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IMPACTS OF THE THREE TRILEMMA POLICIES ON INFLATION, GROWTH AND VOLATILITY FOR TEN SELECTED ASIAN AND PACIFIC COUNTRIES

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ABSTRACT: *A more stable exchange rate benefits China, Malaysia and New Zealand due to lower inflation rates and Japan, the Philippines, New Zealand, South Korea and Thailand because of higher growth rates but produces negative results for South Korea in terms of higher inflation rates and China due to lower growth rates. More monetary independence is beneficial to Australia, Japan and Malaysia due to higher growth rates but generates adverse outcomes for China, Malaysia and South Korea because of higher inflation rates. More free capital mobility is helpful to Australia, China, Japan, New Zealand, the Philippines and Singapore due to lower inflation rates or higher growth rates but yields negative outcomes for Thailand due to higher inflation rates. More exchange rate stability reduces output volatility for China, Indonesia, the Philippines, Singapore, South Korea and Thailand, decreases inflation volatility for Japan and New Zealand, increases inflation volatility for South Korea and Thailand, and has no impacts on inflation or output volatility for Australia and Malaysia. More monetary independence increases inflation volatility for China and output volatility for Singapore, and has no impacts on inflation or output volatility for other countries. More free capital mobility reduces inflation volatility for China, Japan, the Philippines, Singapore and South Korea and output volatility for China, Japan, South Korea, and has no impacts on Australia, Indonesia and New Zealand. Countries are expected to select a policy mix that would reduce inflation or output volatility. Hence, the effectiveness of these policies in reducing the inflation rate, increasing the growth rate and reducing inflation or output volatility should be considered in selecting a policy mix.*

JEL Classifications: *E44, E52, F31*

Keywords: *trilemma policies, inflation, economic growth, volatility*

1. INTRODUCTION

Some countries pursue stable exchange rates, independent monetary policy and free capital flows in order to avoid unstable currency values, change the money supply or interest rates to cool down an over-heated economy or stimulate a sluggish economy, and attract needed foreign capital. The trilemma of international economics poses challenges to policy makers in selecting

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a policy mix suitable to an economy as only two of these three policies can be achieved at the same time (Ghosh, Gulde and Ostry, 1997; Edison, Klein, Ricci and Sløk, 2002; Prasad, Rogoff, Wei and Kose, 2003; Levy-Yeyati and Sturzenegger, 2003; Eichengreen and Leblang, 2003; Frankel, Schmukler and Serven, 2004; Shambaugh, 2004; Obstfeld, Shambaugh and Taylor, 2005, 2009, 2010; Henry, 2006; Kose, Prasad, Rogoff and Wei, 2006; Prasad and Rajan, 2008; Aizenman, Chinn and Ito, 2008b, 2011a; Aizenman and Sengupta, 2011; Aizenman and Ito, 2012; and others).

A stable but under-valued currency would promote exports but cause import prices and domestic inflation to rise. Although an independent monetary policy would serve a country's specific needs such as a stable exchange rate, a central bank may raise the domestic interest rate to be much higher than the world interest rate and increase the borrowing costs for domestic businesses and households. Free capital mobility would allow international capital to flow in and increase foreign direct and portfolio investments. On the other hand, abrupt outflows or withdrawals of international capital from a country may destabilize the economy. Therefore, whether the three trilemma policies – exchange rate stability, monetary independence, and free capital mobility - would reduce inflation, increase economic growth, and reduce output and inflation volatility needs to be examined and tested.

The study of this subject for ten selected Asian and Pacific countries is significant as low inflation, growth and stability are among the most important macroeconomic objectives. To the author's best knowledge, none of the previous studies has examined the relationships using the latest data including the most comprehensive index of financial integration, which is developed and updated by Chinn and Ito (2006, 2008) and Aizenman, Chinn and Ito (2011b).

2. LITERATURE REVIEW

Several recent studies have examined the related subjects. Based on a sample of 155 countries including many Asian and Pacific countries, Shambaugh (2004) shows that the trilemma provides a sensible policy guide in examining the relationship among exchange rate regimes, monetary policy, and international capital flows. He finds that interest rates in pegged exchange rate regimes react to interest rates in the anchor country faster than interest rates in non-pegging exchange rate regimes and that countries without pegging the exchange rate have significant degree of monetary autonomy. Therefore, fixed exchange rates lead to a loss of monetary autonomy.

Obstfeld, Shambaugh and Taylor (2005) reveal that the trilemma can be regarded as a reasonable guide for conducting macroeconomic policy. Countries without pegging and capital controls retain adequate degree of monetary autonomy whereas pegging countries with free capital mobility lose significant monetary independence.

Based on a large sample including many Asian countries, Aizenman, Chinn and Ito (2008b) show that for developing countries, greater exchange rate stability leads to more output volatility and higher inflation, and greater monetary independence results in higher inflation.

Aizenman, Chinn and Ito (2011a) reveal that more exchange rate stability increases output volatility and investment volatility whereas more monetary autonomy reduces output volatility

and that more exchange rate stability or more financial integration reduces inflation whereas more monetary autonomy raises inflation.

Aizenman and Ito (2012) find that the three macroeconomic policies in emerging economies are converging toward an intermediate ground as they pursue managed exchange rates backed up by large international reserves, some degree of monetary autonomy, and restrained financial integration. These emerging economies experience less output fluctuations whereas emerging economies with relatively low international reserves as a percent of GDP would suffer relatively high output fluctuations if they select policy divergence.

3. THE MODEL

We can express potential impacts of exchange rate stability, monetary independence and free capital mobility on the inflation rate, the growth rate of real GDP, inflation volatility and output volatility as:

$$X_t = f(ES_t, MI_t, FC_t) \tag{1}$$

where X stands for π, GR, IV or YV, which are defined as:

π = the inflation rate,

GR = the growth rate of real GDP,

IV = inflation volatility,

YV = output volatility,

Other variables are defined as:

ES = exchange rate stability,

MI = monetary independence, and

FC = free capital mobility.

More exchange rate stability is expected to stabilize the currency value and price level, reduce uncertainty, and help economic growth. On the other hand, more exchange rate stability may increase or reduce the inflation rate, depending upon whether the pegged anchor currency would appreciate or depreciate. Depending upon monetary easing or tightening, the timing and the magnitude, more monetary independence may increase or reduce the inflation rate or the growth rate of real GDP. More capital inflows are expected to increase aggregate demand and the supply of funds, reduce lending rates, help economic growth, and may increase or reduce the inflation rate. However, large amounts of abrupt capital outflows would reduce aggregate demand, destabilize an economy, cause currency depreciation, hurt economic growth, and may increase or reduce the inflation rate.

4. DATA

ES, MI and FC are obtained from Aizenman, Chinn and Ito (2008b, 2010, 2011b) and Chinn and Ito (2006, 2008) and have values ranging from zero to one. A higher value of ES, MI or FC indicates more exchange rate stability, monetary independence or free capital flows. ES is represented by:

$$ES = [1 + \sigma(\Delta\log(X)/0.01)]^{-1}, \quad (2)$$

where σ and X stand for the standard deviation and the nominal exchange rate. MI is measured by:

$$MI = 0.5 - c(i, i^*) / 2, \quad (3)$$

where c, i and i^* stand for the correlation coefficient, the money market rate in the home country and the money market rate in the U.S. FC is derived from the information regarding the requirement of the surrender of export proceeds, the presence of multiple exchange rates, and restrictions on current and capital account transactions, which are detailed in the *Annual Report on Exchange Arrangements and Exchange Restrictions* published by the International Monetary Fund. π is represented by the percent change in the consumer price index. GR is measured by the percent change in real GDP. The consumer price index and real GDP are obtained from the IMF. IV is represented by the standard deviation of the percent change in the consumer price index over a five-year period. YV is measured by the standard deviation of the percent change in real GDP over a five-year period. The consumer price index and real GDP are obtained from the IMF.

The sample consists of ten countries in the Asian and Pacific regions: Australia, China, Indonesia, Japan, Malaysia, New Zealand, the Philippines, Singapore, South Korea, and Thailand. The selection of these countries is because they belong to the Asian-Pacific Economic Cooperation (APEC) that attempts to advance free international trade and economic cooperation in the Asian-Pacific region. Some of the Asian and Pacific countries are not included in this study because of lack of data or data limitation. Taiwan is not a member of the International Monetary Fund. Hence, the *international Financial Statistics* does not publish the data for Taiwan. India is not included because the index for free capital mobility is a constant without any change during the sample period. The sample period ends in 2009 as the data for free capital mobility in 2010 were not available at the time of writing the paper. Time series data are used in empirical work.

5. METHODOLOGY

The Newey-West method is used in order to generate consistent estimates of the covariance and standard errors when the forms of autocorrelation and heteroskedasticity are unknown. Due to relatively small sample sizes and the use of annual data, time series techniques are not used in this study. For the VAR model and the related analysis, if the length of lags is relatively large, the degrees of freedom would be relatively small, and the results for some of the countries would be poor.

A panel data approach is not employed in empirical work because many countries in the study have different sample sizes. If a panel data approach is applied, as many as 21 time series observations have to be deleted from the samples. A linear relationship is employed as some of the values are negative.

6. EMPIRICAL RESULTS

Table 1 presents estimated parameters, t-statistics and values of R-squared for the inflation rate and the growth rate. Major findings are summarized below. The explanatory power of estimated

Table 1
Impacts of Exchange Rate Stability, Monetary Independence and Free Capital Mobility on Inflation and Economic Growth

	Exchange rate stability	*Monetary independence*	*Free capital mobility*	R^2
Australia				
Inflation rate	-3.397 (-1.468)	2.451 (0.628)	-10.805[a] (-2.596)	0.359
Growth rate	2.045 (1.482)	3.334[b] (2.049)	1.616 (1.296)	0.146
China				
Inflation rate	-13.185[b] (-2.255)	21.981[c] (1.725)	-35.386[c] (-1.857)	0.374
Growth rate	-4.930[a](-2.821)	-0.400 (-0.080)	6.644 (0.889)	0.307
Indonesia				
Inflation rate	-7.034 (-0.725)	-1.013 (-0.071)	-8.536 (-0.424)	0.106
Growth rate	5.080 (1.456)	0.082 (0.016)	2.883 (0.398)	0.246
Japan				
Inflation rate	-8.102 (-1.486)	-4.477 (-0.689)	-24.776[a] (-2.831)	0.521
Growth rate	6.655[a] (2.919)	9.900[a] (5.668)	-2.335 (-0.996)	0.454
Malaysia				
Inflation rate	-5.675[a] (-2.963)	7.901[b] (2.089)	-2.647 (-1.288)	0.262
Growth rate	2.639 (1.000)	9.666[c] (1.855)	2.527 (0.892)	0.130
New Zealand				
Inflation rate	-8.704[b] (-2.362)	6.892 (1.579)	-12.898[a] (-3.490)	0.568
Growth rate	-0.686 (-0.289)	1.119 (0.345)	-0.104 (-0.059)	0.006
Philippines				
Inflation rate	-5.645(-1.102)	-4.661 (-0.518)	-28.599[a] (-2.834)	0.184
Growth rate	6.754[a] (3.977)	0.250 (0.084)	4.098 (1.224)	0.309
Singapore				
Inflation rate	1.757 (0.312)	1.703 (0.268)	-9.421[a] (-2.570)	0.212
Growth rate	8.493[c] (1.727)	-4.263 (-0.768)	-1.552 (-0.484)	0.120
South Korea				
Inflation rate	8.170[b] (2.284)	13.120[b] (2.119)	5.050 (0.490)	0.181
Growth rate	7.610[a] (4.249)	-0.950 (-0.226)	-3.000 (-0.711)	0.387
Thailand				
Inflation rate	3.082 (0.951)	-5.714 (-1.257)	16.337[a] (3.572)	0.223
Growth rate	8.855[c] (1.838)	5.082 (1.184)	15.591[c] (1.831)	0.342

Notes: Figures in the parenthesis are t-statistics. a, b or c indicates that a coefficient is significant at the 1%, 5% or 10% level. A constant term is included in each of the estimated regressions and is not reported here to save space. Sample periods are as follows:
1970-2009: Australia, Japan, New Zealand, Malaysia, the Philippines and South Korea,
1972-2009: Singapore,
1977-2009: Thailand,
1983-2009: Indonesia,
1984-2009: China (growth rate of real GDP), and
1987-2009: China (inflation rate).

regressions varies across countries from a low of 0.006 in the growth rate regression for New Zealand to a high of 0.568 in the inflation rate regression for New Zealand. More exchange rate stability causes positive outcomes of lower inflation rates for China, Malaysia and New Zealand

and higher growth rates for Japan, the Philippines, Singapore, South Korea and Thailand and negative results of a higher inflation rate for South Korea and a lower growth rate for China. More monetary independence results in positive benefits of higher growth rates for Australia, Japan and Malaysia and negative outcomes of higher inflation rates for China, Malaysia and South Korea. More free capital mobility leads to positive results of lower inflation rates for Australia, China, Japan, New Zealand, the Philippines and Singapore and a higher growth rate for Thailand and a negative outcome of a higher inflation rate for Thailand.

Table 2 presents estimated regressions for inflation and output volatility. In five (Australia, Japan, New Zealand, the Philippines and Singapore) of the ten countries, more exchange rate stability, more monetary independence or more free capital mobility generates only positive benefits in terms of a lower inflation rate or a higher growth rate and does not result in any negative outcomes in terms of a higher inflation rate or a lower growth rate. Overall, based on the number of countries, more exchange rate stability or more free capital mobility brings about far more positive benefits in terms of a lower inflation rate or a higher growth rate than negative outcomes in terms of a higher inflation rate or a lower growth rate whereas more monetary independence leads to equal number of positive benefits of higher growth rates and negative outcomes of higher inflation rates.

More exchange rate stability reduces inflation or output volatility for eight out of ten countries and raises inflation volatility for two countries. More monetary autonomy does not affect inflation or output volatility for eight countries and increases inflation or output volatility for two of the ten countries. More free capital mobility reduces inflation or output volatility for eight countries and raises output volatility for two countries.

In addition to the three trilemma policies, the variable of international reserves is also considered to determine its potential impacts on output volatility. A log scale of international reserves is selected to reduce a potential high degree of multicollinearity. Empirical results show that more international reserves reduce output volatility for Australia, China, Indonesia, Malaysia, and New Zealand whereas output volatility in Japan, the Philippines, Singapore, South Korea, and Thailand is not affected by the magnitude of international reserves.[1]

In comparison, the findings in this paper differ from Aizenman, Chinn and Ito (2008a, 2011a) in several aspects. First, in this study, more exchange rate stability reduces output volatility for six countries and does not increase output volatility for any other countries where Aizenman, Chinn and Ito (2008a, 2011a) show that more exchange rate stability would raise output volatility. Second, in this paper, more monetary independence raises output volatility just for one country and does not affect output volatility for the remaining nine countries whereas Aizenman, Chinn and Ito (2011a) find that more monetary autonomy reduces output volatility. Third, the amount of international reserves reduces output volatility for five of the ten countries included in this study, suggesting the important role of international reserves in reducing output volatility in some countries (Aizenman, Chinn, and Ito, 2008); Aizenman and Sengupta, 2011; and Aizenman and Ito, 2012).

Hence, these trilemma policies may reduce, increase or not affect the inflation rate, the growth rate, inflation volatility and output volatility for some of these countries. In applying these policies, each of the countries needs to review its own economic conditions and adopt a policy mix which would lead to favorable outcomes.

Table 2
Impacts of Exchange Rate Stability, Monetary Independence and Free Capital Mobility on Inflation and Output Volatility

	Exchange rate stability	*Monetary independence*	*Free capital mobility*	R^2
Australia				
IV	-0.926 (-1.012)	-0.848 (-0.777)	-1.198 (-0.968)	0.072
YV	0.627 (1.080)	0.666 (0.572)	0.431 (0.697)	0.043
China				
IV	-1.051(-0.339)	15.625[a](3.678)	-30.339[a](-4.096)	0.377
YV	-3.030[a](-4.890)	1.032 (0.581)	-10.806[a](-4.077)	0.641
Indonesia				
IV	-9.059 (-1.659)	-6.312 (-0.799)	-16.056 (-1.027)	0.393
YV	-4.445[c] (-1.957)	-0.858 (-0.255)	-0.662 (-0.105)	0.262
Japan				
IV	-4.849[a] (-3.035)	0.323 (0.159)	-9.088[b] (-2.159)	0.388
YV	-1.574 (-1.123)	-0.450 (-0.473)	-4.089[a] (-2.950)	0.301
Malaysia				
IV	-2.228 (-1.503)	1.359 (0.749)	-0.416 (-0.338)	0.094
YV	2.728 (1.607)	2.270 (0.672)	-1.446 (-0.596)	0.177
New Zealand				
IV	-2.287[c](-1.652)	1.884 (0.771)	-1.015 (-0.754)	0.126
YV	-0.813 (-0.913)	2.024 (1.382)	-0.125 (-0.134)	0.106
Philippines				
IV	-1.243(-0.542)	-5.062 (-0.782)	-23.235[a] (-2.963)	0.363
YV	-1.308[c](-1.711)	-0.126 (-0.074)	-3.600 (-1.452)	0.102
Singapore				
IV	2.360 (0.578)	1.270 (0.456)	-11.510[a] (-3.997)	0.652
YV	-3.702[a](-2.720)	5.752[a](2.949)	1.808[c](1.743)	0.369
South Korea				
IV	5.876[a](4.224)	-3.872 (-1.336)	-8.998[b](-2.146)	0.422
YV	-1.802[b](-1.970)	-3.715 (-1.354)	-5.265[a](-2.548)	0.214
Thailand				
IV	3.777[b](2.455)	-3.328 (-1.218)	1.929 (0.686)	0.320
YV	-3.739[c] (-1.820)	3.114 (1.610)	4.786[c] (1.743)	0.344

Notes: IV and YV stand for inflation volatility and output volatility, respectively. Figures in the parenthesis are t-statistics. a, b or c indicates that a coefficient is significant at the 1%, 5% or 10% level. A constant term is included in each of the estimated regressions and is not reported here to save space. Sample periods are as follows:

1970-2009: Australia, Japan, New Zealand, Malaysia (inflation volatility), the Philippines and South Korea (output volatility);

1971-2009: South Korea (inflation volatility);

1972-2009: Singapore;

1975-2009: Malaysia (output volatility);

1977-2009: Thailand;

1983-2009: Indonesia;

1984-2009: China (output volatility); and

1991-2009: China (inflation volatility.

7. SUMMARY AND CONCLUSIONS

This paper has examined the impacts of exchange rate stability, monetary independence and free capital flows on the inflation rate, the economic growth rate, inflation volatility and output volatility for ten selected countries in the Asian and Pacific regions. The impact of international reserves on output volatility is also considered. The Newey-West method is applied in empirical work.

The results in this paper have major implications. A country can review its three trilemma policies to determine whether an existing policy mix may be conducive to a lower inflation rate, a higher growth rate, and less inflation or output volatility. For example, it would be desirable for Australia to pursue monetary autonomy and free capital flows because the policy combination is consistent with the trilemma and because a lower inflation rate and a higher growth rate can be achieved. It would be beneficial for China to pursue more free capital mobility as it generates positive outcomes of a lower inflation rate and less inflation and output volatility whereas more exchange rate stability yields mixed outcomes. Japan seems to have more policy combinations for consideration as all three trilemma policies produce desirable outcomes. It suggests that taking a middle ground of these three trilemma policies may work (Aizenman and Ito, 2011a, 2012). It would be rational for Singapore and the Philippines to pursue a policy combination of exchange rate stability and free capital mobility in order to achieve a lower inflation rate, a higher growth rate, less inflation volatility or less output volatility. Because of different impacts of these three trilemma policies on inflation rates, growth rates and volatility across most countries, using a pooled sample of multiple countries may wash out important information for individual countries.

Note

1. To save space, empirical results are not printed here and will be made available upon request.

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