Exchange Rate Regimes and Persistence of Inflation in Thailand

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Abstract: This paper explored the degree of inflation persistence in Thailand using both headline and sectoral CPI indices during the 1985-2012 period. The results showed that the degree of persistence was low across the fixed and floating exchange rate regimes. The mean shifts appeared to be mostly negative by the impact of switching from fixed to floating exchange rate regime. Furthermore, there seemed to be monetary accommodation of inflation persistence in both regimes. However, some negative mean shifts in the inflation process might be resulted from the impact of inflation targeting implemented in May 2000 and regular price controls of foods and energy items.

Keywords: Inflation persistence, exchange rate regimes, monetary accommodation.

JEL classification: C22, E31

1. Introduction

In the context of empirical model, inflation persistence is defined as the speed that inflation converges to the mean after a shock to inflation process. It is the long-run effect of a shock which implies that how long a shock to inflation today will take inflation to return to its previous level (Willis, 2003, and Pivetta and Reis, 2007). Inflation persistence can affect the conduct of monetary policy. Monetary policy that aims at price stability depends on the persistence of inflation, i. e., inflation can be stabilized by central banks in a shorter period following a shock if persistence of inflation is low and vice versa. According to Marques (2005), the degree of inflation persistence is an important factor determining the medium-term orientation of monetary policy.

Monetary policy can accommodate inflation under floating exchange rate regime, but will not accommodate it under fixed exchange rate regime.[1] The main reason behind this notion is that tight monetary policy is exercised in response to a shock to inflation under fixed than under floating regime.

There exist empirical results that inflation persistence changes across exchange rate regimes. Alogoscoufis (1992) presented the evidence that monetary accommodation and inflation persistence were negligible under fixed exchange rate regimes in contrast to managed exchange rate regimes. On the contrary, Burdekin and Siklos (1999) made an argument that inflation persistence could not be caused by changes in exchange rate regimes. They indicated that other factors, such as wars, oil price shocks, and central bank reforms accounted for changes in inflation persistence. Bleaney (2001) used annual observations over the period 1954-1972 for OECD countries to estimate inflation persistence and found no evidence of greater persistence across exchange rate regimes. Using annual data for 102 developing countries, excluding transition economies, Bleaney and Francisco (2005) found that inflation persistence appeared quite high for both floats and pegs. However, dramatic differences appeared when pegs were divided into hard and soft pegs. Furthermore, inflation persistence was positively correlated with inflation for soft pegs and floats.[2] Cogley and Sbordone (2008) found that variation in the long-run trend component of inflation due to shifts in monetary policy well explained inflation dynamics. Beechey and Osterholm (2012) estimated the path of inflation persistence in the United States over the last fifty years using an ARMA model of inflation with time-varying autoregressive parameter, motivated by the familiar New Keynesian Phillips curve framework. Their results suggested that the Federal Reserve had played an important role in the declining inflation persistence in the United States because it placed increasing weight on inflation stability in recent decades.

There are some empirical studies that analyze both aggregate and sectoral inflation series. Altissimo, et al. (2006) found that aggregate inflation persistence is very high in the Euro area, but very low when using sectoral inflation series. This was due to the influence of transitory sector-specific shocks to inflation. Mladenovic and Nojkovic (2012) employed

[1] This evidence was provided by Alogoskoufis and Smith (1991) who used the data from the United Stated and the United Kingdom.

[2] Fuhrer (2006) demonstrated that intrinsic persistence rather than driving forces should be the dominant source of persistence of inflation.

monthly data of Cenral and Southeastern European countries in the analysis and found that inflation persistence was high in four countries and low in only two countries. In addition, the New Keynesian Phillips curve approach well explained inflation dynamics of these economies. Apergis (2013) analyzed the degree of inflation persistence in Greece during the 1981-2009 period and there was a very moderate degree of inflation persistence for both aggregate and sectoral indices.

Using monthly headline CPI and sectoral CPI data from January 1985 to December 2012, the present paper found that the degree of inflation persistence was low for both fixed and floating exchange rate regimes. Monetary accommodation did not seem to be different between the two exchange rate regimes. Furthermore, the results from monthly data performed better than those from quarterly data in spite of the fact that monthly CPI data could generate lower rate of inflation. The organization of this paper is as follows. Section 2 presents the methods of testing inflation persistence and monetary accommodation of inflation. Section 3 presents empirical results, and the final section concludes.

2. Methodology

This section explains the data and the methods of estimations of the degree of inflation persistence and the monetary accommodation of persistence.

2.1 Data description

Monthly data of aggregated and disaggregated consumer price indices with 2011 base year are collected from Bureau of Trade and Economic Indices, Ministry of Commerce.[3] The period of investigation is from January 1985 to December 2012 with 336 observations. Estimation using monthly data offers higher frequency, and thus more observations. Inflation rates are computed as percentage changes in consumer price indices. The series of broad definition of money is obtained from the Bank of Thailand (BOT) website. The indices of March, June, September, and December are used for the quarterly data in the analysis.

2.2 Methods

2.2.1 Inflation persistence from the univariate autoregression

[3] Most studies employed annual and quarterly data so that the rate of inflation would not be too low. However, Beechey and Osterholm (2012) showed that the results of inflation persistence appeared to be robust for both quarterly and monthly U. S. data.

The measure of inflation persistence is derived from the following equation:

$$\pi_t = a_0 + \sum_{i=1}^{p} a_i \pi_{t-i} + \varepsilon_t \quad (1)$$

where π is the inflation rate. The optimal lag length (p) is determined by Akaike Information Criterion (AIC). Equation (1) can be re-parameterized to obtain the following equation:[4]

$$\pi_t = \mu + \rho \pi_{t-1} + \sum_{j=1}^{k} \beta_j \Delta \pi_{t-j} + u_t \quad (2)$$

The coefficient ρ of equation (2) is corresponding to the sum of the coefficients of lagged inflation rates. The cumulative effect of a shocks to the inflation process is given by [1/(1-ρ)]. This indicates that the higher the value of ρ, the higher the cumulative impact of shocks on inflation, which implies that the economy is able to absorb shocks more rapidly. In this case, the paremeter $\rho = \sum_{i=1}^{p} a_i$ can be estimated from equation (2). The optimal lag of first differences can be obtained by AIC from the estimated equation.

Since the parameter ρ possesses potential limitations, the half-life (HL) indicator can be used to complement the results. This indicator measures the number of periods that a temporary shock displays more than half of its initial impact to the inflation process. To test for the HL indicator, the estimate of equation (1) is required so as to obtain impulse response function. In the first step, the number of periods should be high. In the second step, the number of periods will be decreased until the impulse response above 0.5 is found.

2.2.2 Monetary accommodation of inflation persistence

There may be monetary accommodation of inflation persistence for the entire period of investigation.[5] The equation that can be used is specified as:

$$m_t = b_0 + \phi D_t + b_1 \pi_t + v_t \quad (3)$$

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[4] See Pivetta and Reis (2007).

[5] Under the fixed exchange rate regime, the domestic prices of a country should be kept in line with foreign prices. Therefore, domestic inflation shocks cannot be accommodated by monetary growth while this can be done under the floating regime.

where m is the growth rate of money supply, D is the dummy variable that takes the value of zero under fixed rates and of one under floating rates. This is a reaction function of money growth to inflation rate. In equation (3), the money supply is treated as the policy variable. When the coefficient b_1 is significantly positive, it implies that the central bank will increase money supply in response to inflation shock. The coefficient of the dummy variable will indicate how the flexible exchange rate regime affects the monetary accommodation process. In other words, the size of this coefficient should be larger under the floating than the fixed exchange rate regime.

3. Empirical results

The results of unit root test using Phillips and Perron (PP) test with constant and no linear trend are reported in Table 1. The reason for using PP test with constant only is that all inflation series did not exhibit any trend.

Table 1 Results of unit root test

Series	PP test (constant only)
All commodities (Headline CPI)	-14.113 (3)
Food and non-alcoholic begerages	-18.074 (4)
Rice, flour and cereal products	-12.896 (6)
Meats, poultry and fish	-9.642 (18)
Eggs and dairy products	-11.386 (17)
Vegetables and fruits	-21.724 (58)
Seasonings and condiments	-9.027 (7)
Non-alcoholic beverages	-16.985 (5)
Apparel and footware	-17.589 (11)
Housing and furnishing	-17.587 (7)
Medical and personal care	-17.769 (12)
Transportation and communication	-10.969 (16)
Recreation and education	-15.428(4)
Tobacco and alcoholic beverages	-14.533 (2)
Non-food and beverages	-13.525 (4)
Raw food and energy	-13.443 (16)
Raw food	-14.546 (29)
Energy	-12.231 (10)
Exclude raw food and energy	-15.619 (12)
Money supply	-17.180 (9)

Note: The number in parenthesis is the optimal Newey-West bandwidth determined by Bartlett Kernel. The null hypothesis of unit root is rejected for all inflation series.

The PP test statistic showed that the null hypothesis of unit root in the series was rejected at the 1 percent level of significance. Therefore, all inflation series were stationary. The estimates of equations (1) and (2) require that the series be stationary. Thus this requirement

was satisfied. Moreover, the series of money growth was also stationary. This enabled the estimate of equation (3).

3.1 Inflation persistence for the entire period

The results of inflation persistence from equation (2) are reported in Table 2. The analysis was based on monthly observations of headline consumer price index along with its sectoral components. Table 2 gives the estimates of persistence of nineteen series with dummy variable that captures the impact of switching from fixed to floating exchange rate regime. There were eleven series that significantly exhibited inflation persistence. For headline CPI inflation and the one that excluded raw food and energy, the degree of inflation persistence was 0.23 and 0.49, respectively. The coefficients of dummy variable tended to be negative. The series of inflation that excluded raw food and energy had significantly negative impact of floating exchange rate regime. However, this impact was minimal. For sectoral inflation series, the series of medical and personal care, seasonings and condiments exhibited moderate persistence of inflation with the values of 0.61 and 0.62, respectively. Some series that exhibited low persistence of inflation were: (1) rice, flour and cereal product, (2) eggs and dairy products, (3) non-alcoholic beverages, (4) apparel and footware, (5) transportation and communication, (6) non-food and beverages, (7) tobacco and non-alcoholic beverages, and (8) non-alcoholic beverages, and (10) raw food and energy.

Equation (1) was also estimated for series that showed persistence of inflation. The optimal lag length was determined by AIC. The estimates gave impulse response function that provides useful complementary information to the results from the estimates of the ρ parameter. The impulse response of inflation to shocks is shown in Figure 1.

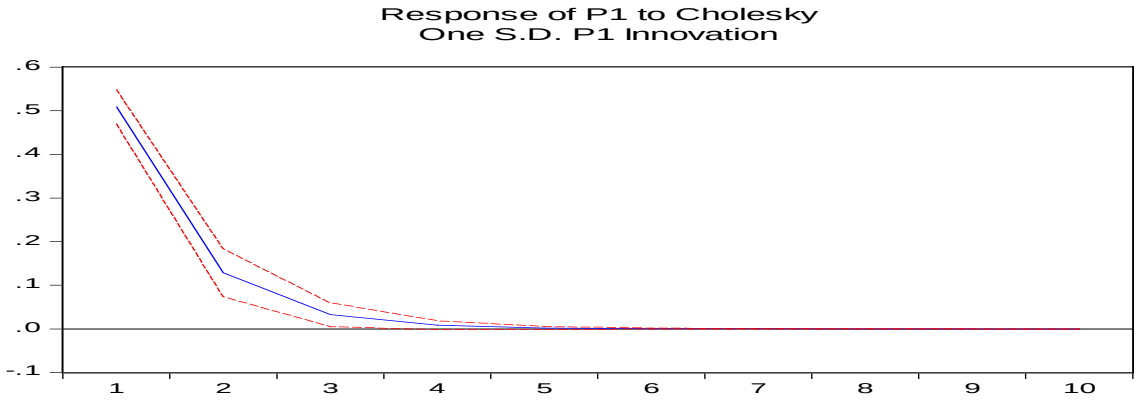


Figure 1. Response of inflation to shocks

Figure 1 showed that the maximum period that impulse response was above 0.5 was less than two months. The shocks to inflation dissipated within 5 months. This evidence confirms that the degree of inflation persistence was not high during the period of investigation. The low value of parameter ρ indicated the low cumulative impact of shocks on inflation. Therefore, the absorption of shocks was not rapid.

Table 2 Results of inflation persistence

Series	Degree of inflation persistence (ρ)	Lag length	Dummy variable
All commodities (Headline Inflation)	0.231***	1	-0.992
Food and non-alcoholic begerages	-0.022	1	-0.127
Rice, flour and cereal products	0.357***	1	-0.149
Meats, poultry and fish	0.136	5	-0.068
Eggs and dairy products	0.280***	3	0.028
Vegetables and fruits	-0.759	3	0.508
Seasonings and condiments	0.621***	2	-0.058
Non-alcoholic beverages	0.191**	1	-0.087
Apparel and footware	0.412***	3	-0.180***
Housing and furnishing	0.005	1	-0.198***
Medical and personal care	0.610***	5	-0.050
Transportation and communication	0.375***	1	0.064
Recreation and education	0.081	1	-0.362
Tobacco and alcoholic beverages	0.194***	2	-0.007
Non-food and beverages	0.322***	1	-0.095
Raw food and energy	0.081***	1	-0.139
Raw food	-0.159	3	-0.074
Energy	0.046	5	-0.054*
Exclude raw food and energy	0.490***	4	-0.116***

Note: The optimal lag length is determined by AIC from the estimated equation. ***, ** and * denote significance at the 1, 5 and 10 percent respectively.

3.2 Monetary accommodation of inflation persistence

Monetary accommodation of persistence of inflation can be examined by estimating equation (3). The main objective is to evaluate the claim that monetary policy will be more accommodating under the floating exchange rate regime. Applying the ordinary least square method to equation (3) might not yield convincing results. Therefore, lagged dependent and

independent variables could be included in the reaction equation.[6] The results are reported in Table 3.

Table 3 Results of monetary accommodation of inflation persistence

Dependent variable: m_t		
Independent variable	Coefficient	t-statistic
Constant	0.464	1.602
Dummy (D_t)	-0.089	-0.285
m_{t-1}	0.005	0.962
m_{t-2}	0.084	0.384
m_{t-3}	0.141	0.145
m_{t-4}	0.069	0.480
$D_t.m_{t-1}$	-0.017	-0.145
$D_t.m_{t-2}$	-0.159	-0.137
$D_t.m_{t-3}$	0.194*	1.664
$D_t.m_{t-4}$	-0.057	-0.474
π_{t-1}	-0.020	-0.092
π_{t-2}	0.412*	1.835
π_{t-3}	0.323	1.462
π_{t-4}	0.637***	2.881
$D_t.\pi_{t-1}$	-0.223	-0.832
$D_t.\pi_{t-2}$	-0.749***	-2.740
$D_t.\pi_{t-3}$	-0.299	-1.112
$D_t.\pi_{t-4}$	0.281	-1.256
R^2=0.242		
F=5.877(p=0.000)		
$\chi^2_{(2)}$=0.547(0.761)		

Note: ***, ** and * denote significance at the 1, 5 and 10 percent, respectively. D is the dummy variable, m is the growth rate of money, and π is the inflation rate. Serial correlation LM test shows that the null hypothesis of serial correlation was rejected.

The evidence in the present study did not support the notion that monetary accommodation of inflation should be stronger under the floating than the fixed exchange rate regime. It seemed to be obvious that monetary accommodation was lower under the floating exchange rate regime. Furthermore, monetary policy reaction function did not appear to shift when the country switched from fixed to floating exchange rate regime. This indicates that the policy reaction function was stable. The presence of monetary accommodation of inflation

[6] The coefficients on lagged money growth and lagged inflation were allowed to vary according to the exchange rate regimes. Bleaney (2001) found that using lagged rather than current inflation in equation (3) yielded a better fit.

persistence did not seem to cause high persistence during the entire period of investigation. The tests were also applied to the quarterly data in the same period of investigation. However, the results were quite similar, but not as convincing as those that used monthly data. According to the results in Table 3, there was no evidence of persistence of money growth because the coefficients of lagged money growth variable were insignificant. The insignificance of the coefficient of the dummy variable indicated the non-persistence of monetary growth. The significant monetary accommodation coefficients were 0.41 for π_{t-2} and 0.64 for π_{t-2}. In addition, the slope coefficient of π_{t-2} was significantly negative while that of π_{t-4} was insignificantly negative. This implied that monetary accommodation of inflation persistence was lower under the floating exchange rate than the fixed exchange rate regime.

3.3 Robustness test

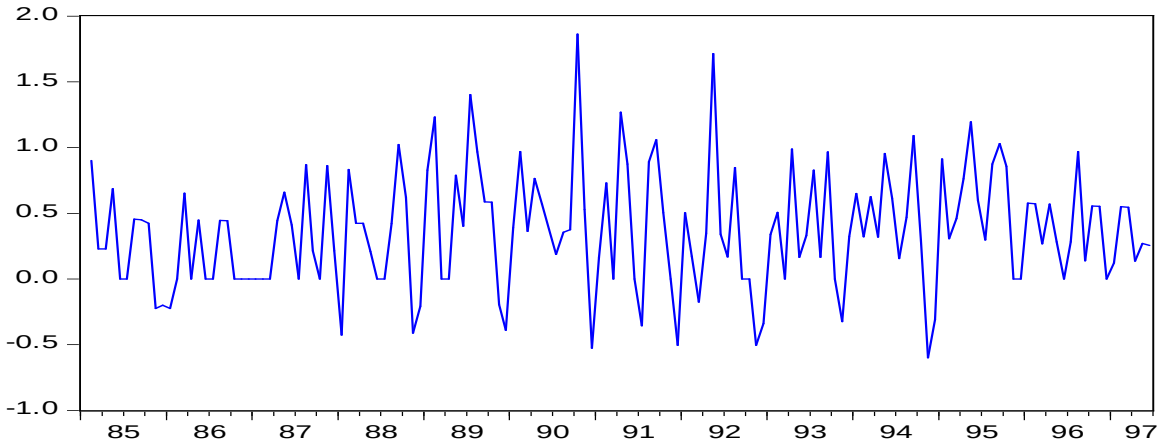
Results in Table 2 showed insignificance of the coefficient of dummy variable. In order to distinguish the difference between inflation persistence in the fixed and floating regimes, the data set was divided for two regimes. The plots of inflation series of the two regimes were illustrated in Figure 2. It seemed that inflation series was more fluctuating under the fixed than the floating regimes. The coefficients of inflation persistence were reported in Table 4.

Table 4. Results of inflation persistence between the two regimes

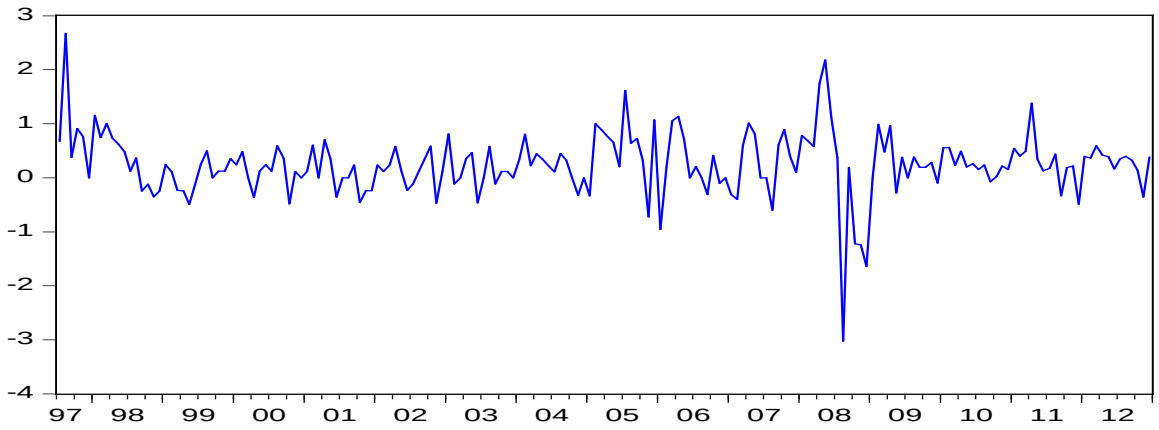
Sample Period	ρ	Lag
1985.01-1997.06	0.363	2
1997.06-2012.12	0.160	2

Note: The optimal lag length is determined by AIC.

Even though the coefficient of dummy variable for the entire period was insignificant, estimations by dividing the whole sample into two sub-samples gave different results of inflation persistence as shown in Table 4. The coefficients of inflation persistence were 0.363 and 0.160 for the fixed and floating regimes, respectively. The higher inflation persistence before the financial crisis does not necessarily imply that it is more difficult to control inflation during the fixed regime because the sizes of persistence were still low. The lower size of persistence of inflation during the floating regime could stem from tougher anti-inflationary measures imposed by the central bank to counter the adverse supply shocks, such as the oil crises.



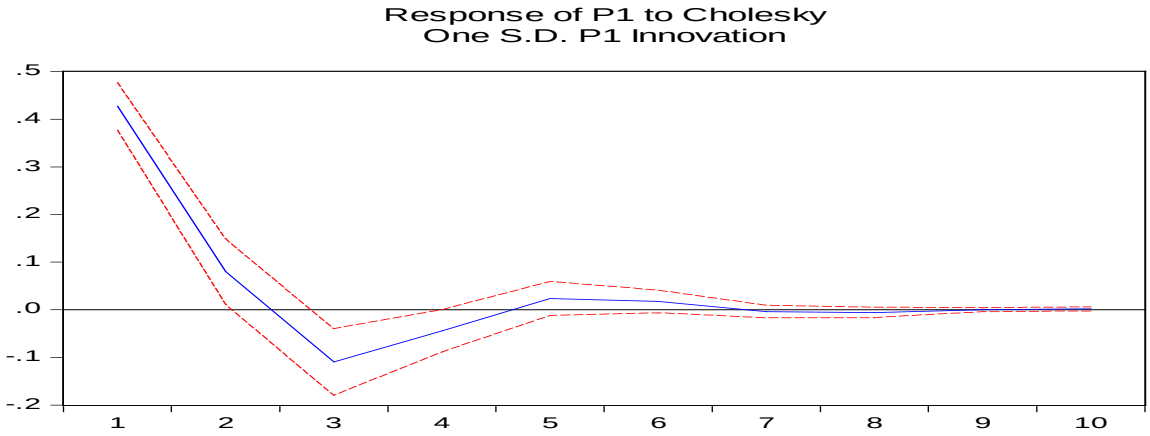
a. Inflation (January 1985 to June 1997)



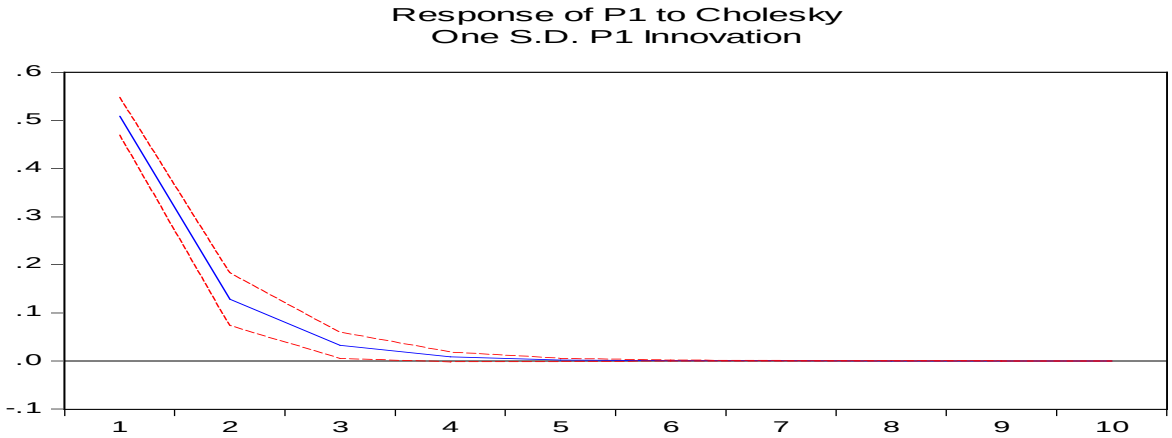
b. Inflation (July 1997 to December 2012)

Figure 2. Inflation under fixed and floating exchange rate regime

Response of inflation to shocks under both regimes is illustrated in Figure 3. Under the fixed regime a positive shock became a negative shock in 3 months and became a positive shock again, but dissipated within 7 month. However, for the floating regime, a positive shock dissipated within 5 months.



a. Response of inflation to shocks: 1987.01-1997.06



b. a. Response of inflation to shocks: 1977.07-2012.12

Figure 3. Impulse response of inflation to shocks between the two regimes

4. Conclusion

This study examines the inflation dynamics of Thailand in 28-year period using monthly data. Theoretically, the degree of inflation persistence should be higher under the fixed than the (managed) floating exchange rate regime. However, the evidence from Thailand showed that the degree of persistence of headline inflation was low. This was also true when the whole sample was divided into two sub-periods for the fixed and floating exchange rate regimes. For sectoral evidence, only few sectoral inflation series showed moderate degree of inflation persistence, and these sectorial series accounted for small percentage in the headline CPI. Some negative mean shifts in the inflation process might be resulted from the impact of inflation targeting implemented in May 2000. Furthermore the Thai government regularly

imposed price controls on necessary items, such as foods and energy. In addition, the claim that monetary policy was more accommodative under the floating exchange rate regime was not supported. Based upon the results from this study, the low persistence of inflation should leave a room for monetary authorities to successfully control inflation in line with the target by imposing various measures to counter inflationary pressure caused by recent oil crises.

References

Alogoskoufis, G. S., 1992. "Monetary accommodation, exchange rate regimes, and inflation persistence," Economic Journal, 102(412), 461-480.

Alogoskoufis, G. S., and Smith, R. P., 1991. "The Phillips curve, the persistence of inflation, and the Lucas critique: evidence from exchange rate regimes," American Economic Review, 81(6), 1254-1275.

Altissimo, F., Bilke, L., Levin, A., Matha, T., and Mojon, B., 2006. "Sectoral and aggregate inflation dynamics in the Euro area," Journal of the European Economic Association, 4(2-3), 585-593.

Apergis, N., 2013. "The stylized facts of Greek inflation: new evidence on persistence," Panoeconomicus, 60(1), 51-71.

Beechey, M., and Osterholm, P., 2012. "The rise and fall of U. S. inflation persistence," International Journal of Central Banking, 8(3), 55-86.

Bleaney, M. F., 2001. "Exchange rate regimes and inflation persistence," IMF Staff Papers, 47(3), 387-402.

Bleaney, M. F., and Francisco, M. 2005. "Inflation persistence and exchange rate regimes: evidence from developing countries," NIPE Working Paper, No. 1/2005.

Burdekin, R. C. K., and Siklos, P. L., 1999. "Exchange rate regimes and shifts in inflation persistence: does nothing else matter?," Journal of Money, Credit and Banking, 31(2), 234-247.

Cogley, T., and Sbordone, A., 2008. "Trend inflation, indexation, and inflation persistence in the New Keynesian Phillips curve." American Economic Review, 98(6), 2101-2126.

Fuhrer, J. C., 2006. "Intrinsic and inherited inflation perisistence," Journal of Money, Credit and Banking, 27(6), 975-984.

Marques, C. R., 2005. "Inflation persistence: facts or artifacts?," Banco de Portugal/Economic Bulletin, Summer, 69-79.

Mladenovic, Z., and Nojkovic, A., 2012. "Inflation persistence in central and southeastern Europe: evidence from univariate and structural time series approaches," Panoeconomicus, 59(2), 235-266.

Pivetta, F., and Reis, R., 2007. "The persistence of inflation in the United States," Journal of Economic Dynamics and control, 31(4), 1326-1358.

Willis, J. L., 2003. "Implications of structural changes in the U. S. economy for pricing behavior and inflation dynamics," Economic Review, First Quarter, Federal Reserve Bank of Kansas City.