Inflation Targeting and Inflation Persistence in Asia[1]

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Preliminary draft

September 1, 2010

Abstract: Following the Asian Financial Crisis in 1997-98, a number of Asian central banks adopted inflation targeting. We explore how successful this framework has been by looking at the persistence of inflation as measured by the sum of the coefficients in an autoregressive model for inflation using Hansen's (1999) median unbiased estimator. We find a significant reduction in inflation persistence following the adoption of inflation targeting in the early 1990s. The speed by which persistence falls varies across countries. Under alternative monetary regimes, however, persistence remains unchanged.

JEL codes: C22, E31, E5

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1 Introduction

Asian economies have historically experienced relatively low and stable inflation rates (Gerlach et al. 2009). Nevertheless, in recent years a number of Asian central banks have adopted monetary policy frameworks involving explicit inflation targeting (Filardo and Genberg 2009). This policy choice reflects the same consideration that led to the introduction of inflation targeting (IT) in many advanced economies, including Sweden and the United Kingdom: the need to introduce a new anchor for monetary policy following the abandonment of a fixed exchange rate regime. Thus, after the Asian financial crisis in 1997-98, Korea introduced IT in 1998, Indonesia and Thailand in 2000, and Philippines in 2002 (Ito and Hayashi 2004).

In this paper we explore how successful these policy choices have been, looking at data from economies with and without IT in Asian and elsewhere. It seems natural to judge success by computing the average inflation rate since the adoption of the inflation target and its variance. However, it is possible for the average inflation rate to be close to target, but inflation may nevertheless have deviated from it by large amounts for extended periods of time. We therefore use an alternative metric of success and study how persistent shocks to inflation have been. The intuition is straightforward: deviations of inflation from target will be temporary if the central bank is effective in stablising inflation. In fact, a number of authors have argued that the persistence of inflation has fallen in many countries in recent years, and have suggested that this is due to the greater focus on inflation stabilization by central banks (Pagan 2003 and Levin and Piger 2006).

Before proceeding, we emphasise that while IT typically has involved an increase in the weight attached to stabilising inflation in the countries that have adopted it, *any* monetary policy strategy that attaches primarily importance to price stability is likely to lead to low level of inflation persistence. Monetary policy makers in both Japan and Singapore (and, outside Asia, in the euro area and in Switzerland) have established long track records of tight inflation control and might therefore not have felt it necessary to adopt IT, yet conduct policy in much the same way as policy makers using explicit IT. The formal adoption of IT is not a necessary condition for a drop in inflation persistence. In fact, we will evaluate whether the drop in inflation persistence, if any, is unique to IT regimes.

The paper is organised as follows. Section two briefly reviews the literature on the role of IT for inflation persistence in mature and emerging economies. Section three presents an illustrative model useful for gauging the effect of IT on the inflation process. Our preferred measure of inflation persistence is introduced in section four, while section five discusses the results from full-sample as well as rolling-window estimation. Finally, section six offers some tentative conclusions and suggestions for future research.

2 Inflation targeting and inflation persistence

The fall in inflation persistence over the last two decades in major industrial countries is now well documented. Levin and Piger (2006) assess inflation persistence for major industrial economies and find that, conditional on a change in the mean (potentially reflecting a change in monetary policy makers' objectives), inflation is much less persistent than previously thought. To understand why, suppose that the central bank controls inflation closely, but that the average inflation rate, as captured by the constant in the autoregressive model for inflation, falls in the sample. If the econometrician does not allow for this change when estimating the degree of persistence, it will appear that inflation was above the mean in the first part, and below the mean in the rest, of the sample. Thus, inflation will be seen as deviating very persistently from the mean. Benati (2008) compares inflation persistence across monetary regime for a set of advanced economies. He also finds a reduction of persistence under a credible commitment to price stability.

Less supportive evidence for a reduction in inflation persistence is provided by Cecchetti and Debelle (2006). They stress that the principal change in the inflation process in the past two decades has been the decline in the mean, not a significant change in persistence. Levin, Natalucci, and Piger (2004) argue that the adoption of IT lowered the degree of inflation persistence in major industrial countries.[2] For the aggregate euro area, however, the results are ambiguous. The widely cited study of O'Reilly and Whelan (2005a) finds no change in inflation persistence over the sample period, while Tillmann (2008) provides evidence in favor of a decline in inflation persistence since 1999.

The empirical impact of regime changes on inflation persistence is studied in Benati (2008). He estimates a small-scale New-Keynesian model for major industrial countries over various subperiods using Bayesian methods. His main result is that the degree of intrinsic inflation persistence, i.e. the coefficient of lagged inflation within a hybrid Phillips curve, drops significantly towards zero once a credible new monetary regime is in place.

IT is also believed to lower the level of inflation and its variance in emerging market countries, see Amato and Gerlach (2002), Vega and Winkelried (2005), and Goncalves and Salles (2008).[3] None of these studies focuses on inflation persistence. Siklos (2008), in contrast, estimates an first-order autoregressive (AR(1)) process for inflation for a set of emerging market countries and includes a dummy variable indicating the adoption of IT. He finds that IT has reduced inflation persistence only in a handful of emerging economies.[4] Recently, Filardo and Genberg (2009) survey the experience with IT in Asia and the Pacific. They

[2] This finding is compatible with the theoretical analysis in Svensson (1997) who finds that under IT, inflation equals the targeted rate plus random shocks that occur between the time the interest rate is set and the impact on inflation. This implies that shocks to inflation are transient.

[3] Recently, Brito and Bystedt (2010) find that IT has no effect on on the level and the variance of inflation in emerging countries.

[4] In a case study of Korea, Kim and Park (2006) also find inconclusive evidence on the change in inflation persistence.

also analyze the development of inflation persistence, measured again as the AR(1) coefficient for inflation, and find a drop in persistence only for Korea, New Zealand, and Australia. In other countries, most notably Thailand, the Philippines, and Indonesia, persistence increases although IT is used.

Beyond studying data for a set of economies that have previously received little attention, this paper is of interest for three reasons. First, it measures inflation persistence by the sum of the coefficients in an autoregressive representation of inflation using the median unbiased estimator developed by Hansen (1999). Thus far the literature on inflation persistence in emerging market countries mostly relies on OLS estimates of the AR(1) coefficient. The least squares estimate, however, suffers from a bias as the sum of the autoregressive coefficients approaches unity. Moreover, confidence bands based on a normally distributed estimator do not have the correct coverage. To check whether persistence falls over time, however, reliable confidence bands are of crucial importance. Using Hansen's (1999) grid-bootstrap estimator solves these issues.

Second, it provides a time-varying measure of persistence obtained from rolling-window estimates. This allows us to assess how inflation persistence has varied over time, which has not been studied previously for emerging market countries. We also allow for structural breaks in the mean of the inflation series. Neglecting these breaks is known to bias the estimates of the AR parameters.

Third, we explicitly test for structural stability of the autoregressive inflation process using a bootstrap approach to calculate critical values.

3 A simple interpretive model

To interpret the results from the econometric analysis below, it is useful to first consider a simple model for inflation. We assume that inflation, π_t, consists of a permanent part, $\overline{\pi}_t$, which obeys a random walk, and a temporary inflation shock, $\upsilon_t \sim N\left(0, \sigma_\upsilon^2\right)$. Formally, we have that:

$$\pi_t = \overline{\pi}_t + \upsilon_t \tag{1}$$

with

$$\overline{\pi}_t = \overline{\pi}_{t-1} + \eta_t \tag{2}$$

and $\eta_t \sim N\left(0, \sigma_\eta^2\right)$.

This is a reduced form model, in the sense that σ_η^2 is not independent of policy. Indeed, one may think of σ_η^2 as being inversely related to the central bank's control of inflation. Thus, a central bank that responds strongly to economic disturbances in order to prevent long-lasting movements in π_t from occurring can be thought of as reducing the variance of the innovations to the permanent shock, σ_η^2. Perfect inflation control could be though of as a case in which $\sigma_\eta^2 = 0$.

To proceed, suppose we estimate a first-order autoregressive model for inflation:

$$\pi_t = \rho\pi_{t-1} + \varepsilon_t \tag{3}$$

We can then show that the estimate of the autoregressive parameter, $\hat{\rho}$, is given by:

$$\hat{\rho} = \frac{(T-1)\sigma_\eta^2}{(T-1)\sigma_\eta^2 + \sigma_v^2} \tag{4}$$

where T denotes the sample length. Note that $\hat{\rho}$ is bounded by zero and unity. In any finite sample, $\hat{\rho}$ can be thought of as a measure of the relative importance of permanent, η_t, to temporary, υ_t, shocks to inflation. Thus, in economies in which permanent shocks to inflation dominate, $\hat{\rho}$ will be relatively high. As argued above, under IT (or any other monetary policy strategy in which the central bank moves interest rates aggressively to offset shocks to inflation), σ_η^2 and therefore $\hat{\rho}$ should both be relatively small. In the remainder of the paper we estimate ρ and check whether we can exclude $\hat{\rho} = 1$ in order to assess the central bank's level of control over inflation dynamics.

4 Measuring inflation persistence

While the model above is helpful for understanding how successful inflation targeting might reduce the persistence of shocks to inflation, it is highly stylized and too simple to take to the data. Following O'Reilly and Whelan (2005a) and Levin and Piger (2006), among others, our preferred measure of persistence is the sum of the autoregressive coefficients in a univariate process of inflation. Let α be an intercept term and ε_t a serially uncorrelated shock. We can then generalise (3) to an AR(q) process for inflation

$$\pi_t = \alpha + \sum_{k=1}^{q} \beta_k \pi_{t-k} + \varepsilon_t \tag{5}$$

The sum of autoregressive coefficients is $\rho = \sum_{k=1}^{q} \beta_k$. According to Andrews and Chen (1994), ρ is the best scalar measure of persistence in π_t, since a monotonic relationship exists between ρ and the cumulative impulse response function of π_{t+j} to ε_t. Rewrite expression (5) as

$$\pi_t = \alpha + \rho\pi_{t-1} + \sum_{k=1}^{q-1} \gamma_k \Delta\pi_{t-k} + \varepsilon_t \tag{6}$$

where $\Delta\pi_t = \pi_t - \pi_{t-1}$. If $\rho = 1$, the inflation process contains a unit root. In terms of the stylized model above, this can be thought of as a situation in which inflation control is poor and the variance of the permanent shocks is much greater than the variance of the transitory shocks. If, by contrast, $|\rho| < 1$, the process is stationary and there is at least some inflation control. In the empirical application below, the appropriate lag length $q \leq q^{\max}$ is chosen

according to the Akaike information criterion (AIC) with a maximum lag length of $q^{\max} = 6$ (quarters).

Estimates of ρ obtained from least squares estimation suffer from a downward bias as ρ approaches unity. Furthermore, confidence bands based on a normally distributed ρ do not have the correct coverage. Therefore, we follow the literature and resort to Hansen's (1999) median unbiased estimator of ρ. His grid bootstrap approach is used to construct confidence bands for ρ with correct coverage. The bootstrap calculations are based on 999 draws and 101 grid points over a range spanned by the sample persistence surrounded by four OLS standard errors.

The presence of structural breaks in the mean of the inflation process can bias the estimates of persistence upwards. To account for this bias we include an appropriate dummy variable d_t in the regression equation, which is unity in $t \geq s$, where s is the break date, and zero elsewhere

$$\pi_t = \alpha + \delta d_t + \rho \pi_{t-1} + \sum_{k=1}^{q-1} \gamma_k \Delta \pi_{t-k} + \varepsilon_t \tag{7}$$

5 Results

In this paper we use quarterly inflation rates, measures as the annualised change of the Consumer Price Index (CPI) in percentage points. The data spans the period 1985:1 to 2010:1 and is taken from the IMF's International Financial Statistics database.[5] We study Indonesia, Korea, the Philippines and Thailand, which all conduct monetary policy using IT.[6] We also present estimates for China, Taiwan, Japan, Malaysia and Singapore that gear monetary policy to price stability without relying on IT. Japan and Singapore have operated with a managed float and have maintained low and stable inflation since the early 1980s. With strong low-inflation credentials, neither economy has felt a need to adopt IT. Malaysia fixed the ringgit to the US dollar during the Asian financial crisis and only abandoned the peg in 2005 following the Chinese authorities' introduction of increased exchange rate flexibility for the renminbi. Monetary policy in Malaysia is now best described as following an eclectic strategy, but with considerable weight attached to inflation outcomes.

We also study data from Hong Kong SAR, which has operated monetary policy with a currency board since 1983. While this arrangement was intended to provide Hong Kong with a firm monetary anchor following an decade of high and volatile inflation after the introduction of floating exchange rates in the early 1970s, such arrangements generate pronounced swings in inflation in response to shocks to equilibrium real exchange rates.[7] Given the exchange

[5] Data for Taiwan is taken from Taiwan's Statistical Office.

[6] The Bank of Thailand targets core inflation, defined as inflation excluding fresh food and energy prices. However, to the extend that the deviation between core and headline inflation is temporary, this distinction would seem to be of little importance for the question at hand.

[7] See this discussion in Gerlach and Gerlach-Kristen (2006).

rate regime, it thus seems likely that shocks to inflation are more persistent in Hong Kong than elsewhere.

The set of countries in the Asia-Pacific region is completed by Australia and New Zealand. New Zealand was the first country to adopt IT in 1990 and Australia followed in 1993. We also present estimates for a number of non-Asian economies that conduct monetary policy with IT. This group includes both emerging (Chile, Israel and South Africa) and advanced economies (Norway, Canada, Sweden and the UK).

The inflation series are depicted in Figures (1) to (3). As a consequence of the Asian financial crisis in 1997-98, inflation rates rose sharply in Indonesia, Korea and Thailand, which introduced IT in response, and in Malaysia, which fixed the exchange rate. The figures also show that in many countries inflation rose sharply in 2007 in response to rising oil and food prices.

Table 1 offers some descriptive statistics for inflation in these countries and warrants two comments. First, inflation was typically been lower and less volatile in the last decade than before, suggesting that central banks have attached greater importance to price stability in setting monetary policy. Second, the importance of this shift seems independent of whether monetary policy is conducted using IT.

5.1 Before and after the Asian financial crisis

In this section we contrast inflation persistence in Asian economies before and after the Asian Financial Crisis in 1997-98 which led several Asian economies to adopt IT. This comparison is made difficult by the fact that the crisis in many cases led to a sharp but temporary increase in inflation. In order to account for this turbulent period we compare persistence in a pre-1997:2 sample with persistence in a post-2000:1 sample. However, this latter period is also disturbed by a sharp run-up in inflation in 2007, following large shocks to oil and food prices, which were more important for the economies studied here. We therefore report results both for the time period 2000:1-2007:2 and for a longer period ending in 2010:1.

The baseline findings for Asian IT economies are reported in Table 2. The estimates point to a significant reduction in inflation persistence all countries with the exception of Indonesia. Take Korea as an example. Prior to the Asian financial crisis persistence is estimated to be $\rho = 0.97$. In the post-2000 subsample, persistence drops to 0.59 which lies outside the confidence band surrounding the pre-1997 estimate. Moreover, we can exclude the unit-root case for all countries in the 2000-2010 subsample, again with the exception of Indonesia. In the 1990s, the sum of the autoregressive coefficient is statistically indistinguishable from unity. In the later period, however, unity is no longer covered by the confidence bands. In most cases persistence remains somewhat larger if the last two years of the sample period are not included in the estimation.

Turning to the Asian comparison group in Table 3, we note that persistence in the 2000-

2010 subsample increases for China, Hong Kong and Japan. Indeed, China and Hong Kong display the greatest levels of persistence, which is perhaps not surprising given their monetary policy regimes. Malaysia and Taiwan experience a fall in persistence, which is, however, very small compared to the group of IT economies. Interestingly, we cannot exclude the unit-root case for any of these non-IT economies.

In the non-Asian reference countries, inflation persistence broadly falls as show in Table 4. Again, the unit-root case cannot ruled out for most advanced economies.

5.2 Rolling window evidence

To illustrate the behavior over time of the persistence measure, we next estimate the model using a moving 10-year window. For each window, we also compute confidence intervals as explained above. Note that if we take the possibility of time variation in persistence seriously, we should also allow for the lag length of the AR models to vary across samples. The adoption of IT could lead to fewer lags being sufficient to describe the inflation process. Therefore, we allow the lag order to be different in each window as determined by the AIC. As mentioned before, neglecting a structural break in the mean inflation rate can lead to spuriously high estimates of inflation persistence. Thus far the literature on the performance of IT in Asian emerging market countries does not take account of this problem. As the estimation window moves over the sample period, the impact of structural breaks is reduced. Nevertheless, most estimation windows include the Asian crisis in 1997-98. Therefore, we control for a structural break in 1998:3 when the fallout from the Asian financial crisis was most readily apparent, without explicitly testing whether such a break occurred at this time.

The resulting series of persistence estimates together with bootstrapped 90% confidence bands are reported in figures (4) to (6). For Indonesia, the Philippines, Korea and Thailand we find a reduction of inflation persistence after the adoption of IT. This is consistent with the estimated over alternative subsamples considered before. While a reduction can be observed for all new IT countries, the rolling window evidence reveals interesting differences with respect to the timing of this reduction. The fall in persistence is not synchronized across countries. Inflation persistence in Korea and Thailand falls immediately after the new monetary regime became effective. Take again Korea as an example. Persistence drops from about unity to 0.5 in the first two years of IT. The Philippines witness a small drop in persistence immediately after the adoption of IT. A substantial reduction occurs only at the very end of the sample period. Likewise, persistence in Indonesia falls much later than in the other countries. The evidence also points to an increase in persistence as the financial crisis unfolds in 2008.

A note of caution is warranted here. While one is tempted to conclude that this decline is due to the adoption of IT, an alternative interpretation is that the sharp change of inflation following the onset of the Asian financial crisis constitutes a temporary shock, which reduces the estimated persistence of innovations to inflation. Once that episode drops out of the

eight-year window used to compute the graphs, the measured persistence rises back to some "normal," and relatively high, level.

The results for the Asian non-IT economies, which are presented in figure (5), are remarkably different. There is no clear tendency for inflation persistence over time. For most economies, persistence meanders around unity throughout the last decade. In the control group of non-Asian IT countries, see figure (6), we observe a drop in persistence following the adoption of IT in South Africa and Norway. This reduction, however, is only temporary and is reversed four or five years later.

It is also of interest to compare these results with those for Switzerland and the euro area.[8] Both economies adopted a new monetary regime at the turn of the century (1999 for the euro area and 2000 for Switzerland). Although neither central bank targets inflation, both central banks have adopted a numerical definition of price stability as the overriding objective for policy. Thus, the difference between these regimes and conventional IT strategies is limited. Interestingly, inflation persistence fell in both economies soon after the new regime was put in place, see figures (7) and (8).

5.3 Structural breaks in inflation persistence

In this subsection we formally test for stability of the autoregressive inflation process using a sequential F-test, i.e. the Andrews-Quandt maximum test statistic ($SupF$). Andrews and Chen (1996) and O'Reilly and Whelan (2005b) show that the size distortion of this statistic is substantial at high levels of persistence. Therefore, we cannot rely on the asymptotic critical values provided by Andrews (1993). Here we perform a bootstrap and estimate an AR(q) model by OLS over the sample size T, draw residuals and generate, based on the estimated coefficients, a set of N artificial series for $t = 1, ..., T$ consistent with the no-break model. For each of these generated series, we perform the break test. The α-th percentile of the resulting distribution is used as the $1 - \alpha$ percent critical value.

Figure (9) plots the sequential test statistic together with the 10% critical value based on 2000 bootstrap replications. Stability of the sum of the autoregressive coefficients can be rejected when the test statistic exceeds the critical value. The results corroborate our earlier findings. We find evidence for a structural break in Korea and the Philippines around the adoption of IT. For Thailand and Indonesia we identify signs of instability which lack statistical significance. In all other Asian economies we cannot support the notion of a drop in inflation persistence. Put differently, persistence changed in those economies that adopted IT but shows hardly any sign of change under alternative monetary regimes, most notably in China and Taiwan.

[8] These results are taken from Tillmann (2008) and (2010).

6 Conclusions

It is widely noted that the introduction of monetary policy strategies focussed on achieving low and stable inflation has been associated in many countries with a sharp decline in the persistence of inflation shocks. Formally, this literature proceeds by estimating a low-order autoregression for the quarterly percentage change in consumer prices and studies the estimated sum of the autoregressive parameters. Applying this approach to a sample of Asian countries which operate monetary policy with a range of strategies – including IT, exchange rate pegs and "eclectic" strategies – we find evidence that inflation persistence has declined under IT, but not under alternative monetary regimes.

Change this: What might explain these differences? We offer two hypotheses for future research. First, Asia has a long history of relatively modest and stable inflation. Moreover, the Asian inflation targeters have not been as successful as economies elsewhere in maintaining inflation close the targeted level. Overall, it is thus possible that the introduction of IT has not led to a large change in the behaviour of inflation. One potential reason why the inflation process has not changed significantly is that Asia central banks continue to attach great weight to the exchange rate in the formulation of monetary policy despite the adoption of IT. While this may be surprising from the perspective of central banks operating with IT elsewhere, policy makers in Asia may be particularly concerned about the exchange rate in light of the inherent risk of currency mismatches in the financial sector, as suggested by their experiences during the Asian financial crisis. Moreover, policy makers who are well aware of the high export dependence of Asian economies, may be concerned that exchange rate changes may impact on inflation and economic activity, which are both goal variables for central banks with IT.

Second, this differences may reflect differences in the structure of the economy rather than a lack of commitment of Asian central banks to low and stable inflation. For instance, the weight on food on the CPI is quite strongly correlated (inversely) with per capita income (IMF 2007, p. 13). Given that food prices are tend to be quite volatile, it is possible that they elicit much larger second-round effects on wages and other prices than in economies in which food is less important in the inflation process. If so, overall inflation control could worsen.

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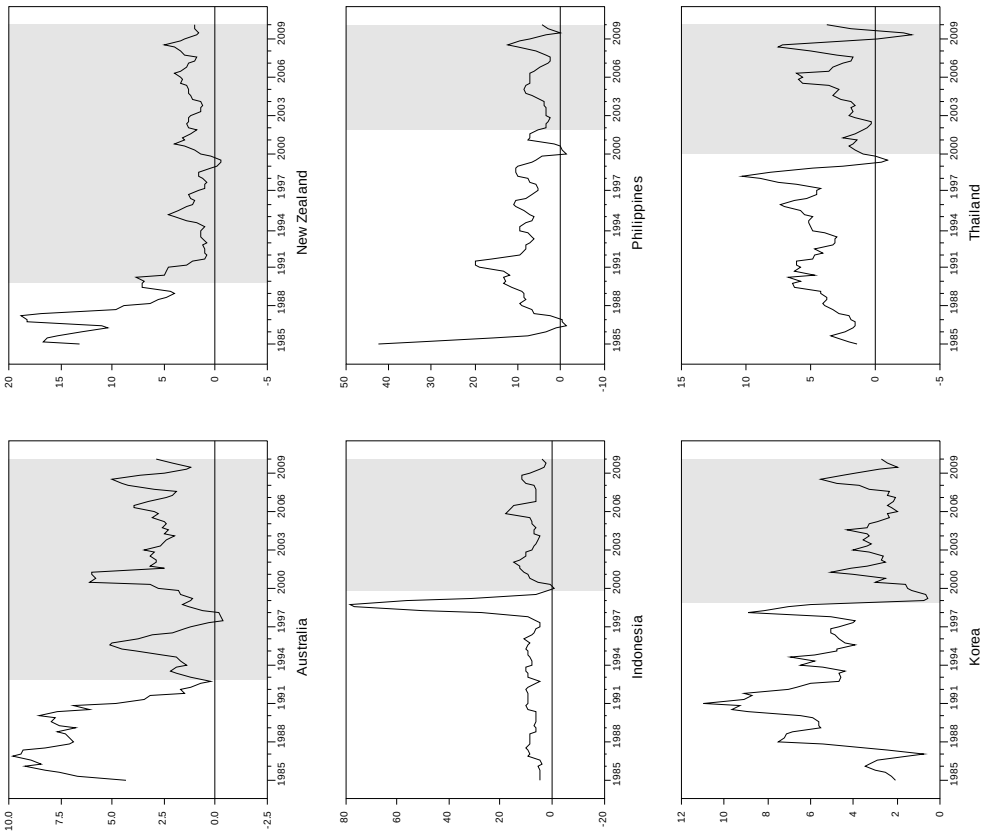

Figure 1: Inflation in Asian inflation targeting economies.

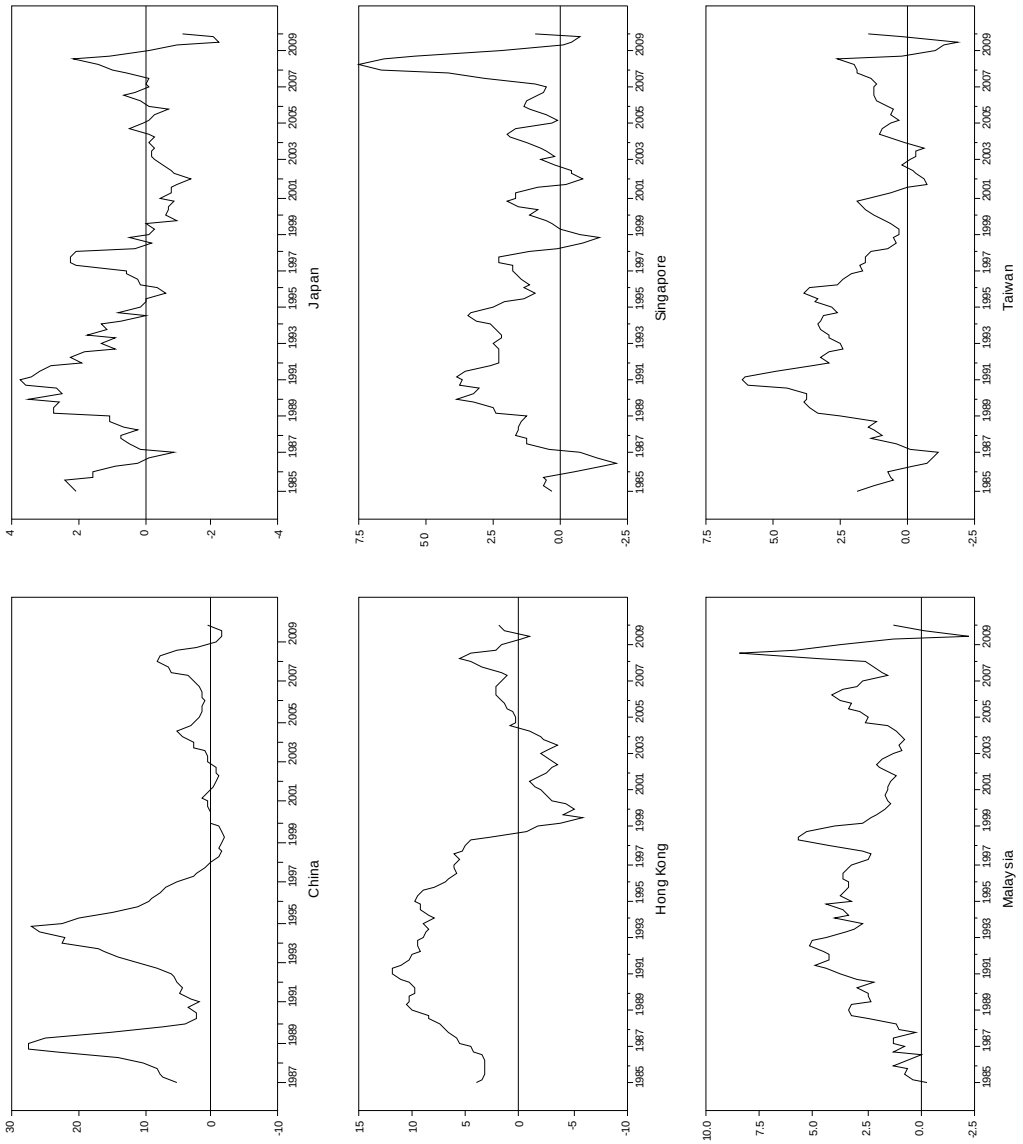

Figure 2: Inflation in Asian non-inflation targeting economies.

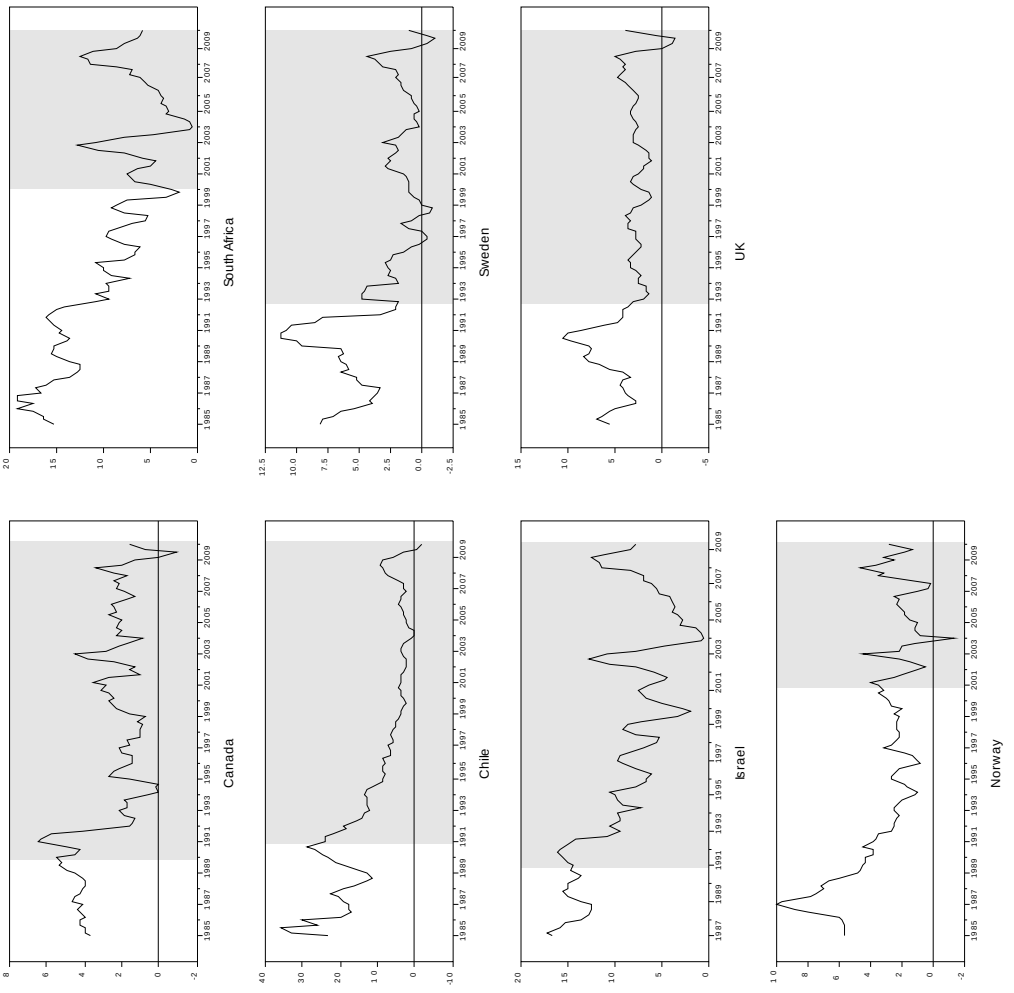

Figure 3: Inflation in other inflation targeting economies.

Table 1: Descriptive statistics

	Year of	Mean inflation		Variance of inflation	
	IT adoption	pre-1997:2	post-2000:1	pre-1997:2	post-2000:1
		Asian inflation targeters			
Australia	1993	5.96	3.25	8.97	1.41
Indonesia	2000	7.77	8.79	4.00	16.17
Korea	1999	5.44	3.17	4.98	0.88
New Zealand	1990	6.09	2.73	30.87	0.67
Philippines	2002	9.88	5.01	54.52	8.94
Thailand	2000	2.18	1.24	0.85	3.32
		Non-Asian inflation targeters			
Canada	1990	3.21	2.23	2.87	0.67
Chile	1991	16.67	3.74	53.39	4.67
Israel	1991	14.67	1.94	18.32	5.46
Norway	2001	4.12	2.11	5.70	1.63
South Africa	2000	12.93	5.31	13.05	14.24
Sweden	1992	4.79	1.63	9.68	1.18
UK	1992	4.53	2.76	5.61	1.55
		Asian non-inflation targeters			
China	-	11.80	1.96	65.16	5.93
Hong Kong	-	3.90	-0.01	1.58	1.96
Japan	-	1.31	-0.16	1.44	0.50
Malaysia	-	2.73	2.37	2.14	2.39
Singapore	-	1.76	1.54	1.96	3.99
Taiwan		2.47	0.64	2.88	0.88

Table 2: Inflation persistence in Asian IT countries

Economy	Sample	Lag order	ρ	90% Confidence band
Australia	1985:1 - 1997:2	6	1.01	$[0.91, 1.05]$
	2000:1 - 2010:1	5	0.58	$[0.30, 0.93]$
	2000:1 - 2007:2	4	0.46	$[0.19, 0.78]$
Indonesia	1985:1 - 1997:2	6	0.45	$[0.19, 0.74]$
	2000:1 - 2010:1	6	0.66	$[0.45, 0.89]$
	2000:1 - 2007:2	6	0.66	$[0.42, 1.04]$
Korea	1985:1 - 1997:2	5	0.97	$[0.83, 1.06]$
	2000:1 - 2010:1	4	0.59	$[0.39, 0.80]$
	2000:1 - 2007:2	1	0.73	$[0.51, 1.05]$
New Zealand	1985:1 - 1997:2	5	1.02	$[0.89, 1.08]$
	2000:1 - 2010:1	5	0.67	$[0.48, 0.92]$
	2000:1 - 2007:2	5	0.71	$[0.50, 1.00]$
Philippines	1985:1 - 1997:2	2	0.86	$[0.77, 1.01]$
	2000:1 - 2010:1	6	0.52	$[0.28, 0.81]$
	2000:1 - 2007:2	6	0.58	$[0.28, 1.03]$
Thailand	1985:1 - 1997:2	6	0.87	$[0.73, 1.04]$
	2000:1 - 2010:1	2	0.66	$[0.52, 0.82]$
	2000:1 - 2007:2	2	0.91	$[0.74, 1.07]$

Notes: The table reports Hansen's (1999) mean unbiased estimator of the sum of autoregressive coefficients ρ and the bootstrapped 90% confidence bands based on 101 grid points and 999 replications. The lag order is chosen according to the AIC.

Table 3: Inflation persistence in Asian non-IT countries

Economy	Sample	Lag order	ρ	90% Confidence band
China	1987:1 - 1997:2	6	0.85	[0.73, 1.02]
	2000:1 - 2009:4	5	0.98	[0.81, 1.08]
	2000:1 - 2007:2	5	1.02	[0.76, 1.12]
Hong Kong	1985:1 - 1997:2	6	0.94	[0.87, 1.02]
	2000:1 - 2010:1	5	1.03	[0.91, 1.09]
	2000:1 - 2007:2	1	1.03	[0.88, 1.12]
Japan	1985:1 - 1997:2	4	0.88	[0.73, 1.04]
	2000:1 - 2010:1	5	0.92	[0.64, 1.12]
	2000:1 - 2007:2	1	0.85	[0.62, 1.10]
Malaysia	1985:1 - 1997:2	5	0.94	[0.79, 1.08]
	2000:1 - 2010:1	5	0.78	[0.45, 1.10]
	2000:1 - 2007:2	4	0.79	[0.65, 1.10]
Singapore	1985:1 - 1997:2	5	0.90	[0.81, 1.02]
	2000:1 - 2010:1	6	0.89	[0.74, 1.06]
	2000:1 - 2007:2	2	0.65	[0.43, 0.90]
Taiwan	1985:1 - 1997:2	2	0.92	[0.83, 1.03]
	2000:1 - 2010:1	6	0.81	[0.56, 1.08]
	2000:1 - 2007:2	6	0.91	[0.67, 1.09]

Notes: The table reports Hansen's (1999) mean unbiased estimator of the sum of autoregressive coefficients ρ and the bootstrapped 90% confidence bands based on 101 grid points and 999 replications. The lag order is chosen according to the AIC.

Table 4: Inflation persistence in other IT countries

Economy	Sample	Lag order	ρ	90% Confidence band
Canada	1985:1 - 1997:2	5	1.05	$[0.94, 1.11]$
	2000:1 - 2010:1	5	0.61	$[0.25, 1.09]$
	2000:1 - 2007:2	4	-0.09	$[-0.43, 0.26]$
Chile	1985:1 - 1997:2	5	1.04	$[0.96, 1.08]$
	2000:1 - 2009:4	2	0.79	$[0.69, 0.91]$
	2000:1 - 2007:2	2	0.73	$[0.56, 0.93]$
Israel	1987:1 - 1997:2	6	0.90	$[0.78, 1.03]$
	2000:1 - 2010:1	2	0.77	$[0.65, 0.90]$
	2000:1 - 2007:2	2	0.78	$[0.64, 1.02]$
Norway	1985:1 - 1997:2	6	1.02	$[0.93, 1.06]$
	2000:1 - 2010:1	5	0.70	$[0.39, 1.13]$
	2000:1 - 2007:2	1	0.72	$[0.43, 1.08]$
South Africa	1985:1 - 1997:2	5	1.04	$[0.93, 1.10]$
	2000:1 - 2010:1	6	0.87	$[0.74, 1.04]$
	2000:1 - 2007:2	6	0.90	$[0.69, 1.08]$
Sweden	1985:1 - 1997:2	5	1.04	$[0.90, 1.09]$
	2000:1 - 2010:1	5	0.80	$[0.60, 1.06]$
	2000:1 - 2007:2	1	0.97	$[0.73, 1.13]$
UK	1985:1 - 1997:2	6	0.96	$[0.87, 1.04]$
	2000:1 - 2010:12	6	0.76	$[0.55, 1.04]$
	2000:1 - 2007:24	5	1.09	$[0.92, 1.21]$

Notes: The table reports Hansen's (1999) mean unbiased estimator of the sum of autoregressive coefficients ρ and the bootstrapped 90% confidence bands based on 101 grid points and 999 replications. The lag order is chosen according to the AIC.

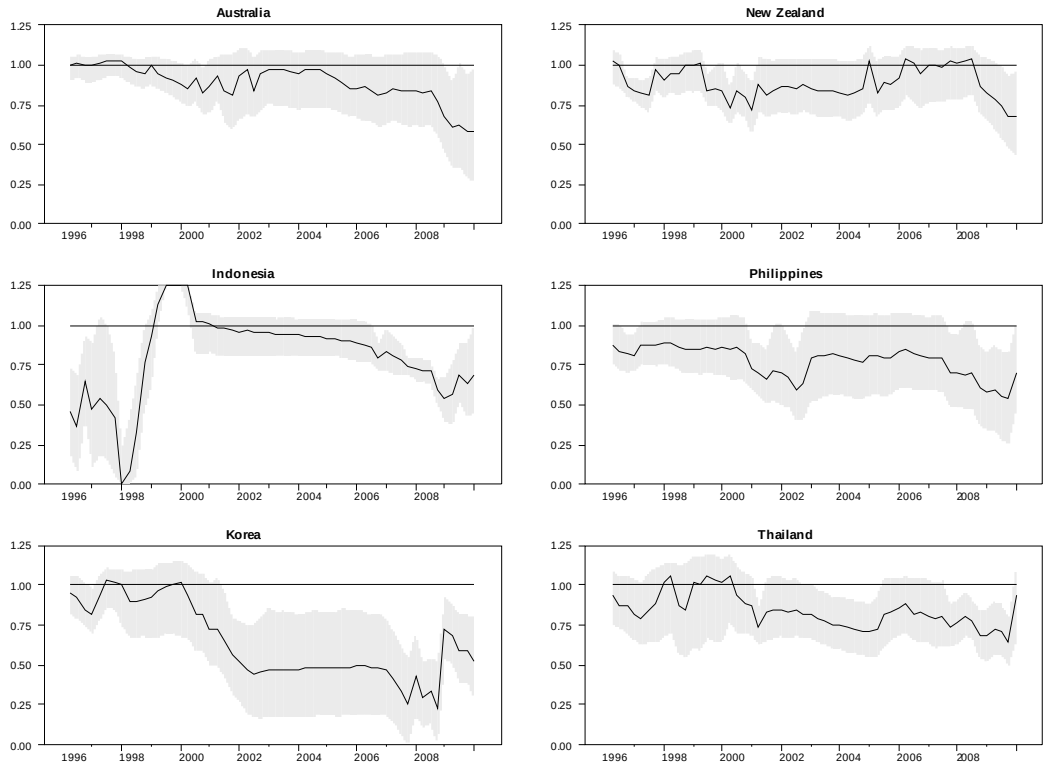

Figure 4: Median unbiased estimate of the sum of autoregressive coefficients with a 90% confidence band based on an 10-year rolling window for Asian IT economies

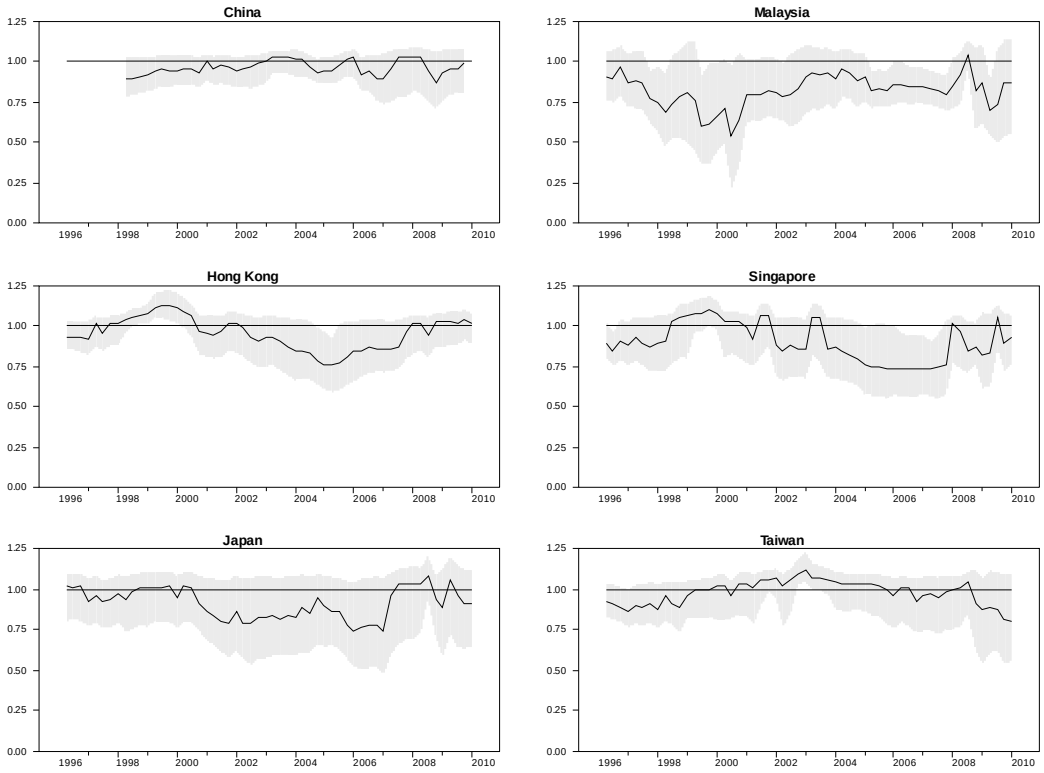

Figure 5: Median unbiased estimate of the sum of autoregressive coefficients with a 90% confidence band based on an 10-year rolling window for Asian non-IT economies

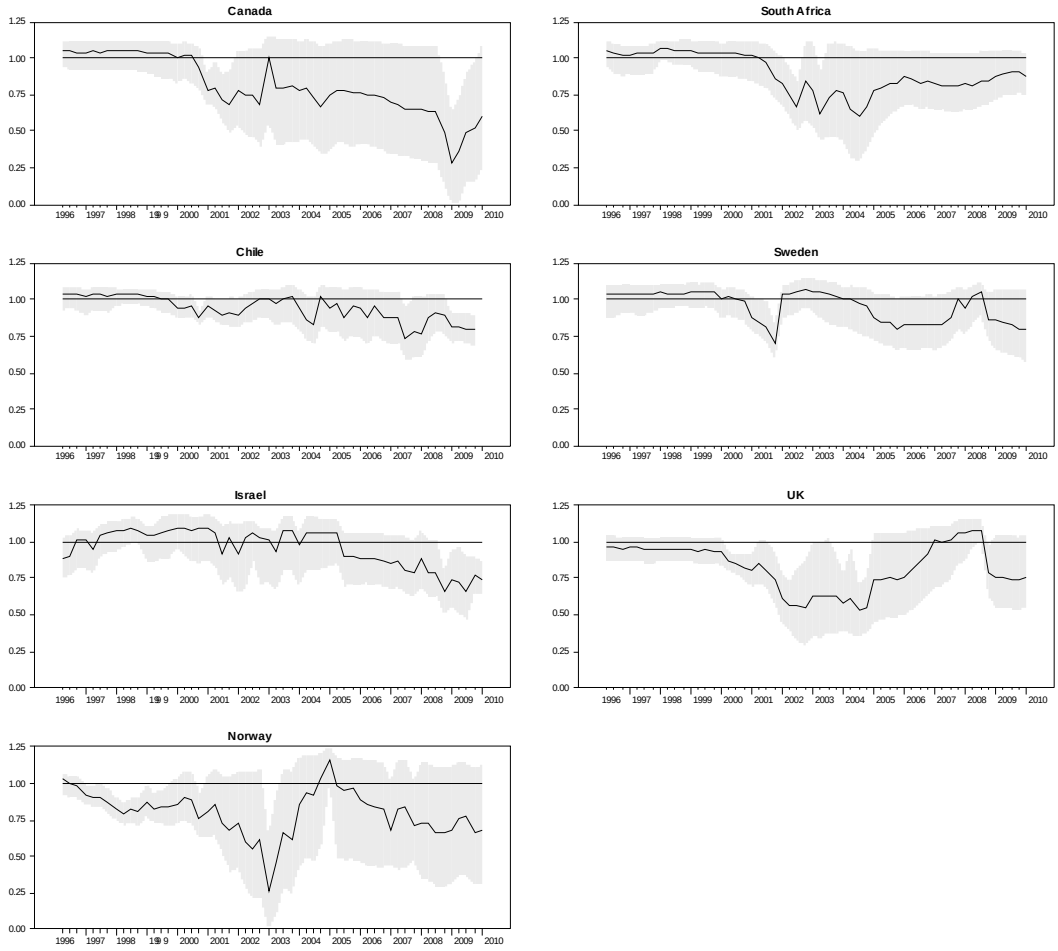

Figure 6: Median unbiased estimate of the sum of autoregressive coefficients with a 90% confidence band based on an 10-year rolling window for Non-Asian IT economies

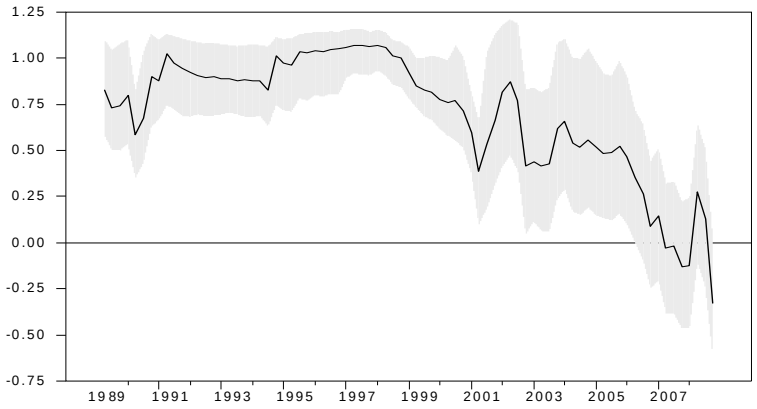

Figure 7: **Switzerland**: Median unbiased estimate of the sum of autoregressive coefficients with a 90% confidence band based on an 8-year rolling window, source: Tillmann (2010)

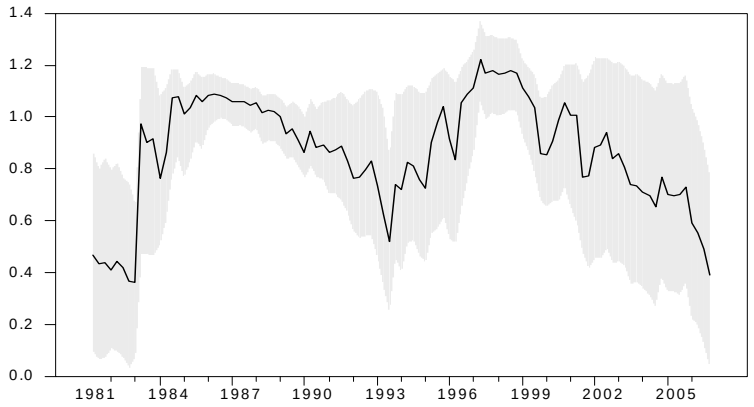

Figure 8: **Euro Area**: Median unbiased estimate of the sum of autoregressive coefficients with a 90% confidence band based on an 8-year rolling window for HICP inflation. The shaded area indicates the EMU period. Source: Tillmann (2008)

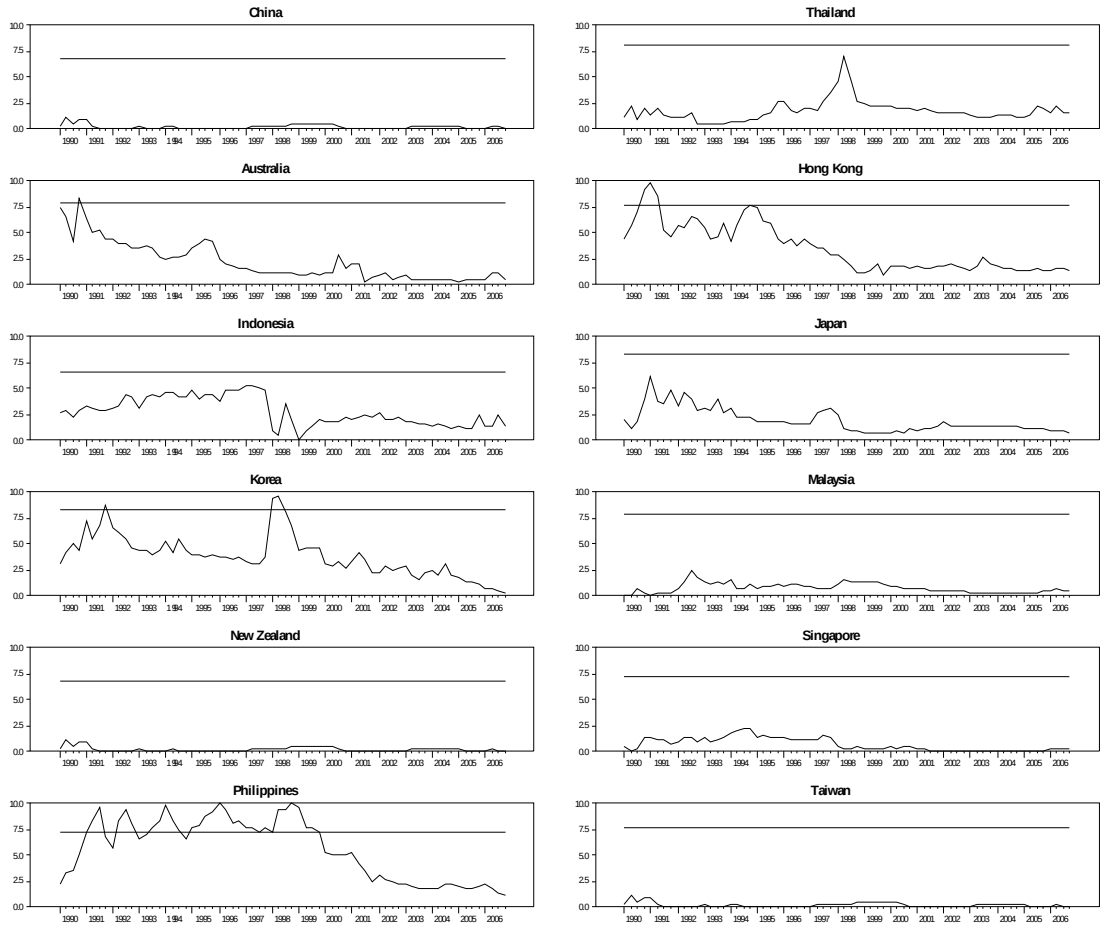

Figure 9: Sequence of Andrews-Ploberger $SubF$-test statistics for a break in the sum of the autoregressive coefficients and bootstrapped 10% critical value