Re-Thinking Monetary Policy Objectives: Why Mess With Success?[1]

Kenneth N. Kuttner
Williams College and NBER

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Abstract

This paper reviews the theoretical arguments for and against expanding the set of monetary policy targets beyond the conventional goals of output and inflation stabilization. It goes on to describe the reaction of monetary policy in six Asian economies – Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand – to global financial conditions and the commodity price surge of 2007-08. The main finding is that the four inflation-targeting central banks and Malaysia respond flexibly, in the sense that external price and financial shocks have not resulted in the neglect of the output stabilization objective.

Introduction

Over the past quarter century, central banks have increasingly emphasized price stability as the primary goal of monetary policy. This is reflected in the widespread adoption of inflation targeting (IT), which became popular among emerging market economies in the early 2000s. In many cases, this was accompanied by changes in the central banks' mandates and enhanced legal independence. Over the same period, there has been a movement away from explicit or implicit exchange rate targets towards more flexible exchange rate regimes.

[1] Department of economics, 24 Hopkins Hall Drive, Williamstown MA 01267 USA, email kenneth.n.kuttner@williams.edu. Paper prepared for the Bank Negara Malaysia conference on "The Future Direction of Monetary Policy Frameworks and Strategies in Emerging Market Economies," held on May 21, 2014 in Kuala Lumpur.

And yet, despite the clear successes of these policies, there are lingering concerns that the emphasis on inflation targeting and flexible exchange rates has gone too far. These concerns were intensified by the financial crisis of 2007-09. First, the crisis served as a reminder of the fragility of the global financial system and put financial stability back on the radar screen as a plausible objective of monetary policy. Second, the volatile capital flows generated by the crisis, and the highly expansionary monetary policies pursued by the Federal Reserve and the European Central Bank, prompted many central banks to re-think the orthodox IT doctrine of freely floating exchange rates.

The goals of this paper are twofold. The first is to review the theoretical arguments for and against expanding the set of monetary policy targets. The second is to describe the experiences of six of the Asian economies – Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand – that have faced challenges in dealing with financial and exchange rate stability, in addition to the conventional macroeconomic goals of output and inflation stability.

Some theoretical considerations

The conventional framework for considering the objectives of monetary policy is the minimization of the objective function,

$$E_t \sum_{s=0}^{\infty} \delta^s \left[\left(\pi_{t+s} - \pi^* \right)^2 + \lambda_y \left(y_{t+s} - y^* \right)^2 \right] \quad , \tag{1}$$

involving squared deviations of inflation, π, from the target, π^*, and output, y, from potential, y^*. The δ parameter is the discount factor attached to future outcomes. A nonzero weight λ_y on output deviations corresponds to the case of flexible inflation targeting, as defined by Svensson (2010).

One would not want to take this specific functional form too literally – for example, except for mathematical tractability, there is no reason to use a quadratic – but it is nonetheless a convenient way to talk about the tradeoffs inherent between different policy objectives. Specifically, with only one policy tool, it will generally not be possible to hit both targets at the same time, achieving on-target inflation and full employment. Only when shocks come purely from the demand side – Blanchard's (2004) "divine

coincidence" case – is there no tension between output and inflation stabilization. This issue, dubbed the "Tinbergen problem" after Tinbergen (1952), gained prominence once IT was formalized in terms of an optimization problem.

There is little debate about inclusion of the output term in the objective function. This was somewhat contentious in the early days of IT, however, with some critics contending that IT overemphasized inflation – or at least that its anti-inflationary rhetoric was inconsistent with flexibility. The concern has faded over the years, however. Even "tough" central banks, such as the Reserve Bank of New Zealand, which used to mention only inflation in its policy target agreement, now acknowledge the importance of output stabilization.

Most of the recent debate has centered on whether to pursue one or more policy goals in addition to output and inflation. Adding a goal entails including a third term to the objective function,

$$E_t \sum_{s=0}^{\infty} \delta^s \left[\left(\pi_{t+s} - \pi^* \right)^2 + \lambda_y \left(y_{t+s} - y^* \right)^2 + \lambda_z \left(z_{t+s} - z^* \right)^2 \right] \quad , \tag{2}$$

where z represents a target other than output or inflation. The two most widely discussed candidates for z are financial stability and exchange rate stability.

Both are worthy goals, of course, but their pursuit could come at a cost. Specifically, including z in the objective function will generally require sacrificing output and inflation stability, except in the case where moving π closer to π^* and y closer to y^* also moved z closer to z^*. The key question, therefore, is whether there is any conflict between the z and output and inflation volatility.[2]

[2] The recognition of potential tradeoffs between conflicting policy goals was recognized long before Svensson and Tinbergen. Pressed to quash stock market speculation in the 1920s, Benjamin Strong, then the President of the Federal Reserve Bank of New York, asked: "Must we accept parenthood for every economic development in the country? That is a hard thing for us to do. We would have a large family of children. Every time one of them misbehaved, we might have to spank them all.'" [The passage is from a letter from Strong to New York Fed economist Carl Snyder, May 21, 1925, quoted in Ahamed (2009), p. 277.]

Figure 1 illustrates the nature of the dilemma. Balancing output and inflation objectives, implied by the minimization of equation 1, amounts to choosing a point along the efficient policy frontier. A high-λ_y central bank will choose a point towards the lower-right of the diagram, with stable output but high inflation volatility. Conversely, a more hawkish, low-λ_y central bank will choose a point on the upper left-hand portion of the curve.

To the extent that it is inconsistent with output and inflation stability, the introduction of a third objective shifts the efficient frontier outward and away from the origin, as shown in Figure 2, leading to higher output and inflation volatility for any value of λ_y. (When there are three objectives, the efficient frontier is three-dimensional, and the weights on the objectives determine a point on the surface.)

Financial stability

Not surprisingly, financial stability has emerged since 2008 as the leading candidate for an additional policy target. This runs counter to the pre-crisis conventional view of Bernanke and Gertler (1999), which held that financial stability should not be a distinct objective. They argued that monetary policy should respond to the macroeconomic effects of asset price fluctuations, but not to the fluctuations themselves:

> The inflation-targeting approach dictates that central banks should adjust monetary policy actively and preemptively to offset incipient inflationary or deflationary pressures. Importantly, for present purposes, it also implies that policy should not respond to changes in asset prices, except insofar as they signal changes in expected inflation.[3]

The Bernanke-Gertler prescription has spawned a great deal of research trying to motivate an explicit, independent financial stability objective.

Bordo and Jeanne (2002) argued that asset price bubbles, and their collapse, have effects that go beyond their impact on aggregate demand. Their focus is on the effects of collateral constraints on the productive sector. In their framework, the reversal of an asset price bubble is the equivalent of an adverse aggregate supply shock. Optimal monetary policy is therefore not just a matter of aggregate demand management. Instead,

[3] Bernanke and Gertler (1999, p. 18).

the appropriate policy response is to preempt asset price appreciation up to some point, but to revert to a more accommodative stance if the perceived probability of an improvement in fundamentals is high.

Dupor's (2002, 2005) model is one in which asset price bubbles create inefficiencies. His framework is one in which firms are not fully rational, and consequently they mistake the bubble component of asset price movements for fluctuations in the fundamental value of capital. Bubbles can therefore lead to over-investment, and distort consumption-leisure and consumption-investment decisions. Monetary policy can be used to offset these distortions by raising the interest rate when stock prices exceed their fundamental values.

Woodford's (2012) motivation for including a distinct financial distress term in equation 2 involves the disruption of financial intermediation. The model's distinguishing feature is that it includes borrowers and savers rather than a single representative agent. Intermediation is required to equate the two agents' marginal utilities of consumption. Crisis-induced disruptions are costly because they create a marginal utility "gap" between the two consumers. The probability of entering a credit-constrained regime depends on the amount of leverage in the economy, which is in turn a function of monetary policy. The model's implication is that optimal policy involves balancing a crisis prevention objective against the conventional goals of output and inflation stabilization. While this can be interpreted as an extension of the flexible IT framework, it runs counter to the Bernanke-Gertler desideratum of responding to financial conditions only to the extent that they affect future output and inflation.

There are at least three serious practical issues with targeting financial stability, however, and it may be unrealistic to think that central bankers will ever be able to operationalize a policy based in the minimization of equation 2.

First, unlike inflation and output, there is no clear empirical counterpart to the *z* that appears in equation 2. Moreover, the models used to motivate a financial stability term in the objective function differ as the relevant variable. In Woodford's framework, leverage is the appropriate variable, but it remains to be seen how a meaningful aggregate gauge of leverage can be constructed, especially in a financial system where so much leverage is

disguised as derivatives and concealed in off-balance-sheet transactions. In the Dupor and Bordo-Jeanne models, on the other hand, the central bank should respond the deviations between the market and fundamental stock valuations, raising the perennial question of how such misalignments might be detected.

A second difficulty is determining the terms of the tradeoff between inflation (or output) and the likelihood of a crisis. Implementing a targeting rule requires an estimate of the likely impact on *z* of a one percentage point reduction in the inflation rate – or alternatively, how much of a deviation from the macro objectives would be needed for a given reduction in the probability of a credit crunch.

Third, the mechanism connecting monetary policy to financial stability remains poorly understood. One possibility is the "risk-taking channel" explored by Dell'Ariccia et al. (2010), among others. In a similar vein, Stein (2014) hypothesized that expansionary monetary policy artificially depresses risk and/or term premiums, which in turn results in a disruptive spike in the premiums. Adrian and Shin (2009) argued that by reducing the cost of short-term collateralized borrowing in the repo market, expansionary monetary policy increases leverage, thus increasing the likelihood of a damaging deleveraging cycle.

Still lacking is a firm quantitative estimate of the short-term interest rate's effects on financial stability. Conventional econometric methods can be used to estimate of the impact of a 25 basis point rate hike on real GDP at a given horizon. Estimating the marginal effects of interest rate changes on the likelihood of a entering a credit constrained regime is a much more daunting task.

Since financial stability is not directly measurable, the best that can be done econometrically is to estimate the impact of policy interest rates on indicators presumed to be related to financial instability, such as asset prices. The estimates tend to be quite small, however. In the research on house prices surveyed in Kuttner (2014), the estimated impact of a 25 basis point policy shock on house prices were on the order of 0.2% to 0.5%. These estimates suggest that deflating the house price bubble of the mid-2000s would have required a draconian policy tightening.

Finally, communication and accountability are also concerns, particularly for inflation targeting central banks. Because inflation and output are readily (if imperfectly) measured, it is straightforward to explain the central bank's monetary policy decisions in terms of the medium-term tradeoffs between the two. Moreover, the regular release of inflation and GDP data make it possible to hold policymakers accountable, with a modest time lag, for macroeconomic outcomes.

It is not clear how these modes of communication and accountability would apply to a criterion as abstract as expected crisis-induced welfare losses, especially when crises occur irregularly, and at intervals measured in years.

By way of illustration, assume the occurrence of financial crises followed a poisson process, with the time-to-crisis random variable *x* following a negative exponential distribution,

$$f(x) = \gamma e^{-\gamma x} , \tag{3}$$

in which $1/\gamma$ is the mean time between crises. Further suppose that the mean time between crises is initially 5 years, corresponding to a γ parameter of 0.2.

Now consider a policy designed to increase the average number of years between crises from five to ten, decreasing γ from 0.2 to 0.1. Even if the policy were completely successful, there would still be a 39% probability of a crisis occurring within five years. If this were to happen, the central bank would inevitably come under fire for pursuing a policy that required sacrificing output and inflation and stability, and yet appeared to be a failure. Pity the central bank governor called on to explain that the policy really *was* a success even though another crisis had occurred within five years.

Conversely, suppose the policy was ineffective, and the mean time between crises remained 5 years. In this case, there would still be a 13% chance that a crisis would not occur for at least 10 years. The apparent financial stability would have been the result of good luck rather than good policy. It would obviously be hard to hold a central bank accountable for the failure of a policy that required decades to substantiate.

Exchange rate stability

An analogous set of issues arises in the context of exchange rate stabilization. These issues are especially germane to emerging market and developing economies, which tend to be highly vulnerable to external shocks, both real and financial. The key issue is again whether exchange rate stability ranks as an independent policy objective, as opposed to one whose pursuit is consistent with full employment and on-target inflation.

The classic expression of this latter view is Taylor (2001), who showed that it was optimal for monetary policy to respond to the price pressures created by exchange rate shocks, but not to the shocks themselves. In a sense, Taylor's prescription is analogous to that of Bernanke and Gertler (1999) with respect to financial stability. In a similar vein, Clarida, Gali and Gertler (2001), suggested modifying the inflation target to include only domestic prices, leaving in tact the dictum that central banks should refrain from exchange rate management. Devereux et al. (2006) showed that the same prescription applies even when there is a high degree of exchange rate pass-through.

Other research has reached the opposite conclusion. Eichengreen (2005) questioned the appropriateness of inflation targeting for emerging market and developing economies subject to large terms-of-trade shocks. Taking into account the reliance of many emerging markets economies on commodity exports, Frankel (2003) argued that tying the exchange rate to the terms of trade would be superior to inflation targeting.

Devereux and Engel (2003) also challenged the conventional prescription of IT and floating exchange rates. They argued that the prevalence of local-currency pricing prevents the adjustment of relative prices, thus undercutting the benefits of exchange rate flexibility. Their model therefore motivates a role for exchange rate management rather than a pure inflation target.

Currency mismatch is another potential rationale for compromising on IT in favor of more active exchange rate management. Aghion et al. (2000) and Bacchetta (2000) observed that contractionary balance sheet effects offset the expansionary effects of exchange rate depreciation, and suggest that this could motivate a role for exchange rate management. However, Cespedes et al. (2004) concluded that balance sheet effects did not overturn the prescription of full exchange rate flexibility. The results of Cespedes et al. notwithstanding, Hausmann et al. (2001) found that the degree of exchange rate

management among emerging market economies was related to their ability to borrow internationally in the domestic currency.

The Asian experience

Has price stability come at a cost? Are central banks in the region already implicitly pursuing objectives other than price stability? This section looks at the recent experiences of six Asian economics – Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand – in an effort to divine how their central banks have managed conflicting economic objectives. Four of the six economies are formal inflation targeters: Indonesia, since 2005; Korea, since 1998; the Philippines, since 2002; and Thailand, since 2000. The International Monetary Fund (IMF) classifies Singapore as following a crawling peg or band, while Malaysia's framework is classified "other."

Overall macroeconomic performance

As shown in Table 1, five of the six countries experienced a sizeable decrease in the level and volatility of inflation since 2000.[4] In four of these countries, increased inflation stability was associated with the adoption of inflation targeting, but even Malaysia, whose *de jure* policy remained unchanged, enjoyed improved performance on this dimension. And while inflation in Singapore has become more volatile in recent years, the average rate has remained low. Clearly, all six have successfully achieved and maintained price stability.

This has not required permitting higher output volatility in the relentless pursuit of low inflation, however. The GDP statistics, reported in Table 2, shows that in every economy except Singapore, output volatility has diminished since the 1990s, leaving aside the 1997-98 and 2007-09 crisis episodes. These five countries appear to have experienced a moderation in economic volatility not unlike that of the U.S. since the mid-1980s.

Figure 3 depicts the output and inflation volatility trends from Tables 1 and 2. The figure shows that, for every country except Singapore, the standard deviations of

[4] The sample includes the Asian crisis of 1997-98 and the global financial crisis of 2007–09, but the general pattern is the same if these periods are excluded. Indonesia's inflation decline is significantly larger post-2005, when IT was formally adopted.

output growth and inflation have declined more or less proportionally, corresponding to a movement down and to the left along a ray intersecting the origin. This pattern is consistent with an inward shift in the volatility frontier. It does not suggest a stricter adherence to an inflation target, which would have led to a movement up and to the left. In fact, Indonesia seems to have enjoyed a disproportionately larger reduction in output volatility, precisely the opposite of what one would have expected if the adoption of IT had forced Bank Indonesia to focus more narrowly on inflation.

There are at least four candidate explanations for the shift. One is simply a decline in the shocks' variance ("good luck"). The second is that central banks have conducted policy more efficiently by reacting pre-emptively to demand shocks and reducing the magnitude of (or perhaps completely eliminating) monetary policy shocks. Third, the establishment of a firm nominal anchor such as IT may have stabilized inflation expectations and reduced the sacrifice ratio. A fourth explanation is that central banks abandoned extraneous, non-macro objectives, which allowed them to achieve better outcomes in terms of output and inflation.

Determining the likely cause of the inward shift in the curve is beyond the scope of this paper. A less ambitious but nonetheless germane question is whether the improvement in the set of feasible policy outcomes was also accompanied by a narrowing of policy objectives, prioritizing price stability over output stability.

Singapore is the conspicuous exception to this pattern, having experienced an increase in both output and inflation volatility. Two of the four hypotheses for other countries' volatility reductions can be dismissed out of hand as explanations for what went on in Singapore. Specifically, it is unlikely that the Monetary Authority of Singapore (MAS) became less competent over time, reacting less effectively or more erratically. Nor is it plausible that inflation expectations would have become unanchored.

That leaves two possibilities. One is that for whatever reason, the shocks hitting Singapore were larger than those affecting the other countries in the region. That is certainly possible, given the differences in economic structure, such as the composition of exports, between Singapore and its neighbors. The other possibility is that the high degree of exchange rate management (a tight crawling band) was that the control of the

exchange rate required sacrificing a certain amount of macroeconomic stability. An unanswered question is why the cost would have become larger in recent years, and the conjecture warrants further investigation.

The response to external financial shocks

This superficial summary of macro performance raises the question of how the central banks in the region have responded to external shocks, and specifically whether exchange rate considerations influenced the setting of the policy interest rate. The evidence, circumstantial as it is, suggests that exchange rate management is common. But by relying primarily on sterilized foreign exchange intervention, the four inflation targeters' pursuit of exchange rate stability has not involved compromising on macroeconomic objectives.

Three sets of regressions are used to assess the impact of external financial shocks on monetary policy. In the first set, the change in the policy interest rate is regressed on its own lag, the lagged level of the policy rate, *R*, plus four variables capturing global financial conditions,

$$\Delta R_t = \alpha + \rho_1 \Delta R_{t-1} + \rho_1 R_{t-2} + \beta_1 \Delta RFF_t + \beta_2 RFF_{t-1} + \beta_3 \Delta RISK_t + \beta_4 \Delta RISK_{t-1} + \beta_5 QE_t + \beta_6 \Delta BORROW_t \ , \quad (4)$$

where *RFF* is the U.S. federal funds rate, *RISK* is the BofA Merrill Lynch Emerging Asia bond risk spread, *QE* is a proxy for the Fed's quantitative easing policies, and *BORROW* is the volume of emergency borrowing that took place in the period leading up to and immediately following the Lehman collapse.[5] The regression is estimated on monthly data through December 2013. The start date is January 2006 (the year after the adoption of inflation targeting) for Indonesia, and January 2002 for the remaining five.

This is a reduced-form regression, of course, and it should be interpreted as such. But it is worth noting that for small open economies, it is reasonable to assume that all of the variables capturing global financial conditions are exogenous. In other words, there

[5] *BORROW* is the sum of discount window and Term Auction Facility (TAF) lending. *QE* is defined as the change in the size of the Fed's balance sheet, excluding the short-term liquidity provided under the TAF and via the discount window.

is no reason to think that the interest rates set by any of the central banks in the region had any impact on the policy of the U.S. Federal Reserve or the bond risk spread. Consequently, it is not necessary to use a vector autoregression to identify exogenous changes in the four variables.

The motivation for looking at the interest rate response is to assess the degree to which the central bank is able and willing to pursue policy independently of the U.S. Federal Reserve. A finding that the domestic rates closely tracked the funds rate would indicate either that high capital mobility prevented the central bank from charting its own course, or that it was unwilling to tolerate the exchange rate fluctuations resulting from interest rate differentials.

The dependent variable in the second set of regressions is the change in foreign exchange reserves, a measure of intervention in the foreign exchange market. A systematic relationship between changes in reserves and external shocks would suggest that central banks are attempting to neutralize the shocks' impact on the exchange rate without adjusting the domestic policy rate. The regression specification is almost identical to equation 4, with the change in foreign exchange reserves replacing ΔR as the dependent variable. The only difference is that the lagged level of the dependent variable is omitted.

The dependent variable in the third set of regressions is the annualized monthly change in the nominal bilateral exchange rate with respect to the U.S., expressed in percentage terms (1200 times the log difference). While not a policy tool in its own right, the response of the exchange rate to financial shocks is an indicator of the degree to which the exchange rate is allowed to move when there is a shock. The regression specification is the same as equation 4, but without the lagged level of the dependent variable.

Table 3 presents the results from the regressions with the policy interest rate as the dependent variable. Clear differences between the countries' responses are evident. Not surprisingly in light of its crawling peg, Singapore's overnight rate exhibits the closest relationship to the federal funds rate. The short-term response, measured by the coefficient on ΔRFF, is virtually one-for-one. The response to a permanent one

percentage point change in the funds rate (shown in the row labeled "Long-run *RFF* response) is approximately 50 basis points. The results are very much in line with the time series plot in Figure 4, where the two interest rates move very closely in tandem.

The relationship between domestic and U.S. policy rates is looser or nonexistent for the remaining five countries. Korea and Malaysia exhibit modest long-run responses of 0.31 and 0.14 respectively. In the Philippines, the central bank's policy rate appears to respond contemporaneously to the federal funds rate, but this does not carry over into a long-run relationship.

The Philippines and Thailand tend to hike the policy rate in response to increases in the Asia risk spread, and even then by very modest amounts – only 12–15 basis points for a one percent increase in the spread. Moreover, Figure 5 shows that these responses were limited to the onset of the 2007 financial crisis, and are not in evidence during the 2002 and 2011-13 upticks in the spread.

The monetary policy responses to the financial crisis and QE also differ considerably across countries. Even controlling for the federal funds rate, the regressions show that Korea, Malaysia and Thailand cut the policy rate significantly during the most intense phase of the crisis, as proxied by *BORROW*. Indonesia, the Philippines and Singapore did not. Finally, it should be noted that Indonesia and Thailand were both raising policy rates even as the Fed embarked on QE, presumably because they were responding to strong domestic economic conditions, which are not controlled for in the regressions.

The salient finding from the results for foreign exchange intervention, shown in Table 4, is that five of the six countries in the sample tend to sell foreign exchange reserves when there are increases in the Asia risk spread. The largest response is Korea's, whose -7.66 coefficient says that a one percentage point in the spread leads to loss of nearly $8 billion in reserves. Indonesia, Singapore and Thailand also display exhibit statistically significant responses on the order of $2 to $5 billion dollars per 1 percentage point increase in the risk spread. The estimates for the Philippines and Malaysia are small and not significant at the 5% level. The strong response of foreign exchange intervention in four of the six countries contrasts with the results in Table 3,

which indicated little or no response of the policy rate to the risk spread. The central banks in the region apparently view foreign exchange reserves as the first line of defense against risk-induced capital outflows depreciations. Fed policy has also elicited foreign exchange intervention. QE and/or cuts in the federal funds rate have the central banks of Indonesia, Singapore, Malaysia and Thailand to accumulate foreign exchange reserves.

The policy rate and foreign exchange intervention regressions in Tables 3 and 4 show that central banks are paying attention to exchange rate fluctuations. The results in Table 5 show that they nonetheless allow the exchange rate to respond flexibly to external financial conditions. Most notably, all six allow the exchange rate to depreciate when the Asia risk spread rises. The impacts of a one percentage point change in the risk spread range from a 1.75% monthly change Thailand to a 6.75% change for Korea.[6] While the sale of foreign exchange was presumably intended to buffer the effects of the spread on the exchange rate, the intervention was either ineffective or of insufficient magnitude to fully offset the effects. The result is also consistent with the finding in the policy rate regressions in Table 3 that spikes in the spread did not elicit contractionary monetary policy responses. Similarly, the Fed's QE policies led to exchange rate appreciation in Korea, Malaysia, Singapore and Thailand. This is to be expected in the cases of Korea and Malaysia, which did not appear to react with changes in the interest rate or foreign exchange intervention. The central banks of Singapore and Thailand did use one or more of these tools in an effort to combat the impact on their exchange rates, but they appreciated nonetheless.

Taken together, the conclusions from the regression analysis are twofold. First, it is clear that exchange rate stability is a policy priority, as evidenced by the responses of foreign exchange intervention and the policy interest rate to external financial conditions. This does not imply that exchange rate enters separately in the policy objective function, however. A response to the exchange rate (in this case, to exogenous factors affecting the exchange rate) may be optimal, even with no weight on it in the objective function, if exchange rate fluctuations affect domestic output and inflation. Second, the use of foreign exchange intervention – in all countries in response to the Asia risk spread, and in four of

[6] The change in the exchange rate is annualized, so the parameter estimate must be divided by 12 to obtain the monthly change.

the six to Fed policy – shows that central banks in the region have deployed tools other than the short-term interest rate to influence macroeconomic outcomes and manage the exchange rate. In other words, foreign exchange intervention is seen as way to ameliorate the Tinbergen problem.

A case study of the 2007 commodity price shock

Commodity prices surged in 2007 and early 2008. The IMF's commodity price index rose 72% from the first quarter of 2007 to the second quarter of 2008. Small open economies were especially vulnerable to the shock. As indicated by the red lines in Figure 6, year-over-year headline CPI inflation rates in the six countries under examination had by early 2008 reached levels of 5% (Korea and Malaysia) to 9% (Indonesia), well above recently prevailing levels and in excess of inflation targeters' goals.

The 2007-08 episode offers a rare opportunity to see how emerging market inflation targeters responded to an exogenous inflation shock generally, and specifically whether a single-minded focus on inflation inhibited a flexible policy response. Unfortunately, the experiment is not an ideal one, having been truncated by the global financial crisis that sent commodity prices plummeting. Consequently, the commodity price shock turned out to be temporary, although the reversal was unlikely to have been foreseen.

The optimal response of a flexible inflation targeter would have been to ignore temporary inflation shocks, focusing instead on expected future inflation and "second round" effects. And to the extent that such effects existed, IT prescribes a gradual return to the target, weighing the costs of foregone output against the benefit of reducing inflation. Did the four inflation targeting central banks follow this prescription? Or did they deviate from it by overly emphasizing inflation, or by pursuing other objectives?

Assessing the central banks' attention to the tradeoff between output volatility and inflation naturally requires some estimate of the output gap. Unfortunately, reliable estimates of potential are elusive, even in advanced economies. Fortunately, real GDP in the six economies had been growing smoothly in the quiescent years leading up to the

shock, so a simple log-linear extrapolation is probably not a bad approximation to potential. (Pseudo-real time estimates from an HP filter are very close to the linear trend.) As shown by the green bars in Figure 6, all six countries show small, positive output gaps in most or all of 2007. The gaps narrowed in early 2008 as high commodity prices and the incipient slowdown among advanced economies began to take its toll.

Conspicuously, in every country except Korea, central banks were either cutting the policy interest rate, shown by the blue line in the figure, or holding it constant throughout 2007 and early 2008, despite accelerating inflation and zero or slightly positive output gaps.

The four inflation targeters' responses to the commodity price surge appear consistent with flexible inflation targeting. The series of cuts in Bank Indonesia's policy rate is in line with declining inflation throughout the period. When inflation finally began to edge up in early 2008, the Bank slightly raised its policy rate. Because the output gap remained in positive territory, there was no conflict between the two macroeconomic objectives. Korea's 2007 rate hike is consistent with rising inflation and a positive output gap – again, no conflict. And Thailand's constant policy rate in the face of rising headline inflation can be explained by the fact that its inflation target was at the time specified in terms of core inflation, which remained subdued.

In the Philippines, the central bank's rate cuts in late 2006 and early 2007 are consistent with the fact that inflation had been undershooting its target. However, the figure raises the question of why it kept the policy rate constant in late 2007 and the first quarter of 2008 even as inflation was rising sharply. The policy non-response is also remarkable in light of the central bank's monetary policy statements, which recognized the upside risks to inflation, acknowledged above-trend GDP growth, and forecast inflation to settle above the 2008 target range.[7] The only mitigating factor cited in the April 2008 report was the incipient slowdown in the U.S.

As in the Philippines, Singapore's short-term interest rate declined throughout 2007, in spite of relatively robust economic performance and rising inflation. However,

[7] Bangko Sentral ng Pilipinas, "Highlights of the Meeting of the Monetary Board on Monetary Policy Issues Held on 24 April 2008," page 1.

given that it was not an inflation targeter, the justification for the rate cuts was presumably to keep the currency within its target range. Indeed, the declines in the short-term interest rate track the exchange quite closely.

Malaysia is unusual among the six central banks for not having adjusted the policy rate at all since the first quarter of 2006. In fact, the Bank Negara Malaysia (BNM) kept the rate constant through the summer of 2008, even as year-over-year inflation hit 5%. The BNM's July monetary policy statement expressed the same tradeoff that inflation-targeting central banks. While acknowledging that "…both the risks to higher inflation and the risks to slower growth have increased," the Bank held the policy rate constant at 3.5%, stating "the immediate concern is to avoid a fundamental economic slowdown that would involve higher unemployment."[8] In this regard, the BNM seems to have pursued a policy similar to that of a flexible inflation targeter, despite not having adopted IT officially as its policy framework.

This brief examination of the response to the 2007 commodity price shock suggests that all four inflation targeters pursued flexible policies, without undue fixation on rising prices. Exchange rates may also have been a concern, currency appreciation may to some extent have made the region's central reluctant to raise interest rates to fight inflation. But since the banks' restraint can also be explained by the flexible inflation targeting approach, the episode does not conclusively demonstrate that exchange rate management entered into their decisions.

Conclusions

This paper set out to address two interrelated questions. The first was the extent to which central banks should take into account objectives other than inflation in setting policy. One aspect of this question concerns the degree to which banks should be concerned with output volatility, in addition to inflation. This issue is largely settled. Few would challenge the tenet that inflation targeting should be flexible, balancing the attainment of the target against excessive output volatility.

[8] July 25, 2008 Monetary Policy Statement, http://www.bnm.gov.my/index.php?ch=en_press&pg=en_press_all&ac=1664&lang=en.

More controversial is the question of whether additional objectives should be included in central banks' objective functions. This issue has gained prominence after the global financial crisis, and some have advocated incorporating financial stability as an explicit policy target. This is analogous to the question faced in many emerging market economies, where exchange rate stabilization has been mooted as a distinct policy goal.

Discussions of the desirability and feasibility of broadening central banks' mandates inevitably involve determining the number of tools at policymakers' disposal. In the consensus macro model developed in recent years, the only tool is the short-term interest rate, making it hard to manage proliferating objectives. Additional tools or enhancing financial stability, such as macroprudential regulation, would help, but these tools' efficacy has yet to be conclusively established.

The second question addressed in this paper was the extent to which the four inflation-targeting central banks in East/Southeast Asia are *already* practicing a flexible and eclectic form of IT – and perhaps responding to exchange rates as well as output and inflation. While by no means definitive, the regression analysis suggests that the four inflation targeting central banks are to some extent concerned with exchange rate management. However, they have tended to use foreign exchange intervention, rather than the policy rate, to deal with risk-induced exchange rate fluctuations and spillovers from the Fed's quantitative easing policies. This is consistent with Ostry et al. (2012), who observed that sterilized intervention may be a viable second policy tool in many emerging market economies. In addition, as noted by Kuttner and Shim (2014), the economies in the region are have been active users of non-interest rate policies intended to enhance financial and macroeconomic stability. The central banks in the region appear to be operating on the assumption that they have two or even three tools at their disposal.

In the end, the proof of the pudding is in the eating. The inflation-targeting central banks of East/Southeast Asia have performed remarkably well since the adoption of the framework – certainly much better than the pre-IT era. It is hard to discern the extent to which these central banks have deviated from the orthodox framework laid out in Svensson (2010) in favor of a slightly more heterodox approach. Given the track

record, therefore, it is hard to find any compelling reason for these countries' central banks to alter their existing policy objectives.

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Table 1: Headline CPI Inflation pre- and post-2000

	1987-1999		2000-2013	
	Mean	Standard deviation	Mean	Standard deviation
Indonesia	11.3%	15.3	7.0%	3.6
Korea	5.5	3.3	2.9	1.6
Malaysia	3.2	2.0	2.2	2.7
Philippines	8.7	4.4	4.0	3.5
Singapore	1.8	1.5	2.1	2.7
Thailand	4.6	2.9	2.5	3.0

Note: excludes the periods from 2007Q3 through 1999Q4 and from 2008Q2 through 2010Q2.

Table 2: Real GDP growth pre- and post-2000

	1987-1999		2000-2013	
	Mean	Standard deviation	Mean	Standard deviation
Indonesia	4.9%	10.1	5.4%	2.2
Korea	6.8	8.0	3.6	5.8
Malaysia	7.2	8.1	4.8	5.2
Philippines	3.5	6.1	4.9	4.0
Singapore	7.6	6.4	5.4	9.5
Thailand	3.2	10.8	3.9	5.8

Note: excludes the periods from 2007Q3 through 1999Q4 and from 2008Q2 through 2010Q2.

Table 3: The effects of external financial conditions on the policy interest rate

	Indonesia	Korea	Malaysia	Philippines	Singapore	Thailand
Lagged Δ policy rate	0.65*** (0.10)	0.04 (0.11)	0.47*** (0.13)	-0.01 (0.12)	0.01 (0.11)	0.35*** (0.08)
Lagged policy rate	-0.02 (0.02)	-0.10*** (0.03)	-0.09*** (0.03)	-0.03 (0.03)	-0.32*** (0.10)	-0.03** (0.01)
ΔRFF_t	-0.14 (0.10)	-0.14 (0.09)	-0.06 (0.05)	0.51*** (0.16)	1.00*** (0.17)	0.13 (0.19)
RFF_{t-1}	0.00 (0.02)	0.03*** (0.01)	0.05 (0.18)	0.01 (0.02)	0.17*** (0.06)	0.01 (0.01)
$\Delta RISK_t$	0.05 (0.04)	0.04 (0.07)	0.01 (0.01)	0.12** (0.05)	0.02 (0.04)	0.15** (0.06)
$\Delta RISK_{t-1}$	–0.10*** (0.02)	-0.06 (0.08)	0.00 (0.03)	0.06 (0.05)	0.01 (0.11)	-0.17** (0.07)
QE_t	0.43* (0.24)	0.35 (0.34)	0.47 (0.31)	-0.06 (0.04)	0.19 (0.26)	0.64** (0.31)
$\Delta BORROW_t$	-0.47 (0.29)	-2.13*** (0.56)	-0.64** (0.30)	0.11 (0.37)	0.51 (0.34)	-0.93*** (0.33)
Long-run *RFF* response	0.16 (0.65)	0.31*** (0.06)	0.14*** (0.04)	0.33 (0.56)	0.53 (0.04)	0.27 (0.27)
Adjusted R^2	0.61	0.46	0.42	0.05	0.26	0.35
Observations	88	136	136	136	136	136

Notes: the dependent variable is the change in the policy interest rate expressed in percentage terms. Robust standard errors are in parentheses. The federal funds rate and the Asia risk spread are both in percentage terms. The quantitative easing and borrowing variables are measured in billions of U.S. dollars. The sample runs from January 2002 (2006 for Indonesia) to December 2013. The variable definitions and data sources are listed in the appendix.

Table 4: The effects of external financial conditions on foreign exchange intervention

	Indonesia	Korea	Malaysia	Philippines	Singapore	Thailand
Lagged intervention	0.16 (0.12)	0.01 (0.11)	0.31*** (0.11)	0.29** (0.14)	-0.25** (0.12)	0.05 (0.13)
ΔRFF_t	0.49 (1.50)	1.94 (2.00)	-2.56* (1.31)	-0.38 (0.39)	-2.44 (1.88)	-4.11** (1.68)
RFF_{t-1}	0.08 (0.16)	0.11 (0.18)	0.03 (0.12)	-0.01 (0.05)	0.16 (0.21)	0.26* (0.13)
$\Delta RISK_t$	-2.38*** (1.08)	-7.66*** (1.30)	-1.61* (0.84)	-0.24 (0.33)	-4.67*** (1.37)	-2.15** (0.93)
$\Delta RISK_{t-1}$	–0.01 (0.57)	0.67 (1.18)	–0.16 (0.81)	0.16 (0.21)	1.47 (0.96)	0.45 (0.59)
QE_t	13.7** (6.7)	10.4 (8.9)	6.4 (7.5)	0.9 (2.6)	22.3** (10.3)	3.2 (7.0)
$\Delta BORROW_t$	-5.8 (4.7)	-11.6* (6.9)	-15.4** (6.0)	0.9 (2.1)	-11.8* (6.8)	7.6 (4.9)
RFF exclusion	0.81	0.46	0.15	0.57	0.37	0.02
Adjusted R^2	0.09	0.44	0.28	0.05	0.13	0.11
Observations	88	136	136	136	136	136

Notes: The dependent variable is the change in foreign exchange reserves, measured in billions of U.S. dollars. Robust standard errors are in parentheses. See also notes to Table 3.

Table 5: The effects of external financial conditions on the exchange rate

	Indonesia	Korea	Malaysia	Philippines	Singapore	Thailand
Lagged depreciation	–0.17 (4.40)	–0.35** (0.14)	–0.15 (0.13)	0.03 (0.09)	–0.28 (0.11)	0.09 (0.09)
ΔRFF_t	–4.1 (0.1)	–18.0 (21.5)	9.8 (10.6)	–16.9 (14.0)	19.8** (9.1)	14.0 (14.2)
ΔRFF_{t-1}	–1.40 (1.02)	–2.02 (1.49)	–1.82 (1.09)	–2.09** (1.01)	–1.71 (1.53)	–1.63* (0.95)
$\Delta RISK_t$	65.5*** (12.9)	81.1*** (20.6)	29.5*** (6.7)	20.3*** (6.3)	31.0*** (7.6)	21.3*** (5.03)
$\Delta RISK_{t-1}$	–13.8 (14.3)	–6.2 (20.7)	–5.7 (5.4)	–13.1*** (4.7)	–2.5 (7.2)	–2.2 (3.5)
QE_t	–0.14 (0.08)	–0.38*** (0.13)	–0.15*** (0.05)	–0.03 (0.03)	–0.14** (0.06)	–0.08** (0.04)
$\Delta BORROW_t$	0.12 (0.08)	0.23** (0.11)	0.07* (0.03)	0.02 (0.03)	0.09** (0.04)	0.04 (0.03)
RFF exclusion	0.59	0.24	0.22	0.04	0.05	0.13
Adjusted R^2	0.43	0.30	0.15	0.12	0.17	0.08
Observations	88	136	136	136	136	136

Notes: the dependent variable is the annualized monthly rate of depreciation vis a vis the U.S. dollar, expressed in percentage terms (1200 times the log difference). Robust standard errors are in parentheses. See also notes to Table 3.

Figure 1: The inflation-output volatility frontier

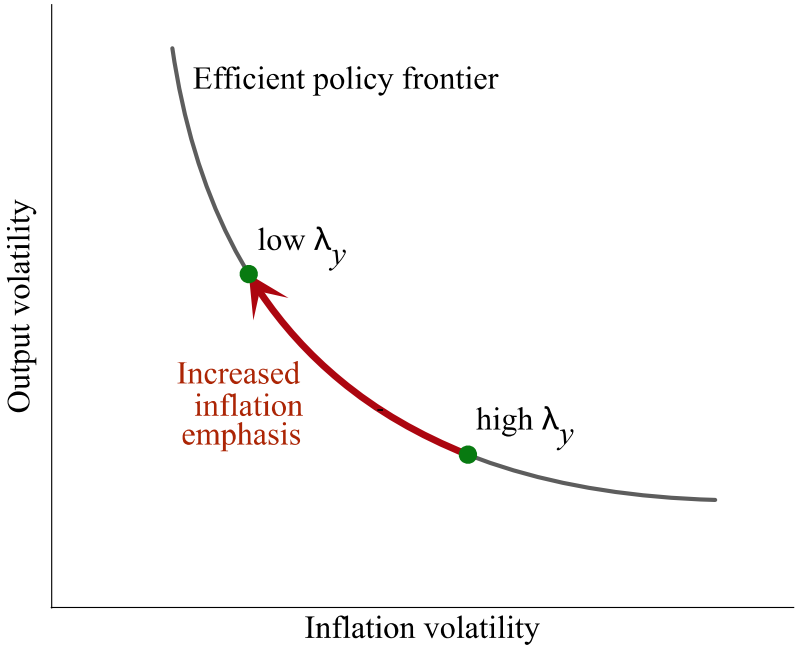


Figure 2: Adding a third policy objective

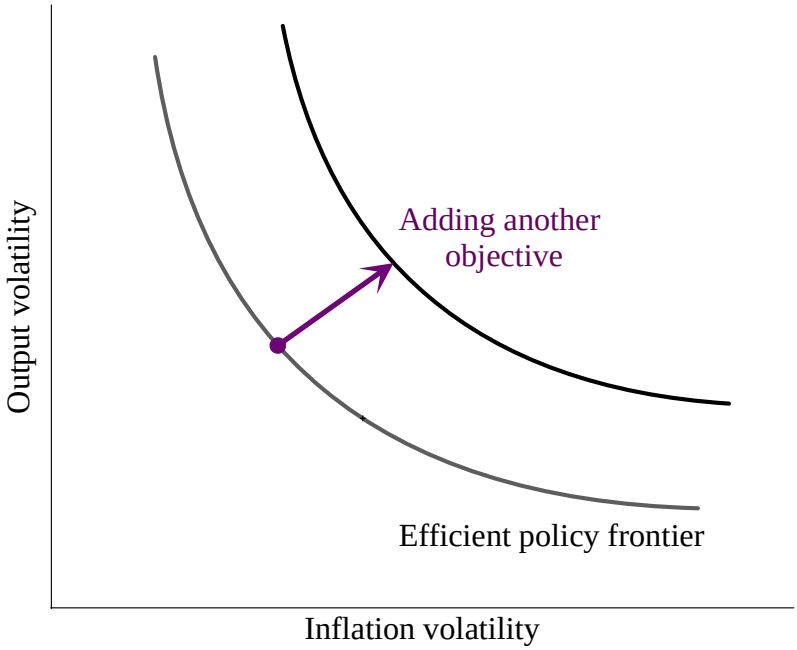


Figure 3: Trends in output and inflation volatility, pre- and post-2000

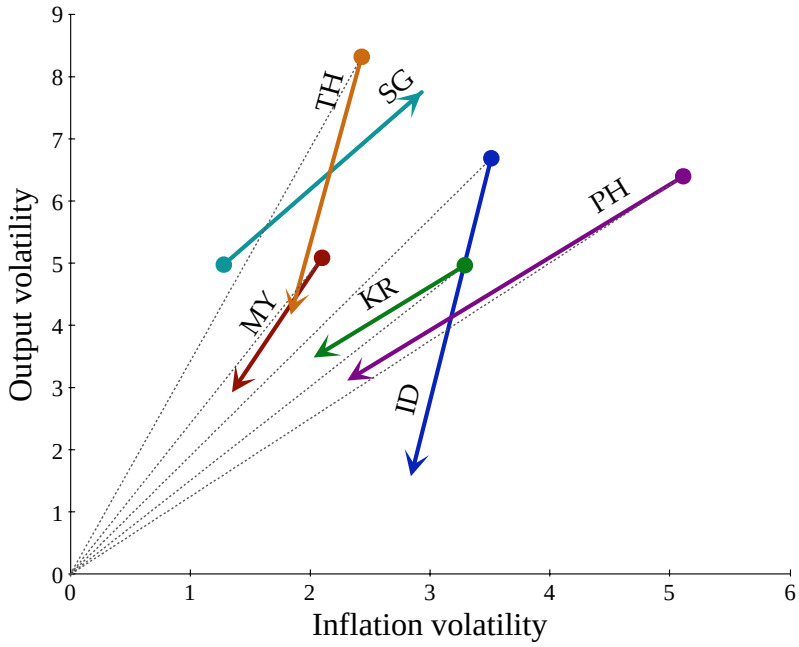


Figure 4: Domestic short-term interest rates and the federal funds rate

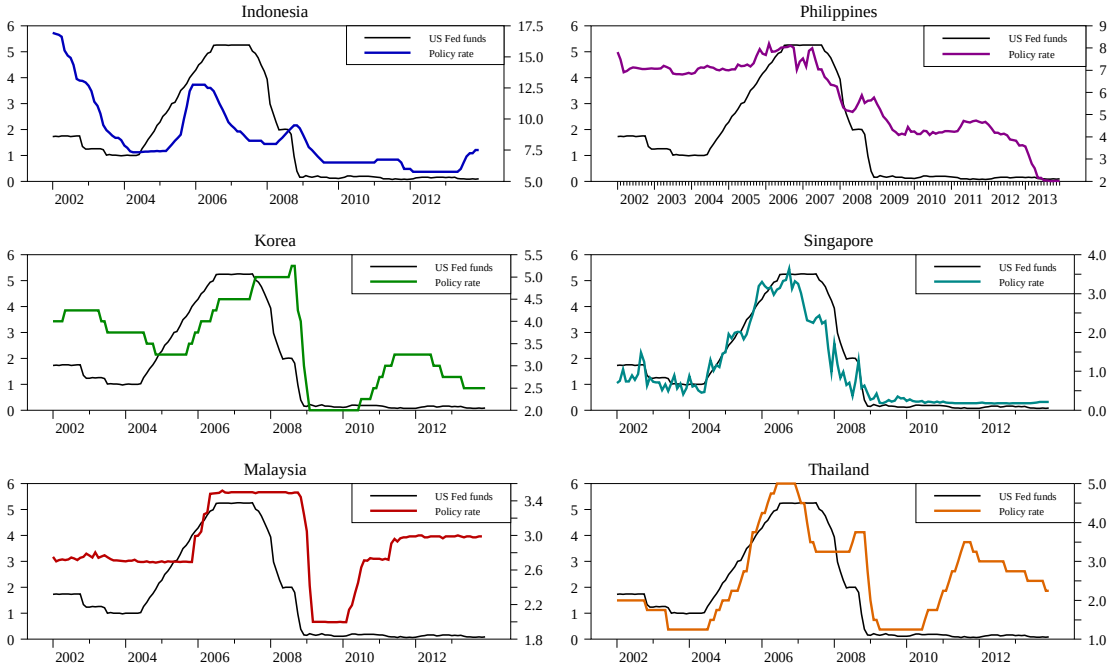


Figure 5: Domestic short-term interest rates and the Asia risk spread

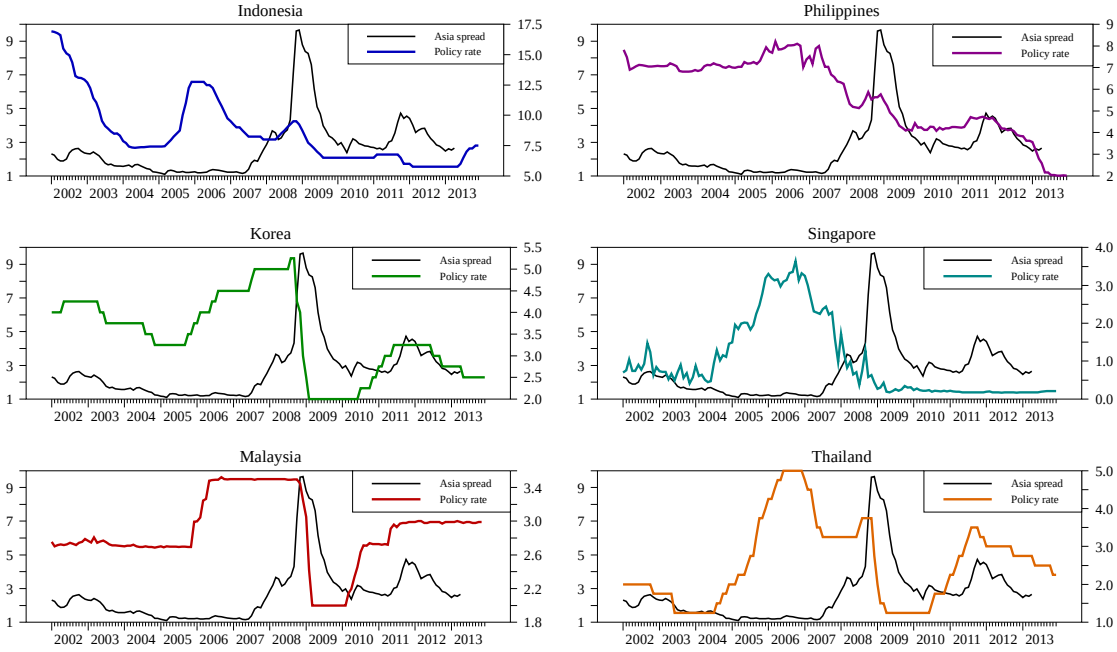
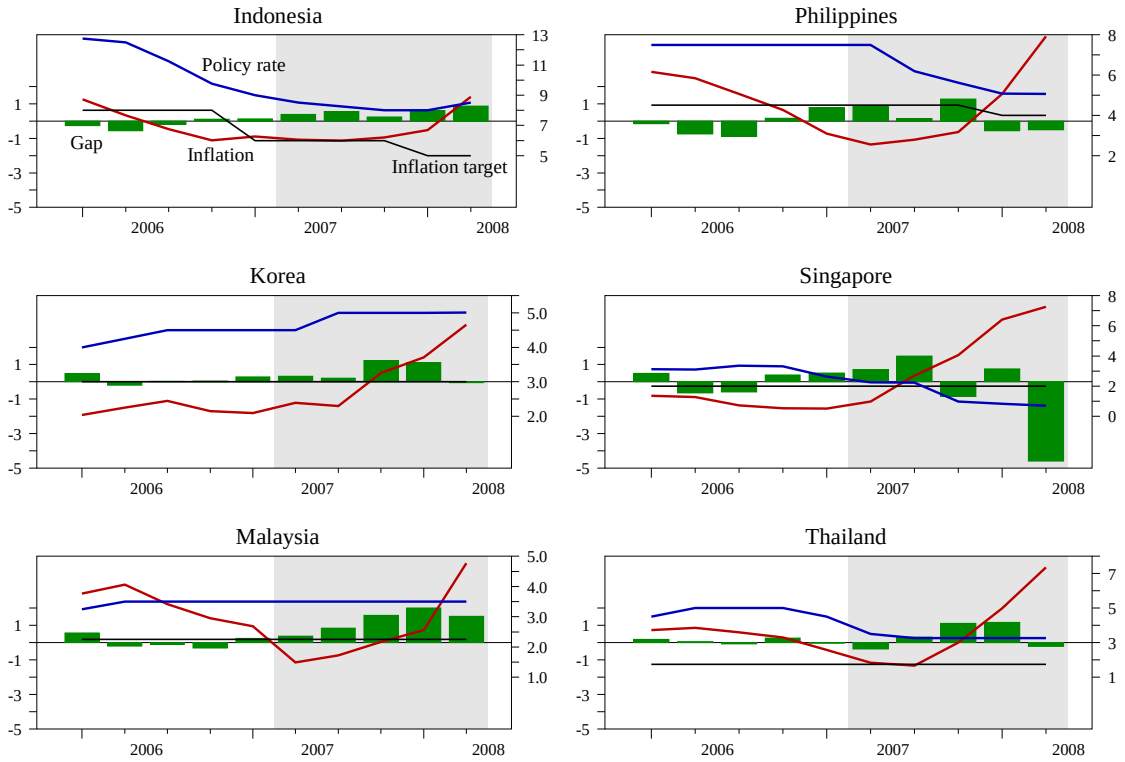


Figure 6: Monetary policy, inflation and output during the 2007 commodity price shock



Notes: The green bars are the differences between log real GDP and a linear trend fitted to data from 2004Q1 through 2007Q2. The blue line is the policy interest rate (the short-term money market rate in the case of Singapore). The red line is the year-over-year headline CPI inflation rate. For inflation targeters, the black line is the inflation target. For Thailand, the target is stated in terms of core CPI inflation. The shaded area corresponds to 2007Q2 through 2008Q2, the period of sharply rising commodity prices.

Appendix: Variable definitions and data sources

Country data	
Real GDP	For Korea, Malaysia and the Philippines, not seasonally adjusted data, from the IFS; seasonally adjusted in Rats with X12. For Indonesia, Thailand and Singapore, seasonally adjusted data from Haver. Thailand's GDP adjusted for discontinuity in 2011Q4.
Price level	For Korea, Malaysia, the Philippines, Singapore and Thailand, not seasonally adjusted headline CPI from the IFS, seasonally adjusted in Rats with X12. For Indonesia, seasonally adjusted CPI from Haver. For Thailand, core CPI, seasonally adjusted, from Haver. Indonesia's CPI adjusted for jump due to the removal of subsidies in 2005Q4. Thailand's CPI adjusted for discontinuity in 2005Q3.
Exchange rate	National currency per USD, end of period (IFS).
Foreign exchange reserves	Total reserves excluding gold (IFS).
Policy interest rates (*R*)	For all countries except the Philippines, the policy-related interest rate (IFS). For the Philippines and Malaysia prior to April 2004, the money market interest rate (IFS).
U.S. and world data	
Borrowing from Fed (*BORROW*)	Borrowings of depository institutions from the Federal Reserves (Fred: TOTBORR)
Quantitative easing (*QE*)	Change in reserve bank credit (Fred: WRESCRT) minus total borrowings (Fred: TOTBORR)
Federal funds rate (*RFF*)	Effective federal funds rate (Fred: FEDFUNDS)
Asia risk spread (*RISK*)	BofA Merrill Lynch Asia Emerging Markets Corporate Plus Sub-Index Option-Adjusted Spread (Fred: BAMLEMRACRPIASIAOAS)
Commodity price	Commodity Prices, All Commodities, Fuel and Non Fuel (IFS).