

## **After Two Crises: The Case of Indonesia**

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Abstract:

This study reviews Indonesian economy after the Asian financial crisis in 1997-1998 and current financial crisis of 2008-2009. We analyze the similarities and differences in the causes, policy responses and impacts of these two crises. Both crises started from financial sector outside the country and transmitted into the domestic economy. Based on monthly and quarterly data over these periods, we find evidence of a change in economic structure after the Asian crisis, but not after the current financial crisis. Exchange rate was changed from managed to floating regime and depreciated sharply, domestic interest rate became less sensitive to foreign rate, capital inflows turned into capital outflows and thus influencing saving-investment gap. To response to the current financial crisis of 2008-2009, expansionary fiscal policy and monetary policy have been designed to stimulate economy and at the same time prevent speculation. Preliminary evidence indicates that domestic demand and rapid policy responses seem to help reducing the impacts of the current financial crisis in Indonesia.

Keywords: crisis, exchange rate, capital flows, investment, fiscal policy, monetary policy

JEL Classification Codes: F31, F32, G20

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## **After Two Crises: The Case of Indonesia**

### **1. Introduction**

The Asian financial crisis was started from Thailand with the floating of the Thai Baht in July 1997. Indonesia floated its exchange rate in August 1997 and large exchange rate depreciation happened during 1998. Many literatures argue that the Asian crisis was caused by financial sector vulnerabilities of the East Asian countries which had been liberalizing their financial market. The financial market liberalization in Asia and other international factors caused a surge of capital inflows to Asia (Calvo et al., 1996). In turn, this financial globalization with an overinvestment and overproduction created financial vulnerabilities in the East Asian countries. The vulnerabilities then triggered by withdrawal of foreign funds from Thailand created financial panic and further withdrawal. Herding and speculative behavior exacerbated the crisis (Bustelo et al., 1999).

Despite the good economic fundamental and quick action to mitigate the crisis, Indonesia was the hardest hit and the most suffered country in the Asian crisis (Radelet and Sachs, 2000). The main cause of the crisis in Indonesia was a contagion and financial panic which led to economic contraction. Although short-term debt to reserve ratio was high at that time, other indicators did not indicate any problems. The crisis went deeper and recovery process was longer than the other Asian countries. Not only economic crisis, social and political turbulence were also happened in Indonesia (Hill and Shiraishi, 2007). The economic growth has not returned to the level before the Asian crisis (Figure 1). It is clear that Indonesian economy suffered much from the Asian crisis. Economic growth plunged from more than 7 percent before the crisis to -13 percent in 1998. Growth had been increasing since the early 2000s. Unfortunately, another crisis occurred in 2008.

Originating from boom and bust of the real estate price, the financial crisis became apparent in United States in August 2007 and worsened in October 2008. The credit crunch

became serious with large spillovers worldwide (Taylor, 2009). The crisis spread worldwide by international trade channel and financial channel (Rose and Spiegel, 2009). The impact of the financial crisis can be seen from the deterioration of assets prices, decline in output, increase in unemployment and surge of government debt (Reinhart and Rogoff, 2009).

To analyze both the Asian financial crisis and current crisis, this paper reviews these two channels using various indicators such as effective exchange rate, interest rates, capital flows and stock price index. We compare these variables and relationships before and after the Asian financial crisis and test the structural change as the impact of the two crises. For this purpose, we estimate interest parity and saving-investment relation.

The remainder of this paper is organized as follows. Section 2 presents the background and methodology. Section 3 describes the structural change after Asian crisis. Section 4 reviews the current crisis. Finally, section 5 concludes.

## **2. Background and methodology**

The first thing is to review the exchange rate for the trade channel of the financial crisis. The development of the nominal and real effective exchange rate is presented in Figure 2. The nominal effective exchange rate (NEER) and real effective exchange rate (REER) starting from 1994 are taken from Bank for International Settlement (BIS). To extend the series, we calculate NEER and REER from 1984 to 1993 using CPI as the price index, weighted by export shares of six trading partners which comprise 74 percent of Indonesian export. We also change the base year to 1995 and transform BIS data to match the definition of increase means depreciation and decrease means appreciation of rupiah.

It is clear that exchange rate management was different between before and after the Asian crisis. Before 1997 exchange rate was gradually depreciated, except the depreciation in 1986 to maintain export competitiveness. The REER was stable. It indicates that overvaluation of the domestic currency was not one of the causes of crisis in Indonesia. NEER was sharply

depreciated up to 500 percent during the Asian crisis. However, REER was depreciated only in the range of 300 percent because of high inflation at that time. NEER has never been back to pre-Asian crisis level. In contrast, REER has been gradually adjusted to almost the pre-Asian crisis level. This indicates the higher inflation in Indonesia compared to the trading partners.

REER appreciation after 2001 implies two alternative conditions. First, there might be indication of exchange rate overvaluation and exchange rate would be depreciated in the future. Second, the Asian crisis caused a deterioration of the exchange rate and exchange rate was returning to the equilibrium. We believe that the later condition may better be explained in the current situation. Moreover, export did not increase as a result of exchange rate depreciation in both crises, but increased from 2001 to 2008 when gradual REER appreciation happened (see Figure 3). Increase in export was mainly caused by export price growth rather than volume growth (Athukorala, 2006).

Increasing export was also followed by increasing import. The net impact on GDP was limited. Net export contributed less than 10 percent of GDP. Figure 4 reports the composition of GDP. The largest components of GDP are private consumption and investment. In this sense, Indonesian economy relied on domestic demand. It also implies that in case of contagion, international trade channel would have limited impact.

Therefore, this paper focuses on financial channel of the two crises. The analysis of capital flows for the financial channel of the crisis is conducted using two main concepts. The first is uncovered interest parity. In an open economy, arbitrage would equate domestic return and foreign return adjusted with expected depreciation.

$$(1 + id_t) = (1 + ib_t) \cdot \frac{s_{t+1}}{s_t} \tag{1}$$

where  $id$  denotes domestic interest,  $ib$  is benchmark rate and  $s$  denotes spot exchange rate. The last term in the right hand side of the equation represents expected exchange rate depreciation.

To test the interest parity condition, many literatures put the expected depreciation as dependent variable and interest differential as independent variable (Flood and Rose, 2002; Chinn, 2006). In this sense, the focus is whether exchange rate adjusts to interest rate differential or whether foreign exchange market is efficient. In this paper, we focus on the domestic interest rate adjustment because exchange rate was managed before the Asian crisis.

$$lrd_t = \alpha + \beta_1 \cdot lrb_t + \beta_2 \cdot lfx_t + u_t \quad (2)$$

where  $lrd$ ,  $lrb$  and  $lfx$  denote log of domestic interest rate, benchmark rate and expected depreciation respectively. In the most restricted form, the hypothesis of uncovered interest parity is  $\beta_1 = \beta_2 = 1$ . If exchange rate is fixed, expected depreciation would be zero ( $\beta_2 = 0$ ). The hypothesis may become  $\beta_1 = 1$ . Shambaugh (2004) argues that in an open capital market with credible peg, domestic interest rate would follow one for one the movement of the benchmark rate. We use the hypothesis  $\beta_1 = 1$  to review the economic structures in Indonesia.

We also estimate the specification in the first difference and error correction model to deal with stationarity issues and the existence of cointegration relationship.

$$\Delta lrd_t = \alpha + \beta_1 \cdot \Delta lrb_t + \beta_2 \cdot \Delta lfx_t + u_t \quad (3)$$

$$\Delta lrd_t = \alpha + \beta_1 \cdot \Delta lrb_t + \beta_2 \cdot \Delta lfx_t + \theta \cdot (lrd_{t-1} - \gamma_1 \cdot lrb_{t-1} - \gamma_2 \cdot lfx_{t-1}) + \varepsilon_t \quad (4)$$

In this case, ( $\beta_1$  and  $\beta_2$ ) in Equation (3) indicates the short-run relationship. Equation (4) assesses both short-run ( $\beta_1$  and  $\beta_2$ ) and long-run ( $\gamma_1$  and  $\gamma_2$ ) relationships.

The second concept is the saving and investment relation. Theoretically, if capital is freely mobile, increase in saving would flow to the highest return investment in the world. Therefore, saving would not correlate with investment, especially when the economy is small (Feldstein and Horioka, 1980). They found a high correlation between domestic saving and domestic investment in industrial countries despite the fact that international capital was freely mobile (Obstfeld and Rogoff, 2000).

To estimate this relationship, we employ time series approach. Although the original estimation used cross country data, there are many time series applications for specific country analysis (for example: Hoffman, 2004 and Jansen, 1998). We use specifications as follows.

$$i_t = \alpha + \beta \cdot s_t + u_t \quad (5)$$

$$\Delta i_t = \alpha + \beta \cdot \Delta s_t + u_t \quad (6)$$

$$\Delta i_t = \alpha + \beta \cdot \Delta s_t + \theta \cdot (i_{t-1} - \gamma \cdot s_{t-1}) + u_t \quad (7)$$

where  $i$  and  $s$  denote investment and saving ratio to GDP respectively.

There have been many literatures regarding the interpretation of the saving and investment relation (Apergis and Tsoumas, 2009). One side argues that saving and investment relation does not imply capital mobility, while the other maintains that it indicates capital mobility.

In this paper, we review the saving-investment relation in the context of capital flows. We test the null hypothesis of no capital mobility with saving coefficient equal to unity,  $\beta = 1$  in the short-run and  $\gamma = 1$  in the long-run. With the apparent capital inflows before the Asian crisis and capital outflows afterward, the natural expectation is that the null hypothesis can be rejected.

The main data source in this paper is International Financial Statistic (IFS) of International Monetary Fund (IMF). We also employ data from Statistics Indonesia and Bank Indonesia to extend the IMF data back to 1984. Domestic interest is the domestic money market rate (53660B..ZF...) and benchmark rate is U.S. T-Bill rate (11160C..ZF...). Market exchange rate (536..AE.ZF...) is stated as rupiah per U.S. dollar. Domestic saving is GDP subtracted by private and government consumption. Investment includes gross fixed capital investment and changes in inventories.

### **3. Impact of the Asian crisis**

In the Asian financial crisis, the Indonesian government supported by IMF could not

win the confidence from the market. The worst of the crisis happened after IMF program started in November 1997. There are many debates about why and how IMF program could not prevent the crisis in Indonesia. The IMF macroeconomic package required a monetary contraction with high interest rate and fiscal tightening aiming a budget surplus. The impact of these policies was economic contraction (Ito, 2007). High interest rate intended to minimize speculation also affected the real sector. Interest rate reached the level of 80 percent which paralyzed economic activity. High interest rate was not able to stop the capital outflows.

To review capital flows, we divide the period of analysis into two sub-periods. The first sub-period represents the period before the Asian crisis (1984m1 to 1997m6) and the second sub-period is after the Asian crisis, but before the current financial crisis (2000m1 to 2008m6). We exclude the crisis period to eliminate the outliers that may influence the estimation.

The first analysis is about interest parity condition. Table 1 shows the interest parity condition for the two sub-periods. In the first sub-period, the coefficients of expected exchange rate depreciation were not significantly different from zero in all specifications. The exchange rate regime seems to affect this result. Exchange rate was managed before the Asian crisis, thus the only adjustment for the change in benchmark rate was domestic interest rate. In this case, free capital mobility would cause domestic interest rate to follow the movement of benchmark rate. In other words, monetary policy was not independent. We test this condition using parameter restrictions on benchmark rate coefficient ( $\beta_1 = 1$  and  $\gamma_1 = 1$ ).

All of the benchmark rate coefficients were not significantly different from unity. Short-run coefficients ( $\beta_1$  in the second and third model) had a large standard deviation, but long-run coefficients were highly significant. Moreover, the adjustment speed was very high with the value of 0.5. The deviation from equilibrium was corrected in two months. This indicates that domestic interest rate followed the movement of the benchmark rate.

In the second sub-period, the interest parity condition could not be clearly identified. As

in the previous sub-period, the coefficients of expected exchange rate depreciation were not significant. However, the interpretation is quite different because exchange rate has been floated after the Asian crisis. In this case, exchange rate market was not efficient or exchange rate was determined by factors other than interest rate. The F statistic and adjusted  $R^2$  value of the first and second model were very small we could not interpret the result. In addition, short-run coefficient of benchmark rate was weakly significant in the third model with the unexpected sign.

The high correlation between domestic and benchmark interest rate before the Asian crisis may be interpreted as an evidence of credible peg and free capital mobility. This is in line with the highest value of KAOPEN index of Chinn and Ito (2008) for Indonesia during 1983-1995. The interpretation of the interest parity condition for the period 2000-2008 may not be crystal clear. At least we may conclude that exchange rate is more flexible than in the previous period, therefore interest rate may move independently from the benchmark rate.

The next is capital flows analysis. Figure 5 shows the current account and financial accounts as ratio to GDP. We can see clearly the different conditions before and after the Asian crisis. In the first sub-period significant amount of foreign capital inflows caused the current account deficits. After the Asian crisis the opposite condition happened, capital outflows and current account surplus. In the Feldstein-Horioka framework, large capital inflows should weaken the relationship between domestic saving and domestic investment.

Interestingly, saving and investment were moving together (see Figure 6). The one to one relationship was apparent in the period 1984-1997. In the second sub-period the co-movement was still visible, but the gap was wider than in the previous sub-period. The gap signifies the capital outflows during the second sub-period because domestic saving was larger than domestic investment. On the contrary, pre-crisis capital inflows could not be seen because of the closeness of domestic saving and domestic investment.



Empirical estimation on this relationship is presented in Table 2. In the first sub-period domestic investment was virtually equal to domestic saving. Short-run and long-run coefficients of domestic saving were not statistically different from one. In the second sub-period the parameters were different. Although close to one and highly significant,  $\beta$  in all three models were not equal to one. Long-run coefficient in the ECM was not different from one, but this was because of the large standard deviation.

Although saving and investment moved one to one in the first sub-period, we could not conclude that Indonesia was a closed economy. The fact is large capital inflows happened and domestic interest rate followed the benchmark rate. Short-run coefficient in the second sub-period also shared similar characteristic. However, we can see a clear difference in  $\gamma$  between the first and second sub-period. In the first sub-period  $\gamma$  was highly significant and not different from unity, while in the second sub-period it was not significant.

Another issue emerged because domestic investment was equal to domestic saving. This means that domestic investment was fully financed by domestic saving. In this case, what was the impact of capital inflows during the period 1984-1997? In general, capital inflows would be used to finance investment or consumption. If capital inflows financed investment, investment should have increased. If it is used to finance consumption, consumption should have increased and saving decreased. In all cases, capital inflows should create a gap between investment and saving. Further research is necessary to analyze the absence of the gap between saving and investment in the first sub-period.

#### **4. Analysis of the current crisis**

Although originated from United States, the sign of contagion from the financial channel could be seen in Indonesia. Stock price was declining since early 2008 (Figure 7). In the beginning of 2009, the stock price was cut half. The international trade channel started half year later. Export and import values in early 2009 were around half of the mid 2008 value. However,

the stock price, export and import recovered rapidly and now back to the level before crisis.

To respond to the current crisis, Bank Indonesia designed several actions to prevent another contagion to Indonesian economy. Learned from the lesson from the Asian crisis, the objective of the policy was to prevent unnecessary capital outflows. Therefore, the policies were intended to ensure adequate foreign currency supply for business activities and at the same time to minimize speculative foreign currency transaction. In most cases, these two objectives are incompatible because it is difficult to distinguish speculative motive.

It would be impossible to defend the exchange rate only by direct intervention because of the reserve availability concern. Therefore, Bank Indonesia conducted limited scale foreign exchange interventions and launched several policies to manage foreign exchange demand and supply. Some of policies to address liquidity problems were cutting reserve requirement in foreign currency deposit, the extension of foreign exchange swap tenor and provision of foreign currency for domestic companies through the banking sector. Other policies to minimize speculative transactions were the requirement of underlying transaction for purchase of foreign currency through bank and prohibition of structured product transaction.

The policies successfully mitigate the impact of the crisis. Capital outflows were not prolonged and exchange rate stabilized in the mid 2009. Probably, one important factor is the short-term debt was not as high as in the Asian crisis. At the onset of the Asian crisis short-term debt to international reserve ratio was around 1.9, while at the current crisis it was only around 0.5 (see Figure 8).

Banking sector resilience also contributed to the crisis mitigation. At the onset of the Asian crisis, banking sector was practically collapse following the closure of 16 banks. During the current crisis, banking sector resilience can be maintained. Figure 9 shows the interest rates and exchange rate during the current crisis. Money market rate in domestic currency was increasing since the early 2008 to reduce the inflationary pressure. When exchange rate

depreciation occurred, interest rate was relaxed to provide liquidity. Money market in foreign currency followed the USD LIBOR rate closely. This condition indicates the foreign currency liquidity problem could be minimized. Herding and speculative behavior was successfully limited while foreign exchange liquidity was maintained.

On fiscal side, Indonesian government took various measures to prevent crisis and to stimulate economic growth. In the early 2009, fiscal stimulus was announced. The first policy was to boost the purchasing power to maintain private consumption by reducing personal income tax and providing more direct subsidy for medium and low income household. Secondly, reduction of costs of business was conducted through lower income tax and subsidy for energy prices. The third was to create jobs with additional expenditure on infrastructure projects to support employment creation and poverty reduction.

Although the financial market crisis had been started since the third quarter of 2008, economic growth in the 2008 (6.1 percent) was only slightly lower than in 2007 (6.3 percent) and even higher than in 2005 (5.7 percent). Economic contraction could be seen in 2009 (4.5 percent). This contraction was not as severe as in the Asian crisis. Although the crisis began after mid 1997, growth in 1997 was substantially reduced from 7.8 percent in 1996 to 4.7 percent in 1997. In 1998, economy was in real trouble with large negative growth (-13.1 percent). As a comparison, average GDP growth for three years before the Asian crisis (1994-96) was 7.9 percent, while before the current crisis (2006-08) was 5.9 percent.

It is difficult to estimate the impact of current crisis because it may not be over yet. The structural change is also difficult to measure. Unlike the Asian financial crisis, time series data on the macroeconomic variables is not long enough to estimate independently. To test the existence of a structural break, we employ Chow breakpoint test based on the interest parity and saving-investment relation (Equation (4) and Equation (7)). For this purpose, we estimate the model from 1984 to third quarter of 1998 for the Asian crisis and from 2000 to third quarter of

2009 for current crisis. We use two indicators, F statistic and loglikelihood ratio, to test the hypothesis of no structural break at the specified breakpoint. We test the possibility of the existence of a breakpoint in 1997 and 2008.

The results of the breakpoint test are presented in Table 3. The existence of a structural break can be seen in 1997. Both interest parity and saving-investment relation underwent structural changes in 1997. The hypothesis of no breaks can be rejected for the whole periods in 1997. The results also confirm that the breakpoint was at the eighth month or third quarter of 1997. The F stat and loglikelihood ratio of the interest parity relation at this month were the largest with the value of 22.6 and 106.2 respectively. The F stat and loglikelihood ratio of the saving-investment relation were also the largest at the third quarter of 1997 with the value of 9.9 and 34.0 respectively.

For the current crisis, the test could not reject the hypothesis of no breaks for the whole period of 2008. It indicates that there were no structural changes because of the current crisis with respect to the interest parity condition and saving-investment relation. However, these results should be interpreted carefully because the current crisis may persist. If the recovery process in the world economy is slow, another round of contagion may happen.

## **5. Concluding remarks**

This paper reviews the Indonesian economy after two crises. There are two shared characteristic of severe financial crisis from these two crises. Assets prices were deteriorating and international trade slowed down. In both crises, these two variables dropped to half of the value before the crises. However, the recovery process in current crisis seems more rapid than in the Asian crisis. Another similarity of the two crises is both originated from financial sector outside Indonesian economy. The contagion process was transmitted through financial channel.

The policy responses for the two crises are quite different. In the Asian crisis IMF supported program required tight monetary and tight fiscal policy. The policies to fight

speculation fired back because of the loss of confidence. On the other hand, fiscal stimulus and foreign exchange liquidity management in current crisis seem to produce better results.

Structural change in Indonesian economy was apparent in the aftermath of the Asian crisis. Exchange rate management was clearly different both de jure and de facto, from managed to floating exchange rate. As a consequence, interest parity relation was also different. Capital flows pattern also differed substantially. Capital inflows turned into capital outflow after the Asian crisis. On contrary, the breakpoint test failed to provide evidence of a structural break in the current crisis. Although economic growth slightly slowed down, other indicators were returning to the pre-crisis level.

The impact of the current crisis to Indonesian economy seems less severe than in the Asian crisis. Several factors may contribute to this condition. First, the size of the domestic market is large and less reliance to export. Secondly, the financial vulnerability is lower than in the Asian crisis because short-term debt to international reserve ratio was less than one. In addition, banking sector resilience can be maintained during the current crisis. Third, the rapid and accurate policy responses to mitigate the impact of the current crisis may also contribute to the success. Domestic demand has been maintained by the fiscal stimulus. Herding and speculative behavior have been minimized by restricting the liquidity for structured products.

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Figure 1 GDP growth (%)

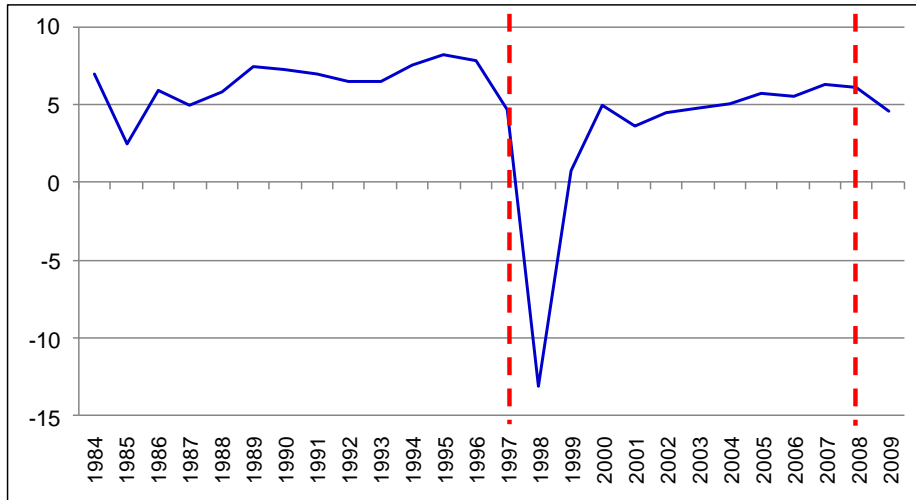
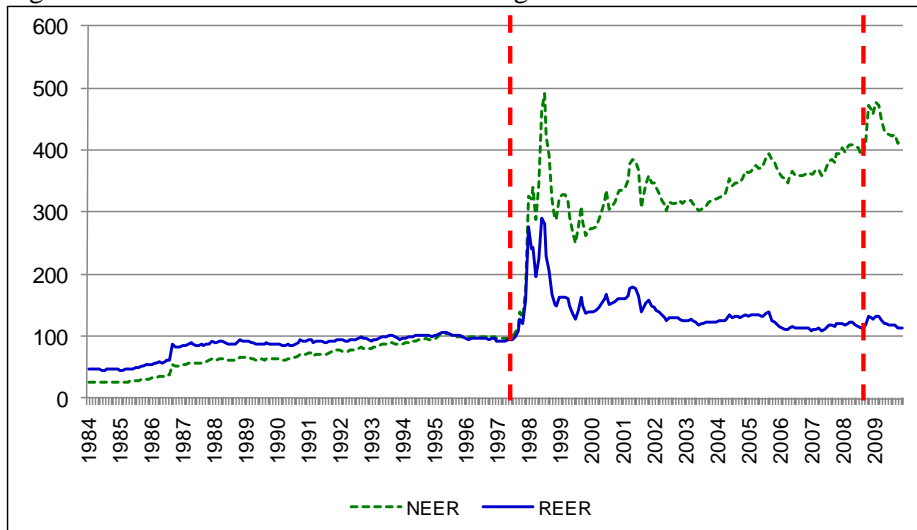


Figure 2 Nominal and real effective exchange rate



Notes:

Increase means depreciation. The base year is 1995. Data for the period 1984-1993 is from author calculation based on six trading partners representing 74 percent of Indonesian export. From 1994, data are taken from BIS and transformed to match the definition.

Figure 3 Exports and Imports (Billions USD)

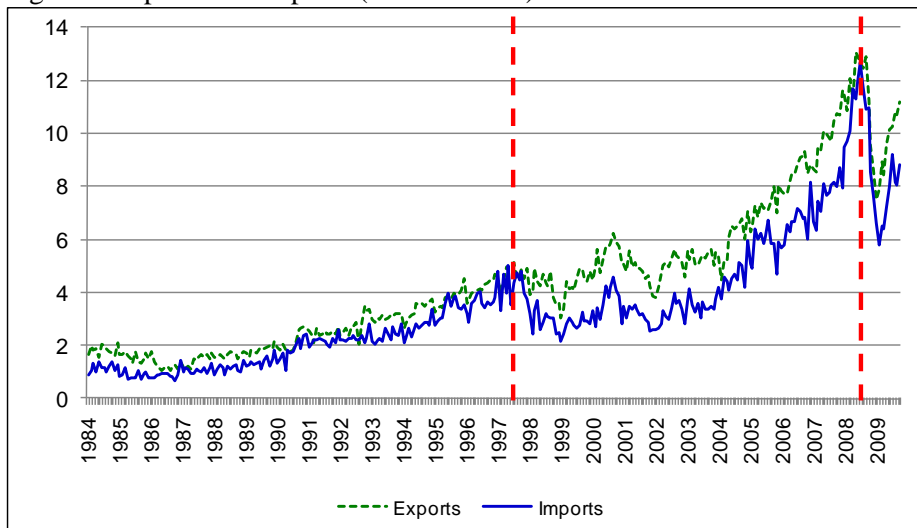




Figure 4 Composition of GDP

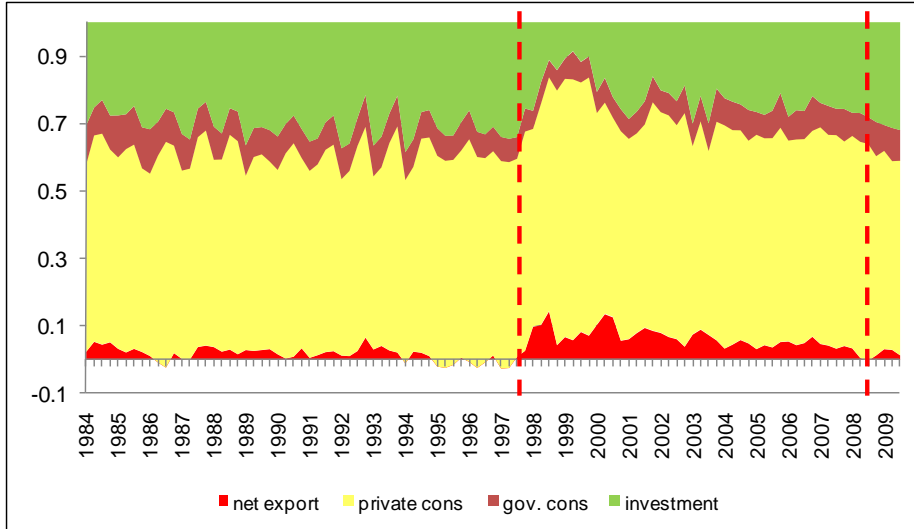


Figure 5 Current accounts and financial accounts ratio to GDP

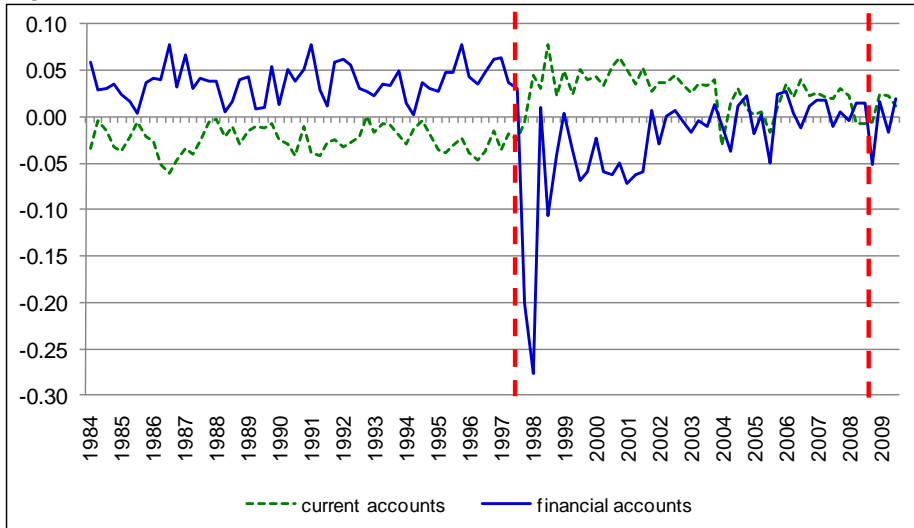


Figure 6 Saving, investment and net export ratio to GDP

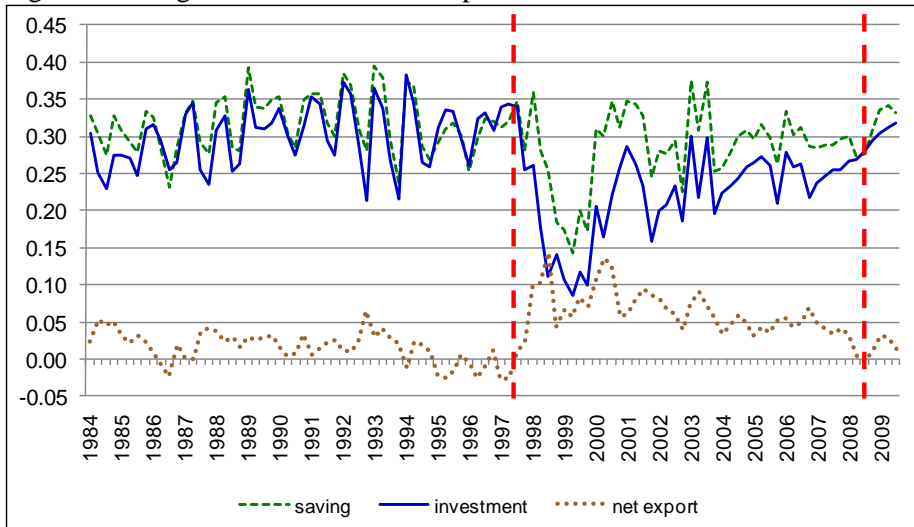


Figure 7 Stock price index

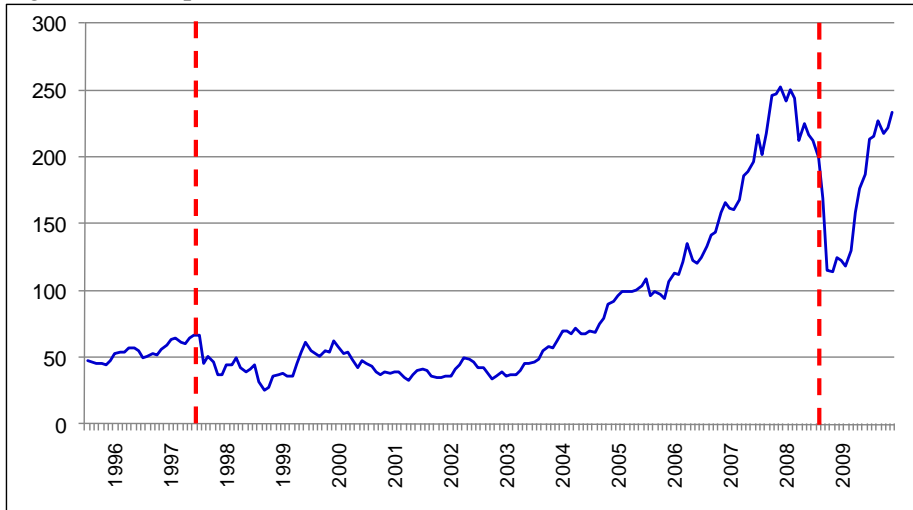
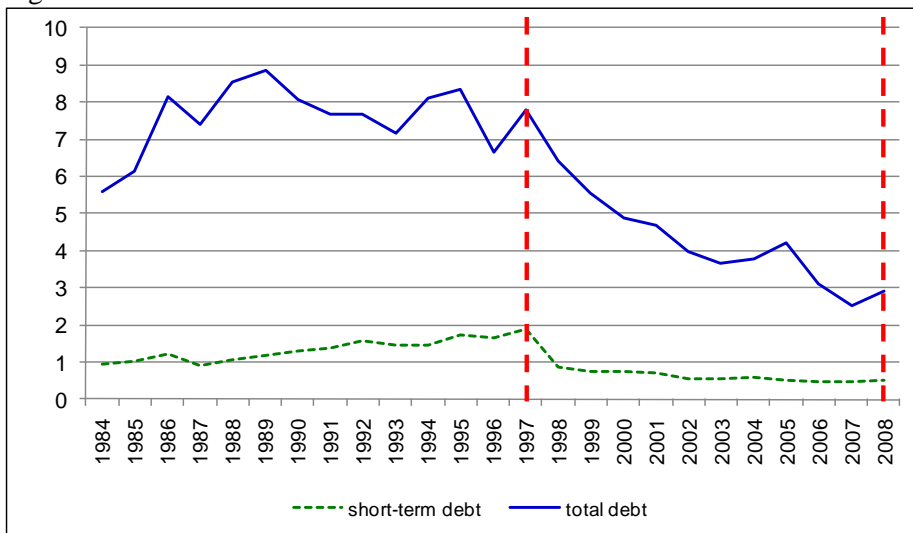
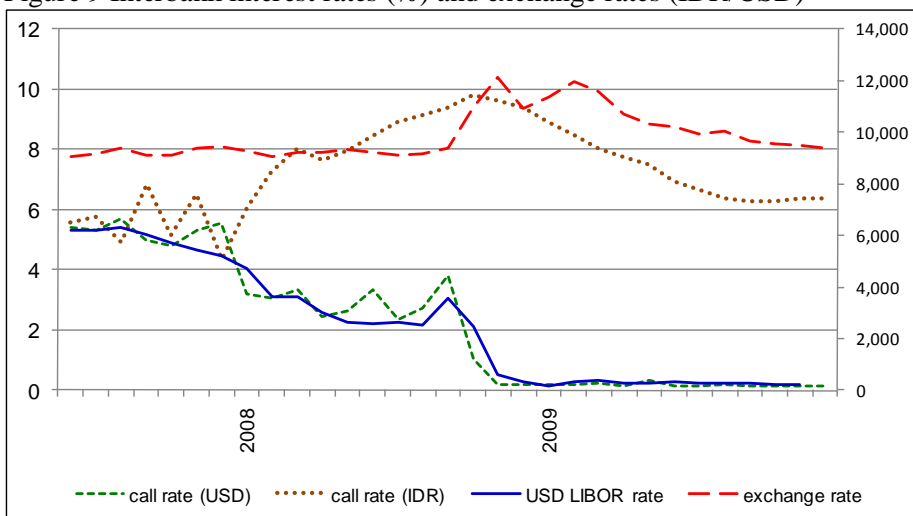


Figure 8 Debt to international reserve ratio



Notes:  
Data are taken from Global Development Finance of the World Bank.

Figure 9 Interbank interest rates (%) and exchange rates (IDR/USD)



Notes:  
Interest rates are on the left axis, while exchange rate is on the right axis.

Table 1 Interest parity condition

	$\alpha$	$\beta_1$	$\beta_2$	$\theta$	$\gamma_1$	$\gamma_2$	Adj. R <sup>2</sup>	DW	$\beta_1=1$	$\gamma_1=1$
1984m1-1997m6										
lrd	7.5272 *** (1.6714)	0.9352 *** (0.3038)	-0.0012 (0.0018)				0.1714	0.9905	0.8315	
$\Delta$ lrd	0.0454 (0.1606)	1.9966 (1.6127)	-0.0025 (0.0018)				0.0058	2.5623	0.5375	
$\Delta$ lrd	3.6783 ** (1.5909)	1.5026 (1.2615)	-0.0007 (0.0013)	-0.4976 *** (0.1703)	0.9577 ** (0.3901)	0.0060 (0.0054)	0.2383	2.0315	0.6909	0.9139
2000m1-2008m6										
lrd	8.2941 *** (1.3848)	0.2668 (0.3199)	-0.0063 (0.0098)				-0.0023	0.3444	0.0240	
$\Delta$ lrd	-0.0609 (0.1335)	-0.7620 (0.6509)	-0.0011 (0.0021)				-0.0123	2.8581	0.0080	
$\Delta$ lrd	1.3761 ** (0.5158)	-1.6907 * (0.8021)	-0.0054 (0.0033)	-0.2040 *** (0.0699)	0.6629 (0.3995)	-0.0480 (0.0204)	0.0920	2.6222	0.0011	0.4009

Notes:

- \*, \*\* and \*\*\* represent 10%, 5% and 1% levels of significance, respectively.

- Standard errors reported in parentheses are robust to heteroskedasticity and autocorrelation.

Table 2 Domestic saving and investment relations

	$\alpha$	$\beta$	$\theta$	$\gamma$	Adj. R <sup>2</sup>	DW	$\beta=1$	$\gamma=1$
1984q1-1997q2								
i	0.0072 (0.0248)	0.9447 *** (0.0702)			0.8081	0.8498	0.4350	
$\Delta$ i	0.0010 (0.0019)	1.0446 *** (0.0582)			0.8624	2.4716	0.4471	
$\Delta$ i	0.0202 (0.0181)	1.0139 *** (0.0505)	-0.4184 *** (0.0802)	0.8235 *** (0.1299)	0.8880	2.0600	0.7839	0.1805
2000q1-2008q2								
i	0.0275 (0.0320)	0.7070 *** (0.1051)			0.4361	0.6224	0.0089	
$\Delta$ i	0.0024 (0.0028)	0.8416 *** (0.0473)			0.8424	1.9133	0.0021	
$\Delta$ i	0.0179 (0.0315)	0.7921 *** (0.0608)	-0.2496 (0.1635)	0.5833 (0.4547)	0.8503	1.7050	0.0018	0.3667

Notes:

- \*, \*\* and \*\*\* represent 10%, 5% and 1% levels of significance, respectively.

- Standard errors reported in parentheses are robust to heteroskedasticity and autocorrelation.

Table 3 Chow breakpoint test

	interest parity				saving and investment				
	1997		2008		1997		2008		
	F-stat	ll ratio	F-stat	ll ratio	F-stat	ll ratio	F-stat	ll ratio	
M1	5.4629 ***	32.0718 ***	0.3195	2.1165	Q1	6.6082 ***	24.6374 ***	1.4714	6.7795
M2	5.8389 ***	34.0793 ***	0.3239	2.1455					
M3	6.0039 ***	34.9531 ***	0.3042	2.0166					
M4	7.7686 ***	44.0386 ***	0.2698	1.7899	Q2	9.0278 ***	31.5862 ***	1.3365	6.2049
M5	9.1380 ***	50.7812 ***	0.2799	1.8564					
M6	12.2392 ***	65.1630 ***	0.2363	1.5695	Q3	9.9204 ***	33.9562 ***	0.6159	2.9824
M7	14.0805 ***	73.1800 ***	0.2193	1.4572					
M8	22.6077 ***	106.1980 ***	0.2177	1.4467					
M9	5.2619 ***	30.9893 ***	0.1972	1.3110	Q4	9.6148 ***	33.1555 ***	0.4057	1.9902
M10	5.7974 ***	33.8590 ***	0.1636	1.0888					
M11	7.8360 ***	44.3768 ***	0.1276	0.8497					
M12	13.9118 ***	72.4601 ***	0.1060	0.7068					

Notes:

- \*, \*\* and \*\*\* represent 10%, 5% and 1% levels of significance, respectively.

- F-stat denotes F statistic value and ll ratio denotes loglikelihood ratio.

- The null hypothesis is no breaks at specified breakpoints.