

Thailand's Monetary Policy Strategy for Long-term Growth and Stability

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Abstract

This paper examines the relation between monetary aggregates and output to shed light on monetary policy strategy in Thailand. The key interest rate policy is analyzed to see if it can be used effectively to stabilize output growth and maintain price stability. The role of business confidence is emphasized as an important factor in the success of countercyclical monetary policy. The paper also investigates whether monetary authorities should prick asset price bubbles.

JEL classification: E47, E52, O53, E32

Key words: Monetary policy stance, cyclical movement, business confidence, asset price bubbles

1. Introduction

In the process of sustainable economic development, real per capital income must be raised continuously for several decades. Success in economic development can then be observed in rising standards of living and longer life expectancy. Economic growth enhances a government's ability to redistribute income and reduce unemployment. Small differences in growth rates make enormous differences in levels of potential output over a few decades. If the growth rate is maintained at three percent over a decade, income rises by 35 percent. If the growth rate is raised to seven per cent, income will double. When seven-percent output growth is continued for three decades, income rises eightfold. The key strategy for long-term development is to keep growth continuous for several decades.

How should monetary policy strategy be applied to maintain growth without disruption during internal and external shocks? Monetary policy is the key macroeconomic tool employed by central banks to maintain economic growth and

price stability. To raise real per capita income, inflation must be contained so that interest rates can be kept low. Since inflation is related to interest rates, monetary policy can stimulate capital accumulation by ensuring that investors and savers are rewarded for undertaking risk and saving, respectively. Unstable investment expenditures cause short-term fluctuations in Gross Domestic Product by affecting aggregate demand and its components. Rising investment also generates long-term growth by increasing potential or full-employment national income. Monetary policy can reduce investment fluctuation by controlling the cost and quantity of credit available to investors.

From the early 1960s to 1996, the Thai economy generally experienced low inflation, but high economic growth. Since then, the growth path has been reduced as a result of corrections to macroeconomic imbalances. External and internal shocks have reduced the long-term growth path, although the pre-crisis level of income was regained within a few years after the 1997 financial crisis.

The Bank of Thailand adopted an inflation-targeting strategy after switching from a fixed exchange rate regime to a managed floating exchange rate system. The core inflation target is set between zero and 3.5 percent, although net benefits from targeting core instead of headline inflation are not clear due to problems with measuring core inflation (Quah and Vahey, 1995). Because of global recession and a sharp drop in oil prices in 2008, Thailand experienced price deflation in the first half of 2009. Inflation targeting is subject to a real test of its potency.

As the Thai economy was exposed to globalization, capital inflows influenced monetary aggregates. Evidence points to an increasing degree of financial market integration in East Asia (Jeon et al., 2006). As such, monetary policy must take into account the impact of shocks in world money markets. Since foreign portfolio investment affects domestic money supply and exchange rates, monetary aggregates have not increased at the rate corresponding to a stable output growth, which led to the deleterious effect of fluctuations in monetary aggregates.

The paper is organized as follows: the following section examines the relationship between money supply and output. Trade-off between inflation and unemployment

is discussed in Section 3. The reaction function of monetary policy is investigated in Section 4. Then we evaluate the effectiveness of monetary policy and explore the degree of monetary policy autonomy in Section 5. Section 6 discusses monetary policy strategy in dealing with asset price bubbles. Section 7 provides a brief conclusion.

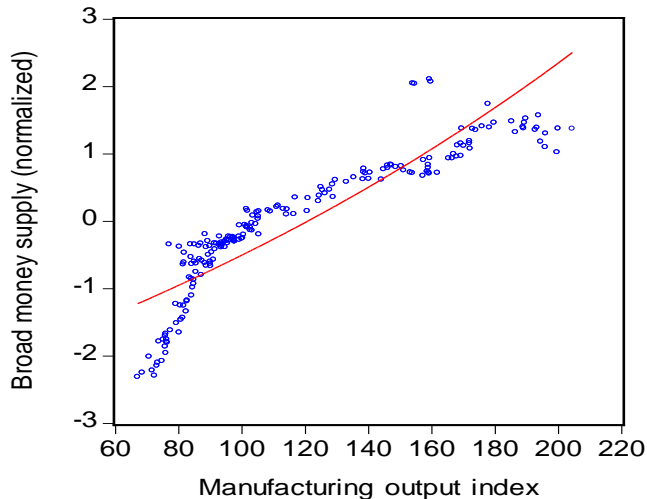
2. Money and output relationship

In the absence of GDP monthly data, manufacturing output index was employed to represent economic activity with high frequency data. Although manufacturing output cannot represent all economic activities, its importance to GDP has increased over time. While the share of agricultural output has declined, the increasing contribution to GDP from the service sector cannot be denied. It is stipulated that activities in the manufacturing sector are related to the GDP contributed from the agricultural and service sectors.

Monthly data from January 1993 to March 2009 are employed to capture the relationship between manufacturing output and monetary aggregates (Figure 1). As the result from a cointegration test indicates, a long-run relationship exists between output and broad money supply. To maintain a stable growth path, money supply growth must be kept in line with output growth.

The rate of growth of money supply outpaced growth in output during the boom years before the 1997 financial crisis. There was a steep increase in money supply as output expanded from a manufacturing production index (MPI) of 60 to 90. At this time, monetary shocks led to an excessive unsustainable growth of output.

Figure 1: The long-run relationship between output and money supply



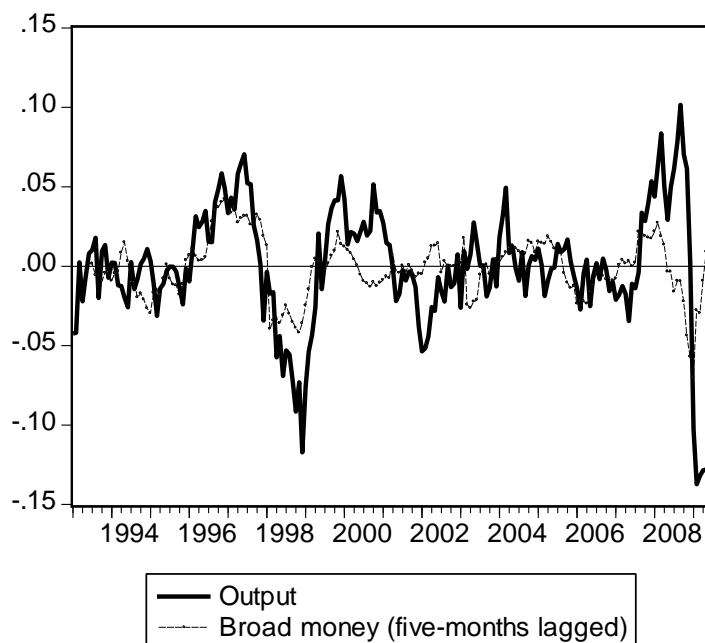
Source: Bank of Thailand

As the Thai economy recovered from the recession of 1997-98, the monetary aggregate and output regained their long-run equilibrium relationship. Since 2006, the Thai economy suffered from internal political upheavals and oil price shocks during which output and money supply drifted away from the equilibrium path again. It was not an excessive boom like the early 1990s, but output contraction since August, 2008 and slow growth in money supply (Figure 1). The economy will not soon return to a long-run equilibrium path between money and output.

Following Hodrick and Prescott (1997), we define cyclical movements as the difference between the actual value of the series and the Hodrick-Prescott filter trend of the series. We observe a remarkable positive relationship between the degree of cyclicity of output and monetary aggregates (broad money supply) in Figure 2.

When broad money exceeded its long-run trend, output also expanded at a rate faster than its normal growth path. Similarly, when monetary aggregates contracted below their long-run trend, output growth slowed to beneath its trend. Peaks of monetary growth (lagged five months) were associated with peaks in manufacturing output; the deepest contraction in output synchronized with a trough in monetary cycles. The lead-lag relationship of two variables gives us a clue to direction of causation.

Figure 2: Cyclical movements of monetary aggregate and manufacturing product



Source: Exponential smoothed deviation from the Hodrick-Prescott Filter trends.

Since there is a long run relationship in cyclical fluctuations in output and the monetary base, we perform the Granger causality test and report the result in Table 1. Statistical evidence supports the notion that money supply growth affects economic growth. Changes in output do not contain information useful for predicting future movement of monetary aggregates. However, output growth can be predicted by the growth rate of money supply lagged by two months. A rising income level contributes to a higher demand for money. Other forms of financial assets may be used as saving vehicles. Increasing sophistication of the capital market has made bonds and stocks alternative forms of financial assets to be held for investment and saving. Consequently, changes in output have lost their power to predict M2.

Table 1: Broad money supply(M2)and output (MPI) relationship

Sample: 1993M01 2009M03

Lags: 2 months

Null Hypothesis:	Obs	F-Statistic
$\Delta(\text{MPI})$ does not Granger cause $\Delta(\text{M2})$	192	0.41246

$\Delta(\text{M2 does not Granger cause } \Delta(\text{MPI}))$ 11.7362 1.6E-05
 Lags: 5 months

Null Hypothesis:	Obs	F-Statistic	Probability
Cyclical M2 does not Granger cause cyclical MPI	190	13.2687	5.3E-11
Cyclical MPI does not Granger cause cyclical M2		0.40582	0.84435

Theoretical reasons explain why M2 affects output level. Money balances can be thought of as a factor input in the production function, so an increase in money supply provides working capital to smooth the production process. As the economy is increasingly dominated by manufacturing output, money balances and bank credit become inseparable inputs in the production function. Failure to provide liquidity to the real sector could lead to a fall in output. A credit crunch or capital crunch in the banking sector is always associated with a slowdown of the real sector. In this sense, monetary policy impacts output by affecting supply and demand. The impact of credit contraction would be more severe than when money supply is not an important factor of production.

We now turn to the issue of shocks that might originate from the real and monetary sectors. If shocks are defined as actual values and expected values obtained from the long-run trend, output and monetary shocks can be measured by the gap between trends of output and monetary aggregates. Again we employ the Hodrick-Prescott (HP) Filter trends to extract the cyclical movement of two variables. The second panel in Table 1 produces the Granger causality test between two cyclical movements (difference between the actual and HP filter trend). The test result shows that output shocks do not Granger cause monetary shocks. The causation runs from monetary shocks to output shocks. We have arrived at an important conclusion on the conduct of monetary policy: Monetary authorities must avoid creating large swings in monetary aggregates because they could lead to output fluctuations.

Accommodating monetary policy or pro-cyclical monetary expansion can propagate temporarily booms as it eventually leads to an overheated economy, requiring both

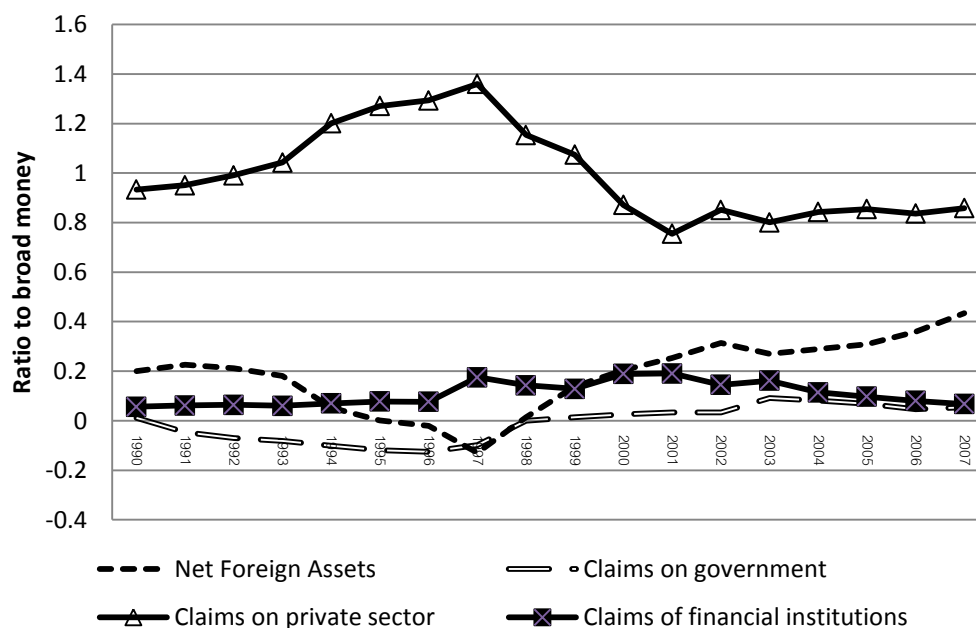
internal and external disequilibrium¹. Inflation, unsustainable current account deficit, and appreciation of real exchange rates would ensue, leading to output collapse and unemployment. Counter-cyclical monetary policy can be employed to prevent booms or busts through adjustments in monetary aggregates and interest rates.

Since we have established the crucial link and causation running from money supply to real output, we further investigate sources of rapid increases in money supply broadly defined (M2). After 1991, when Thailand accepted the IMF Article VIII, liberalizing capital accounts, the rate of growth of the monetary aggregate gained momentum. The establishment of Bangkok International Banking Facilities (BIBFs) to make Bangkok a regional financial center resulted in huge rapid capital inflows. The influx of foreign borrowing was so large that it was impossible to sterilize the expansion of the monetary base. Figure 3 shows that net foreign assets increased substantially after capital account liberalization and establishment of the BIBFs. Premature liberalization led to huge rapid capital inflows so that the existing antiquated financial infrastructure was unable to monitor and supervise activities in the financial sector.

The Thai economy was able to grow rapidly with low inflation in the late 1980s, partly because the monetary base did not grow too fast. Surplus budget mitigated the rise in monetary base as claims on government were negative, due to the amount of public debt reduction. Fiscal surplus helped reduce upward pressure on the monetary base. The bailout of financial institutions prior to the 1997 financial crisis was reflected in the rising claim on financial institutions. After the collapse in 1998 of 56 finance companies and a bank, the bailout's impact on monetary base level gradually eased.

¹ Calderon et.al (2004) found the evidence that countries with higher credibility levels are able to conduct countercyclical macroeconomic policies, while pro-cyclical policies are observed when credibility is weak.

Figure 3: Net foreign assets and domestic credit



Source: Bank of Thailand

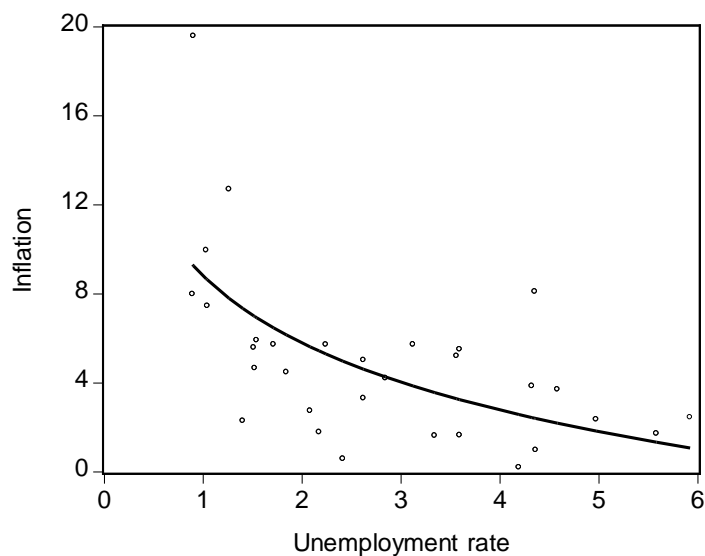
After the 1998 crisis, the BOT’s lending to the government and financial institutions declined as the economy returned to its pre-shock growth path. However, as the Bank of Thailand began intervening in foreign exchange markets to prevent baht appreciation, the amount of foreign assets relative to the broad money steadily increased. The analysis of monetary policy must consider implications of the exchange rate regime and capital inflows.

3. The Phillips curve

Under the circumstances of global recession, oil price shocks, and virulent capital flows, how should monetary authorities conduct policy instruments? After baht flotation in July 1997, new monetary policy strategy was adopted in 2000. The Bank of Thailand announced an inflation target strategy, stipulating the core inflation target between zero and 3.5%. Note that the target was not on headline inflation, which includes the prices of fresh food and energy. Since food and energy prices are subject to uncontrollable factors, the Bank of Thailand opted to focus on core inflation.

The relationship between headline inflation and unemployment is shown in Figure 4. If there is a trade-off between price stability and full employment, monetary expansion can reduce unemployment at the expense of higher price levels. How high is a price must we pay to reduce the unemployment rate? How can the Central Bank strike a balance between growth and price stability? Which policy instruments are available and effective? The effectiveness of inflation targeting can be evaluated from linkage between the policy interest rate and commercial banks' lending rates, which would eventually affect investment, price level, and output growth.

Figure 4: The Phillips curve: 1977-2007



Source: Bank of Thailand

Employing annual data between 1997 and 2007, we present a statistical relationship between unemployment and inflation. The Phillips curve depicted in Figure 4 clearly exhibits a negative relationship between inflation and unemployment over the past 30 years.

Table 2: Inflation-unemployment trade-off

$$\pi_t = 5.201 - 3.011 \log(U_t) + 0.483 \pi_{t-1}$$

(3.879) (3.242) (3.602)

Note: OLS estimation, t-statistics in parentheses

Adjusted R² 0.55, F-statistic 19.5 (p=0.000)

Durbin-Watson stat 2.013

Breusch-Godfrey Serial Correlation test: F = 0.207, (F_{2,26} = 0.81), nR² = 0.48 ($\chi^2 = 0.78$)

To measure the trade-off coefficient by utilizing the same set of data, we regress the annual inflation rate (π_t) on the unemployment rate (U_t) and expected inflation rate, as proxied by the previous year's inflation rate (π_{t-1})². The estimated coefficient of U_t is negative, implying that there is a trade-off between inflation and unemployment (Table 2). The log-linear functional form is employed, indicating that a further reduction in unemployment rate must result in higher price inflation.

The serial correlation test does not detect the problem of autocorrelation of the error terms. The estimated coefficient of the previous period's inflation rate can be treated as the impact of inflationary expectations on the current inflation rate. Alternatively, it can be thought of as the persistent coefficient of inflation (Pivetta and Reis, 2007). If the persistent coefficient is high, the cost of disinflation will be large, as it will take longer to reduce inflation.

4. Interest rate policy responses

The bank rate was employed as the key policy rate between 1993 and 1996. After the bank rate, the Bank of Thailand employed the repurchase rate as the key policy rate from January 1997 to March 2008 and after that, began using the lending facility rate.

² The model's underlying assumption is adaptive rather than rational expectations assumption. Nevertheless, Mankiw and Reiss (2002) criticizes the New Keynesian Phillips curve model with rational expectations that the model predicts that disinflation causes a boom and monetary policy quickly impacts inflation.

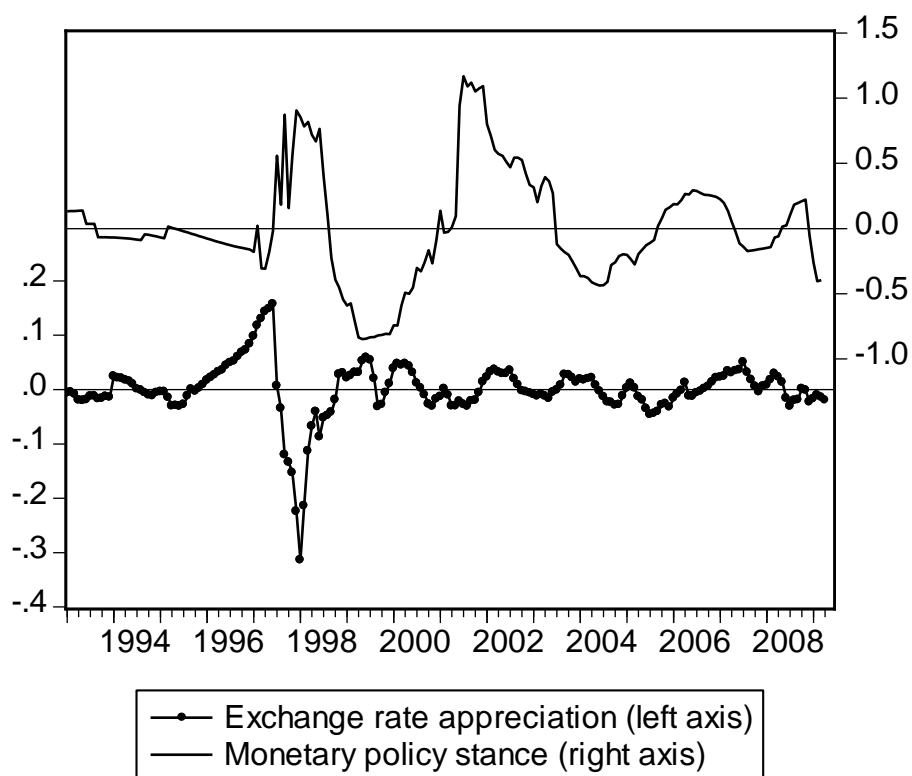
In this study we use the connected series of three rates and treat them as the BOT's key policy interest rate.

Figure 5 plots cyclical movements of the nominal effective exchange rate from its HP trend. A positive value indicates an appreciation from the long-run trend, while a negative value indicates depreciation from the trend. Likewise, a positive cyclical movement of the bank rate signifies a tightening of monetary policy as the policy rate rises above the long-term trend. Similarly, a negative cyclical movement from the normal interest rate indicates monetary easing, as its key policy rate is below the long-run HP trend.

During the fixed exchange rate regime, the country's price anchor is the foreign partner's price level. In the long run, inflation rate in the country should move in line with inflation in the country to which the currency was pegged. As long as the exchange rate remains fixed, the target of inflation remains the trading partner's inflation rate. Before 2000, the bank rate was apparently adjusted to maintain exchange rate stability. Before the crisis, the interest hike was used to keep the baht from depreciating (Figure 5). After the 1998 crisis, the monetary policy stance did not correspond to exchange rate movement. Yet we can observe a constant shifting of monetary policy from easing to tightening³. In short, since 2000, the bank rate must have adjusted to other targets.

³ It is a standard practice to describe the stance of monetary policy in terms of short-run nominal interest rate (Clarida et al., 1999). However, Chowdhury and Schabert (2008) find that an assessment of US Federal Reserve policy based on postwar money supply leads to different conclusions about the impact of Fed policy on macroeconomic stability than previous studies indicated.

Figure 5: Monetary policy stance and exchange rate movements

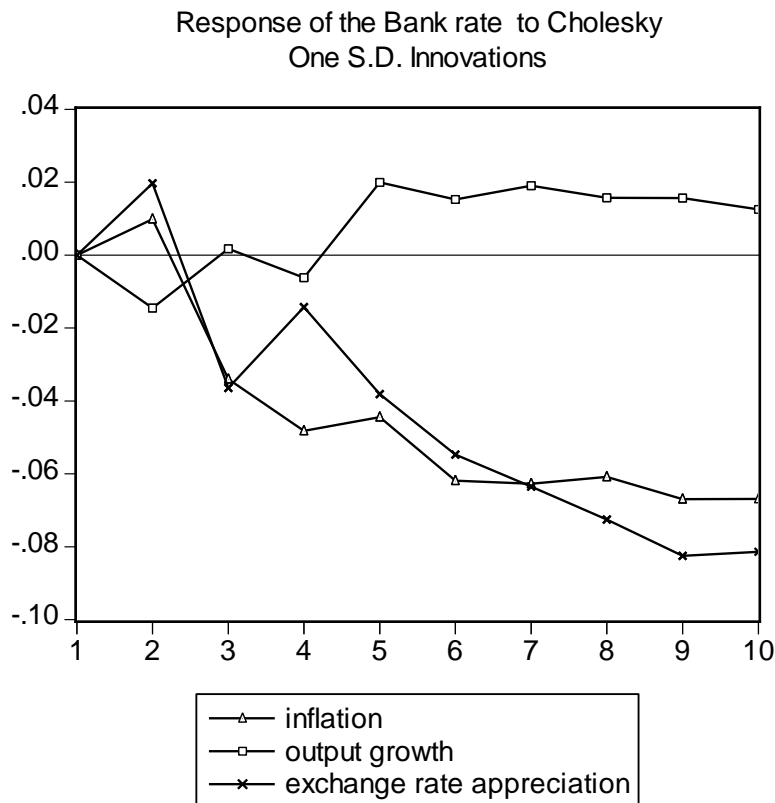


Source: Bank of Thailand

To detect monetary policy reaction functions of the Central Bank, we examined five important variables measured as the gap between actual values and long-run paths (HP filter trends). These variables are usually comprised in Taylor's rule (Taylor, 1993). The determinants of interest rate response include: output, inflation, and nominal effective exchange rate⁴. These magnitudes turn out to be cointegrated, implying that we can employ a Vector Error Correction Model (VECM) to examine the reaction functions of the bank rate.

⁴ Ball (2000) proposes the exchange rate be included in the monetary policy reaction function. Chadha et al. (2004) estimated Taylor type rules that include exchange rates for a number of open economies.

Figure 6: Interest policy responses: 1993-1999



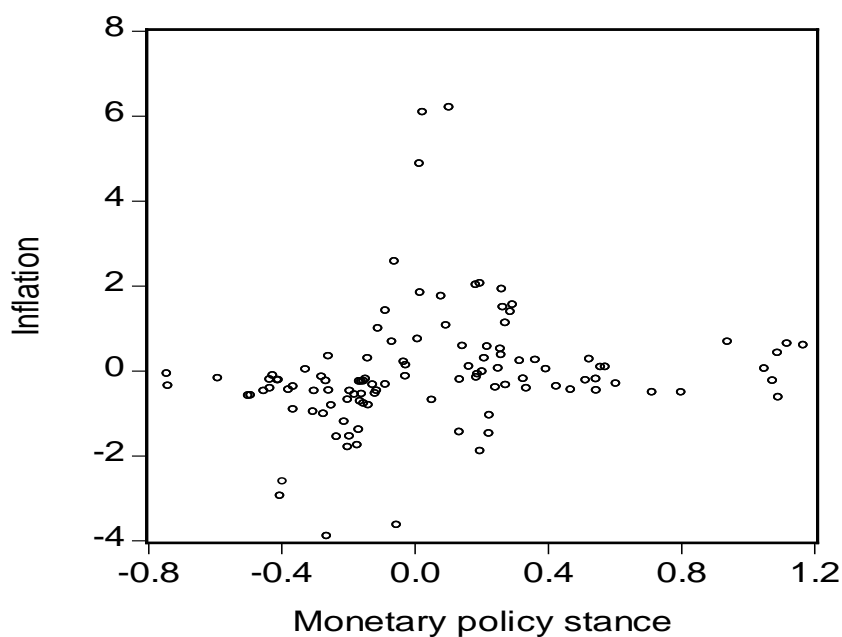
Source: Impulse response from VECM: 1993-1999

The impulse response obtained from the VECM (Figure 6) indicates that, monetary policy between 1993 and 1999 was pro-cyclical and the bank rate was employed in response to changes in the nominal effective exchange rates. The interest rate was raised to dampen excessive growth only after the fifth month of rapid output expansion above the trend. Inflation was not answered by a sharp increase in the key policy rate. And it appeared that monetary policy was easing when there was a positive shock in the price level. Growth seemed to be the main objective during this period. Since growth was propelled by exports, the response of the central bank was to reduce the interest rate when the baht appreciated. On the other hand, as the baht depreciated, the policy response was to raise the bank rate to defend the currency at the expense of output growth. In sum, monetary policy in the 1990s put more focus on growth. External stability of the exchange rate was given more importance than the internal price stability.

There has been a shift in policy response after the Bank of Thailand adopted the inflation targeting strategy. The result from impulse response obtained from VECM, utilizing monthly data from January 2000 to March 2009 clearly demonstrated that the key policy rate responded most to shocks in inflation, followed by the federal funds rate, and output growth.

Figure 7 depicts the relationship between monetary stance and shocks in the price level. There were inflation shocks from supply side that did not require tight monetary policy. In general, we observe a positive relationship between monetary tightening and inflation. During this period, there was evidence that monetary policy was counter-cyclical, unlike the procyclical policy in the 1990s.

Figure 7: Inflation and monetary policy stance, 2000-2009M03

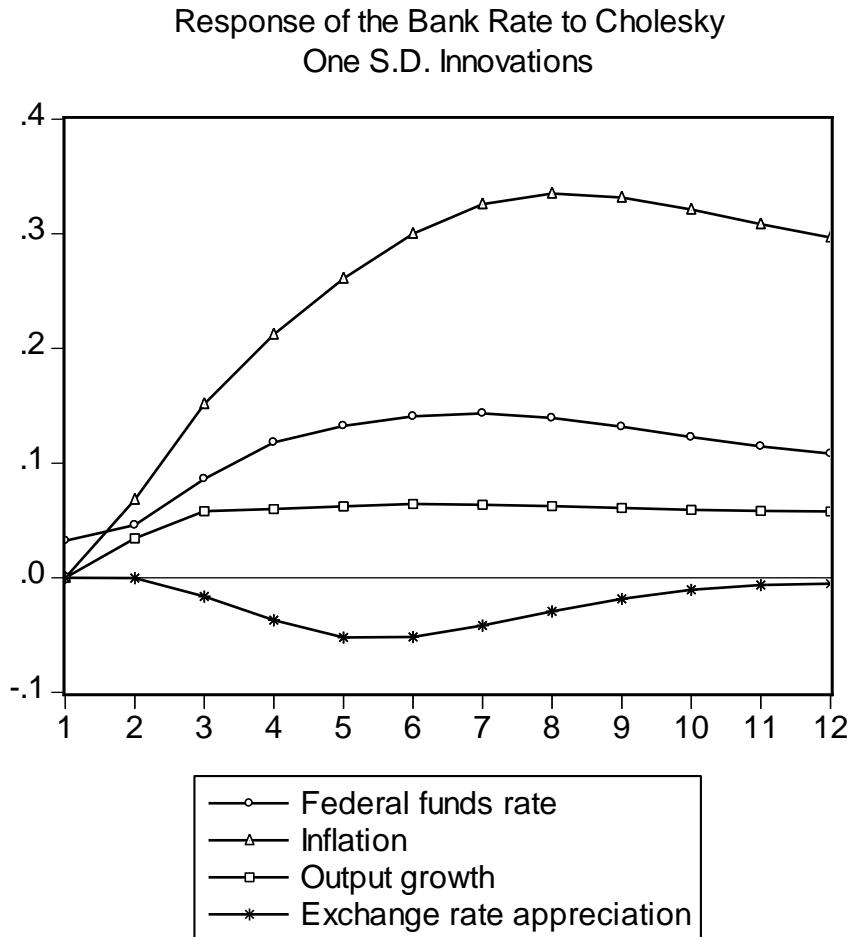


Source: Cyclical components obtained from the gap between actual values and the HP trends

To examine the shift in the monetary policy strategy, we employ the VECM with a new set of monthly data between January 2000 and March 2009. The federal funds rate is included in the model to shed light on the policy autonomy of the Thai monetary authorities. The federal funds rate variable is measured in terms of its gap

between actual and the long-run trend. The impulse response functions are reported in Figure 8.

Figure 8: Interest policy responses: 2000-2009



Source: Impulse response from VECM: 2000-2009

The flexible inflation targeting strategy was captured by the reduction in the bank rate in response to the baht appreciation. Indeed, the bank rate adjusted to exchange rate changes in addition to output growth and inflation. The Bank of Thailand also resorted to other policy instruments, to prevent the baht appreciation such as capital controls and direct intervention in foreign exchange markets.

The bank rate did respond to inflation as anticipated by the inflation targeting strategy employed after floating the currency. Nevertheless, this adopted inflation target strategy is in a flexible form, since the bank rate also responded to other factors: the

federal funds rate, and the nominal effective exchange rate. Note that exchange rate appreciation was met by the interest rate cut in both periods (Figures 6 and 8). Hence the Bank of Thailand has demonstrated its policy consistency in intervening in the foreign exchange market using, among other means, the interest rate policy. This is akin to the fear of floating syndrome (Calvo and Reinhart, 2002). The root of the problem is the myth that the exchange rate was the major determinant of trade flows. In fact, the world trade volume, or the output effect, has greater impact on trade flows than the substitution effect caused by exchange rate changes.

5. Monetary autonomy and its effectiveness

We may conjecture that the bank rate is affected by the federal funds rate, because of openness of the capital accounts in Thailand. In an age of financial globalization, a small country may not be able to carry its own monetary policy independently of world market interest rates. The question arises of how long the Bank of Thailand can conduct its own monetary policy while ignoring the Federal Reserve Board's decision to adjust federal funds rates.

In November 2008, the federal funds rate was reduced to one percent, while the Bank of Thailand still maintained its key policy rate at 3.75%. By May 2009, the federal funds rate stood at 0.25%, while the bank rate in Thailand was maintained at 1.25%. At the same time, the European Central Bank and other central banks in the world reduced interest rates to prevent economic recessions. The widening interest gap between domestic and world interest rates might provide incentives for capital inflows. Nevertheless, capital movements depend on other factors apart from interest rate differentials. Capital flight could occur during heightened political and foreign exchange risks. So keeping interest rates may only be kept temporarily higher than the world interest rate.

We examine the causation between foreign interest rates and the domestic interest rate in Thailand between January 2000 and March 2009. The interest rates in question enter the test in terms changes (Δ) in order to remove non-stationary trend that creates spurious regression results. Of course, the Granger causality test does not signify causality in the usual sense of the term. It is based on predictability of the other

variable at question. However, since outcome cannot occur before the cause, there is a high probability that Granger predictability criteria can identify the cause of an event. To see whether the federal funds rate affects Thailand's monetary policy instruments, we test the hypothesis that the federal funds rate (FED) does not Granger cause the bank rate. If we can reject that hypothesis, it means that interest rates in Thailand are dependent on the federal funds rate.

Table 3: Independence of monetary policy instruments

Pairwise Granger Causality Tests

Sample: 2000M01 2009M03

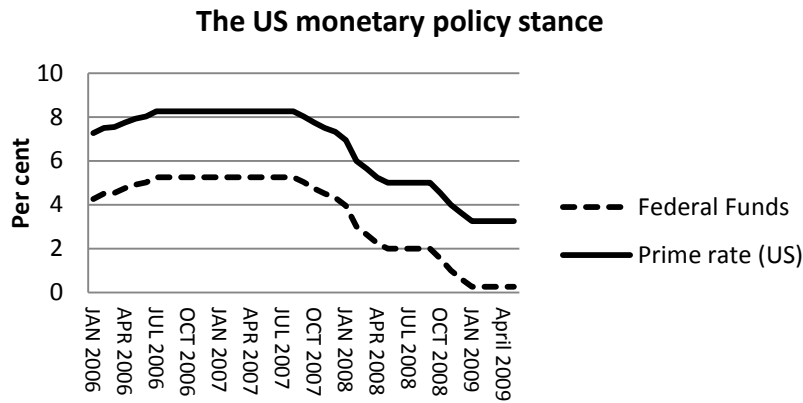
Lags: 5 months

Null Hypothesis:	Obs	F-Statistic	Probability
Δ (FED) does not Granger Cause Δ (BOTRATE)	93	3.71387	0.00443
Δ (BOTRATE) does not Granger Cause Δ (FED)		1.18232	0.32502

The hypothesis that the Bank of Thailand can conduct independent monetary policy is rejected by the statistical results in Table 3. BOT policy interest rate may be predicted by the federal funds rate five months in advance, but not vice versa. Given that the BOT can temporarily conduct monetary policy when world interest rates change in a different direction, a further question arises regarding the BOT's ability to change commercial bank interest rates. Let us examine the relationship between the key policy rate and prime lending rate in the USA before further examining the case of Thailand.

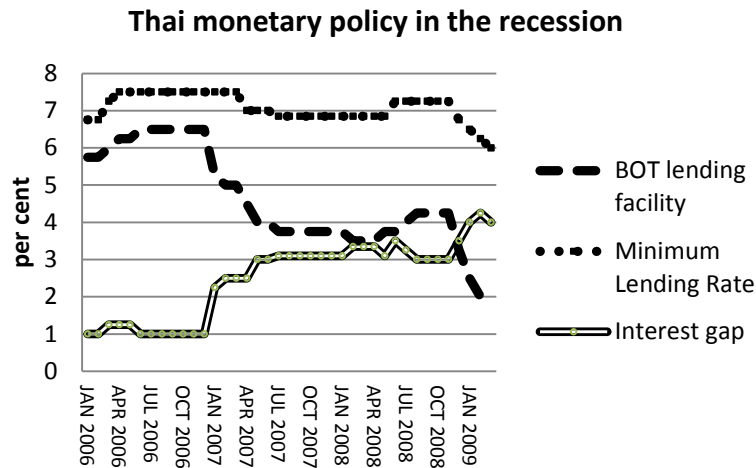
Figure 9 shows the U.S. prime rate which seems to closely follow the federal funds rate. There is a consistent gap between policy rate and bank lending rates. In the U.S.A., monetary policy instruments can be used to achieve a desirable lending rate. Underlying institutional factors, including industrial concentration and the sophisticated structure of money and capital markets, determine the predictability of policy outcome.

Figure 9: Impact of the federal funds rate



Source: Bank of Thailand

Figure 10: Impact of BOT key policy rate



Source: Bank of Thailand

While between 2006 and 2009, the difference between prime rate and federal funds rate was maintained at 3 per cent, the gap between Minimum Lending Rate (MLR) and the BOT bank rate was widened to 4 per cent in March 2009 (Figure 10). Unlike

the federal funds rate which systematically impacted the prime lending rate of commercial bank in the USA, the impact of the rate cut in Thailand is unpredictable and inconsistent, as commercial banks refuse to lower interest rates during recessions. High liquidity and rising default risks are used as excuses to maintain commercial bank lending rates. With excess liquidity, cutting the Central Bank lending rate does not encourage other banks to borrow from the Central Bank. The slow reaction of the lending rate to the key policy rate cut is also due to a lack of price competition. The Thai banking industry still remains highly concentrated. Thus, monetary policy effectiveness is limited during recessions when the Central Bank seeks to stimulate the economy. Unsurprisingly, Thai banks in 2008 enjoyed high profits despite a slowdown in lending activity.

During recessions, banks are unwilling to lend and investors are unwilling to borrow. Investment is also determined by factors other than the cost of borrowing. Credit availability is an important factor during economic booms since there are many liquidity-constrained investors. Monetary policy effectiveness is enhanced during booms when the Central Bank can control credit availability. Business confidence is no problem during booms because investors are likely to be carried away with irrational exuberance. During slumps, by contrast, business confidence erodes quickly. Despite the Central Bank's low interest rate policy, which influences commercial bank lending rate cuts, investors have no confidence in projects likely to fail if they anticipate a future deterioration of demand. For this reason, business confidence must be taken into account when modeling the impact of monetary policy.

To examine the effectiveness of monetary policy, five important macro variables are chosen: bank rate, output, private investment, price level, and business confidence index. We measure these variables in terms of deviation from long-term HP trends, or the difference between actual values and HP path values from January 2001 to March 2009. This cyclical magnitude can be considered a shock that perturbs the long-run path. Because these cyclical variables are found to be cointegrated, we proceed by using a Vector Error Correction Model (VECM) as the variables employed in the model exhibit a long-run relationship. The VEC model takes into account of the adjustment when the system is temporary out of long-run paths. To examine impact of interest rate policy, we employ the impulse response function to investigate its

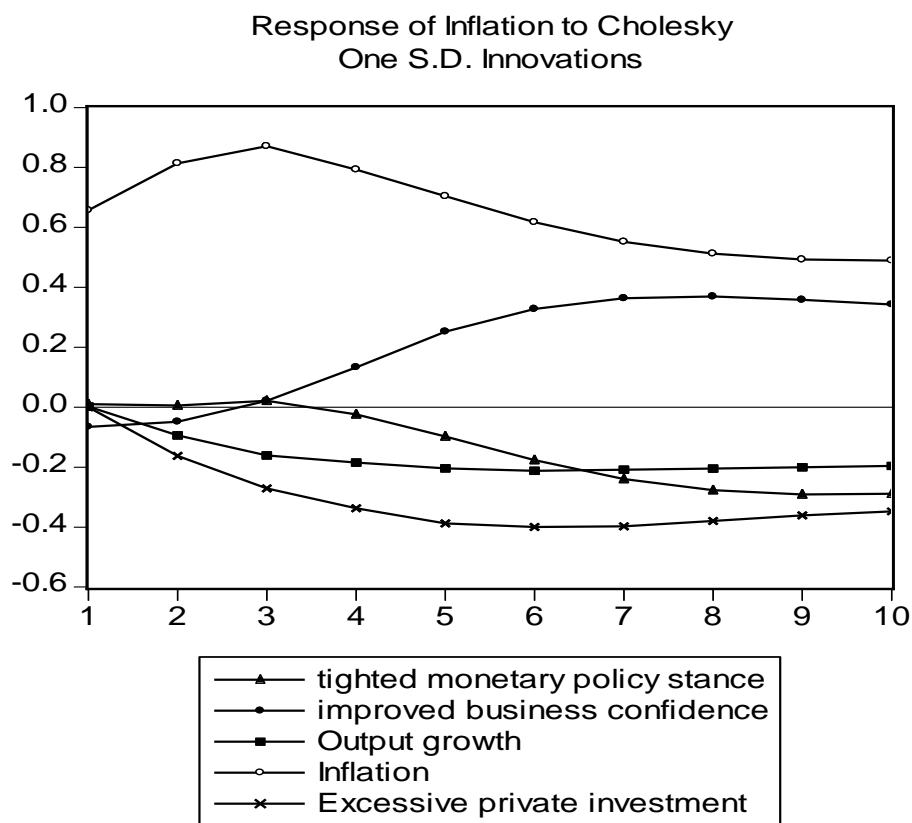
impact on manufacturing output, private investment, price level, and business confidence (Figure 11).

The finding from the response functions indicates that inflation inertia is powerful. It is reflected by the long lag impact of price innovations. The impact of a sudden jump in price level peaks in the third month. Its impact remains strong, albeit at a slower rate, 10 months after the inflation shock. This result is consistent with the estimated coefficient of lagged inflation rate reported in Table 2. Inflation expectations are difficult to disperse after they begin. Monetary authorities must avoid inflation in the first place⁵. Business confidence impacts inflationary pressure. The confidence variable is represented by the business sentiment index provided by the Bank of Thailand. When an optimistic outlook is widespread, inflationary pressure will build as consumption and capital spending rise. The bank rate may be used to curb inflation. Nevertheless, the impact on price level will not be apparent until 5 months after implementation. This long lag effect produces some degree of uncertainty about the outcome of monetary policy. The collapse of business confidence has a more powerful impact than any interest rate hike.

An output shock that leads to an excessive supply of manufactured goods can ease inflationary pressure. Expanding manufacturing plants generates more supply, lowering pressure on commodity prices. Positive output and capacity buildup have similar impacts on price levels. Note that the investment variable is represented by the amount of newly registered capital. This is distinct from construction investment which tends to put upward pressure on price levels

⁵ According to van der Ploeg (2009), prudent monetary policy could also mean more aggressive reactions of nominal interest rates to inflation and output gaps.

Figure 11: Impact of various shocks on inflation



Source: Impulse responses from VECM

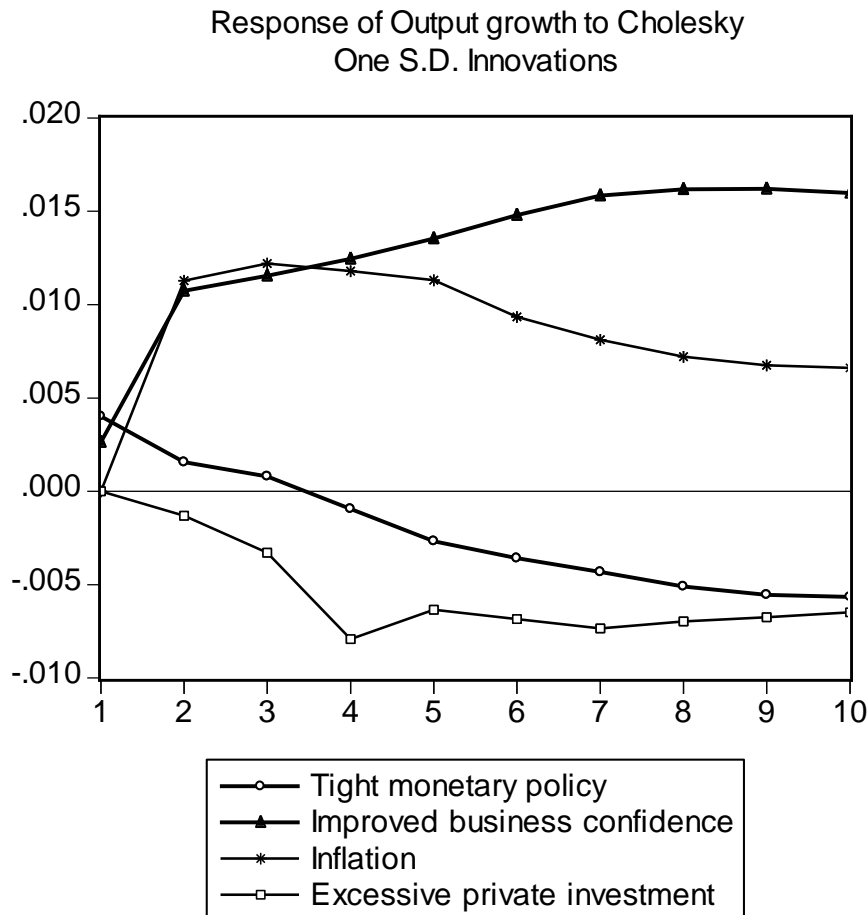
The conclusion obtained from Figure 11 is that using the bank rate can mitigate inflationary pressure, but other factors such as business confidence can impact price levels more.

To answer the question whether an interest rate hike can curb excessive output growth, we shock the model by using a one S.D. innovation in the bank rate. The impulse response functions reported in Figure 12 confirm that the dampening effect of monetary tightening policy could only be felt after three months of implementation. The rise in bank rate can reduce excessive output growth and subdue inflation (Figure 11).

Both inflationary pressure and rising business confidence provide incentives for the private sector to expand its output level. We can also interpret the impact of price deflation on output (Figure 12) as the result of a negative shock in the price level.

Price deflation and output contraction occur simultaneously. Similarly, times of price inflation and output expansion are related. During uncertainty and abnormally high level of bankruptcies, loss of business confidence further aggravates a slowdown in output.

Figure 12: Impact of various shocks on output growth



Source: Impulse responses from VECM

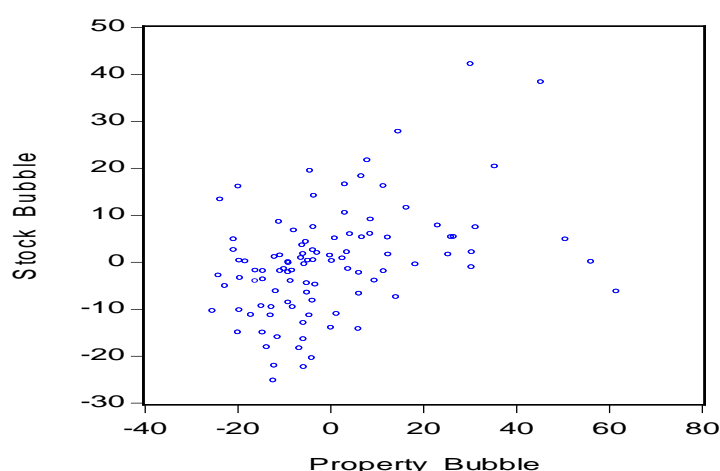
The evidence from Figure 12 clearly underscores the importance of business confidence during economic slumps. It is more powerful than the interest rate cut. In effect, monetary policy cannot stimulate growth during recessions unless the government can restore and enhance business and consumer confidence.

6. Asset price bubbles

During the course of rapid economic expansion, there might be a positive relationship between stock prices and property market activity. Evidence in Taiwan (Chen, 2001), and in Japan (Ito and Iwaisako, 1995) indicate the relationship among asset prices and credit expansion. Through the wealth effect, asset prices can increase the effectiveness of monetary policy used to counteract business fluctuations. We can investigate the Bank of Thailand policy during the pre-crisis in response to asset bubbles.

More importantly, another relevant policy question is whether the Bank of Thailand should raise the interest rate to curb activities in asset markets. In a rapidly growing economy, the property sector has high linkages to the real economy through large multiplier effects. The demand for property and securities is related to credit availability. By controlling credit growth, the Central Bank can ultimately influence speculation in asset markets. In addition, asset markets are linked to foreign exchange markets through foreign capital inflows. Consequently, the exchange rate is affected by inflows of foreign capital attracted by capital gains in the asset markets. The central bank must choose whether to curb capital inflows or to allow the exchange rate to perform an equilibrating role in external adjustments.

Figure 13: Stock market and property speculation



Source: Bank of Thailand

Using data from January 2000 to July 2008, the relationship between asset price bubbles in Thailand, is shown in Figure 13. The size of the stock price bubble can be

captured by the percentage deviation from the HP trend line. Similarly, the size of the property bubble can be approximated from the deviation from the HP trend of construction activity, approximated by permitted construction in urban areas.

There seems to be a positive relationship between speculations in both asset markets. There is also the question regarding of where and when the bubble started. The lead-lag relationship between the two bubbles can shed light on measures to prevent busting asset bubbles. Since speculation happens with a mechanism akin to Ponzi finance where net assets decline with borrowing to finance acquisition of assets with rising prices. Therefore, extending credit into these sectors propels speculative demand for these assets.

Bank loans expand as the monetary base increases, and other things remain unchanged. Despite the constant level of the monetary base, bank loans can increase rapidly as banks may become recklessly aggressive, lending when collateral value increases. As a result, the credit multiplier will magnify rapidly during lending sprees as banks become more lenient with credit risk assessment. This actually happened from 1994 to 1998 at the height of the lending boom cycle.

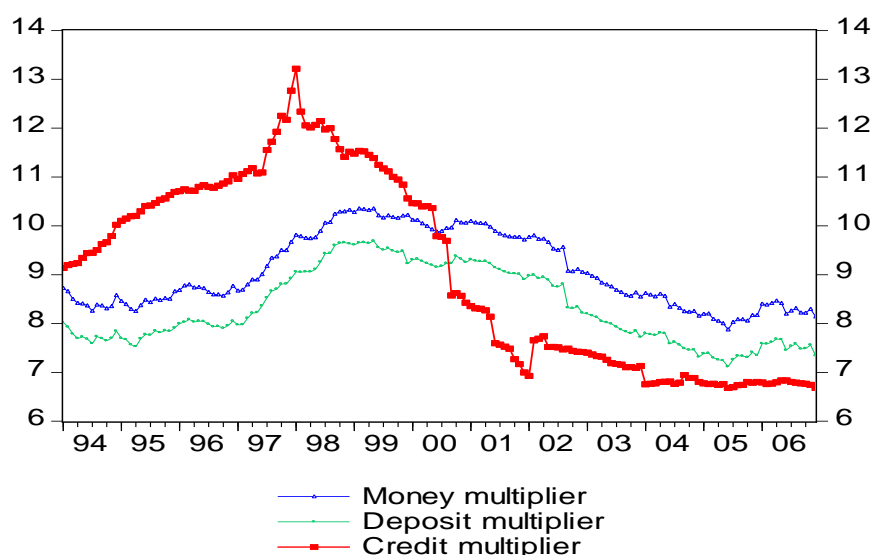
Figure 14 shows that the credit multiplier increased abnormally and deviated entirely from the behavior of deposit and money multipliers. We can monitor the financial sector by using the credit multiplier as an early warning indicator for over-lending. When the interest rate is high, commercial banks are willing to take more risk to obtain higher returns from assets. If the Bank of Thailand raises the interest rate on its lending facilities, banks would be discouraged in lending, thereby causing a decline in the credit multiplier⁶.

An increase in the minimum lending rate (MLR) would raise the value of the credit multiplier, while the BOT lending rate reduces it. The deposit multiplier does not lead to a significant change in the credit multiplier as depositors behave differently than banks. There was a significant degree of lending inertia. A positive shock in the credit

⁶ This conclusion may not hold if commercial banks can get access to cheap foreign sources of funds and the forward exchange market works efficiently.

multiplier did not entirely phase out after a year. Because of the long lag effects of shocks in lending, it is difficult to curtail rapid growth of credit within a year, to boost credit growth within a short period after the economy experiences a credit crunch.

Figure 14: Indicators of excessive lending



When the credit multiplier increases, and the monetary base growth is uncontrollable, the impact on credit growth would be excessive. When large amounts of foreign capital flows into the stock market and the Bank of Thailand must prevent currency appreciation, asset price bubbles are likely to appear.

We further investigate the relationship between bubbles in two asset markets. Data from January 2000 to September 2008 indicate that $\Delta \log(\text{stockbubble})$ Granger causes $\Delta \log(\text{propertybubble})$ at $F = 2.8$ ($p\text{-value} = 0.03$), but not vice versa. We can predict the property bubble from speculative activities in the stock market. In conclusion, measures to curb stock market bubbles are necessary to prevent bubbles in the property sector. This conclusion does not imply that the stock market index belongs among monetary policy reaction functions. Selective control measures may be used directly to stamp out speculative lending in the stock market.⁷

⁷ Mandler (2009) finds evidence of a strong deterioration in the stabilization success of US monetary policy reaction functions that respond to stock market indices.

7. Concluding remarks

What monetary policy strategies ensure stable growth and price stability? This paper has shown that there is an along-run relationship between output and monetary aggregates. Monetary policy can stabilize the economy to achieve long-term growth and price stability. Changes in monetary aggregates influence cyclical movement of real output. If the broad money supply can grow at a stable rate corresponding to output growth, monetary authorities can avoid deep recessions and excessive booms.

Past excessive growth of monetary aggregates was related to capital account liberalization and the fixed exchange rate regime. Despite the low level of claims on government, monetary aggregates increased substantially prior to the 1998 financial crisis. Capital flows and foreign exchange market interventions led to burgeoning net foreign assets. Consequently the monetary base and broad money supply increased at an excessive rate, causing an unsustainable boom. A general lesson is that pursuing an unrealistic exchange rate target could undermine the fundamental objective of monetary policy: to sustain growth and maintain price stability.

There is a trade-off between inflation and unemployment. The cost of pushing the economy to full employment is not high in terms of sacrificing price stability. Nevertheless, persistent inflation is difficult to subdue after it starts to accelerate.

Given the concentration of the banking industry, monetary easing strategies during recessions may not be able to stimulate the economy back to the long-term growth path unless business confidence can be restored. Tight monetary policy works more effectively during booms when investors are constrained by credit availability. Prior to the 1998 economic crisis, excessive bank lending was captured by the rising credit multiplier. Consequently, monetary authorities must scrutinize the movement of the credit multiplier, which can be a leading indicator of asset price bubbles. Since a stock market bubble precedes a real estate market bubble, it is desirable and possible to burst the stock market bubble with quantity tightening policies to curb excessive output and credit growth. This is not to suggest that stock price indexes be included among monetary policy reaction functions.

Economic growth and price stability are not mutually exclusive. An economy can expand rapidly with price stability as long as monetary growth is consistent with real output growth. Output expansion creates employment, thereby reducing poverty by transferring labor from low-productivity rural areas into urban areas with plentiful job opportunities. As such, stable output growth has an efficiency-augmented effect. If monetary policy can simultaneously produce sustainable growth and price stability, there would be favorable consequences would include poverty reduction, employment generation, income distribution, and urban migration.

References

- Ball, L., (2000), "Policy rules and external shocks," *NBER Working Paper* No, 7559.
- Calderon, C., R. Duncan, and K. Schmidt-Hebbel (2004), "The role of credibility in the cyclical properties of macroeconomic policies in emerging economies," *Review of World Economies*, 140(4), 613-633.
- Clarida, R., J. Gali, and M. Gertler, (1999) "The science of monetary policy: A new Keynesian perspective," *Journal of Economic Literature*, 37, 1661-1707.
- Calvo, G., and C. Reinhart (2002), "Fear of floating," *Quarterly Journal of Economics*, 117(2), 379-408.
- Chadha, J.S., Sarno, L., Valente G., (2004) "Monetary policy rules, asset prices, and exchange rates," *IMF Staff Papers* 51, 529-552.
- Chen, N.,(2001) "Asset price fluctuations in Taiwan: Evidence from stock and real estate prices: 1973 to 1992," *Journal of Asian Economics*, 12, March, 215-232.
- Chowdhury, I., and A. Schabert, (2008) "Federal reserve policy through a money supply lens," *Journal of Monetary Economics*, 55, 825-834.
- Hodrick, R., and E. Prescott, (1997) "Postwar U.S. business cycles: An empirical investigation," *Journal of Money, Credit, and Banking*, 29(1), 1-16.
- Ito, T., and Iswaisako, T. (1995) "Explaining asset bubbles in Japan," *NBER Working Paper* no.5358.
- Jeon, J., Y. Oh and D. Yang, (2006) "Financial market integration in East Asia: Regional or global?," *Asian Economic Papers*, 5 (1), 73-89.

Mandler, M., (2009) “In search of robust monetary policy rules—should the Fed look at monetary growth or stock market performance?,” *Journal of Macroeconomics*, 31, 345-361.

Mankiw, N.G., and R. Reis (2002) “Sticky information versus sticky prices: A proposal to replace the New Keynesian Phillips curve,” *Quarterly Journal of Economics*, 1295-1328.

Pivetta, F. and R. Reis, (2007), “The Persistence of Inflation in the United States,” *Journal of Economic Dynamics and Control*, 31, 1326–1358.

Quah, D. and S.P. Vahey, (1995), “Measuring core inflation,” *The Economic Journal*, no. 422, 1130-1144.

Taylor, J. B. ,(1993) “Discretion versus policy rules in practice,” *Carnegie-Rochester Conference Series on Public Policy* 39, 195-214.

Van der Ploeg, F., (2009), “Prudent monetary policy and prediction of the output gap,” *Journal of macroeconomics*, 31, 217-230.