The Political Economy of Exchange Rate Regimes: Evidence from Hong Kong and Taiwan

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Abstract

This paper investigates whether the macroeconomic performance of a small-open economy depends upon the choice of exchange rate regimes. Hong Kong and Taiwan, two economies with many similar macroeconomic characteristics, but different in their choices of exchange rate regimes, provide a good setting to study the relation between the choice of exchange rate regime and macroeconomic performance. We examine the basic facts of growth and inflation and the coefficients' stability of their VAR as well as cyclical characters of other aggregate variables in Hong Kong and Taiwan. Our empirical finding indicates that macroeconomic performance is not systematically related to the exchange rate regimes.

Keywords: exchange rate regime; monetary institution arrangement.

JEL: E52, E58, F33

1. Introduction

Hong Kong and Taiwan share similarities not only in their geographies and culture but also in their macroeconomic characteristics such as high degree of openness, labor market flexibility, and fiscal discipline.[1] Between them lies an important difference in the choice of exchange rate regime. Hong Kong adopted the floating exchange rate system until the third quarter of 1983 and then switched to the fixed exchange rate system. On the contrary, Taiwan had a pegged, but adjustable, exchange rate system before the fourth quarter of 1980 and a managed floating exchange rate system after that. Does the choice of exchange rate regime affect their performance such as inflation and growth?

Assuming a strong commitment mechanism, a fixed exchange regime theoretically provides an automatic rule for the conduct of monetary policy that helps mitigate the time-inconsistency problem and avoids inflation bias. There are several empirical studies confirming these kinds of models. McCarthy and Zanalda (1996) compare the macroeconomic performance of Caribbean countries to show that countries operating

[1] The openness degree in terms of the ratio of exports plus imports to GDP is high for Taiwan and Hong Kong. It is about 95% for Taiwan and 200% for Hong Kong while only 20% for Japan in the last three decades. In addition, as reported by World Bank (1993), labor markets in the high-performing Asian economies have been free of interventions that restrict labor mobility or repress wages and, on the other hand, both Hong Kong and Taiwan do not borrow abroad and keep public deficits within the limits they could absorb. In fact, data from Hong Kong Monthly Digest of Statistics and Taiwan Financial Statistics Monthly indicates that there is budget surplus for the two economies over the last two decades.

under a currency board system have lower inflation and higher economic growth. Ghosh, et al. (1997) provide stylized facts and regression results covering 136 International Monetary Fund members over 1960 to 1990 and find that inflation is both lower and more stable, but real volatility is higher, under a pegged exchange rate regime.

On the contrary, Baxter and Stockman (1989) compare the post-war stylized facts of 49 countries, including industrialized countries and LDC's, and find little evidence for systematic differences in the behavior of aggregate variables across alternative exchange rate regimes except for real exchange rates. Hutchison and Walsh (1992) conclude that Japanese output stability since the mid-1970s is not attributable to changes in her exchange rate regime. In addition, Ahmed, et al. (1993) show no differences in international business cycles between the U.S. and its foreign partner (composed of 5 other OECD countries) from a fixed exchange rate regime to a floating one.[2]

The countries examined in most empirical studies may have different structural characteristics. Furthermore, most industrial countries adopted floating exchange rates at roughly the same time as the first oil price shock occurred. It is not easy to isolate

[2] Taylor (1993) simulates the economic performance of the G-7 countries under several monetary policy rules and finds that the performance of output fluctuations and inflation are better with the flexible exchange-rate system than with the fixed-rate system.

the effect of the choice of exchange rate regimes on macroeconomic performance from oil price shocks and other structural differences. In order to isolate differences due to the exchange rate regime, Hong Kong and Taiwan, two economies with many similar macroeconomic characteristics but different in their choices of exchange rate regimes, provide a unique setting to study the relation between the choice of exchange rate regime and macroeconomic performance.

The remainder of this paper is organized as follows. Section 2 follows Edwards' (1999) model which focuses on the tradeoff between commitment and flexibility in selecting an exchange rate regime. The model is used to illustrate a common view about monetary policy: Discretionary policy (managed float) has flexibility, but its inflation performance is biased relative to a rule (fixed exchange rate). While a policy rule must be accompanied with a commitment mechanism to get its credibility in theory, monetary institutions must be properly designed to achieve the economy's optimal performance in practice. Section 3 therefore reviews the monetary authorities and exchange rate history of Hong Kong and Taiwan. Section 4 examines the two countries' macroeconomic performance in the sample period of 1975:1-2000:4. Section 5 concludes the paper and provides an issue on monetary institutional arrangement in forming a commitment mechanism to a specific policy rule for future research.

2. Fixed or Flexible? A Model of Small-Open Economies

Whether or not the choice of exchange rate regimes matters for the control of inflation and the smoothing out of aggregate fluctuations is quite interesting for discussion. Theoretically, there exists an active or contingent optimal rule that is superior to other policy rules under a stochastic environment, but subject to dynamic inconsistency. However, in practice no central bank follows such an exchange-rate-targeting rule (Svensson, 1999). This section therefore focuses on two types of practical exchange rate systems: A fixed (or pegged) rate and a discretionary managed float.

Let the growth rate of a small-open economy's aggregate output (or employment rate) at time *t*, y_t, equal its natural rate y^n plus a term that depends positively on the unexpected inflation rate and an exogenous shock:

$$y_t = y^n + \alpha[\pi_t - E_{t-1}(\pi_t)] + \varepsilon_t . \qquad (1)$$

Here ε_t is a white noise exogenous shock with mean zero and variance σ_ε^2. The operator E_t is defined by $E_t X \equiv E[X|\Omega_t]$, where X is a random variable, E is the mathematical expectation operator, and Ω_t is an information set available at time *t*.

For a small-open economy, the inflation rate (π_t) is the weighted average of domestic currency devaluation (d_t) and a change in the nominal wage rate (w_t):

$\pi_t = \theta d_t + (1-\theta) w_t$, in which the weight (θ) is between zero and one. The presence of nominal stickiness implies that the expected increase in the nominal wage rate is determined by private agents' expectation of inflation at the previous period: $w_t = E_{t-1}(\pi_t)$. It is clear from the definition of π_t that

$$w_t = E_{t-1}(d_t).$$

When a monetary authority selects an exchange rate regime, it sets a sequence of the domestic currency depreciation rate $\{d_t, t \geq 0\}$. The authority looks ahead of the intertemporal loss function conditioned on the information set at the time it makes the decision (period 0):

$$L = E_0(1-\beta)\left[Z_0 + \beta Z_1 + \beta^2 Z_2 + \cdots\right], \tag{2}$$

subject to equation (1).[3] Here β is the constant discount factor with $0 < \beta < 1$, and the temporal loss function at time t (Z_t) is given by

$$Z_t = a(y_t - ky^n)^2 + \pi_t^2,$$

in which a characterizes the monetary authority's preferences over the stabilization objective of output growth, and $k \geq 1$ implies that the natural rate of output growth (or full-employment rate) is too low due to tax distortion and externalities. In the limit

[3] We simplify the analysis by assuming that the economy, as with Hong Kong and Taiwan, does not bother with the balance of payments constraints.

$\beta \to 1$, the value of the intertemporal loss function (2) will approach the unconditional mean of the period loss function,

$$L = EZ_t,$$

as in Edwards (1999).[4] Finally, assume that the monetary authority and agents in the private sector form their expectations rationally.

2.1 Fixed Exchange Rate System

Suppose the economy has pre-commitment technology so that the "permanent" fixed exchange rate system is a feasible choice. Under the fixed exchange rate system, domestic currency depreciation by definition equals zero in each period, i.e., $d_t = 0$, and thus $\pi_t = 0$ and $y_t = y^n + \varepsilon_t$. The unconditional means of the inflation rates and output growth rates are zero and the natural rate, respectively. Let $\sigma_y^2 = (k-1)^2 (y^n)^2$. It is easy to see that the unconditional expected value of the monetary authority's loss function is given by $E[L^F] = a[\sigma_y^2 + \sigma_\varepsilon^2]$.

Although we assume that the monetary authority adopting a fixed exchange rate will always follow this policy rule, at every moment the authority has an incentive to make a surprise devaluation so as to increase output. What kind of monetary institutional arrangement can install a binding commitment under a fixed exchange rate

[4] Edwards (1999) is one of a few that has attempted to empirically identify the determinants behind the choice of a fixed exchange rate regime.

regime? According to Hanke and Walters (1992), a typical currency board contains two essential characteristics that inherit pre-commitment technology. First, it stands ready to exchange domestic currency for foreign reserve currency on demand at a pre-specified and fixed rate. Second, the domestic currency is issued based upon at least 100 percent reserves of securities denominated mainly in the foreign reserve currency. Once there is no resort to the printing press to pursue various policy objectives such as low unemployment and extraction of seigniorage revenues, adopting currency board adds fundamental credibility to the fixed exchange rate system. However, even a currency board can severely limit the monetary authority in conducting a discretionary policy and can make its decisions more credible, the currency board can be abandoned just as the fixed exchange rate system can be.

2.2 Discretionary Managed Float

A policy is discretionary when it is conducted on a period-by-period basis. Minimizing the loss function under discretion is potentially closer to the practice and decision framework of monetary authorities. Since $E_{t-1}(\pi_t)$ is given and ε_t is realized at time *t*, a discretionary monetary authority chooses the optimal current devaluation rate as

$$d_t = -\frac{\alpha a(1-k)y^n + \alpha a\varepsilon_t - [\alpha^2 a\theta - (1-\theta)][E_{t-1}(\pi_t)]}{\theta(\alpha^2 a + 1)}. \qquad (3)$$

If the private agents form their expectations rationally, then their expectations of

d_t must be consistent with equation (3). A consistent discretionary equilibrium is

$$d_t = -\alpha a(1-k)y^n - \frac{\alpha a}{\theta(\alpha^2 a+1)}\varepsilon_t,$$

and the equilibrium inflation rate becomes:

$$\pi_t = \alpha a(k-1)y^n - \frac{\alpha a}{\alpha^2 a+1}\varepsilon_t.$$

Clearly, the average inflation rate is above its zero target value due to the monetary authority's output stabilization objective with $k>1$. Furthermore, the volatility of inflation rates is also greater than its zero counterpart under a fixed exchange rate regime.

Under this discretionary managed floating exchange rate system, the unconditional mean of the objective function is given by $E[L^D]$:

$$E[L^D] = a\left[(\alpha^2 a+1)\sigma_y^2 + \frac{\sigma_\varepsilon^2}{\alpha^2 a+1}\right].$$

It is thus easy to show that

$$E[L^F] - E[L^D] = \frac{\alpha^2 a^2}{\alpha^2 a+1}\left[\sigma_\varepsilon^2 - (\alpha^2 a+1)\sigma_y^2\right].$$

When $E[L^F] > E[L^D]$, the managed floating exchange rate regime shall be chosen by the monetary authority. For example, when either the monetary authority's ambition of the output target measured by $(k-1)y^n$ is small enough or the variance of the exogenous shock (σ_ε^2) is large enough, the managed floating exchange rate regime is

preferred over the fixed exchange rate regime.

Since an optimal rule under a managed floating rate system is not practical in the real world, we focus on the comparison between a fixed exchange rate and a discretionary managed float. Our simple model gives us the common impression that inflation rates under a managed float regime are biased and with a higher volatility than under a fixed exchange rate regime. However, the overall performance (evaluated on the objective function of monetary authorities) is ambiguous between the two exchange rates regimes.

Before moving to the next section, there is one thing worth mentioning. Given a chosen exchange rate system, a monetary institution should be properly designed to achieve the economy's optimal performance. For example, a currency board can install a binding commitment under a fixed exchange rate regime, but a discretionary central bank cannot.[5] Both Hong Kong and Taiwan have had high growth and low inflation in the past four decades. We guess that most of the time Hong Kong and Taiwan's monetary institutional arrangements have been proper for the exchange rate regime they have chosen.

3. Hong Kong and Taiwan's Monetary Institutions and Exchange Rates History

Hong Kong's government established the Exchange Fund under the Currency

[5] Ghosh et al. (1998) find that the inflationary performance of IMF members under a currency board system is better than that under other fixed exchange rate regimes.

Ordinance in December 1935. This monetary arrangement has all the features of a currency board, with the exception that legal tenders were issued by authorized private banks rather than directly by the board. Unlike the central bank, the Exchange Fund does not have suitable policy instruments for monetary targeting. However, there have been several adjustments in the currency board. In 1988 the Exchange Fund established the new "Accounting Arrangements" to conduct open market operations. Since March 1990, the Exchange Fund has been permitted to issue several kinds of Exchange Fund Bills, which were similar to Treasury bills. In 1992 a sort of discount window was opened to provide liquidity to banks. The Hong Kong Monetary Authority was then established in December 1992 to take over the power of the Exchange Fund Office and the commissioner of Banking.

Taiwan's central bank resumed its operations on July 1, 1961. According to current central bank law, maintaining the external and internal purchasing power of its currency is not the only ultimate objective for the central bank. Both the Ministers of Finance and Economic Affairs are mandatory government representatives on the board, and the appointment of other directors is under government control. The parliament has no say in the formulation and conduct of monetary and exchange rate policies, and the central bank is not required to hold any regular public hearings and reveal the record of the board meeting. This setup in fact puts the central bank under the control of the

executive branch of the central government.

Hong Kong and Taiwan had different choices of exchange rate regimes after the first oil price shock. Following a violent speculative attack against U.S. dollars, Hong Kong abandoned the fixed exchange rate system on November 24, 1974. The performance of the Exchange Fund was traumatic during her floating rate period (November 26, 1974 - October 17, 1983). According to the official policy, the Exchange Fund passively supplied any amount of certificates of indebtedness denominated in U.S. dollars that the private banks requested in exchange for foreign currencies at market rates of exchange. In 1982 the British and PRC governments began to negotiate over the future of Hong Kong, and political uncertainty led to a series of financial crises. On October 17, 1983, Hong Kong returned to the full currency board and the exchange rate has been fixed at 7.8 HK dollars to one U.S. dollar ever since then.

On the other hand, Taiwan established its first currency market on February 1, 1979. During the first year of operation, the central bank and five designated banks determined the buying and selling rate of the exchange rate on a daily basis. Before that the central bank pegged the exchange rate and the Taiwan dollar seemed to be devaluated. The pegged exchange rate and huge trade surpluses led to a rapid accumulation of foreign reserves. After the central bank withdrew from its daily

process in the first quarter of 1981, the exchange rate system in Taiwan became a managed floating exchange rate system.

The predominant view in the sizable literature on exchange rate regimes is that pegged exchange rates can be an important anti-inflation tool. Knowing that Hong Kong and Taiwan have the monetary institutional arrangement compatible with their respective exchange rate regimes, the preconditions for the best performance under a specific exchange rate regime is satisfied. We can therefore examine whether the two countries' macro performance is consistent with the theoretical implications in section 2.

4. The Exchange Rate Regime and Macroeconomic Performance

This section provides basic facts for Hong Kong and Taiwan to examine whether the relation between the choice of exchange rate regimes and macroeconomic performance in terms of inflation and growth is consistent with the implications of the model in Section 2. Apart from the evidence of the simple statistics, regression results of a two-variable VAR are also investigated. Finally, cyclical characters of other aggregate variables under different exchange rate regimes are also compared.

4.1 Basic Facts of Inflation and GDP Growth Rates

Our sample consists of quarterly per capita GDP and CPI data from 1975:1 to 2000:4. The second sub-sample period 1983:4-2000:4 for Hong Kong (the first sub-sample period 1975:1-1980:4 for Taiwan) is treated as fixed-exchange-rate-regime

observations, while the first sub-sample period 1975:1-1983:3 for Hong Kong (the second sub-sample period 1981:1-2000:4 for Taiwan) is treated as flexible-exchange-rate observations. All data series have been seasonally adjusted before estimation.[6]

Table 1 reports the means and standard deviations of GDP growth rates and inflation rates for Hong Kong and Taiwan in the full sample period (1975:1-2000:4) and in different exchange rate regimes as well. The population means and standard deviations (with their standard errors in parentheses) in the sub-sample period are estimated as generalized method of moments (GMM) estimators using Hansen-Heaton-Ogaki GAUSS program estimator. The standard errors are robust to both heteroscedasticity and autocorrelation of the residuals. Values in brackets are $\chi^2(1)$ statistics' p-values for testing the null that the statistic estimated in the specific exchange rate regime equals the corresponding value for the data in the full sample period.

[Insert Table 1 here]

The statistics in Table 1 reveal that the fixed exchange rate regime does not have a better inflationary performance than the floating exchange rate regime. The statistics

[6] Data for Hong Kong are from the Census and Statistics Department, Hong Kong Administrative Region, while data for Taiwan are from its central bank and Directorate-General of Budget, Accounting and Statistics, Executive Yuan.

for Hong Kong's inflation is insignificantly different from their full-sample counterparts. However, the mean and variance of Taiwan's inflation rates are lower than average at a 1% significance level in the floating rate period, while the mean of its rates is higher at a 10% level in the fixed rate period. They indicate that inflationary performance improved over time for Taiwan. This is contrary to our model's predictions and inconsistent with the findings in both Ghosh et al. (1997) and Ghosh et al. (1998). On the other hand, the average annual growth rate of Taiwan's (Hong Kong's) real GDP in the fixed rate period is higher at a 10% level (although insignificant) than its full-sample counterpart. In addition, Taiwan's (Hong Kong's) real GDP is less volatile than average in the floating rate period (the fixed rate period) at a 5% (10%) level. These time-series properties appear to suggest that the oil price shock rather than the choice of exchange rate regime was the important determinant of macroeconomic performance for Hong Kong and Taiwan.

4.2 A Vector Autoregression (VAR) Analysis

The theoretical model in section 2 does not provide a testable structural econometric model for the output growth rate and inflation rate. Nevertheless, suppose that the reduced-form VAR system is an adequate description of the GDP growth rate (y_t) and inflation rate (π_t): $C + A(L)X_t = U_t$ in which C is the 2×1 constant vector, $A(L) \equiv I + A_1 L + A_2 L^2 + \cdots + A_p L^p$, $X_t = [y_t \ \pi_t]'$ is a vector of

stationary variables, and $U_t = [u_{1t} u_{2t}]'$ is a vector of serially-uncorrelated normal-distributed shocks.[7] Here L is the lag operator with $L^q x_t = x_{t-q}$, I is a 2×2 identity matrix, and A_i is a 2×2 matrix coefficient, for $i = 1, 2, 3, ... p$. The lag order in the VAR model, which is decided by the likelihood ratio test, is 4 for Hong Kong and 2 for Taiwan.

According to the theoretical predictions in section 2 and previous empirical studies (e.g., Ahmed et al., 1993), the most likely structural changes in the VAR system of X_t are volatility shift and regression parameter instability.[8] To detect the regression parameter instability, we can investigate whether the coefficients in $A(L)$ change across alternative exchange rate regimes. If the coefficients indeed change, then the dynamic responses are not the same for the two exchange rate regimes.

This paper first tests for the constancy of the variances, as this logically precedes the test for the constancy of the regression parameters. Given the normality and independence assumptions, the ratio of the estimated variances in the managed float rate period to those in the fixed exchange rate period is an F statistic.[9] The F-test statistics for testing the constant variances across the two exchange rate regimes are distributed with degrees of freedom $N_1 - 1$ and $N_2 - 1$, where N_1 is the number of observations in the floating rates regime, and N_2 is the number of observation in the

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[7] Phillips and Perron's $\hat{Z}_\alpha$ test shows that these variables are non-stationary in levels and stationary in growth rates.

[8] Both the slopes and intercepts' dummy variables for observations corresponding to the flexible exchange rate period are added when estimating the VAR system by OLS.

[9] Diagnostic tests in regression by Godfrey's Lagrange Multiplier tests indicate that the error terms are

fixed rate regime. The F-test statistics for the constant variance of u_{1t} and u_{2t} across the two exchange rate regimes are 2.08 and 1.26 for Hong Kong and 0.43 and 0.24 for Taiwan, respectively. The null hypothesis of the constant variances of U_t for Hong Kong and for Taiwan is rejected at the 1 percent significance level except for Hong Kong's u_{2t}.

According to F-test statistics, Hong Kong had a higher volatility of U_t under the floating exchange rate regime, while Taiwan had a higher volatility of U_t under the fixed exchange rate regime. Since Hong Kong and Taiwan adopted different exchange rate regimes in their first sub-sample periods, a higher volatility of U_t in the first sub-sample period indicates that the volatility patterns of the two aggregate variables cannot be systematically related to the exchange rate regime. Moreover, this evidence is consistent with the higher volatility of oil price changes in the 1970s.

We then investigate whether the exchange rate regime change has induced other structural shifts, leading to instability in the regression parameters. Due to the differences in the volatility of shocks, we adopt a weighted least squares estimation so that the parameter-instability test is conditioned on a non-constant variance across regimes. This amounts to testing for the significance of the slope dummies associated with A_1. The likelihood ratio statistics for this hypothesis, which are asymptotically distributed as $\chi^2(16)$ for Hong Kong and $\chi^2(8)$ for Taiwan, are 18.73 and 13.31, respectively. Both statistics are less than the 5 percent critical values. Thus, the dynamic interactions among inflation and GDP growth rate have been the same across exchange rate regimes for both Hong Kong and Taiwan. This result is consistent with Ahmed et al. (1993) who find no differences in the transmission properties of economic

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serially uncorrelated.

disturbances across exchange rate regimes.

4.3 Other Macroeconomic Performances

This paper also examines whether the cyclical behaviors of aggregate variables in Hong Kong and Taiwan such as GDP, consumption, investment, exports, imports, and real exchange rate are systematically related to the choice of exchange rate regime.[10] To compare our results with those in Baxter and Stockman (1989), we use their trend-removing procedures to induce the stationarity of relevant aggregate variables: (a) seasonal-difference the logarithm of the variable, and (b) removing a segmented linear trend fitted to the logarithm of a seasonally-adjusted variable.[11] All quantity variables are real and are measured on a per capita basis.

One would expect that the choice of exchange rate regime would have important effects on trade variables such as exports, imports, and real exchange rate. When using the first-differencing procedure, it is clear from Table 2 that the real exchange rate's volatility is high in the floating rate period. However, the difference is not statistically significant. This is surprising, because the real exchange rate's volatility is commonly thought to be associated with the floating exchange rate regime. While changes in imports' volatility are also insignificant, the volatility of Taiwan's exports is a distinct exception. The latter is significantly more stable in the floating rate period at a 1% level, independent of the two trend-removing procedures, as displayed in Table 2.

[Insert Table 2 here]

[10] Data source of Hong Kong: Whaton Econometric Forecasting Associates, Census and Statistics Department, Hong Kong Special Administrative Region, and International Financial Statistics (IFS), IMF. Data source of Taiwan: Financial Statistics, and National Income Accounts, Taiwan district, ROC. U.S. data: IFS, IMF.

[11] The breaking point in the linear trend is 1986:1. Seasonal factors are removed by dummy variables.

According to Baxter and Stockman (1989), all OECD countries except Italy experienced an increase in export volatility, but only three out of 23 non-OECD countries experienced the increase in the post-1973 floating rate period. Our finding also provides week support that changes in real trade variability depends on the choice of exchange rate regimes.

Table 2 also gives the average annual growth rates and volatility measures of GDP, consumption, and investment. The mean and standard deviation of consumption, just as the statistics of the real exchange rate, increase insignificantly under a floating exchange rate regime.[12] On the other hand, investment as well as GDP has a higher (lower) growth rate and volatility in a floating exchange rate regime for Hong Kong (Taiwan).[13] Of them, only Taiwan's GDP volatility with a linear detrending process is significantly higher in the fixed rate period and lower in the floating rate period. These results appear to suggest that the statistical properties of GDP may be related to the stage of economic development rather than the choice of exchange rate regime.

The business cycle phenomenon consists also of a common pattern of correlation between different aggregate variables and Table 3 presents the cross-correlation statistics. We turn to consumption and investment and their cross-correlation with GDP. The first observation is the rise in the correlation between consumption and

[12] Hong Kong experienced increases in the floating rate period only with the first-differencing procedure.

[13] Again, Hong Kong's did only with the first-differencing procedure.

GDP in the fixed rate period except for Taiwan with a differencing procedure. Some of the statistics in Hong Kong are significant. As for the correlation of investment and GDP, the estimate of Taiwan with a differencing procedure is not precise and many of these statistics even indicate a countercyclical investment. For the rest of the estimated correlation of investment and GDP, there is no significant difference across exchange rate regimes. For real exports and imports, the strong procyclical character in the fixed rate period was not generally applied to the floating rate period and many of these correlation coefficients are significantly different.[14]

[Insert Table 3 here]

As the U.S. is the most important trade partner for Hong Kong and Taiwan, we also examine whether their output cross-correlation with the U.S. differs across alternative exchange rate regimes. It can be seen in Table 3 that the output correlation with the U.S. generally loses its procyclical character in the second sample period for both Hong Kong and Taiwan. However, the standard errors for the estimates of correlation coefficients are large and none of the changes is significant.[15] In general, the changes in the casual structure between GDP and other aggregate variables appear to be independent of the choice of exchange rate regime.

[14] There are more phase-shifts with the seasonal differencing procedure for Taiwan.

[15] One possible interpretation of these results is that business cycles in the second sample period have been more country-specific than in the first sample period.

5. Concluding Remarks

The choice of exchange rate regimes has long been one of the most fundamental issues in international finance. In order to isolate differences due only to the exchange rate regime and not due to a 'post-1973' effect, this paper studies two episodes of countries which have many similar macroeconomic characteristics, but changed their exchange rate regime at different times - Hong Kong and Taiwan. However, our empirical study, either documented by simple statistics or a VAR analysis of inflation and growth, indicates that macroeconomic performance is not systematically related to the choice of exchange rate regimes.

On the other side, it is well known that the effect of an announcement depends on the extent to which the public believes the announcement itself. Today's giant global capital markets easily magnify any weaknesses in a country's commitment to targeting an exchange rate and leave little room for maneuver. A proper monetary institutional arrangement could be important for building the commitment mechanism. The 1997 Asian financial crisis, a time when many countries announced a target for their exchange rate, provides a good episode for examination. For Taiwan, the problem may be that there are too many competing objectives for the central bank. A central bank as a lender of last resort pledging that it will ignore all side effects indefinitely to defend the exchange rate is not likely to be credible. The secret of Hong Kong which

managed to beat back or to avoid altogether the speculative attacks in the fall of 1997 while still retaining an open capital market is the transparency and accountability of its monetary policy. Currency stability is the overriding goal in the currency board system. The practical arrangement of monetary institutions is therefore an interesting issue and worthy of further research.

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Table 1. Statistical Properties of Growth Rates of GDP and CPI

Variable	Mean (%)			Standard Deviation (%)		
			I. Hong Kong			
	1975:1-2000:4	Fixed	Floating	1975:1-2000:4	Fixed	Floating
GDP growth rate	1.13	0.87	1.64	2.13	1.71	2.68
		(0.25)	(0.36)		(0.24)	(0.34)
		[0.303]	[0.179]		[0.070]	[0.177]
Inflation rate	1.62	1.39	2.08	1.26	1.21	1.22
		(0.31)	(0.26)		(0.20)	(0.12)
		[0.476]	[0.127]		[0.775]	[0.742]
			II. Taiwan			
	1975:1-2000:4	Fixed	Floating	1975:1-2000:4	Fixed	Floating
GDP growth rate	1.56	1.98	1.43	1.13	1.52	0.94
		(0.19)	(0.14)		(0.39)	(0.10)
		[0.065]	[0.355]		[0.414]	[0.042]
Inflation rate	0.94	2.08	0.60	1.41	2.01	0.93
		(0.67)	(0.09)		(0.36)	(0.05)
		[0.058]	[0.003]		[0.444]	[0.000]

1. Hong Kong's fixed rate period is 1983:4-2000:4; its floating rate period is 1975:1-1983:3. Taiwan's fixed rate period is 1975:1-1980:4; its floating rate period is 1981:1-2000:4.
2. The means and deviations are estimated by GMM estimation. Numbers in parentheses are standard errors. Values in brackets are the p-values of the $\chi^2(1)$ statistics for testing the null that the statistic under a specific exchange rate regime equals the corresponding full sample moment.

Table 2. Statistical Properties of Aggregate Variables

Variable	Seasonal Differencing						Linear Detrending		
	Annual Growth Rate (%)			Standard Deviation (%)			Standard Deviation (%)		
	I. Hong Kong								
	1975:1-2000:4	Fixed	Floating	1975:1-2000:4	Fixed	Floating	1975:1-2000:4	Fixed	Floating
GDP	4.39	3.65	5.85	4.89	4.60	5.04	5.06	5.20	4.66
		(2.58)	(1.28)		(1.43)	(0.49)		(1.29)	(0.77)
Consumption	4.62	3.52	6.79	5.20	4.51	5.60	6.88	7.19	6.04
		(2.00)	(1.37)		(2.30)	(0.86)		(1.04)	(0.76)
Investment	4.71	3.50	7.07	9.31	9.14	9.05	12.02	11.82	11.12
		(3.07)	(5.17)		(3.29)	(2.16)		(1.96)	(1.94)
Exports	8.86	9.56	7.48	8.58	8.21	8.99	10.25	11.89	5.33
		(4.71)	(3.58)		(1.71)	(1.78)		(2.48)	(0.60)
Imports	9.62	9.86	9.17	9.49	9.14	10.02	12.34	14.03	7.73
		(5.60)	(4.41)		(2.51)	(1.41)		(2.57)	(1.42)
Real exchange rate	0.09	-1.85	3.37	5.56	4.61	5.59	6.09	6.38	4.93
		(4.10)	(3.26)		(1.68)	(1.02)		(3.54)	(3.77)
	II. Taiwan								
	1975:1-2000:4	Fixed	Floating	1975:1-2000:4	Fixed	Floating	1975:1-2000:4	Fixed	Floating
GDP	6.13	7.26	5.79	2.96	4.15	2.38	2.97	4.28*	2.31[a]
		(1.31)	(1.14)		(0.52)	(0.73)		(0.40)	(0.47)
Consumption	6.23	5.84	6.35	2.49	2.37	2.49	3.41	2.58	3.57
		(1.00)	(0.91)		(0.30)	(0.43)		(0.46)	(1.04)
Investment	6.88	9.67	6.04	7.73	9.18	6.97	9.38	9.35	9.03
		(3.48)	(2.10)		(2.28)	(0.74)		(1.18)	(0.99)
Exports	8.87	11.20	8.17	10.40	16.63	7.35**	7.05	11.23*	5.03**
		(4.77)	(2.11)		(2.37)	(1.16)		(1.80)	(0.50)
Imports	8.09	7.86	8.16	10.31	14.54	8.57	8.20	10.10	7.41
		(5.09)	(2.28)		(3.25)	(1.08)		(2.26)	(1.46)
Real exchange rate	0.12	-0.11	0.19	6.85	3.34	7.56	8.83	3.53	9.81
		(2.27)	(3.95)		(4.21)	(1.90)		(1.15)	(2.73)

1. See Table 1 for the description of the fixed rate period and floating rate period.

2. The means and deviations are estimated by GMM estimation. Numbers in parentheses are standard errors. Terms [a], *, and ** indicate the $\chi^2(1)$ statistics for testing the null that the statistic under a specific exchange rate regime equals the corresponding full sample moment is significant at the 10, 5, and 1 percent level, respectively.

Table 3. Cross-Correlations with GDP

	Correlation of X_{t-j} with GDP_t						
Variable (X_t) j:	-4	-2	-1	0	1	2	4
I. Hong Kong: Seasonal Differencing (Fixed / Floating)							
Consumption	.23/.50	.55/.38	.70/.48	.75/.37	.68/.30	.53/.18	.10/-.19
Investment	.40/.39	.63/.48	.60/.60	.46/.60	.22/.54	-.02/.47	-.34/-.11
Exports	.30/-.53*	.76/-.14	.86/.20*	.88/.62	.73/.57	.53/.51	.06/.01
Imports	.33/-.22*	.73/-.03	.82/.24[a]	.82/.45	.67/.61	.46/.52	.02/.16
U.S. GDP	-.01/.00	.11/.20	.17/.34	.18/.53	.14/.57	.01/.51	-.25/.02
II. Hong Kong: Linear Detrending (Fixed / Floating)							
Consumption	.71/.53	.83/.58*	.87/.71	.86/.49 [a]	.84/.59	.75/.43	.55/.10
Investment	.66/.74	.69/.65	.67/.70	.65/.77	.57/.69	.49/.50	.32/.18
Exports	.72/-.13	.89/.13	.90/.30*	.91/.66	.81/.52	.71/.56	.48/.43
Imports	.75/.40	.89/.39	.90/.45[a]	.91/.65	.83/.67	.73/.55	.53/.38
U.S. GDP	-.60/.05	-.57/.32	-.57/.40	-.57/.52	-.57/.59	-.59/.63	-.56/.55
III. Taiwan: Seasonal Differencing (Fixed / Floating)							
Consumption	.01/.49	.42/.65	.67/.66	.67/.63	.34/.44	-.01/.28	-.75/-.05
Investment	-.36 [a] /.31	-.52/.61	-.39/.62	-.32/.56	.03/.33	.33/.16	.26/-.26
Exports	-.58/-.33	.21/.26	.57/.52	.91/.73	.76/.68	.21/.53	-.41 [a]/.10
Imports	-.44/.15	.25/.62	.68/.75	.74/.75	.49/.55	.02/.38	-.53/-.05
U.S. GDP	-.11/.11	.57/.34	.79/.40	.78/.40	.60/.31	.16/.17	-.33/-.15
IV. Taiwan: Linear Detrending (Fixed / Floating)							
Consumption	.73/.63	.77/.77	.77/.72	.83/.78	.65/.60	.65/.57	.56/.35
Investment	.45/.54	.15/.56	.36/.58	.37/.69	.35/.62	.21/.52	.21/.39
Exports	.24*/-.43	.70*/-.11*	.74/.15 [a]	.86*/.26	.82/.21	.78 [a] /.19	.62 [a] /.15
Imports	.57/.31	.73/.58	.80/.76	.76/.74	.74/.68	.63/.55	.45/.30
U.S. GDP	.48/-.35	.75/-.20	.83/-.17	.85/-.18	.86/-.20	.84/-.26	.75/-.34

1. See Table 1 for the description of the fixed rate period and floating rate period.

2. See Table 2 for the description of the estimation method, and the definition of [a] and *.