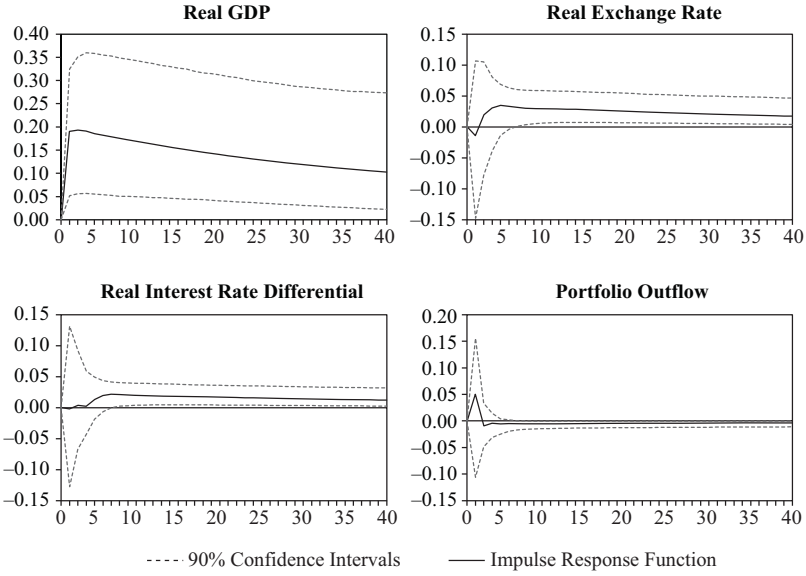


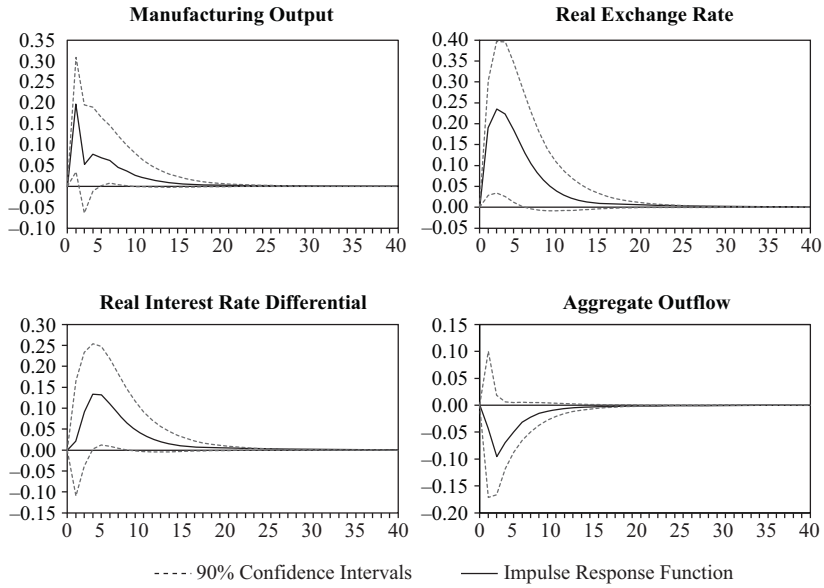
Figure 14b. **Real Output = Real GDP**



Source: Authors' calculation.

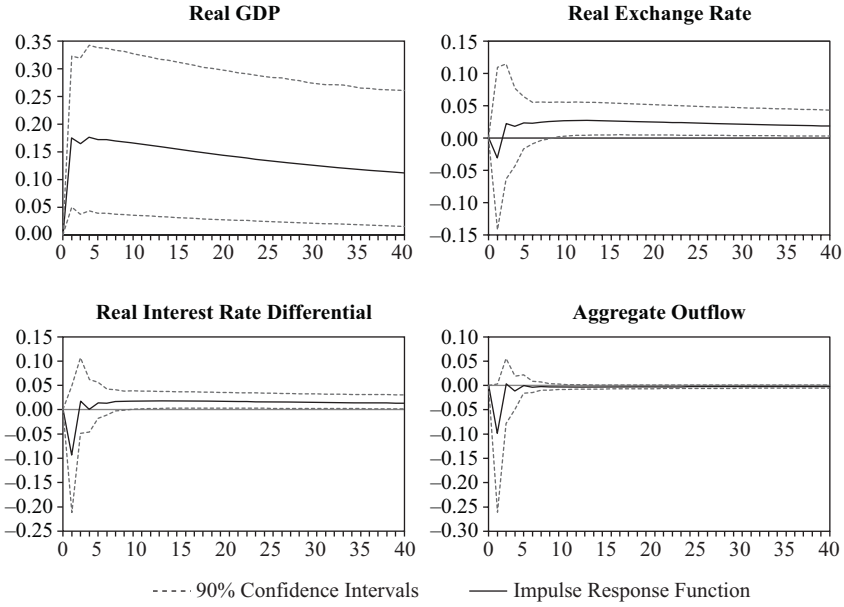
Dynamic Responses to One S.D. Outflow Restriction Shock (Q1 2000–Q3 2010)
(capital flow = total outflow)

Figure 15a. **Real Output = Manufacturing Output**



Source: Authors' calculation.

Figure 15b. **Real Output = Real GDP**



Source: Authors' calculation.

VII. CONCLUSIONS

Indonesia has operated a liberal capital account permitting relatively free flow of international non-FDI flows since the early 1970s. Indonesian authorities have not relied on capital control measures as a principal instrument to maintain macroeconomic stability and eschewed capital controls even during the 1997 crisis despite massive capital flight. Restrictions on FDI, quite significant till the mid-1980s, have been progressively eased over time and they are no longer seen as an important policy issue. However, authorities have taken measures from time to time to discourage or restrain "destabilizing" short-term capital flows. These control measures, generally quite limited in scope (such as during the 2004–2005 period), were primarily aimed at restricting the activities of commercial banks which were the main conduits for international funds transfers and for the "internationalization of the currency." More recently, measures directed at impeding short-term interest arbitrage transactions (mainly swap transactions) were implemented to cope with a surge in private capital inflows, part of the large private international capital inflows that started to come into emerging markets after the 2008 global financial crisis and recession. This new development where private investors are purchasing government paper and BI securities on a large scale has posed new policy issues and dilemmas.

In this paper, we have reviewed the Indonesian experience and the effectiveness of capital restrictions during 1990–2010. We estimated an SVAR model of the Indonesian economy and constructed a capital restriction index to explore the impact of policy restrictions on various types of capital flows. In doing so, we have highlighted data limitations, particularly relating to the highly unreliable official data on private capital flows prior to the 1997 crisis. Further, the Indonesian monetary policy and broader macroeconomic regime has undergone fundamental changes since the 1997 crisis. Hence, we also estimated a model separately for the 2000–2010 period, and we feel that the results based on this model are probably more reliable and policy-relevant despite the shorter time period and hence fewer data points.

There has been a general consensus in Indonesia that pre-1997 capital restriction measures targeted at commercial bank operations to limit short-term capital movements were quite ineffective for a variety of reasons. Our 1990–2010 SVAR model results are consistent with that view, suggesting that inflow and outflow restrictions are effective for FDI but largely ineffective for portfolio capital. Results from the 2000–2010 SVAR model support this basic conclusion. However, the results not only indicate that restrictions on inflows do have a short-term impact on restricting portfolio flows, they also suggest that controls on inward portfolio investments can have some success in shifting funds from short-term to longer-term markets, though the impact is again short-lived.

While we treat these findings as preliminary, they are broadly consistent with other findings in the literature and suggest a possible short-term role for capital restrictions. These results need to be further validated through a more comprehensive examination of measures impacting on capital flows, including a deeper analysis of the most recent episode of control measures.

APPENDIX A

Indonesian Capital Control Measures on Aggregate Inflows and Outflows 1988–2010

Year	Events	Assigned Weight	
		Aggregate Inward	Aggregate Outward
Q4 1988	The legal reserve requirement for foreign currency liabilities of foreign banks was reduced from 15% to 2%. (commercial banks and other credit institutions)	–0.25	–0.25
Q1 1990	Joint-venture banks and foreign banks were permitted to open branch offices in Batan Island (export processing zone). (commercial banks and other credit institutions)	–0.25	–0.25
Q2 1991	Investment licensing requirements were liberalized. The number of activities on the negative list was reduced from 70 to 60. Domestic and foreign investors were allowed to grant licenses under pre-specified conditions (partially deregulating 31 other activities). (direct investment)	–0.25	
Q3 1991	Quantitative limits were placed on offshore borrowing by banks and the government sector, including state-owned enterprises.	+0.50	
Q2 1992	Full foreign ownership of foreign direct investments (FDI) by nonresidents was permitted. (direct investment)	–1.00	
	Foreign direct investments with a minimum capital of $250,000 were permitted in certain cases. (direct investment)	–0.25	
	Foreign investors were allowed to reinvest profits in the shares of other foreign firms. (capital and money market instruments)	–0.25	
Q2 1993	The restriction on FDI was relaxed by reducing the number of sectors closed to foreign investment and reclassifying sectors to fall under less stringent bars. (direct investment)	–0.25	
Q4 1993	Requirements on FDI, in particular on land-use rights and environmental standards, were liberalized. Divestiture requirements relaxed. (direct investment)	–0.25	
Q3 1997	Forward sales of foreign currency contracts offered by domestic banks to nonresidents were limited to $5 million a bank and a customer. Such restriction not applicable to trade/investment related transactions. (derivatives and other instruments)		+0.50
	Foreign investors were allowed to purchase unlimited domestic (nonbanking) shares. (capital and money market instruments)	–0.50	
Q1 1998	All barriers to foreign investments in palm oil plantations were removed. (direct investment)	–0.25	
	Controls on branching by foreign banks lifted. (commercial banks and other credit institutions)	–0.25	
	Controls on foreign investment in retail banks were lifted. (direct investment)	–1.00	
Q2 1998	Controls on foreign investment in wholesale trade were lifted. (direct investment)	–0.50	

Q3 1998	Revised and shortened list of activities closed to foreign investors were issued. Some seasonal restrictions were removed. (direct investment)	–0.25	
Q4 1998	Controls on nonresident investment in domestic banks were lifted. (direct investment)	–0.50	
Q1 1999	Income tax holdings for up to 8 years to newly established corporations in 22 industrial sectors were granted. (direct investment)	–0.25	
	The ceiling on the amount of stock foreigners may acquire in nonstrategic corporations without the approval of the company's board of directors was raised. (capital and money market instruments)	–0.25	
	A takeover of nonstrategic operations by foreign investors without government approval was permitted. (direct investment)	–0.50	
	Equity participation of foreign banks in a joint bank was raised from 85% to 99%. (commercial banks and other credit institutions)	–0.25	
Q2 2000	The final phase of the transition to 20% maximum net open position went into effect. (commercial banks and other credit institutions)		+0.25
Q1 2001	Resident banks were permitted from conducting the following transactions with nonresidents: lending or provision of overdrafts in rupiah or foreign currency, placing funds with nonresidents, purchase of rupiah-denominated securities issued by nonresidents, interoffice transactions in rupiah, equity participation in rupiah with nonresidents. (capital and money market institutions)		+0.50
Q2 2003	Banks were obliged to maintain overall net open position (on- and off-balance sheet) maximum of 20% of capital. (capital and money market institutions)		+0.25
Q2 2004	Deposit accounts in rupiah were made subject to a reserve requirement in the range of 5% to 8%, depending on the total amount of deposits; those in foreign currencies of third party funds were subject to a 3% reserve requirement. (commercial banks and other credit institutions)		+0.25
Q3 2004	Banks were obliged to maintain overall net open position (on- and off-balance sheet) maximum of 20% of capital and net open position for on balance-sheet maximum of 20% of capital in the middle and of working day. (commercial banks and other credit institutions)		+1.0
Q1 2005	Short-term borrowings by banks were limited to 20% of bank capital. Long-term borrowings (maturity of over one year) by banks required approval by BI. (commercial banks and other credit institutions)	+0.50	
	Banks were required to observe a daily limit on short term offshore loan (STOL) balances of 30% of capital, excluding loan balances arising from STOLs from controlling shareholders for liquidity support, operating funds of a foreign bank branch in Indonesia of up to 100% of declared operating funds, current and saving accounts and time deposits held by foreign country	+0.25	

	representatives and international institution, current accounts held by nonresidents for investment activities in Indonesia. (commercial banks and other credit institutions)		
	Banks were prohibited from owning assets in the form of stock or securities with an underlying reference stock. (commercial banks and other credit institutions)	+0.25	
Q2 2005	The limit on forward and swap transactions of banks with nonresidents without an underlying investment-related transaction was reduced from $3 million to $1 million. (commercial banks and other credit institutions)	+0.25	
Q4 2008	Restrictions on buying of foreign exchange against rupiah above $100,000 for nonspeculative activities and some related restrictive measures on purchase of particular "structured products."		+0.75
Q4 2010	One month holding period for Bank Indonesia certificates (SBI). (portfolio investments)	+0.25	
	Reimposition of restrictions on the net short-term foreign borrowing by banks with a 30% of capital limit on banks' short-term overseas borrowing and higher reserve requirements on foreign currency deposits. (commercial banks and other credit institutions)	+0.50	
Q2 2011	Replaced the one-month holding period for Bank SBIs with a six-month holding period, effective beginning 13 May 2011. (portfolio investments)	+0.75	

APPENDIX B

Table 3. **Reduced Form Estimation of the Capital Inflow Equation**

	Total		**FDI**		**Portfolio**		**Other**	
y_{t-1}	0.171	(0.32)	0.045	(0.32)	0.127	(0.25)	0.048	(0.44)
y_{t-2}	–0.049	(0.75)	–0.014	(0.76)	–0.059	(0.56)	0.029	(0.63)
y_{t-3}	0.025	(0.85)	0.052	(0.18)	0.015	(0.86)	–0.081	(0.14)
rr_{t-1}	–0.204	(0.24)	–0.043	(0.31)	–0.160	(0.12)	–0.012	(0.87)
rr_{t-2}	–0.233	(0.25)	0.024	(0.63)	–0.186	(0.12)	0.011	(0.89)
rr_{t-3}	0.211	(0.16)	–0.008	(0.85)	0.139	(0.14)	0.085	(0.13)
q_{t-1}	0.041	(0.62)	–0.007	(0.71)	–0.082	(0.14)	0.130	(0.00)
q_{t-2}	0.017	(0.85)	–0.010	(0.68)	0.185	(0.01)	–0.050	(0.16)
q_{t-3}	–0.070	(0.35)	–0.011	(0.56)	–0.102	(0.07)	–0.036	(0.22)
cf_{t-1}	0.004	(0.98)	0.198	(0.18)	0.088	(0.62)	–0.307	(0.02)
cf_{t-2}	–0.034	(0.85)	0.117	(0.44)	–0.356	(0.04)	–0.192	(0.15)
cf_{t-3}	–0.099	(0.55)	0.058	(0.67)	–0.335	(0.02)	–0.229	(0.07)
ci_{t-1}	–0.018	(0.67)	–0.015	(0.18)	0.003	(0.90)	–0.003	(0.86)
ci_{t-2}	–0.047	(0.35)	–0.009	(0.53)	–0.027	(0.39)	–0.019	(0.33)
ci_{t-3}	0.000	(0.99)	0.001	(0.90)	0.015	(0.57)	–0.015	(0.36)
const	–153.9	(0.06)	–45.28	(0.03)	–65.84	(0.16)	–44.20	(0.13)
$sdum1_t$	–0.702	(0.73)	0.004	(0.99)	0.424	(0.74)	–0.374	(0.63)
$sdum2_t$	0.650	(0.82)	0.190	(0.80)	1.026	(0.57)	0.420	(0.70)
$sdum3_t$	0.740	(0.73)	0.049	(0.93)	0.676	(0.62)	0.445	(0.60)
$acrisis_t$	–15.53	(0.00)	–1.779	(0.04)	–10.31	(0.00)	–4.838	(0.00)
y_t^*	0.953	(0.43)	0.102	(0.74)	1.420	(0.07)	–0.608	(0.16)
y_{t-1}^*	–0.797	(0.50)	–0.058	(0.85)	–1.374	(0.07)	0.654	(0.13)
sp_t^*	0.126	(0.21)	–0.001	(0.98)	0.052	(0.40)	0.042	(0.27)
sp_{t-1}^*	–0.180	(0.07)	–0.021	(0.42)	–0.076	(0.22)	–0.049	(0.19)
Adj. R^2		0.521		0.616		0.389		0.714
Mean of Dep Variable		0.912		0.815		0.748		–0.650
S.E. of Dep Variable		5.694		1.714		3.189		2.861
S.E. of Equation		3.942		1.062		2.493		1.530
S.S.R.		823.7		59.78		329.5		124.1
Regression F(23,53)		4.590		6.299		3.102		9.243
Sig Level of F test		0.000		0.000		0.000		0.000
Log Likelihood		–200.5		–99.51		–165.2		–127.6

Note: P-values are reported in parentheses.

Table 4. **Reduced Form Estimation of the Capital Outflow Equation**

	Total		**FDI**		**Other**	
y_{t-1}	0.003	(0.35)	0.003	(0.25)	–0.001	(0.03)
rr_{t-1}	–0.006	(0.10)	–0.005	(0.19)	–0.001	(0.21)
q_{t-1}	0.001	(0.58)	0.001	(0.69)	0.000	(0.82)
cf_{t-1}	0.487	(0.01)	0.482	(0.01)	–0.093	(0.76)
ci_{t-1}	–0.001	(0.10)	–0.001	(0.09)	0.000	(0.17)
const	–10.58	(0.35)	–11.27	(0.30)	–1.446	(0.48)
$sdum1_t$	–0.041	(0.34)	–0.029	(0.48)	–0.013	(0.08)
$sdum2_t$	0.010	(0.83)	0.016	(0.73)	–0.017	(0.09)
$sdum3_t$	0.068	(0.09)	0.070	(0.07)	–0.007	(0.33)
$acrisis_t$	–0.169	(0.04)	–0.157	(0.05)	–0.010	(0.39)
y_t^*	0.018	(0.61)	0.020	(0.57)	–0.004	(0.45)
y_{t-1}^*	–0.006	(0.85)	–0.007	(0.82)	0.006	(0.30)
sp_t^*	–0.003	(0.43)	–0.003	(0.41)	–0.001	(0.27)
sp_{t-1}^*	–0.001	(0.77)	–0.002	(0.66)	0.001	(0.13)
Adj. R^2		0.718		0.768		0.845
Mean of Dep Variable		0.140		0.120		0.020
S.E. of Dep Variable		0.145		0.157		0.033
S.E. of Equation		0.077		0.076		0.013
S.S.R.		0.153		0.149		0.005
Regression F(23,53)		8.623		10.91		17.39
Sig Level of F test		0.000		0.000		0.000
Log Likelihood		54.52		55.05		125.0

Note: P-values are reported in parentheses

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