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## INFLATION TARGETING POLICY: THE EXPERIENCES OF INDONESIA AND THAILAND

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# **Inflation Targeting Policy: The Experiences of Indonesia and Thailand**

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# **Inflation Targeting Policy: The Experiences of Indonesia and Thailand**

**Abstract:**

The chief objective of our paper is to highlight basic features of the IT policies adopted by Indonesia and Thailand, and to evaluate their overall performances. These economies have seen their inflation rates to decline during the post-IT period, and pass-through rates for both tradable and non-tradable prices in the two emerging markets have also declined. More importantly, no trade-offs between output growth and inflation have been reported. The implementations of the IT policy in these two Southeast Asian economies have however largely been “flexible” rather than “strict”, seeking the balance between minimizing output gap and achieving price stability.

**JEL Classification:** E52, E58, F31, F33

**Key Words:** Inflationary Expectation; Output Gap; Inflation Targeting; Pass-through, Monetary Policy Rule.

## **1. Introduction**

High inflationary pressures have created havoc in Asia, especially since late 2007. Managing price stability, especially for those economies with prohibitive vulnerability to sudden shifts in global investor sentiment, is therefore imperative to sustain robust economic growths. The return of strong, yet volatile, capital inflows has been one of the determinant factors for the strong inflation inertia in some of these economies, especially the newly emerging markets, such as Vietnam. In addition, the sliding US dollar, whose decline since early 2007 has been accelerated by a series of interest rate cuts in the US, is also feeding the growing inflationary pressures in these economies. This phenomena is particularly evident in the countries that have continued to pursue rigid exchange rate regime against the US dollar as the anchor of their monetary policies. High and volatile prices of key commodities, most notably oil and food items, have also further contributed to alarmingly high living cost in Asia.<sup>1</sup>

Most of the major Asian economies have resorted to heavy sterilization to rein in the unwanted consequences of capital inflows in the domestic economy (Table 1). However facing the mounting cost and the declining effectiveness of the sterilization measures, a number of these countries have gradually introduced more flexible regimes of exchange rate and carried out the necessary adjustments in their monetary, fiscal, investment and trade policies.

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<sup>1</sup> At the end of the second quarter of 2008, the year on year inflation rates of Indonesia, China and Vietnam have already reached the levels of around 11 percent, 12 percent and 26 percent, respectively.

For some of these emerging markets, the adoption of the more flexible exchange rate policy is proven to be an initial step toward the full adoption of the inflation targeting (IT) policy as the anchor of their monetary policy in particular and their macroeconomic policies in general. Two of the most severely affected economies by the 1997 East Asian crisis, namely Indonesia and Thailand have officially adopted the IT regime. Although the process and the timing varied from one country to another, the needs to abandon the unsustainable rigid exchange rate policy and to strengthen the operation and the effectiveness of the monetary policy have been the principal driving factors behind the adoption of the IT policy by these two major Southeast Asian countries.

The chief objective of our paper is to highlight the basic features of the IT policies adopted in Indonesia and Thailand, and more importantly to evaluate their overall performances. Most of early studies focused their analyses mainly on the implementation of the IT policy in the industrialized economies, and only few studies have attempted to examine the implementation of the IT policy in these two economies.<sup>2</sup> Our study hopes to fill in the gap in the literature and ultimately aims to draw policy lessons for the other emerging markets, particularly in Asia.

To start with, we will first review a number of performance indicators such as price stability, growth rate and output volatility, and potential trade-offs between them. We then examine the pass-through effects in both tradable and non-tradable prices, and the effectiveness of the nominal exchange rate as a shock absorber. In particular, we are

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<sup>2</sup> Charoenseang, J. & Manakit, P. (2007) and Kubo (2008) have examined the monetary policy transmission in Thailand during the IT period. Alamsyah et.al. (2001) discuss issues facing Indonesia during preparation stages of the inflation targeting policy.

interested to learn whether the pass-through effects have indeed declined during the post-IT period. Furthermore, have the declines in the pass-through been more significant for the non-tradable prices than for the tradable prices? If yes, the nominal exchange rate has arguably become a more effective shock absorber.

Another pertinent concern that has been frequently highlighted by past studies, but has not been fully resolved, is with the commitment of the monetary authority to consistently and credibly implement the IT framework. The IT policy is credibly enforced, if the monetary authority is committed to rein in inflationary expectation as the primary or one of the independent targets of its monetary policy rule during *both* stable and volatile economic environments (Schmidt-Hebbel and Tapia (2002), and Bernanke and Mishkin (2007)). Under the lack of credible and transparent implementation of the IT framework by the monetary authority, no conclusive argument can therefore be made to attribute the present level of inflation rate to the IT policy adopted by the country. We employ markov-switching approach to examine the monetary reaction functions of the central banks. The test results allow us to compare and contrast the objectives of the monetary authorities of these two countries during the pre and post-IT periods.

This paper proceeds as follows. Next section briefly discusses policy backgrounds and basic economic performance indicators under the IT regime. Section three lays out the pass through equation and the monetary policy rule model to be tested in our study. The empirical section introduces the data sets and presents the findings of the autoregressive distributed lag (ARDL) for the pass-through effects and the markov-switching testing for the monetary policy reaction function. The conclusion section ends the paper.

## **2. Brief Policy Backgrounds and Primary Performance Indicators**

### **2.1 Policy Backgrounds**

#### **2.1.1 Indonesia**

Following the new Central Bank Act, the UU No.23/1999 enacted on May 17, 1999 and as amended by Act No.3 of 2004, the ultimate goal of Bank Indonesia (BI) is to achieve and maintain the stability of rupiah (Article 7), which is reflected in the inflation rate and exchange rate. Nonetheless, BI had only officially launched its IT policy as its new monetary policy framework in July 2005. Among the reasons that prompt BI to move away from the past base money targeting framework to the current IT framework are:

- (i) the unstable relationships between base money, output, and as well as price level, especially due to the structural changes in the post-crisis period,
- (ii) the growing difficulties in controlling base money,
- (iii) the growing success of other IT countries in reining in inflation without increasing output volatility, and
- (iv) the need to strengthen the credibility of BI as the monetary authority.

Under the IT framework, the inflation target represents the overriding monetary objective set by the Indonesian government after coordination with BI. The government has gradually increased the headline inflation target from 3-5% in 2000 to  $9 \pm 1\%$  in 2003 before revising the headline inflation target downward to  $5 \pm 1\%$  for 2008<sup>3</sup>. The setting of these intermediate targets is consistent with the desire to achieve a medium to long-term inflation rate of 3% such that the country can remain competitive with its Asian neighbors.

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<sup>3</sup> See Table 2 for details on Indonesian inflation target.

In order to increase the effectiveness of monetary policy signals as well as to provide greater certainty to market players and the public, the BI rate is chosen as the signaling interest rate instrument for Bank Indonesia. The BI rate is determined during the quarterly or monthly Board of Governors' meeting for the coming quarter in response to the outlook for the achievement of the inflation target. The BI rate is used as a reference in the monetary control operations<sup>4</sup> to ensure that the weighted average of 1-month Certificate of Bank Indonesia (SBI) rate formed in the Open Market Operations (OMOs) auctions remains at around the level of the BI rate. The 1-month SBI rate is then expected to influence interest rates on the interbank money market and longer-term interest rates. BI began issuing its own debt in the form of SBI to manage the money supply since 1984. Currently the one-month SBI is auctioned weekly and the three-month SBI is auctioned monthly.

The central bank conducts regular and irregular OMOs. The latter operations are also referred to as the Fine Tuning Operations (FTO), introduced in April 2005. The regular operations include one or three month SBI auctions, the Fasilitas Bank Indonesia (FASBI) deposit facility, the SBI repurchase agreements and the Wadiah Certificate (SWBI)<sup>5</sup>. The FASBI deposit facility is BI's rupiah deposit facility, in which banks can deposit funds with BI for 1 to 14 days and receive interest. The central bank's decision to phase out an overnight FASBI window in January 2005 has led to increased volatility in the overnight interbank rate.

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<sup>4</sup> The monetary control operations take place through the use of the following instruments: (i) Open Market Operations (OMOs), (ii) standing facilities; (iii) foreign exchange market intervention, (iv) establishment of the minimum statutory reserve requirement, and (v) moral suasion. The most important monetary control instrument is the OMOs.

<sup>5</sup> SWBI is an SBI using sharia principals.

The FTO is exercised on an “as needed” basis for both monetary contraction (FTK) and expansion (FTE) purposes. These instruments can be used for 1 to 14 days to fine tune the short-term liquidity. The FTK rate is fixed by BI and is capped at the one-week FASBI rate. The FTE is a short-term lending facility to provide liquidity and only SBI and government bonds can be used as underlying assets for this transaction.

### **2.1.2 Thailand**

The Bank of Thailand (BOT) formally adopted the IT policy in May 2000 after exited from the IMF financial assistance programme. The decision to shift from the previous monetary targeting regime to the current IT regime is largely driven by the recognition that the relationship between monetary indicators and output growth was becoming less stable, especially in the immediate aftermath of the 1997 financial crisis and under the rapidly changing financial sector in Thailand (Kubo (2008)). In addition, the implementation of IT is needed to restore the BOT credibility as well as its independence (Jansen, 2001).

Under the IT framework, the quarterly average of the core inflation target (the headline inflation excluding raw food and energy prices) has been set at a range of 0-3.5% from 2001 onwards. This is to ensure that Thailand’s inflation rate is in line with those of its trading partners and to maintain the stability of Thai baht. The target bandwidth of 3.5% is expected to mitigate temporary economic shocks and to minimize the need for the BOT to carry out frequent monetary policy adjustments.

The BOT sets the 14-day repurchase rate as its policy rate to influence the short-term money market rates. The BOT signals the shifts in monetary policy stance through the

announced changes in the key policy rate via the open market operations (OMOs)<sup>6</sup>. In order to maintain the policy rate, the BOT regularly injects and absorbs liquidity through the market as well as acting as a matched-principal broker. The standard tenors are 1-day, 7-day, 14-day, 1-month, 2-month, 3-month and 6-month. The monetary authority has the option of conducting either a fixed-rate or a variable-rate tender. Nonetheless, the most active tenors are overnight and 14-day. In order to enhance the signaling effect of monetary policy, a fixed-rate tender is always conducted for the 14-day tenor, while a variable-rate tender applies for all other tenors.

## **2.2 Preliminary Performance Indicators**

A number of basic performance indicators have often been applied to evaluate the outcome of the inflation targeting policy. Most have considered the potential trade-offs between economic growth and inflation. Cecchetti & Ehrmann (1999) for instance argue that one should expect to see heightened levels of output volatility in the IT countries as the monetary authority manipulated the output gap to reverse shocks to inflation. Similarly, Mishkin and Schmidt-Hebbel (2007) examine both the mean and the standard deviation of the inflation rate and the GDP growth rate during the pre-and post-IT period to examine the volatility and potential trade-offs between the growth and the inflation rates. For the IT policy to be considered successful, the following outcomes should at least be achieved:

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<sup>6</sup> In conducting the OMOs, the BOT undertakes transaction in the financial markets to affect the aggregate level of reserve balances available in the banking system and thus affects the short-term interest rates. This operation is in accordance with the Bank of Thailand Act, B.E.2485.

- Lowered inflation and output volatility are posted during the post-IT when compared to the pre-IT rates.
- The sacrifice ratio (i.e. the output cost of maintaining inflation rate within the targeted range) decline over time.

Table 3 reports the mean and standard deviation of the annualized monthly consumer price index (CPI)-based inflation and the annualized quarterly GDP growth rate for both economies during the period of two years before ( $t - 2$ ) and after ( $t + 2$ ) the full adoption of the IT policy. Following IMF (2005), two features/conditions must be met to be considered under the full-fledged IT period:

- a) The central bank is mandated, and commits to, a unique numerical target in the form of a level or a range of annual inflation, and
- b) The inflation forecast over some horizon is the de facto intermediate target of the monetary policy.

Based on those two conditions, the official starting dates of the IT framework in Indonesia and Thailand are reported in Table 2.

As far as the inflation performance, we find the headline inflation rates in Thailand, but not in Indonesia, to be relatively lower and less volatile during two immediate years following the adoption of the IT policy than during the pre-IT period. However, the inflation rates of both economies have declined and appeared to be well contained within the official targeted IT rates by 2006-2007.<sup>7</sup> We see also relatively more stability in the domestic price

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<sup>7</sup> As core inflations are in general lower than headline inflations, we therefore argue that having headline inflation rate lower than the IT target is a sufficient evidence for meeting the IT target for those countries with the core inflation rate as the target rate, including Thailand. Note here, our study  
(continued)

levels in recent years, as suggested by the smaller standard deviations of the inflation rates in general.

Most encouragingly, there seems to be no trade-off between inflation and economic growth. The average GDP growth rates of Indonesia and Thailand have in general been higher and less volatile than the rates during the pre-IT period, and the growth performance continued to improve in 2006/2007.<sup>8</sup> With both inflation rates to fall and growth rates to increase, macroeconomic performance under the IT policy in these two countries looks to be promising. To confirm the benefits of the IT policy however, we need to carry out more in-depth empirical investigation. Next section will first introduce the empirical models and the set of hypotheses to be tested.

### **3. Working Model**

#### **3.1. Inflation Inertia and Pass-through Effects**

Has the IT regime reduced the pass-through effects and inflation inertia, and therefore contributed to the reported fall in the domestic inflation rate of these two economies? Taylor (2000) argues that the extent of a pass-through decline is highly influenced by the strong commitment of the monetary authority toward price stability. Supporting Taylor's claim, Gagnon and Ihrig (2004) tested a sample of advanced nations and found that the decline in

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only covers the period of up to July 2007. Hence, high energy and food prices in 2008 will not be accounted in our data.

<sup>8</sup> It should be acknowledged that the GDP growth rate of Thailand at  $(t - 2)$  was heavily affected by the 1997 financial crisis.

the pass-through has been related to the changes in monetary policy procedures, and in particular, to the adoption of inflation targeting.

Edwards (2006), however, demonstrates that “pass-through problem” does not only relate to the issue of inflation, but also to the overall effectiveness of the nominal exchange rate as a shock absorber. Therefore, the paper argues that it is important to make a distinction between the pass-through of exchange rate changes into the domestic price of non-tradable and into the domestic price of tradable. From a policy perspective, a desirable situation is to realize a more efficient shock absorbing exchange rate where the pass-through coefficients for tradable and non-tradable are low and different, with pass through for tradable goods being higher than that for non-tradable goods.

To address the set of questions introduced earlier, our study employs the following empirical model based on Edwards (2006)<sup>9</sup>:

**Equation 1:**

$$\Delta \log P_t = \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta \log E_{t-i} + \sum_{i=1}^n \beta_{2i} \log \Delta P_{t-i}^* + \sum_{i=1}^n \beta_{3i} \log \Delta P_{t-i} + \sum_{i=1}^n \beta_{4i} (\Delta \log E_{t-i} * DIT) + \sum_{i=1}^n \beta_{5i} (\Delta \log P_{t-i} * DIT) + \varepsilon_t$$

Where:

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<sup>9</sup> This model is the variant of the models introduced by Campa and Goldberg (2002) and Gagnon and Ihrig (2004).

- $P_t$  is a domestic price index –either of tradable or non-tradable. As proxies, the rate of change of the CPI is for the non-tradable inflation and the rate of change for the producer price index (PPI) is for the tradable inflation.
- $E_t$  is the nominal effective exchange rate (an increase implies a nominal depreciation of the local currency).
- $P_t^*$  is a world price index. The change of this index captures the rate of world inflation. The US consumer price index is going to be adopted here as a proxy.
- $DIT$  is a dummy variable for Inflation Targeting regime. It is equal to zero before the adoption of the inflation target in the country, and equals to one otherwise.

Several fundamental assessments can be derived from the regression outcomes on

Equation 1:

- The first one is the pre-IT short-run pass through, captured by  $\sum \beta_1$ . We would expect  $\sum \beta_1$  to be equal or greater than zero, i.e. a depreciation of the nominal effective exchange rate ( $\Delta \log E > 0$ ) would lead to a rise in the inflation ( $\Delta \log P > 0$ ), and vice versa.
- The second one is the post-IT short run pass through ( $\sum \beta_1 + \sum \beta_4$ ). If ( $\sum \beta_4 < 0$ ), the pass through effect for the post-IT period is lower than that of the pre-IT. Hence, we find evidence to support Taylor (2000) that a more inflationary-focused policy such as IT should reduce pass through.

- The third one is the pre-IT long-run pass through, estimated as  $\left(\frac{\sum \beta_1}{1 - \sum \beta_3}\right)$ .

Similar to the short-run pre-IT pass through, we would expect the long-run pre-IT pass through to be positive.

- The next one is the long-run pass through estimates for the post-IT period,

$$\left(\frac{\sum \beta_1 + \sum \beta_4}{1 - (\sum \beta_3 + \sum \beta_5)}\right).$$

- $\left(\frac{\sum \beta_1}{1 - \sum \beta_3}\right) > \left(\frac{\sum \beta_1 + \sum \beta_4}{1 - (\sum \beta_3 + \sum \beta_5)}\right)$  implies that the adoption of the IT policy

has reduced the pass through effects.

- $\sum \beta_5 > 0$  suggests that inflation inertia has risen in the local economy. The

rise (fall) in inflation inertia may contribute as well to the rise (fall) in the long-run pass through during the post-IT as compared to the pre-IT period.

- Lastly, we will evaluate whether the ratio of the pass-through coefficients for

the non-tradable price over those of the tradable prices has declined

(increased), suggesting that the nominal exchange rate is becoming a more

(less) efficient shock absorber.

### 3.2 Monetary Policy Reaction Function Under Inflation Targeting Policy

Can the decline in the inflation rate and the pass-through effect during the IT period

be attributed to the full commitment of the monetary authority to the pursuit of the IT policy?

One way to address this question is by examining the monetary policy rule of the central bank during the pre- and the post-IT period. Taylor in his seminal 1993 paper proposes a very specific and simple monetary policy rule, where central bank adjusts its key interest rate in a smooth manner responding to the changes in the expected inflation and output gap. Furthermore, his study and many others have argued that the domestic monetary policy does not systematically respond to external shocks.<sup>10</sup> Therefore, exchange rate variable should not explicitly be included in the reaction function of the monetary authority. The arguments are two folds. First, the exchange rate should already play an indirect role through inflation and output variable. Second, adding exchange rate into the policy rule will only place considerably more volatility to monetary policy (Taylor, 2001). Mishkin and Schmidt-Hebbel (2001) shared this view as well. Likewise, Clarida (2001) contends that even though central banks do not target the exchange rate explicitly, the central banks' objective to stabilize inflation will lead to the increase in short-term interest rate when the domestic currency is weakening and vice versa.

Others however challenge the exclusion of the exchange rate in the optimal monetary policy rule. Svensson (2000) for instance argues the need to allow for the indirect and direct exchange rate transmission channel in the optimal monetary policy reaction function. For our study, there are a number of compelling reasons to explicitly account for the role of the exchange rate variable in the monetary policy reaction function. To start with, external shocks are transmitted largely through exchange rate movements in small open economies, such as Indonesia and Thailand. More importantly, the monetary authorities of these

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<sup>10</sup> For instance, refer to Corbo, et.al (2001) and Trehan and Wu (2007).

economies had officially and unofficially adopted rigid exchange rate policy regimes in the past. Hence, by including the exchange rate variable, we can examine whether the monetary authority continued to place a significant weight on the exchange rate variable during the IT-period.

We adopt an approach introduced by Clarida, Gali and Gertler (1998), henceforth refer to as the CGG approach. The policy instrument is the short-term interest rate and the CGG approach can be generally defined as:<sup>11</sup>

$$r_t^* = \bar{r} + \sum_i^n \beta_i (E_{t-i} \pi_{t+1-i} - \pi^*) + \sum_i^n \gamma_i (E_{t-i} y_{t+1-i} - y^*) + \sum_i^n \lambda_i (q_{t-1-i} - q^*) \quad (2)$$

Where:  $r_t^*$  is the interest rate target;  $\bar{r}$  is the long run equilibrium nominal target;  $\pi^*$  is the long run inflation target;  $E_t \pi_{t+1}$  and  $E_t y_{t+1}$  are expected inflation and output for period  $(t+1)$ , respectively, conditioned on information set available at time  $(t)$ ;  $(y^*)$  is the potential output;  $(q_{t-i})$  denotes the lagged real exchange rate; and  $(q^*)$  denotes the long-run target or equilibrium real exchange rates.  $\beta$ ,  $\gamma$  and  $\lambda$  are the parameters determining the central bank's response to deviations of expected inflation from inflation targets, expected output gap and exchange rate disequilibrium respectively.

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<sup>11</sup> As briefly mentioned, the CGG approach is often referred to as an augmented version of Taylor rule with forward looking expectation on inflation, output and exchange rate gaps (refer to Taylor (2001) and Chadha, Sarno and Valente (2004)).

Early studies have demonstrated that under the forward looking expectation, interest rate smoothing behavior, such that  $r_t = (1 - \rho)r_t^* + \rho r_{t-1} + \varepsilon_t$ , should have a stabilizing effect on the monetary policy reaction function (Rudebusch and Svensson (1999) and Clarida, Gali and Gertler (1998)). Incorporating interest rate smoothing into equation (2) and the two above adjustments, the following monetary policy reaction function can be specified:

$$r_t = \omega + \sum_i^n \rho_i r_{t-1-i} + \sum_i^n \delta_i E_{t-i} \pi_{t+1-i} + \sum_i^n \phi_i (E_{t-i} y_{t+1-i} - y^*) + \sum_i^n \zeta_i (q_{t-1-i} - q^*) + \varepsilon_t \quad (3)$$

Where  $r_t$  is the current interest rate,  $\rho \in [0,1]$  captures the interest rate smoothing behavior,  $\omega = (1 - \rho)(\bar{r} - \beta\pi^*)$ ,  $\delta = (1 - \rho)\beta$ ,  $\phi = (1 - \rho)\gamma$  and  $\zeta = (1 - \rho)\lambda$ . Note:  $i = 1, 2, \dots, n$ .

Due to the limitation with the official data, adjustments have to be made to allow the application of the CGG approach for the cases of Indonesia and Thailand. Given no specified target of exchange rate equilibrium announced by the monetary authorities of these countries and current limitation in available models or tools for estimating equilibrium exchange rate, our modified CGG framework considers exchange rate volatility instead ( $\Delta q$ ) (Siregar and Rajan (2006)). ( $\Delta q$ ) is a measure of periodical change or fluctuation of the real effective exchange rate ( $q_t - q_{t-1}$ ). The rise in ( $\Delta q$ ) implies a depreciation of the local currency.

Similarly, no official data is available for the long-run equilibrium interest rate target ( $\bar{r}$ ) from either the Bank of Indonesia or the Bank of Thailand. However, since variable ( $\bar{r}$ ) is not explicitly included in the regression equation (#3), the lack of official data for that

variable should not influence the test results. Given the discussed necessary adjustments, the modified CGG model to be tested in this paper could be presented as the following equation:

$$r_t = \omega + \sum_i^n \rho_i r_{t-1-i} + \sum_i^n \delta_i E_{t-i} \pi_{t+1-i} + \sum_i^n \phi_i (E_{t-i} y_{t+1-i} - y^*) + \sum_i^n \zeta_{t-i} (\Delta q_{t-1-i}) + \varepsilon_t \quad (4)$$

Equation 4 basically indicates that key central bank interest rate will be determined by the past levels of interest rate and exchange rate volatility, and the past and present level of expected inflation rate and expected output gap. Based on the significance and the size of the estimate coefficients of  $\rho, \delta, \phi$  and  $\zeta$ , we can analyze the relative weights of these key economic indicators on the monetary policy rule of the country. Theoretically, we would expect  $\delta, \phi$  and  $\zeta$  to be all positive. The rise in the inflation expectation should lead to the tightening of the monetary policy. Similarly, rising expected output gap ( $E_{t-i} y_{t+1-i} - y^*$ ) should result in stronger inflationary pressure, and therefore requires tighter monetary policy stance. Lastly, the rise in  $(\Delta q)$  should trigger stronger imported inflation and warrants an upward adjustment in the key interest rate.

To ensure consistent analyses, we consider the implementation of the IT policy to be *strict*, if the following conditions are satisfied:

- a) Following Svensson (2000), the coefficient estimates of all key factors (inflationary expectation, exchange rate volatility and output gap) must be significant and theoretically consistent.
- b) The expected inflation variable is significant during both regimes. That is the forward looking policy to rein in inflation should always be fully enforced under both stable and volatile economic conditions.

- c) The coefficient estimate for the expected inflation is relatively larger than the coefficient estimates for the other two economic variables (exchange rate volatility and output gap) and should have the most significant t-statistics.

If however only condition (b) is met, then we have the case of *flexible* IT regime.

Following Bernanke and Mishkin (2007), IT regime is flexible when there is a discretionary space for the monetary authority to place most important weight to other factors, such as output stability, rather than to price stability. In an extreme case where an IT country places a significant weight only on inflation variable, then this country, according to literature, is following IT *rule* rather than *framework*. Lastly, if none of the above conditions is met, then IT policy has not been enforced. Accordingly, one can argue that other factors, such as more stable macroeconomic environment, are largely responsible for the low inflation and the more moderate pass-through effects.

## **4. Empirics**

### **4.1. Data and Date Selection**

Our monthly data series run from January 1990 to June 2007. Most of the raw data for prices, key interest rates and exchange rates are sourced from the official websites of the central banks of the individual countries and the International Financial Statistics of the International Monetary Fund. However, due to the lack of official data, the nominal and real effective exchange rates of Indonesia are sourced from the database of JP-Morgan. As discussed earlier, we follow IMF(2005) for selecting the starting dates for the official implementation of the IT policy.

All raw variables are in the log-form. The inflation rate is calculated as the monthly percentage change in the price levels (consumer price index (CPI) and producer price index

(PPI)). The monthly industrial production index (IP) for each country is adopted to proxy the domestic output, and the growth rate is calculated as the monthly percentage change of the IP. For the key policy rate, we employ the three month-SBI rate for Indonesia and the 14-day repurchase rate for Thailand.<sup>12</sup>

## **4.2. Autoregressive Distributed Lag Approach for Pass-Through and Inflation Inertia**

### **4.2.1 Exponential Smoothing Inflation of Cogley (2002)**

Most studies examining the pass-through effects for developing countries often rely on the most common measure of inflation such as the CPI-based or PPI-based rates of inflation. However it is well known that there is a substantial presence of transient noises in the CPI series of the developing economies, due for instance to the relatively larger shares of household expenditures on food and energy products. The volatility of the world prices of food and energy commodities, especially since mid-2005, has indeed contributed to the much more fluctuated CPI-series in Indonesia and Thailand in recent years. Therefore to enhance the quality of our pass through estimates, in addition to the CPI and the PPI based inflation series, we also calculate the exponentially smoothed version of the CPI and PPI-based inflation series proposed by Cogley (2002).

Extending the early works of Bryan and Cecchetti (1995) and Cecchetti (1997), Cogley (2002) proposes a simple adaptive method for filtering inflation data to remove transient noise. The study demonstrates that by considering the source of *persistent*

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<sup>12</sup> To reduce the noise and short-run volatilities, we calculate the six-month moving average of the exchange rate variable.

movements in inflation, it can further reduce the still relatively high-frequency variation of the transient noise in the inflation series derived from the early approach of Bryan and Cecchetti (1995).<sup>13</sup>

Cogley (2002) develops a core measure of inflation that down-weights distant movements in the price index. The study proposes the following core inflation measure, involving the exponential smoothing of current and past aggregate inflation series:

$$\tilde{\pi}_t = g_0 \sum_{j=0}^{\infty} (1 - g_0)^j \pi_{t-j} \quad 0 < g_0 < 1 \quad (5)$$

Where  $\pi$  denotes the relevant aggregate CPI or PPI-based inflation rates. Equation (5) defines the core measure as a one-sided geometric distributed lag of current and past inflation. Cogley (2002) sets the gain parameter of  $g_0 = 0.125$ . For our study however, we do not predetermine the size of  $g_0$ , instead we estimate the smoothing parameter ( $g_0$ ) that will minimize the sum of squares of one-step forecast errors.

Figures 1 and 2 contrast and compare the monthly inflation rates based on the actual CPI against that derived by the exponentially smoothing approach of Cogley (2002). Clearly, a fair amount of transient noises in the CPI-based inflation rates of Indonesia and Thailand

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<sup>13</sup> Since the CPI index for each components of the aggregate CPI index is not officially available for Indonesia (full data only available starting 2000) and Thailand (only 7 components are available), we are not able to calculate the weighted median measure of the aggregate inflation series proposed by Brian and Cecchetti (1994) for both of these economies. Moreover, given the adaptive measure of Cogley (2002) has been demonstrated to successfully generate less volatile inflation series than the approach of Brian and Cecchetti (1994), we will only employ the former methodology.

has successfully been taken out by the smoothing process. For the sake of brevity, we do not report the exponential smoothed inflation figures based on the PPI series.<sup>14</sup>

#### 4.2.2 Pass Through Effects

Early studies have acknowledged that  $(\Delta \log E)$  may not be exogenous in Equation 1 and may very well be correlated with the error term. However, finding an appropriate instrumental variable for  $(\Delta \log E)$  is difficult.<sup>15</sup> One way to circumvent the problem is to employ the classical ARDL (Autoregressive Distributed Lag) testing with the general to specific approach (Hendry, 1976). This is a common approach adopted by early studies such as Campa and Goldberg (2002) and Gagnon and Ihrig (2004). To avoid potential endogeneity, the ARDL testing includes variables at period  $(t - 1 - i)$  only, with  $i = 0, \dots, n$ .<sup>16</sup> Furthermore, a battery of test statistics will be reported to ensure that our coefficient estimates are valid and robust.

In addition, a crisis dummy is included in the testing to capture potential structural breaks due to the financial and exchange rate crisis started in the middle of 1997. Prior to conducting the ARDL testing, we test the unit-root properties of each of the variables in Equation 1 and found that all of them to be non-stationary and integrated of order 1 ---I(1) series. Next, we test for the possible cointegrating relationship among the variables in

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<sup>14</sup> However, these figures can be made available upon request.

<sup>15</sup> The difficulty in finding a good instrument for exchange rate variable was initially highlighted by Meese and Rogoff (1983).

<sup>16</sup> Due to the degree of freedom, we start with  $i = 5$  (up to six month lag). In all cases, we do not find higher lagged variables to be significant.

Equation 1. If any cointegrating relationship is found, then the error-correction component series ( $ECM_{t-1}$ ) will be included in the ARDL testing. To ensure the comprehensiveness of the testing, we carried out the ARDL testing on both sets of inflation measures: a) based on the official data of CPI and PPI; and b) based on the Cogley (2002) adaptive measure of inflation.

The test results are reported in Tables 4a, 4b and 5.<sup>17</sup> Based on the test-statistics, we do not find conclusive cointegrating relationship in Equation 1 for both countries. In some of the regression results, we do find weak cointegrating relationship with at least one of the key variables, namely ( $\log E_{t-i} * DIT$ ) and ( $\log P_{t-i} * DIT$ ), to be statistically insignificant in the cointegrating relationships. Hence we opt to exclude the error correction component in the final testing. Similarly, we also find in general the crisis dummy to be insignificant. The R-squares suggest that the explanatory variables can explain well above 80 percent of the monthly price changes of tradable and non-tradable goods. The F-statistics indicate that one or more of the independent variables are non-zero. In addition, the DW statistics and the LM statistics confirm that autocorrelations are not a problem in any of the regressions.

It is important to note here that the test results for the exponential smoothing generated by the approach of Cogley (2002) are indeed superior for both tradable and non-tradable prices of these two economies. Not only the adjusted R-squares are respectably higher, but more importantly we find the probabilities of the estimate parameters of the key

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<sup>17</sup> For the sake of brevity, the test results for the crisis dummy, the unit-root and the cointegration test will not however be posted in the tables. They can however be made available upon request. Three commonly used unit-root tests are applied here, namely the ADF test, the Phillip-Perron test and the KPSS test.

variables to be significant are much higher for the exponential smoothing case. For instance, the estimate parameters for variables ( $\Delta \log E_{t-i} * DIT$ ) and ( $\Delta \log P_{t-i} * DIT$ ) are not significant for the regressions on “Actual CPI” of Indonesia and “Actual CPI” of Thailand, respectively. But both of these variables are significant for the respective “Expo-Smooth” regressions (Table 4a). The only exception is for the case of tradable price of Thailand where we find the estimate parameter for ( $\Delta \log P_{t-i} * DIT$ ) is significant for the case “Actual PPI”, but not for the “Expo-Smooth PPI” regression.

Supporting the claims of Taylor (2000) and Gagnon and Ihrig (2004), our test results suggest that the pass-through effects have all declined in the post-IT periods in these two economies. The test results also suggest that the short and long-run pass-through effects of the non-tradable and tradable prices in Indonesia have declined the most with the adoption of the IT policy. The same country has also reported a relatively larger decline in both short-run and long-run pass-through of its non-tradable price than those of its tradable price in the post-IT period. In contrast, we have the drops in the pass-through effects in Thailand case to be less for the non-tradable price than for the tradable price. Hence we can conclude that the nominal exchange rate has become more efficient shock absorber in the short- and long-run in Indonesia, but not in Thailand.

Yet, it is also interesting to note that Indonesia has seen its inflation rate to rise during the first two years of the post-IT period (Table 3). These contrasting results seem to suggest that the inflationary pressure in Indonesia was less attributed to imported inflation during those years. From late 2004 to late 2005, the government of Indonesia has initiated gradual reduction in the price subsidies for a number key petroleum products. The measure has successfully alleviated pressures on the current expenditure of the central government

budget, but at the cost of rising transportation and production costs, and eventually increasing the prices of key commodities, including food products. The sharp rise in the policy rate of Bank Indonesia had however successfully brought down the inflation rate by 2006, and kept the rate within the targeted inflation rate by early 2007 (Table 3).

#### **4.2.3 Inflation Inertia**

Two contrasting trends are reported on the inflation inertia. For the non-tradable price, the inflation inertia has in general declined in both economies with the adoption of the IT policy (Table 5). But for the tradable goods, inflation inertia has declined only in Indonesia, but not in the case of Thailand. The test result has in fact suggested that the inflation inertia in the tradable price in Thailand has unchanged. More in-depth studies are clearly needed to explain these contrasting test results.

#### **4.2.4 Robustness Testing: The Degree of Economic Openness**

Early works, such as Campa and Goldberg (2002), Gagnon and Ihrig (2004), Frankel, et.al.(2005) and BIS (2005) among others, have recorded a broad-based decline in the exchange rate pass-through (ERPT) during the past two decades. Moreover, looking at 76 countries during the period of 1990-2001, Frankel, et.al. (2005) find the decline in the pass-through was much more rapid in the developing economies than in the high-income countries. These studies offer a number of plausible explanations for the decline in the ERPT, but most of them consistently underline the significant contribution of import penetration, international mobility of capital, and overall degree of economic openness.

Given the natures of the rapid economic reforms in Indonesia and Thailand since early 1980s, both in the current and capital account sides, the robustness of the test results posted in Tables 4a and 4b therefore has to be examined. Investment and Trade reforms were taken place in mid-1980s and were followed by aggressive liberalization of the financial sector, particularly in the banking and capital market. Both economies shifted away from import-substitution policy to export promotion in 1980s and committed themselves into both multilateral trade arrangements (such the world trade organization (WTO) and the Asia Pacific Economic Cooperation (APEC)) in 1990s, and bilateral trade arrangements with their key trading partners, such as the USA and Japan in 2000s.<sup>18</sup> As an annual percentage of GDP, the average total export and import surged from the levels around 36 percent and 53 percent in 1985-1990 in Indonesia and Thailand, respectively, to as high as around 45 percent and 118 percent in 2002-2007. Much more impressive trends have been demonstrated by the market capitalizations of the stock exchanges in these two Southeast Asian nations. The capitalizations of the Jakarta Stock Exchange and the Bangkok Stock Exchange were averaging around 0.10 percent and 3 percent per annum of GDP in 1980-1985, and surged to 30 percent and 67 percent, respectively, in 2002-2007.

If indeed, the rise of economic openness reduces the size of the exchange rate pass-through, then we need to explicitly take into account the openness variable as a control variable in our Equation 1. In particular, we want to address the following questions:

- Have the early sets of estimates of ERPT, shown in Tables 4a and 4b, overestimated the pass-through effects?

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<sup>18</sup> Refer to Sen and Rajan (2005) and Kastner and Kim (2008).

- More importantly, have the initial regressions on Equation 1, without controlling the changing degrees of economic openness, overrated the moderating impacts of the IT policy on the pass-through effect and inflation inertia?

To address the questions above, we construct (*Openness*) control variable for Indonesia and Thailand. This variable would capture the impact of both trade and financial sector reforms on the degree of economic openness of the countries. The monthly (*Openness*) variable is calculated as the product of log-normalized values of export ( $\ln Export_t$ ), import ( $\ln Import_t$ ) and market capitalization of the stock exchanges ( $\ln MarketCap_t$ ), hence ( $Openness_t = \ln Export_t * \ln Import_t * \ln MarketCap_t$ ).<sup>19</sup> Since we are interested to take into account the impact of the change in the degree of the economic openness on the estimate parameters of the key variables in Equation 1, we add ( $\Delta Openness_t$ ) as a control variable into that equation. Note: ( $\Delta Openness_t = Openness_t - Openness_{t-1}$ ). The ( $\Delta Openness_t$ ) is tested to be stationary, hence having consistent unit-root property with the rest of the variables in Equation 1.

Given the superior results reported in Table 4a and 4b, our robustness testing focuses only on the pass-through estimates based on the exponentially smoothing inflation rate. Consistent with the general finding of early studies, the change in the degree of economic openness variable has largely reduced the pass-through effects, as indicated by negative estimate parameters for the ( $\Delta Openness$ ) variable in Table 6, with the exception for the Thailand PPI where the estimate parameter for that variable is found to be insignificant. This

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<sup>19</sup> Given no monthly official GDP data for both economies, we are not able to calculate the composition of the (*Openness*) control variable as monthly percentages of GDP.

implies that the estimate parameters for the short-run and long-run pass-throughs reported in Tables 4a and 4b have overestimated the size of the pass-through and most importantly the impacts of the IT policy on the pass-through levels. However, our main finding that the IT policy had moderated the pass-through effects continues to hold, both for the short-run and long-run scenarios.

For instance, the short-run pass through estimate of the pre-IT,  $(\sum \beta_1)$  in Equation 1, for the non-tradable price of Indonesia is at around (0.516) from Table 4a, respectably higher than (0.037) with the inclusion of the (*Openness*) control variable (Table 6). The IT policy reminds effective in reducing the pass-through effects for the non-tradable price in Indonesia. However, the impact of the IT policy on the pass-through  $(\sum \beta_4)$  declined from (-0.415) without the (*Openness*) control variable to (-0.225), controlling the impact of the trade and balance of payment liberalization. Further confirming the robustness of our test results, the IT policy has been found to reduce the inflation inertia for the non-tradable price in Indonesia,  $(\sum \beta_5) < 0$ , although at a lesser rate when we impose the (*Openness*) control variable. Consistent sets of findings and analyses can be generated for the rest of the test results for both Indonesia and Thailand. Therefore, we have confirmed the overall robustness of the role of the IT policy in restraining imported inflationary pressures and inflation inertia in these two major Southeast Asian economies during the observed period.

#### **4.3. Markov-Switching Approach for Monetary Policy Rule**

To compare and contrast the experiences and the shifts in the policy rules under the pre- and post-IT periods, past studies, in general, separated the sample observations into two

sets, the pre- and the post-IT periods based on the pre-determined starting dates of the IT policy. This approach however would lead to potential problem with the degree of freedom. For the case of Indonesia in particular, we will not be able to carry out any testing for the post-crisis period as Indonesia only officially adopted the IT policy in July 2005. By breaking the samples into the pre and post-IT groups, we would not have enough degree of freedom to carry out any testing for the post-IT period.

To avoid the above shortcomings, we will employ the Markov-Switching (MS) regression procedure on Equation 4. The MS-VAR does not require us to break the observations into two sample sets as it is designed to pick out changes in the generating mechanism of a series. In our case, the changes in the central banks' operating rule will almost for sure affect the stochastic process of the short-term interest rate in Equation 4. Furthermore, the dynamic of the interest rate may change from the period of stability to that of volatility.<sup>20</sup>

The Markov-switching VAR framework is essentially extending Hamilton's (1989) Markov-switching regime framework to the Vector Autoregressive (VAR) systems (see Krolzig, 1997; Sims, 1999; Valente, 2003). Our study considers three types of MS-VAR models that allows for either regime shifts in intercept term, variance-covariance matrix or autoregressive terms. Firstly, we will consider a  $M$ -regime  $p$ -th order Markov-switching VAR that allows for regime shifts in variance-covariance matrix. This model, the Markov-Switching-Heteroscedastic-VAR or  $MSH(M)$ -VAR( $p$ ), may be written as follows:

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<sup>20</sup> To our knowledge, hardly any study has applied the MS-VAR approach to examine the impacts of regime shifts on the monetary policy rule. Valente (2003) has examined the monetary policy rules of the central banks from 6 OECD economies, namely France, Germany, Italy, UK and USA.

$$\mathbf{y}_t = \mathbf{v} + \sum_{i=1}^p \mathbf{A}_i \mathbf{y}_{t-i} + \boldsymbol{\varepsilon}_t \quad (6)$$

Where  $\mathbf{y}_t$  is a  $K$ -dimensional observed time-series vector,  $\mathbf{y}_t = [y_{1t}, y_{2t}, \dots, y_{Kt}]'$  and for this paper matrix  $\mathbf{y}_t$  contains all variables used in our monetary policy reaction functions (see Equation (4)).  $\mathbf{v}$  is a  $K$ -dimensional column vector of intercept terms,  $\mathbf{v} = [v_1, v_2, \dots, v_K]'$ ; the  $\mathbf{A}_i$ 's are  $K \times K$  matrices of autoregressive parameters;  $\boldsymbol{\varepsilon}_t = [\varepsilon_{1t}, \varepsilon_{2t}, \dots, \varepsilon_{Kt}]'$  is a  $K$ -dimensional vector of Gaussian white noise process with a regime-dependent variance-covariance matrix  $\Sigma$ ,  $\boldsymbol{\varepsilon}_t \sim NID(\mathbf{0}, \Sigma(\mathbf{s}_t))$ . The regime-generating process is assumed to be a hidden Markov chain with a finite number of states  $s_t \in \{1, \dots, M\}$  governed by the transition probabilities  $p_{ij} = \Pr(s_{t+1} = j | s_t = i)$ , and  $\sum_{j=1}^M p_{ij} = 1$  for  $\forall i, j \in \{1, \dots, M\}$ . We can then collect all the conditional transition probabilities  $p_{ij}$  into a transition matrix  $\mathbf{P}$  as follows:

$$\mathbf{P} = \begin{bmatrix} p_{11} & p_{12} & \cdots & p_{1M} \\ p_{21} & p_{22} & \cdots & p_{2M} \\ \vdots & \vdots & \ddots & \vdots \\ p_{M1} & p_{M2} & \cdots & p_{MM} \end{bmatrix}$$

Secondly, we will consider a  $M$ -regime  $p$ -th order Markov-switching VAR that allows for regime shifts in both intercept terms and variance-covariance matrix. The Markov-Switching-Intercept-Heteroscedastic-VAR or MSIH( $M$ )-VAR( $p$ ) may be written as follow:

$$\mathbf{y}_t = \mathbf{v}(s_t) + \sum_{i=1}^p \mathbf{A}_i \mathbf{y}_{t-i} + \boldsymbol{\varepsilon}_t \quad (7)$$

where  $\mathbf{v}(s_t)$  is a  $K$ -dimensional column vector of regime-dependent intercept terms,

$$\mathbf{v}(s_t) = [v_1(s_t), v_2(s_t), \dots, v_K(s_t)]'; \boldsymbol{\varepsilon}_t \sim NID(\mathbf{0}, \Sigma(s_t)) \text{ as in equation (6), and } s_t \in \{1, \dots, M\}.$$

Finally, we will consider a  $M$ -regime  $p$ -th order Markov-switching VAR that allows for regime shifts in all intercept terms, autoregressive parameters and variance-covariance matrix. The Markov-Switching-Intercept-Autoregressive Heteroscedastic-VAR or MSIAH( $M$ )-VAR( $p$ ) can be presented as the following equation:

$$\mathbf{y}_t = \mathbf{v}(s_t) + \sum_{i=1}^p \mathbf{A}_i(s_t) \mathbf{y}_{t-i} + \boldsymbol{\varepsilon}_t \quad (8)$$

where  $\mathbf{v}(s_t)$  is a  $K$ -dimensional column vector of regime-dependent intercept terms,

$\mathbf{v}(s_t) = [v_1(s_t), v_2(s_t), \dots, v_K(s_t)]'$ ; the  $\mathbf{A}_i(s_t)$ 's are  $K \times K$  matrices of regime-dependent autoregressive parameters;  $\boldsymbol{\varepsilon}_t \sim NID(\mathbf{0}, \Sigma(s_t))$  and  $s_t \in \{1, \dots, M\}$ .<sup>21</sup>

In short, there are several advantages of adopting the MS-VAR approach to test Equation 4.

- The MS approach allows the coefficient estimates to change over time (time variant) in response to possible switches in the policy. Thus, the shifts in the parameter estimates of the key variables should reveal any changes in the policy commitments and the priorities of the monetary authority during the pre-IT and the post-IT periods.
- The test results disclose the type of regimes (low (stable) and high (volatile) regimes) that the IT period falls under, and allow us to analyze whether the implementation of the IT only occurs under one particular regime. The period of stable regime is the one with smaller standard error. As discussed, the IT policy is credible *if and only if* the role of expected inflation is significant

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<sup>21</sup> All of the above Markov-switching VAR models will be estimated using the expectation-maximization (EM) algorithm (see Hamilton, 1989 and Krolzig, 1997).

under both stable and volatile regimes. That is to say for the policy to be credible, the central bank must be committed to address expected inflationary pressure under *both* stable and less conducive economic environment. This way we can ensure to some extent that the commitment to rein in inflationary expectation and the lower inflation rate are not simply due to the economic environment/condition.<sup>22</sup>

Prior to conducting the MS-VAR testing, the expected output gap ( $E_t y_{t+1} - y^*$ ) and the expected inflation ( $E_t \pi_{t+1}$ ) variables in Equation 4 have to be estimated. Following Valente (2003), the expected rate of inflation can be obtained using a preliminary signal extraction procedure. This process would extract the unobservable expected rate of inflation from the observed rate of inflation by applying the law of iterated projections following the Kalman filter technique. Since we are investigating the monetary policy reaction function of the Bank of Thailand (BOT) and the Bank of Indonesia (BI), it is only appropriate that we extract the expected inflation series from the central banks' official targeted inflation rates, namely the core inflation rate for the BOT and the headline inflation for the BI. Furthermore, the commitment of these central banks to the full implementation of the IT policy should be transparent, and therefore should only be diagnosed against their observed official target rates.<sup>23</sup>

To estimate the expected output gap variable, we adopt two stages of estimation:

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<sup>22</sup> The possible association between the economic condition and the commitment to inflation targeting has not been addressed by most of the past studies.

<sup>23</sup> We therefore do not think that it is necessary and appropriate to generate expected inflation series from the exponentially smoothing CPI rates. In the case of Thailand, in particular, the central bank has officially measured its core inflation by excluding the raw food and energy prices from the country's aggregate headline inflation series.

- The Hodrick and Prescott (1997) filtering approach is employed to obtain a smooth estimate of the long-run trend component of the industrial production (IP) index as proxy for output. The gap between the actual IP index and its long-run trend component would give us the proxy of the actual output gap at time ( $t$ ).
- Next, we employ the Kalman filtering technique, as described earlier, to estimate the expected output gap ( $E_t y_{t+1} - y^*$ ).

For the sake of brevity, the estimates for the expected inflation and the output gap will not be reported.

Next, we test the unit-root properties on all variables in Equation 4.<sup>24</sup> We found that the expected inflation, expected output gap and ( $\Delta q$ ) variables to be generally stationary (I(0)) series. But the key interest rates listed in Table 2 are, in general, found to be non-stationary at the first level ---I(1). To avoid potential spurious regression problem, we modify Equation 4 by subtracting ( $r_{t-1}$ ) from both sides of the equation, and test the following equation, where all variables are I(0).

$$\Delta r_t = \omega + \sum_i^n \rho_i \Delta r_{t-1-i} + \sum_i^n \delta_i E_{t-i} \pi_{t+1-i} + \sum_i^n \phi_i (E_{t-i} y_{t+1-i} - y^*) + \sum_i^n \zeta_i \Delta q_{t-1-i} + \varepsilon_t \quad (9)$$

Table 7 presents the estimates from the MS-VAR. To incorporate regime shifts in the conditional variance, two and three states were estimated. Testing were performed with both the normal and the  $t$ -distribution, and with different lags based on the Akaike Information Criteria (AIC). In order to arrive at the most plausible specification in describing the

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<sup>24</sup> We applied three commonly applied Unit-Root tests: - the standard Augmented Dickey Fuller (ADF) test; - the Phillip-Perron test; and – the KPSS test. For the sake of brevity, we do not report the results in the paper.

conditional volatility, a bottom-up strategy following Krolzig (1997) was pursued. The starting point is to formally test the null hypothesis of no regime switch ( $m = 1$ ) against the alternative of a regime switch ( $m = 2$ ). If the conventional likelihood ratio test suggests that the null hypothesis of no regime switching can, indeed, be rejected, we then proceed to test the null hypothesis of two regimes ( $m = 2$ ) against the alternative of three regimes ( $m = 3$ ).<sup>25</sup>

Dictated by the availability of the continuous monthly key policy interest rate data series, particularly for Thailand, our MS-VAR testing for both countries cover only the period of January 1998 to July 2007, thus excluding the pre-1997 financial crisis period. On the basis of the set of bottom-up testing, the monetary policy reaction functions (Equation 9) for these two Southeast Asian countries are adequately characterized as having at most two regimes (stable (Regime 1) and volatile (Regime 2)) during the period of observations.<sup>26</sup>

Our test results highlight a number of important findings (Tables 7 and 8). Based on the dates listed under each regime, it is clear that the Regime 2 associates predominantly with the periods of economic turbulences. As expected, the early and peak stages of the 1997 financial crises from the beginning to late 1998 and some parts of 1999 have predominantly fallen under the regime 2. In Thailand, a large share of the IT period in recent years has taken

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<sup>25</sup> A word of caution is necessary in interpreting this result. In Markov switching models, the usual regularity conditions justifying the use of classical tests such as the likelihood ratio test are violated. This is because, under the null hypothesis of only one state, the transition probabilities are not identified, implying that the sample likelihood function is flat with respect to these parameters. As in Hamilton and Susmel (1994), the likelihood ratio test results mentioned here should be treated more as a descriptive summary than formal statistical tests. The likelihood ratio test statistics can be made available upon request.

<sup>26</sup> We also apply the LR statistics to choose the optimal MS-VAR model, i.e. to test the null of MSH and MSIH model against the alternative of the more unrestricted MSIAH model.

place during the volatile regime, especially since December 2003. In contrast, the most recent months of the inflation targeting era in Indonesia have occurred in a stable regime.

Most importantly, our test results provide adequate evidence that controlling inflationary expectation has indeed been the focus of the monetary policies of these economies. But the degrees of the policy commitment vary from one country to another and from one period to another. The central banks of Indonesia has attached significant weights to inflationary expectation pressure during both stable and volatile regimes. In the case of Thailand, the test results suggest that the commitment to address rising inflationary expectation only prevails during the stable regime (Regime 1). The coefficient estimate for the inflation expectation variable is insignificant during the Regime 2.

Surprisingly, we find the exchange rate variable to have no significant role in both regimes in Indonesia, and has only a small weight for the case of Thailand in Regime 1. Our results seem to contradict other studies, such as McKinnon & Schnabl (2004), that have found the rigid exchange rate against the US dollar policy continued to be implemented in these two economies during the post-1997 period. Further testing may be needed to examine the exchange rate factor.<sup>27</sup> On the other hand, the output gap arguably assumes a larger role than the exchange rate during the IT periods in these two economies. The coefficient parameters of the output gap variable are found to be significant in Regime 1 for Thailand and in Regime 2 for Indonesia.

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<sup>27</sup> As noted earlier, there are few modifications to the standard CGG approach have to be carried out, including for the exchange rate variable. Future works may need to consider different measurements of exchange rate volatility or the misalignment (the gap between the actual exchange rate and the equilibrium rate).

In summary, a credible and flexible commitment to IT framework is evident in the case of Indonesia. During the stable regime, the country's monetary authority focused on managing inflation expectation as the primary objective of its monetary policy reaction function. Facing a more volatile economic condition, the policy was adjusted to aim at balancing inflation and output stabilities (Table 7). The discretionary to make the necessary adjustment is what Bernanke and Mishkin (2007) consider to be the advantage of pursuing flexible IT framework, and is the reason as to why the IT policy should be implemented flexibly rather than as a strict rule.

In contrast, there seems to be less commitment to IT framework in Thailand. In a stable regime, the Bank of Thailand (BOT) pursues a forward looking policy to manage both price and output stabilities. This finding supports the claim made by Kubo (2008). However, the BOT completely abandoned any forward looking strategy during a more difficult and volatile period. No signal of its policy objective can be traced in Regime 2, as suggested by the insignificant coefficient estimates of the key variables (Table 7).

## **5. Concluding Remarks**

A series of initiatives have been proposed and implemented by the Asian governments to prevent the repeat of the 1997 financial crises in their economies. Promoting financial integration within the region and the world markets is one of the initiatives with the view to both reducing vulnerabilities and improving the allocation of saving. Deepening of the bond market is another important step taken to reduce reliance on bank financing. Recent years have also seen impressive growths in the net foreign asset holdings of the Asian economies.

In addition to the strengthening of the key financial institutions and reducing potential vulnerabilities of the financial sector, there is a growing consensus among the policy makers and academics in general that consistent macroeconomic policy frameworks must be in place. In pursue of credible anchor of monetary policy, maintaining price stability, either as explicit or implicit nominal anchor of the monetary policy framework, has clearly gained popularity in the last decade. Prior to the outbreak of the 1997 East Asian financial crises, none of the Asian economies adopted the IT policy. In fact, in total only five developed economies have officially announced their inflation targets before 1997. By end of 2006, 24 economies have inflation targeting as the official policy objective of their monetary authorities, and more than half of these economies are from the emerging markets.

Our paper has examined the implementation and the performance of the IT policy in Indonesia and Thailand. We conducted in-depth analyses on the pass-through effects, both for non-tradable and tradable prices in the local economy. In addition, the markov-switching approach is employed to test for the shift in the monetary policy rule of the monetary authorities during the pre-and post-IT periods. In general, these economies have seen their inflation rates to fall during the post-IT period. The pass-through effects for both tradable and non-tradable prices in these economies have in general declined considerably. Despite of all of those encouraging outcomes, we find robust evidence of flexible and credible implementation of the IT policy only in the case of Indonesia, but not in Thailand.

## References:

- Alamsyah, H., Joseph, C., Agung, J and Zulverdy, D. (2001), "Towards Implementation of Inflation Targeting in Indonesia", *Bulletin of Indonesian Economic Studies*, Vol. 37, No.3, pp. 309-324.
- Bernanke, B. and Mishkin, F.S. (2007), "Inflation Targeting: A New Framework for Monetary Policy?" in Mishkin (ed), *Monetary Policy Strategy*, The MIT Press, Cambridge, Massachusetts, USA.
- BIS (2005), *75<sup>th</sup> Annual Report* (Basel).
- Bryan, M.F. and Cecchetti, S.G. (1995), "The Seasonality of Inflation", *Economic Review of the Federal Reserve Bank of Cleveland*, 31, Quarter 2, pp.12-23.
- Campa, J.M. and Goldberg, L.S. (2002), "Exchange Rate Pass-Through into Import Prices: A Macro or Micro Phenomenon?," *NBER Working Paper*, No. 8934, May.
- Cecchetti, S.G. (1997), "Measuring Short-Run Inflation for Central Bankers", *Economic Review of the Federal Reserve Bank of St. Louis*, 79, (May/June), pp. 143-156.
- Chadha, J.S., Lucio, S., and Valente, G. (2004), "Monetary Policy Rules, Asset Prices, and Exchange Rates", *IMF Staff Papers*, Vol.51, No. 3.
- Charoenseang, J. and Manakit, P. (2007), "Thai Monetary Policy Transmission in an Inflation Targeting Era", *Journal of Asian Economics*, 18, pp. 144-157.
- Cecchetti, S.G. and Ehrmann, M. (1999), "Does Inflation Targeting Increase Output Volatility? An International Comparison of Policy Makers' Preferences and Outcomes", *NBER Working Paper*, No. 7426, December.
- Clarida, R. (2001), "The Empirics of Monetary Policy Rules in Open Economies", *International Journal of Finance and Economics*, 6(4), pp. 315-323.
- Clarida R., Gali, J., and Gertler, M. (1998), "Monetary Policy Rules in Practice: Some International Evidence", *European Economic Review*, 42(6), pp. 315-323.
- Cogley, T. (2002), "A Simple Adaptive Measure of Core Inflation", *Journal of Money, Credit, and Banking*, Vol.34, No.1, February, pp.94-113.
- Corbo, V., Landerretche, O., and Schmidt-Hebbel, K. (2001), "Assessing Inflation Targeting After a Decade of World Experience", *International Journal of Finance and Economics*, 6, pp.343-368.
- Edwards, S. (2006), "The Relationship Between Exchange Rates and Inflation Targeting Revisited," *NBER Working Paper*, No.12163, April.
- Frankel, J., Parsley, D., and Wei, S.J. (2005), "Slow Pass-Through Around the World: A New Import for Developing Countries?," *NBER Working Paper*, No.11199.
- Gagnon, Joseph E. and Jane Ihrig (2004). "Monetary Policy and Exchange Rate Pass-Through," *International Journal of Finance and Economics*, 9(4), pp. 315-338.
- Hamilton, J.D. (1989), "A New Approach to the Economic Analysis of Nonstationary Time Series and the Business Cycle", *Econometrica*, 57(2), pp.357-384.
- Hamilton, J. and Susmel, R. 1994, 'Autoregressive conditional heteroscedasticity and changes in regime', *Journal of Econometrics*, vol. 64, pp. 307-333.
- Hendry, D.F. (1976). The structure of simultaneous equations estimators. *Journal of Econometrics*, 4, 51-88.

- Ho, C., & McCauley, R. N. (2003), "Living with flexible exchange rates: Issues and recent experience in inflation targeting emerging market economies", *BIS Working Papers*, No.130.
- Hodrick, R.J. and Prescott, E.C. (1997), "Postwar U.S. Business Cycles: An Empirical Investigation", *Journal of Money, Credit and Banking*, Vol. 29, No. 1 (February) , pp. 1-16.
- IMF (2005), the World Economic Outlook, Chapter IV, September.
- Jansen, K. (2001), "Thailand, financial crisis and monetary policy", *Journal of the Asia Pacific Economy*, 6(1), 124-152.
- Kastner, S.L., and Kim, S.Y. (2008), "Why the Rush to Bilateral Free Trade Agreements in Asia-Pacific?" Presented at the International Studies Association Annual Meeting, San Francisco, CA, March.
- Krolzig, H.-M. (1997). *Markov Switching Vector Autoregression*. Berlin: Springer-Verlag.
- Kubo, A. (2008), "Macroeconomic Impact of Monetary Policy Shocks: Evidence from Recent Experience in Thailand", *Journal of Asian Economics*, 19, pp. 83-91.
- McKinnon, R. I., & Schnabl, G. (2004). The East Asian dollar standard, fear of floating, and original sin. *Review of Development Economics*, 8(3), 331-360.
- Meese, R., and Rogoff, K. (1983), "Empirical Exchange Rate Models of the Seventies," *Journal of International Economics*, 14(1-2), pp.3-24.
- Mishkin, F. S., & Schmidt-Hebbel, K. (2001), "One decade of inflation targeting in the world: What do we know and what do we need to know?" *NBER Working Paper*, 8397.
- Mishkin, F.S. and Schmidt-Hebbel, K. (2007), "Does Inflation Targeting Make a Difference?" *NBER Working paper*, No.12876 (January).
- Rudebusch, G. and Svensson, L.E.O. (1999), "Policy Rules for Inflation Targeting", in Taylor, J.B. (Ed), *Monetary Policy Rules*, University of Chicago Press (1999).
- Schmidt-Hebbel, K., and Tapia, M. (2002), "Monetary Policy Implementation and Results in Twenty Inflation-Targeting Countries", *Central Bank of Chile Working Papers*, No. 166.
- Sen, R. and Rajan, R.S. (2005), "The New Wave of FTAs in Asia: Implications for ASEAN, China and India", *ADB Volume on Asian Economic Cooperation and Integration*, Manila: Asian Development Bank, pp.123-160.
- Sims, C.A. (1999), "Drift and Breaks in Monetary Policy", Unpublished Manuscript, Princeton University.
- Siregar, R., and Rajan, R.S. (2006), "Models of Equilibrium Real Exchange Rates Revisited: A Selective Review of the Literature", *The Center for International Economic Studies Working Paper*, 06-04, the School of Economics, University of Adelaide, Australia, April.
- Svensson, L.E.O. (2000), "Open Economy Inflation Targeting", *Journal of International Economics*, 50(1), pp. 155-183.
- Taylor, J.B. (1993), "Discretion versus Policy Rules in Practice", *Canargie-Rochester Conference Series on Public Policy*, 39, pp. 195-214.
- Taylor, J. B. (2000), "Low Inflation, Pass-Through, and the Pricing Power of Firms," *European Economic Review*, 44(7), pp. 1389-1408.

- Taylor, J.B. (2001), "The Role of the Exchange Rate in Monetary-Policy Rules", *American Economic Review*, Vol. 91, No.2, Papers and Proceeding of the Hundred Thirteenth Annual Meeting of the American Economic Association, (May) pp. 263-267.
- Trehan, B. and Wu, T. (2007), "Time-Varying Equilibrium Real Rates and Monetary Policy Analysis", *Journal of Economic Dynamic & Control*, 31, pp. 1584-1609.
- Valente, G. (2003), "Monetary Policy Rules and Regime Shifts", *Applied Financial Economics*, 13(7), pp.525-535.

**Table 1:**  
**Sterilization Coefficients** <sup>a,b</sup>

	2000-2007	2000-2002	2003-2004	2005-2007
<b>India</b>	-0.79*	-0.72*	-1.00*	-0.72*
<b>Indonesia</b>	-0.82*	-0.85*	-0.79*	-0.77*
<b>Korea</b>	-1.00*	-0.93*	-1.02*	-1.06*
<b>Philippines</b>	-0.85*	-0.72*	-0.92*	-1.15*
<b>Thailand</b>	-0.87	-0.91*	-0.69	-0.90*

Source: Asia Pacific Regional Economic Outlook, IMF, October 2007.

<sup>a</sup> The sterilization coefficient is the coefficient from a regression on the contribution of net domestic assets to reserve money growth on the contribution of net foreign assets to reserve money growth. Net domestic assets in the regression are defined as reserve money minus net foreign assets.

<sup>b</sup> An asterisk denotes that the null hypothesis of full sterilization (a coefficient equal to or smaller than -1) cannot be rejected at the 95 percent confidence level.

**Table 2:  
Implementation and Design of Inflation Targeting Framework**

Country	Date Introduced	Target Price Index	Inflation Target Level	Target Horizon	Policy/ Official Interest Rate	Target Set By	Escape Clauses	Accountability of Target Misses	Publication and Transparency
Indonesia	May 1999 <sup>a</sup>	CPI	2000: 3 – 5% 2001: 4 – 6% 2002: 9 – 10% 2003: 9% (± 1%) 2004: 5.5% (± 1%) 2005: 6% (± 1%) 2006: 8% (± 1%) 2007: 6% (± 1%) 2008: 5% (± 1%)	Indefinite	1-month SBI (Certificate of Bank Indonesia) rate	Government in consultation with Central Bank (CB)	None	None, but the House of Representatives can request progress report at any time.	Periodically publications of: ▪ Weekly Report ▪ Monthly Indonesian Financial and Economic Statistics ▪ Monthly Review of Monetary Policy ▪ Quarterly Monetary and Economic Progress ▪ Quarterly Report on Monetary Policy Progress ▪ Annual Report
Thailand	May 2000	Core CPI <sup>b</sup>	Since 2000: 0 – 3.5%	Indefinite	14-day repurchase rate	Government in consultation with CB	None	Public explanation of target breach and measures taken as well as time required to bring inflation within the target	▪ Publication of inflation report. ▪ Publication of inflation projections. ▪ Publication of the minutes of monetary policy meetings.

Note:

- a) Indonesia adopted inflation targeting policy formally in July 2005.
- b) Thailand core CPI is defined as CPI excluding raw food and energy prices.

Sources: *Compiled by authors from the Bank Indonesia and the Bank of Thailand web-pages, Mishkin & Schmidt-Hebbel (2001), Ho & McCauley (2003)*

**Table 3: Pre- and Post-IT Headline Inflation and GDP Growth Rates at  $(t-2)$  to  $(t+2)$ <sup>1</sup>**

(Mean and Standard Deviation)<sup>2</sup>

	Inflation at $(t-2)$	Inflation at $(t+2)$	Inflation Jan – Jun 2007	GDP Growth rate $(t-2)$	GDP Growth rate $(t+2)$	GDP Growth Rate q1, 2006 – q2, 2007	Official Starting Dates of IT Framework
<b>Indonesia</b>	6.5 ( $\pm 1.02$ ) *	11.74 ( $\pm 4.99$ ) *	6.3 ( $\pm 0.19$ ) *	5.07 ( $\pm 0.91$ ) *	5.65 ( $\pm 0.52$ ) *	5.70 ( $\pm 0.59$ ) *	July 2005
<b>Thailand</b>	1.53 ( $\pm 0.68$ ) *	1.51 ( $\pm 0.75$ ) *	2.19 ( $\pm 0.41$ ) *	-1.94 ( $\pm 8.80$ ) *	3.41 ( $\pm 1.54$ ) *	4.82 ( $\pm 0.84$ ) *	May 2000

<sup>1/</sup>  $(t-2)$  denotes two years prior to the adoption of inflation targeting framework and  $(t+2)$  implies two years after the adoption of IT framework.

<sup>2/</sup> Mean for inflation is calculated as the monthly average of year on year inflation  $\left( \Delta p = \left[ \frac{CPI_t - CPI_{t-12}}{CPI_{t-12}} * 100 \right] \right)$ . The mean for

GDP growth rate is the average of the annualized quarterly GDP growth rate  $\left( \Delta GDP = \left[ \frac{GDP_t - GDP_{t-4}}{GDP_{t-4}} * 100 \right] \right)$ . Note: GDP is in

local currency at current market price.

\* The numbers inside ( ) are the standard deviation.

**Table 4a: Pass-Through Effects for the Monthly Non-Tradable Inflation**

	<b>Indonesia (Actual CPI)</b>	<b>Indonesia (Expo-Smooth CPI)</b>	<b>Thailand (Actual CPI)</b>	<b>Thailand (Expo-Smooth CPI)</b>
<b>Constant</b>	0.001 (5.025)***	0.002 (5.362)***	0.0006 (3.325)***	-6.21E-06 (-0.038)
$\Delta \log E_{t-1}$	0.078 (8.207)***	0.026 (2.792)***	0.0161 (2.567)**	0.036 (2.745)***
$\Delta \log E_{t-2}$	-0.041 (-3.581)***	0.0519 (3.955)***	(---)	-0.029 (-1.830)*
$\Delta \log E_{t-3}$	(---)	-0.029 (-2.630)***	(---)	(---)
$\Delta \log E_{t-4}$	0.016 (1.851)*	(---)	(---)	0.017 (2.003)**
$\Delta \log P_{t-1}^*$	(---)	-0.116 (-2.171)**	(---)	0.104 (3.988)***
$\Delta \log P_{t-2}^*$	(---)	(---)	(---)	(---)
$\Delta \log P_{t-3}^*$	(---)	(---)	0.046 (1.711)*	0.049 (1.847)*
$\Delta \log P_{t-4}^*$	-0.128 (-2.354)**	-0.197 (-3.558)***	(---)	0.069 (2.534)**
$\Delta \log P_{t-1}$	1.046 (15.036)***	0.992 (26.879)***	1.099 (15.338)***	1.059 (14.977)***
$\Delta \log P_{t-2}$	-0.181 (-1.865)*	(---)	-0.336 (-3.152)***	-0.323 (-3.155)***
$\Delta \log P_{t-3}$	0.181 (1.761)*	(---)	0.202 (1.886)*	0.259 (2.544)**
$\Delta \log P_{t-4}$	-0.195 (-3.084)***	-0.113 (-3.978)***	-0.151 (-2.107)**	-0.146 (-2.098)**
$\Delta \log E_{t-1} * DIT$	(---)	(---)	(---)	(---)
$\Delta \log E_{t-2} * DIT$	(---)	(---)	-0.044 (-2.442)**	(---)
$\Delta \log E_{t-3} * DIT$	(---)	(---)	(---)	(---)
$\Delta \log E_{t-4} * DIT$	(---)	-0.415 (-3.422)***	(---)	-0.039 (-2.138)**
$\Delta \log P_{t-1} * DIT$	(---)	(---)	(---)	-0.073 (-1.716)*
$\Delta \log P_{t-2} * DIT$	(---)	(---)	(---)	(---)
$\Delta \log P_{t-3} * DIT$	-0.444 (-5.037)***	(---)	(---)	(---)
$\Delta \log P_{t-4} * DIT$	0.415 (4.631)***	-0.345 (-3.601)***	(---)	(---)
<b>Adj R-squared</b>	0.970	0.971	0.844	0.860
<b>D-W Statistics</b>	1.981	1.887	2.033	2.060
<b>Prob (LM-test)</b>	0.201	0.635	0.519	0.383
<b>Prob (F-stat)</b>	0.000	0.000	0.000	0.000

Note: (---) implies not significant, hence excluded from the final test;  
( ) t-statistics; \*/10% significant; \*\*/5% significant; \*\*\*/1% significant

**Table 4b: Pass-Through Effects for the Monthly Tradable Inflation**

	<b>Indonesia (Actual PPI)</b>	<b>Indonesia (Expo-Smooth PPI)</b>	<b>Thailand (Actual PPI)</b>	<b>Thailand (Expo-Smooth PPI)</b>
<b>Constant</b>	0.002 (3.468)***	0.001 (2.095)**	0.0004 (2.702)***	0.0003 (2.217)**
$\Delta \log E_{t-1}$	(---)	0.326 (25.547)***	0.164 (6.029)***	0.132 (9.018)***
$\Delta \log E_{t-2}$	(---)	-0.226 (-11.101)***	-0.109 (-3.969)***	(---)
$\Delta \log E_{t-3}$	(---)	(---)	(---)	-0.153 (-5.391)***
$\Delta \log E_{t-4}$	0.088 (2.869)***	(---)	(---)	0.101 (4.211)***
$\Delta \log P_{t-1}^*$	(---)	0.052 (2.119)**	(---)	0.058 (4.104)***
$\Delta \log P_{t-2}^*$	(---)	0.070 (2.868)***	(---)	(---)
$\Delta \log P_{t-3}^*$	(---)	(---)	(---)	(---)
$\Delta \log P_{t-4}^*$	(---)	(---)	(---)	(---)
$\Delta \log P_{t-1}$	1.321 (18.639)***	1.023 (19.271)***	0.967 (10.629)***	1.160 (18.641)***
$\Delta \log P_{t-2}$	-0.623 (-5.379)***	-0.270 (-4.996)***	-0.139 (-1.664)*	-0.313 (-5.048)***
$\Delta \log P_{t-3}$	0.359 (3.079)***	0.086 (2.556)**	(---)	(---)
$\Delta \log P_{t-4}$	-0.339 (-4.403)***	(---)	(---)	(---)
$\Delta \log E_{t-1} * DIT$	(---)	(---)	-0.106 (-2.932)***	0.127 (1.949)**
$\Delta \log E_{t-2} * DIT$	(---)	(---)	(---)	-0.215 (-3.308)
$\Delta \log E_{t-3} * DIT$	(---)	(---)	(---)	(---)
$\Delta \log E_{t-4} * DIT$	(---)	-0.207 (-2.034)**	(---)	(---)
$\Delta \log P_{t-1} * DIT$	(---)	(---)	0.373 (2.884)***	(---)
$\Delta \log P_{t-2} * DIT$	(---)	0.179 (2.068)**	-0.337 (-2.681)***	(---)
$\Delta \log P_{t-3} * DIT$	-0.447 (-1.739)*	(---)	(---)	(---)
$\Delta \log P_{t-4} * DIT$	0.599 (2.325)**	-0.301 (-2.941)***	(---)	(---)
<b>Adj R-squared</b>	0.895	0.976	0.885	0.912
<b>D-W Statistics</b>	2.054	1.875	1.857	2.051
<b>Prob (LM-test)</b>	0.125	0.227	0.166	0.294
<b>Prob (F-stat)</b>	0.000	0.000	0.000	0.000

Note: (---) implies not significant, hence excluded from the final test;  
( ) t-statistics; \*/10% significant; \*\*/5% significant; \*\*\*/1% significant.

**Table 5 : Summary of Impact of IT on the Pass-Through Effects<sup>(1)</sup>**

(Based on the Exponential Smoothing Price Levels)

	<b>IT Impact on Short-Run Pass-Through</b>	<b>Long-Run Pass-Through</b>	<b>Inflation Inertia</b>
	$(\sum \beta_1 + \sum \beta_4) - \sum \beta_1$	$\left( \frac{\sum \beta_1 + \sum \beta_4}{1 - (\sum \beta_3 + \sum \beta_5)} \right) - \left( \frac{\sum \beta_1}{1 - \sum \beta_3} \right)$	$\sum \beta_5$
<b>1. Non-Tradable</b>			
<b>Indonesia</b>	-0.415	-1.190	-0.345
<b>Thailand</b>	-0.039	-0.226	-0.073
<b>2. Tradable</b>			
<b>Indonesia</b>	-0.207	-0.999	-0.122
<b>Thailand</b>	-0.089	-0.582	0

**Note:**

<sup>1/</sup>(-) indicates that IT has managed to reduce the pass-through effects and inflation inertia.

**Table 6: Pass-Through Effects and Economic Openness on Exp-Smooth Inflation**

	Indonesia (CPI)	Indonesia (PPI)	Thailand (CPI)	Thailand (PPI)
<b>Constant</b>	0.001 (4.808)***	0.0005 (1.410)	-6.97E-05 (0.659)	0.0003 (2.217)**
$\Delta \log E_{t-1}$	0.019 (1.992)**	0.309 (20.876)***	0.020 (3.429)***	0.132 (9.018)***
$\Delta \log E_{t-2}$	0.037 (2.664)***	-0.245 (-11.107)***	(---)	(---)
$\Delta \log E_{t-3}$	-0.039 (-2.886)***	(---)	(---)	(---)
$\Delta \log E_{t-4}$	0.020 (1.924)*	0.043 (3.004)***	(---)	0.101 (4.211)***
$\Delta \log P_{t-1}^*$	(---)	0.058 (2.322)**	0.101 (3.749)***	0.058 (4.104)***
$\Delta \log P_{t-2}^*$	(---)	0.058 (2.354)**	(---)	(---)
$\Delta \log P_{t-3}^*$	(---)	(---)	0.062 (2.282)**	(---)
$\Delta \log P_{t-4}^*$	-0.161 (-2.982)***	(---)	0.073 (2.548)**	(---)
$\Delta \log P_{t-1}$	1.025 (22.206)***	1.074 (17.808)***	1.047 (14.711)***	1.160 (18.641)***
$\Delta \log P_{t-2}$	(---)	-0.277 (-5.441)***	-0.185 (-2.633)***	-0.313 (-5.048)***
$\Delta \log P_{t-3}$	-0.153 (-4.107)***	(---)	(---)	(---)
$\Delta \log P_{t-4}$	(---)	(---)	(---)	(---)
$\Delta \log E_{t-1} * DIT$	(---)	(---)	(---)	0.127 (1.949)**
$\Delta \log E_{t-2} * DIT$	0.246 (2.125)**	0.207 (1.753)*	(---)	-0.215 (-3.308)
$\Delta \log E_{t-3} * DIT$	(---)	(---)	-0.033 (-1.874)*	(---)
$\Delta \log E_{t-4} * DIT$	-0.471 (-3.837)***	-0.329 (-2.976)***	(---)	(---)
$\Delta \log P_{t-1} * DIT$	(---)	-0.181 (-1.684)*	-0.075 (-1.657)*	(---)
$\Delta \log P_{t-2} * DIT$	(---)	0.378 (2.919)***	(---)	(---)
$\Delta \log P_{t-3} * DIT$	0.217 (1.745)*	(---)	(---)	(---)
$\Delta \log P_{t-4} * DIT$	-0.462 (-3.468)***	-0.294 (0.102)***	(---)	(---)
$\Delta \text{Openness}_{(t-1)}$	(---)	-0.032 (-1.758)*	-5.31E-05 (-1.754)*	(---)
$\Delta \text{Openness}_{(t-2)}$	-0.004 (-2.995)***	(---)	5.19E-05 (1.779)*	(---)
$\Delta \text{Openness}_{(t-3)}$	(---)	(---)	(---)	(---)
$\Delta \text{Openness}_{(t-4)}$	(---)	(---)	(---)	(---)
<b>Adj R-squared</b>	0.970	0.977	0.859	0.912
<b>D-W Statistics</b>	1.919	1.943	2.000	2.051
<b>Prob (LM-test)</b>	0.782	0.764	0.610	0.294
<b>Prob (F-stat)</b>	0.000	0.000	0.000	0.000

Note: (---) implies not significant, hence excluded from the final test;  
( ) t-statistics; \*/10% significant; \*\*/5% significant; \*\*\*/1% significant

**Table 7: the MS-VAR Test Results**

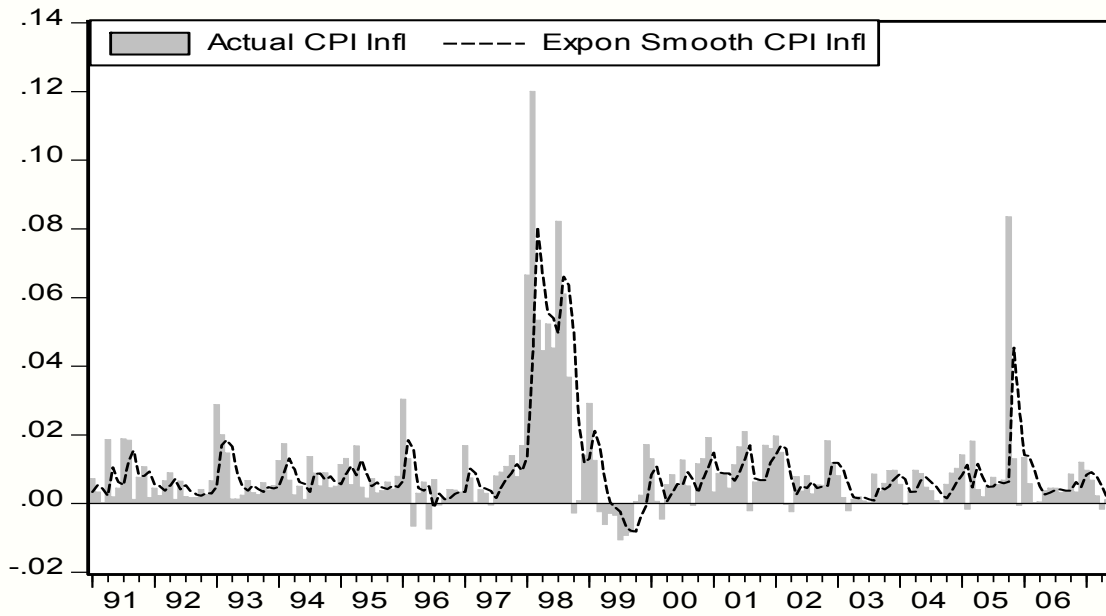
	<b>Indonesia (Headline) MSIAH(2,2) (Jan 1998 – May 2007)</b>		<b>Thailand (Core) MSIAH(2,3) (Jan 1998 - May 2007)</b>	
	<b>Regime 1</b>	<b>Regime 2</b>	<b>Regime 1</b>	<b>Regime 2</b>
Constant	-0.004 (-0.976)	-0.028 (-1.887)*	-0.022 (-5.083)***	0.009 (3.286)***
$\Delta r_{t-1}$	1.256 (13.999)***	0.170 (0.910)	0.402 (2.667)**	0.853 (8.499)***
$\Delta r_{t-2}$	-0.368 (-3.899)***	-0.189 (-1.255)	-0.297 (-1.802)*	0.199 (1.518)
$\Delta r_{t-3}$	----	----	0.404 (2.633)**	-0.203 (-2.209)**
$\Delta q_{t-1}$	-0.107 (-0.809)	0.403 (1.501)	0.447 (0.973)	-0.554 (-0.922)
$\Delta q_{t-2}$	0.118 (0.988)	-0.090 (-0.387)	-0.838 (-1.904)*	0.677 (0.789)
$\Delta q_{t-3}$	----	----	0.632 (1.465)	-0.263 (-0.532)
$E_{t-1}\pi_t$	1.299 (1.909)*	2.204 (2.289)**	0.030 (2.364)**	0.012 (1.359)
$E_{t-2}\pi_{t-1}$	-1.065 (-1.809)*	-1.953 (-2.066)**	-0.015 (-0.781)	-0.008 (-0.690)
$E_{t-3}\pi_{t-2}$	----	----	-0.022 (-1.541)	-0.008 (-0.992)
$E_{t-1}y_t - y^*$	0.013 (0.171)	1.011 (2.618)**	0.687 (2.683)**	-0.040 (-0.208)
$E_{t-2}y_{t-1} - y^*$	0.035 (0.528)	-1.509 (-4.006)***	0.087 (0.277)	-0.186 (-0.926)
$E_{t-3}y_{t-2} - y^*$	----	----	-0.663 (-1.793)*	0.229 (1.319)
<b>Std Error</b>	0.013	0.024	0.011	0.016

Note: The numbers inside ( ) are the t-statistics. \*\*\*, \*\*, and \* denote significance at 1%, 5% and 10% respectively. T-test critical values: at 1% = 2.66; at 5%=2.00 and at 10%=1.67.

**Table 8: MS-VAR Stable and Volatile Regimes**

	<b>Indonesia</b>	<b>Thailand</b>
<b>Regime 1: Stable Period</b>	1998:12-2000:6 2000:8 – 2005:9 2005:12-2006:3 2006:6-2007:5	1998:8 - 1999:5 2000:4 - 2000:5 2001:12 – 2002:1 2002:4 – 2002:4 2003:7 – 2003:11 2007:4 – 2007:5
<b>Regime 2: Volatile Period</b>	1998:1 – 1998:11 2000:7 – 2000:7 2005:10 – 2005:11 2006:4 – 2006:5	1998:1 - 1998:7 1999:6 - 2000:3 2000:6 - 2001:11 2002:2 – 2002:3 2002:5 – 2003:6 2003:12 – 2007:3

**Figure 1: Monthly CPI based Inflation in Indonesia ( $\ln P_t - \ln P_{t-1}$ )**



**Figure 2: Monthly CPI based Inflation in Thailand ( $\ln P_t - \ln P_{t-1}$ )**

