Economic Growth Centre
Working Paper Series

Should China Let Her Exchange Rate Float? The Experience of Developing Countries

by

Cheng HSIAO and Siyan WANG

Economic Growth Centre
Division of Economics
School of Humanities and Social Sciences
Nanyang Technological University
Nanyang Avenue
SINGAPORE 639798

Website: http://www.hss.ntu.edu.sg/egc/

Working Paper No: 2005/09

Copies of the working papers are available from the World Wide Web at:

Website: http://www.hss.ntu.edu.sg/egc/

Preliminary
Not to be quoted
without the authors permission

Should China Let Her Exchange Rate Float? — the Experience of Developing Countries*

Cheng Hsiao
Department of Economics
City University of Hong Kong
and
University of Southern California
3620 S. Vermont Ave.
KAP300
Los Angeles, California 90089-0253
Tel: (213)740-2130
email: chsiao@usc.edu

and

Siyan Wang
Department of Economics
University of Delaware
316A Purnell Hall
Newark, DE 19716
Tel: (302)831-1924
email: wangs@lerner.udel.edu

April 18, 2005

*We would like to thank Echu Liu for making available his maximum likelihood computer program to us.

1. Introduction

China is under increasing pressure to let her currency float. In this paper we draw on the experience of developing countries choice of exchange rate regime and its impact on economic performance to conjecture what may happen should China let her currency float.

It is commonly argued that under floating (or flexible) exchange rate an economy has a greater ability to adjust to external shocks, hence contributing to improved economic performance (e.g. Friedman (1957), Meade (1951)), while fixed or pegged exchange rate results in price distortion and misallocation of resources. Furthermore, Calvo (1999) and others have also argued that the need to defend a peg in the event of a negative external shock could lead to a significant rise in real interest rate and uncertainty as to the substainability of the regime, hence harm investment prospects. On the other hand, fixed exchange rate or exchange rate peg contributes to predictability and macro discipline. It could reduce relative price volatility, reduce a country's vulnerability to speculative exchange rate fluctuations, hence lead to lower real interest rate and stronger growth performance as compared to an economy under flexible exchange rate. (Calvo (2000), Frankel (1999) and Mundell (1990)). Moreover, flexible exchange rate regime could amplify the negative effects of terms of trade shocks for countries where the private and public sectors have large foreign currency-dominated liabilities. Currency depreciation generated by the external shock could generate (large) increases in the value of the debt expressed in domestic currency which might trigger bankruptcies, and resulted in a reduction in the rate of growth.

Whether there exists a link between exchange rate regimes and growth is ultimately an empirical issue. Ghosh (1997) finds no systematic link between the two. On the other hand, Klein and Shambaugh (2004) show a large, significant effect of a fixed exchange rate on bilateral trade between a base country and a country that pegs to it. Levy-Yeyati and Sturzengger (2003), Edwards and Levy-Yeyati (2004) find that less flexible exchange

rate regimes are associated with slower growth, as well as with greater output volatility for developing countries, but do not have any significant impact on growth for industrial countries. Husain, Mody and Rogoff (2004) find that for relatively poor countries with little access to international capital markets, pegged exchange rate regimes have relatively low inflation and relatively high exchange rate regime durability. For advanced economics, flexible exchange rate systems yield somewhat higher growth without higher inflation. For emerging markets, the exchange rate regimes does not appear to have a systematic effect on inflation or growth.

This paper uses a more general model specification that encompasses those previously specified as special cases to help resolve this dispute. We shall also rely on our parameter estimates derived from the experience of developing counties to conjecture what might have happened to China's economic growth if China moves to flexible exchange rate. In section 2 we present the basic model. Section 3 describes the data. Section 4 presents the results for developing countries and uses the empirical estimates from developing counties to conjecture what might happen to China if exchange rate regime changes. Conclusions are in section 5.

2. The Model

A simple framework to analyze the impact of exchange rate regimes on economic growth is to assume a baseline growth equation for country i at time t taking the form

$$y_{it} = \alpha + \underset{\sim}{\beta}' \underset{\sim}{x}_{it} + \delta d_{it} + \epsilon_{it}, \tag{2.1}$$

where y denotes the growth rate, $\underset{\sim}{x}$ are determinants of growth such as those specified by Levine and Renelt (1992), Barro (1991), d is the dummy for the exchange rate regime with 1 for pegged exchange rate regime and 0 for flexible exchange rate regime, and ϵ denotes the zero mean error term that are assumed independent of $\underset{\sim}{x}$ and d. Then whether exchange rate regime affects a country's growth conditional on $\underset{\sim}{x}$ depends on the regression estimate of δ being significantly different from zero or not.

Model (2.1) assumes that the choice of exchange rate regime is independent of a country's growth rate.However, choices of exchange rate regimes could be made simultaneously with changes in macroeconomic variables. To allow for the possibility that d may be endogenous, we may assume that the exchange rate regime choice is determined by

$$d_{it}^{*} = \underset{\sim}{\gamma}' \underset{\sim}{z}_{it} + v_{it}, \tag{2.2}$$

and

$$d_{it} = \begin{cases} 1, & \text{if} \quad d_{it}^{*} > 0, \\ 0, & \text{if} \quad d_{it}^{*} \leq 0, \end{cases} \tag{2.3}$$

where $\underset{\sim}{z}$ denotes the determinants for exchange rate regime and v denotes the error term independent of $\underset{\sim}{z}$ and $\underset{\sim}{x}$. If v and ϵ are correlated, consistent estimate of δ may be obtained by jointly estimating (2.1) - (2.3).

Equation (2.1) essentially assumes that apart from a level change (given by δ) the optimal decision rules of economic agents conditional on $\underset{\sim}{x}$ in an economy are invariant under different exchange rate regimes. It is conceivable that regime changes can lead to modification of the behavioral parameters because optimal decision rules vary with changes in structures (e.g. Lucas (1976)). For instance, according to Ghosh, et.al. (1997) the investment to GDP ratio was about one percent higher in countries with pegged exchange rates than with flexible exchange rates. If behavior of economic agents stay the same conditional on investment and exchange rate regime a country chose, one would expect that other things being equal the growth rate of countries with pegged exchange rates would be higher than countries with flexible exchange rates. However, according to Ghosh et.al. countries operating under floating rates grow about 1 percent faster compared to countries operating under pegged exchange rates. As a matter of fact, economists have argued that although pegged exchange rates reduce policy uncertainties including exchange rate variability, but may also exacerbate protectionist pressures. On the other hand, flexible exchange rates could lead to expectation of lower quantity violation. With changing expectations, economic agents optimal decision rules may change also. To allow for changing

behavioral patterns under different exchange rate regime, we assume that the baseline growth equation for country i at time t under pegged exchange rate regime is given by

$$y_{it}^1 = \alpha_1 + \underset{\sim}{\beta}_1' \underset{\sim}{x}_{it} + \epsilon_{it}^1, \tag{2.4}$$

and under flexible exchange rate is given by

$$y_{it}^0 = \alpha_0 + \underset{\sim}{\beta}_0' \underset{\sim}{x}_{it} + \epsilon_{it}^0, \tag{2.5}$$

where ϵ_{it}^1 and ϵ_{it}^0 denote the zero mean error terms that are independent of $\underset{\sim}{x}_{it}$. By allowing $\underset{\sim}{\beta}_1$ to be different from $\underset{\sim}{\beta}_0$, we allow the possibility that exchange rate regime changes can fundamentally alter behavior of economic agents.

Under model (2.4) - (2.5), the effect of regime changes is given by

$$\begin{aligned} y_{it}^1 - y_{it}^0 = (\alpha_1 - \alpha_0) + (\underset{\sim}{\beta}_1 - \underset{\sim}{\beta}_0)' \underset{\sim}{x}_{it} \\ + (\epsilon_{it}^1 - \epsilon_{it}^0). \end{aligned} \tag{2.6}$$

However, we do not simultaneously observe y_{it}^1 and y_{it}^0. What we do observe is

$$y_{it} = d_{it} y_{it}^1 + (1 - d_{it}) y_{it}^0. \tag{2.7}$$

If $(v_{it}, \epsilon_{it}^1, \epsilon_{it}^0)$ are correlated, then conditional on $d_{it} = 1$,

$$E(y_{it} \mid \underset{\sim}{x}_{it}, d_{it} = 1) = \alpha_1 + \underset{\sim}{\beta}_1' \underset{\sim}{x}_{it} + E(\epsilon_{it}^1 \mid v_{it} > -\underset{\sim}{\gamma}' \underset{\sim}{z}_{it}), \tag{2.8}$$

and conditional on $d_{it} = 0$,

$$E(y_{it} \mid \underset{\sim}{x}_{it}, d_{it} = 0) = \alpha_0 + \underset{\sim}{\beta}_0' \underset{\sim}{x}_{it} + E(\epsilon_{it}^0 \mid v_{it} < -\underset{\sim}{\gamma}' \underset{\sim}{z}_{it}). \tag{2.9}$$

Because $E(\underset{\sim}{\epsilon}_{it}^1 \mid v_{it} > \underset{\sim}{\gamma}' \underset{\sim}{z}_{it})$ and $E(\epsilon_{it}^0 \mid v_{it} < -\underset{\sim}{\gamma}' \underset{\sim}{z}_{it})$ are different from zero, regressions of (2.4) using pegged exchange rate regime data and (2.5) using flexible exchange rate regime data will give biased estimates of $(\alpha_1, \underset{\sim}{\beta}_1)$ and $(\alpha_0, \underset{\sim}{\beta}_0)$.

If ϵ and v are uncorrelated

$$H_0^* : \epsilon_{it} \perp v_{it},$$

model (2.1) - (2.3) is reduced to model (2.1). If $\underset{\sim}{\beta}_1 = \underset{\sim}{\beta}_0 = \underset{\sim}{\beta}$,

$$H^{**} : \underset{\sim}{\beta}_1 = \underset{\sim}{\beta}_0 = \underset{\sim}{\beta},$$

model (2.2) - (2.5) is reduced to model (2.1) - (2.3). If v_{is} is dependent of $(\epsilon_{it}^1, \epsilon_{it}^0)$ and $\underset{\sim}{\beta}_1 = \underset{\sim}{\beta}_0 = \underset{\sim}{\beta}$,

$$H_0^{***} : v_{it} \perp (\epsilon_{it}^1, \epsilon_{it}^0) \text{ and } \underset{\sim}{\beta}_1 = \underset{\sim}{\beta}_0 = \underset{\sim}{\beta},$$

model (2.2) - (2.5) is reduced to the commonly specified model (2.1). However, these are testable hypotheses.

3. Data

We use panel data from 1974 - 1994 of Argentina, Bangladesh, Bolivia, Brazil, Cameroon, Chile, China, P.R.: Mainland, China, P.R.: Hong Kong, Columbia, Congo, Dem. Rep. of Costa Rica, Cote D'Ivoire, Ecuador, Ghana, India, Indonesia, Kenya, Korea, Madagascar, Malawi, Malaysia, Mali, Mauritius, Mexico, Morocco, Nigeria, Pakistan, Paraguay, Peru, Philippines, Senegal, Sierra Leone, Singapore, South Africa, SRI Lanka, Tanzania, Thailand,Tunisia, Turkey, Uganda, Urugay, Venezuela, Rep. Bol., Zambia, Zimbabwe.

For the growth regression, the dependent variable is annual growth rate of real per capita GDP in US$. The regressors we consider are: log of initial real per capita GDP in US$, lagged by one period, measure level of economic development, a negative coefficient would support the conditional convergence hypothesis; terms of trade shock, measured as% change in terms of trade (terms of trade is defined as the ratio of export unit price to import unit price) and their lag by one period; investment to GDP ratio, lagged by one period; consumption — share of government consumption in GDP, lagged by one period; openness — imports plus exports as a percentage of GDP, lagged by one period; gross — gross private capital flow as % of GDP, a measure of financial openness, lagged by one period; human capital as measured by primary school enrollment rate, 5-year backward moving average to remove missing data; and secondary school enrollment rate, 5-year backward moving average to remove missing data; and regional dummies: Asia, Africa,

Latin America (use middle eastern countries as benchmark). The interest rate variable is the 6-month London interbank rate (LIBOR).

For the determination of exchange rate regimes the dependent variable is a dummy variable that takes the value 1 for pegged exchange rate regime and 0 otherwise. For the determinants, we use peg dummy lagged by one period; last period black market premium, a measure of exchange rate misalignment, lagged by one period; terms of trade shock lag by one period; openness defined as imports plus exports as a percentage of GDP, lagged by one period; reserves over GDP, lagged by one period; volatility of reserves, lagged by one period, computed as the standard deviation of monthly reserves over that period's mean serve; lagged inflation rate based on CPI or GDP deflation in case CPI is not available; log of real GDP in US$, lagged by one period, measures the size of the economy; log of lagged GDP; and lagged backward 5-year moving average of real GDP growth.

For the classification of exchange rate regimes, we shall use

a. de jure classification by IMF: peg=1 if single currency peg or composite peg; 0 otherwise.
b. natural classification by Reinhart and Rogoff (2002). R&R classification scheme relies on a broad variety of descriptive statistics on exchange rate inflation, and detailed country chronologies to group episodes into 14 fine grids and 5 coarse grids of regimes. In our study, we are not interested in treating the high inflation cases separately. We therefore reclassify observations in the freely-falling category into the other 14 categories using information on secondary classification from the country chronologies prepared by R&R, regardless of the inflation rate and the nature of currency crisis. After the reclassification, the peg dummy is set to one if coarse grid takes the value of one.
c. de facto classification by Levey-Yeyati and Sturzengger (2003) (LY&S). Using cluster analysis, LY&S classify exchange rate regimes according to the actual

behavior of three variables: change in nominal exchange rate, the volatility of these changes, and the volatility of international reserves.

Most empirical studies on the choice and implication of exchange rate regimes have used the IMF *de jure* classification, which is based on the regime the country declares to be running. However, many countries that in theory have a flexible rate intervene in exchange market so pervasively that in practice very little difference exists with countries that have explicit fixed exchange rate regimes. Conversely, periodic devaluations of pegs in inflation-prone countries are the results of the implementation of monetary policies that are inconsistent with fixed exchange rates and that make the effective regime resembles a flexible arrangement. Moreover, countries that appear to behave according to the declared regime during tranquil time may be tempted to change their course of action once the regime is under stress. Thus, a very different picture of exchange rate regime choices may appear once the international context becomes more volatile.

Recognizing the inadequacy of the IMF's de jure classification, several authors have proposed de facto classification schemes. Among them, Reinhart and Rogoff's (2004) "Natural" classification and Levy-Yeyati and Sturzenegger's (2005) de facto classification have been gaining popularity.

IMF classification does not distinguish between tranquil time and crisis time. LY&S claims they do (in a purely statistical way) by examining the absolute and relative size of exchange rate and reserves volatility. R&R Natural classification employs a rolling five-year horizon to measure the true flexibility of the regime. This helps distinguish between longer-term "regimes" and shorter-term "spells" within a regime, such as the widening of a horizontal band or a one-time devaluation followed by a re-peg. However, LY&S classification results in inconclusive results for some observations. There is also an issue when new observations become available, would the current classification of observations also change? On the other hand, R&R natural classification seeks to address the potential misclassification by separating episodes of macroeconomic instability that are characterized by

very high inflation rates, often reflected in high and frequent exchange rate depreciation, into a "freely falling" category. Classification of such episodes as floating, intermediate, or pegged is problematic, since the macroeconomic disturbances could be incorrectly attributed to the exchange rate regime. Freely falling episodes are typically classified under other systems as freely floating.

Since there is no uniformly acceptable criterion for classifying exchange rate regimes, we shall use all three classification to see if the statistical results are sensitive to the classification schemes.

Data Sources of these variables are from: World Development Indicator, IMF International Financial Statistics, IMF Direction of Trade Statistics, Annual Report on Exchange Arrangement and Exchange Restrictions: various years, World Currency Yearbook: various years, Cukierman, Alex (1992), Central Bank Strategy, Credibility, and Independence, Cambridge, Sierman, Clemens, L.J. (1998), Politics, Institutions and the Economic Performance of Nations, Edward Elgar; Cheltenham, Levy Yeyati and Sturzeneggner (2003), "Classifying Exchange Rate Regimes: Deeds vs. Worlds", available at www.utdt.edu/ fsturzen, and Reinhart, Carmen and Kenneth S. Rogoff (2002), "The Modern History of Exchange Rate Arrangements: A Reinterpretation", NBER working paper 8963.

4. Empirical Results

Table 1 presents the summary statistics of real per capital GDP growth of our data. Table 2 presents the ordinary least squares estimates of (2.1). Table 3 presents the maximum likelihood estimates of model (2.1) - (2.3). Table 4 presents least squares estimates of (2.4) and (2.5). Table 5 presents the maximum likelihood estimates of model (2.2) - (2.5). Table 6 presents the results of testing model 1 ((2.1)) against model 2 ((2.1) - (2.3)), model 1 against model 3 ((2.2) - (2.5)) and model 1 against model 3.

It is clear from these tables that the results are indeed highly sensitive to the way exchange rate regimes are classified. However, some general pictures also appear no matter which classification is used: First, our results appear to favor model 3 as a maintained

hypothesis. Second, government consumption had no direct effect on private productivity, but lowered growth through the distorting effects from taxation or government-expenditure programs (e.g. Barro and Xavier (1995)). Third, we have not found evidence that terms of trade shocks get amplified in countries that have more rigid exchange rate (e.g. Edwards and Levy-Yegati (2003)). Fourth, political instability appears detrimental to economic growth. Fifth, there is no evidence supporting the conditional convergence in levels of per capital income across countries (the coefficients of lagged GDP are positive in terms of IMF classification and are negative in terms of LY&S classification, but neither are statistically significant. The R&R classification yields negative and statistically insignificant estimate for flexible exchange rate regime and statistically significant estimate for pegged rate regime, however, its value is so unreasonable (-1.98) which leads one to doubt its reliability).

Table 7 presents the actual growth rate of China and the predicted growth rate under different exchange rate regimes using China's average values for the period, 1974-1993, or 1980-1993 or 1993. The IMF or LY&S classification suggest that should China switch from pegged to floating rate, China's growth rate might be reduced by 1.5 to 2 percentage point. On the other hand, R&R classification suggests the reverse outcome which could lead to an increase of growth rate by about 5 percent. However, the predicted growth rates under pegged rate are so far off from China's actual, the validity of this inference based on R&R classification is quite doubtful.

5. Conclusions

A number of developing countries have experienced currency crises with severe costs in the past three decades. There are extensive debates about systems for achieving both exchange rate stability and domestic price stability to prevent crises. It is often argued that economies cannot have capital mobility, independent monetary policy, price and exchange rate stability simultaneously. In this paper we have developed a more complete model specifications that encompasses specifications used in previous studies to focus on

the impact of exchange rate regime on economic growth. Based on the experience of developing countries, we found holding investment, openness, government consumption constant, countries following a pegged rate rather than floating rate tend to grow 1.5 - 2 percent faster in terms of IMF and LY&S classification but yields reverse projection in terms of R&R classification.

However we must caution the over-generalization of this study. Our study only focuses on one aspect of an economy. We have not looked at many other aspects of the outcomes associated with exchange rate regime changes such as the effects of shocks (speculative attacks) on international payments, pass-through of exchange rate changes to consumer import prices, inflation, legal and judicial systems, market based disciplines, the entry of foreign banks, capital controls, financial liberalizations, or other aggregative activities and their volatility. The lack of exchange rate adjustments under a peg could result in serious price distortion and misallocation of resources. Moreover, pegs could be more likely subject to speculative attacks, hence induce higher output volatility. Before the 1997 East Asian financial crises, all the crises countries followed a de factor dollar-pegged system. Government budgets were more or less balanced. Inflation rates were manageable. Financial markets were buoyant for the assets of the countries in question and therefore by major inflows of capital (the GDP growth rate for South Korea, Indonesia, Malaysia and Thailand in 1996 are 7.1%, 8%, 8.6%, 5.5%, respectively, and the inflation rate is 4.9%, 7.9%, 3.5% and 5.9%, respectively). However, when domestic currencies became over valued because of higher domestic inflation than the US and the rise of the dollar vis-á-vie major industrialized currencies, notably the Japanese yen and the German duetschemark, the weak domestic financial system, excessive unhedged foreign borrowing by the domestic private sector, and a lack of transparency about the ties among government, business, and banks caused investors to abruptly changed their attitudes, leading to bouts of panic and massive outflow of capital. The sudden interruption of capital flows unleashed a profound crisis in domestic financial system and productive sectors. Floating exchange rate has

the advantage that relevant information becomes available promptly to allow market to operate efficiently and there is less chance for a country subjecting to speculative attack. However, the cost of transition to the floating region could be high if there are serious banking and financial sector weakness (e.g. Summers (2000)). Given hedging instruments such as currency futures and options are not fully available in China and China's relative inexperience in handling sudden large capital flows and imperfect information, perhaps instead of converting to a completely free flexible exchange rate regime, a "closely managed flexible system" focusing on stabilizing RMB against a currency basket that have weights directly proportional to the currencies of China's major trading partners might be a more suitable and sustainable alternative in the near future.

References

Barro, R. (1991), "Economic Growth in a Cross Section of Countries", *Quarterly Journal of Economics*, 106, 407-443

Berger, H., J.E. Sturm and J. Haan (2000), "An Empirical Investigation into Exchange Rate Regime Choice and Exchange Rate Volatility", CESifo working paper no. 263.

Broda, C. (2001), "Coping with Terms-of-Trade Shocks: Pegs versus Floats", *American Economic Review, Papers and Proceedings*, 91, 376-380.

Calvo, G. (1999), "Fixed versus Flexible Exchange Rates: Preliminaries of a Turn-of-Millennium Rematch", mimeo, University of Maryland.

_____ "The Case for Hard Pegs in the Brave New World of Global Finance", mimeo, University of Maryland.

Collins, S. (1996), "On Becoming More Flexible: Exchange Rate Regimes in Latin America and the Carribbean", *Journal of Development Economics*, 51, 117-138.

Edwards, S. (1996), "The Determinants of the Choice between Fixed and Flexible Exchange-Rate Regimes", NBER, working paper no. 5726.

Edwards, S. (2000), "Exchange Rate Systems in Emerging Economics"

Edwards, S. and E. Levy-Yeyati (2003), "Flexible Exchange Rates as Shock Absorbers", NBER working paper 9867.

Frankel, J. (1998), "No Single Currency Regime is Right for All Counties or at All Times", NBER working paper no. 7388.

Friedman, M. (1953), "The Case for Flexible Exchange Rates", in *Essays in Positive Economics*, Chicago: University of Chicago Press.

Ghosh, A.R., A. Gulde, J.D. Ostry and H.C. Wolf (1997), "Does the Nominal Exchange Rate Regime Matter", NBER working paper 5874.

Heckman, J. (1979), "Sample Selection Bias as a Specification Error", *Econometrica*, 47, 153-161.

Heller, R. (1978), "Determinants of Exchange Rate Practices", *Journal of Money, Credit and Banking*, 10, 308-321.

Holden, P., M. Holden and E. Suss (1979), "The Determinants of Exchange Rate Flexibility: An Empirical Investigation", *The Review of Economics and Statistics*, 61, 327-333.

Husain, A., A. Mody and K.S. Rogoff, (2004), "Exchange Rate Regime Durability and Performance in Developing versus Advanced Economies", NBER working paper 10673.

Klein, M.W. and N.P. Marion (1997), "Explaining the During of Exchange-Rate Pegs", *Journal of Development Economics*, 54, 387-404.

Klein, M.W. and J.C. Shambaugh (2004), "Fixed Exchange Rates and Trade", NBER working paper 10696.

Levy-Yeyati, E. and F. Sturzegger (2003), "To Float or to Fix: Evidence on the Impact of Exchange Rate Regimes on Growth", *American Economic Review*, 93, 1173-1193.

_____ (2005), "Classifying Exchange Rate Regimes: Deeds versus Worls", *Europe Economic Review*, 49, 1603-1635.

Lucas, R.E., Jr. (1976), "Econometric Policy Evaluation: A Critique", in K. Brunner and A.H. Meltzer (eds), *The Phillips Curve and Labor Markets*, Carnegie-Rochester Conference Series on Public Policy, vol. 1, North-Holland, Amsterdam.

Meade, J. (1951), *The Theory of International Economic Policy*, 2 volumes.

Melvin, M. (1985), "The Choice of an Exchange Rate System", *Journal of Money, Credit and Banking*, 17, 467-478.

Mundell, R. (1995), "Exchange Rate Systems and Economic Growth", *Rivista di Politica Economica*, 85, 1-36.

Reinhart, C.M. and K. Rogoff (2004), "The Modern History of Exchange Rate Arrangements: A Reinterpretation", *Quarterly Journal of Economics*, 119, 1-48.

Summers, L. (2000). "International financial Crises: Causes, Prevention and Cures", *American Economic Review*, Papers and Proceedings, 90, 1-16.

Table 1. Summary Statistics of Real Per Capita GDP Growth

	All	IMF		R&R		LY&S		Asia	Africa	Latin American
		Fix	Flexible	Fix	Flexible	Fix	Flexible			
Mean	1.17	0.91	1.41	1.31	1.11	1.09	1.23	4.11	-0.95	0.99
Media	1.98	1.55	2.26	1.82	1.95	1.71	2.00	4.20	-0.53	1.59
Minimum	-17.91	-15.72	-17.91	-15.42	-17.91	-15.72	-17.91	-7.65	-17.91	-14.93
Maximum	16.90	16.90	9.91	16.90	10.69	16.90	10.86	10.81	16.90	10.86
Standard Deviation	5.09	5.39	4.78	5.44	4.94	5.38	4.87	2.94	5.75	4.61

Table 2. OLS Estimation of Equation (2.1)

Growth Equation

	IMF	R&R	LY&S
Peg (Peg=1 if fixed)	.620	1.05**	1.02**
	(.425)	(.501)	(.468)
PCGDP(-1)	-.081	-.147	-.078
	(.375)	(.402)	(.404)
Terms of Trade Shock	.039***	.038***	.039***
	(.012)	(.012)	(.014)
Terms of Trade Shock (-1)	.028**	.028**	.026**
	(.012)	(.012)	(.013)
Investment (-1)	.045	.024	.034
	(.032)	(.032)	(.034)
Government Consumption (-1)	-.164***	-.189***	-.171***
	(.051)	(.053)	(.056)
Openness (-1)	.005	.008	.009
	(.006)	(.006)	(.006)
LIBOR	-.147***	-.173***	-.138**
	(.054)	(.055)	(.058)
Secondary School Enrollment	.021	.019	.018
	(.017)	(.017)	(.017)
Social-Political Instability	-1.76***	-1.95***	-1.77***
	(.546)	(.546)	(.586)
Legislative Effective	.018	.022	.026
	(.020)	(.020)	(.021)
Sub-Sahara Africa	-3.53***	-3.95***	-4.47***
	(.596)	(.635)	(.696)
Latin American	-2.53***	-2.50***	-2.79***
	(.662)	(.708)	(.701)
Middle East & North Africa	-.875	-.695	-.807
	(.805)	(.854)	(.948)
Constant	4.14	6.95	5.64
	(2.06)	(2.20)	(2.31)

Notes: Standard errors are in parenthesis
* Significant at 10% level
** Significant at 5% level
*** Significant at 1% level

Table 3. Joint ML Estimation of Growth and Exchange Rate Regime Equations (2.1) – (2.3)

Growth Equation

	IMF	**R&R**	**LY&S**
Peg (Peg=1 if fixed)	2.22**	2.19**	5.23***
	(1.04)	(1.06)	(1.59)
PCGDP(-1)	.273	-.115	.358
	(.389)	(.398)	(.435)
Terms of Trade Shock	.038***	.038***	.038***
	(.012)	(.012)	(.013)
Terms of Trade Shock (-1)	.025**	.026**	.021
	(.012)	(.012)	(.013)
Investment (-1)	.039	.024	.020
	(.032)	(.032)	(.034)
Government Consumption (-1)	-.161***	-.187***	-.179***
	(.051)	(.053)	(.056)
Openness (-1)	.003	.008	.007
	(.006)	(.006)	(.007)
LIBOR	-.155***	-.169***	-.145**
	(.053)	(.054)	(.057)
Secondary School Enrollment	.021	.021	.023
	(.017)	(.017)	(.016)
Social-Political Instability	-1.29**	-1.77***	-.940
	(.613)	(.553)	(.692)
Legislative Effective	.023	.024	.039*
	(.020)	(.020)	(.021)
Sub-Sahara Africa	-3.79***	-3.89***	-4.94***
	(.607)	(.629)	(.706)
Latin American	-2.79***	-2.45***	-3.41***
	(.675)	(.701)	(.737)
Middle East & North Africa	-1.17	-.789	-1.24
	(.814)	(.847)	(.945)
Constant	2.30	6.18	1.47
	(2.32)	(2.26)	(2.80)

Table 4. OLS Estimation of Equations (2.4) and (2.5)

Growth Equation --- Fixed Exchange Rate Regime

	IMF	**R&R**	**LY&S**
PCGDP(-1)	.073	-2.37**	-.533
	(.566)	(1.09)	(.742)
Terms of Trade Shock	.027	.028	.030
	(.017)	(.028)	(.021)
Terms of Trade Shock (-1)	.037**	.061**	.048**
	(.017)	(.029)	(.022)
Investment (-1)	.062	.068	.093*
	(.044)	(.072)	(.055)
Government Consumption (-1)	-.161**	-.458***	-.289***
	(.073)	(.172)	(.102)
Openness (-1)	.0067	.092**	.030*
	(.012)	(.036)	(.017)
LIBOR	-.085	-.086	-.086
	(.082)	(.124)	(.100)
Secondary School Enrollment	.0086	.098*	.0035
	(.030)	(.054)	(.032)
Social-Political Instability	-2.97**	-.798	-1.32
	(1.22)	(2.48)	(1.43)
Legislative Effective	.028	-1.71**	.186
	(.028)	(.743)	(.238)
Sub-Sahara Africa	-3.44***	-3.72**	-4.35***
	(.841)	(1.49)	(1.27)
Latin American	-2.63***	1.80	-2.70**
	(.978)	(2.16)	(1.32)
Middle East & North Africa	-1.37		
	(1.27)		
Constant	4.24	15.66	8.35
	(3.22)	(6.90)	(4.32)

Table 4. OLS Estimation of Equations (2.4) and (2.5) (continue)

Growth Equation --- Flexible Exchange Rate Regime

	IMF	**R&R**	**LY&S**
PCGDP(-1)	.0097	.092	.367
	(.535)	(.445)	(.484)
Terms of Trade Shock	.063***	.048***	.045**
	(.019)	(.014)	(.019)
Terms of Trade Shock (-1)	.016	.021	.0066
	(.018)	(.013)	(.017)
Investment (-1)	-.015	.0066	-.032
	(.051)	(.037)	(.044)
Government Consumption (-1)	-.233***	-.172***	-.119*
	(.080)	(.057)	(.069)
Openness (-1)	.0049	.0057	.0045
	(.0068)	(.0061)	(.0067)
LIBOR	-.214***	-.209***	-.167**
	(.072)	(.062)	(.072)
Secondary School Enrollment	.029	.012	.024
	(.022)	(.019)	(.019)
Social-Political Instability	-1.72***	-2.05***	-1.93***
	(.608)	(.550)	(.620)
Legislative Effective	.0079	.019	.025
	(.030)	(.020)	(.020)
Sub-Sahara Africa	-4.96***	-3.92***	-4.73***
	(.958)	(.731)	(.847)
Latin American	-2.68***	-2.74***	-3.60***
	(.977)	(.799)	(.837)
Middle East & North Africa	-.751	-.936	-1.35
	(1.11)	(.889)	(.954)
Constant	7.32	6.32	3.97
	(2.92)	(2.37)	(2.80)

Table 5. Endogenous Switching Regression
Joint ML Estimation of Equations (2.2) - (2.5)

Growth Equation --- Fixed Exchange Rate Regime

	IMF	**R&R**	**LY&S**
PCGDP(-1)	.739	-1.98**	-.742
	(.590)	(1.03)	(.768)
Terms of Trade Shock	.022	.025	.022
	(.016)	(.026)	(.019)
Terms of Trade Shock (-1)	.028*	.061**	.039**
	(.017)	(.027)	(.020)
Investment (-1)	.042	.044	.055
	(.044)	(.069)	(.054)
Government Consumption (-1)	-.135*	-.302*	-.314***
	(.070)	(.176)	(.094)
Openness (-1)	-.0075	.068**	.014
	(.013)	(.034)	(.017)
LIBOR	-.111	-.186	-.083
	(.079)	(.118)	(.949)
Secondary School Enrollment	.030	.042	.020
	(.029)	(.051)	(.029)
Social-Political Instability	-1.13	-1.81	.888
	(1.31)	(2.38)	(1.48)
Legislative Effective	.035	-1.81***	.386**
	(.025)	(.676)	(.192)
Sub-Sahara Africa	-4.13***	-3.85***	-3.90***
	(.818)	(1.40)	(1.22)
Latin American	-3.75***	1.11	-3.53***
	(.973)	(2.00)	(1.24)
Middle East & North Africa	-2.64**		
	(1.24)		
Constant	4.24	14.23	5.57
	(2.99)	(6.59)	(4.43)

Table 5. Endogenous Switching Regression
Joint ML Estimation of Equations (2.2) - (2.5)
(continue)

Growth Equation --- Flexible Exchange Rate Regime

	IMF	**R&R**	**LY&S**
PCGDP(-1)	-.108	-.199	-.433
	(.581)	(.437)	(.452)
Terms of Trade Shock	.064***	.040***	.040**
	(.019)	(.013)	(.016)
Terms of Trade Shock (-1)	.017	.025**	.0091
	(.018)	(.013)	(.014)
Investment (-1)	-.015	.034	.019
	(.050)	(.036)	(.038)
Government Consumption (-1)	-.231***	-.214***	-.099
	(.079)	(.055)	(.061)
Openness (-1)	.0058	.0030	.0057
	(.0069)	(.0064)	(.0074)
LIBOR	-.211***	-.202***	-.173**
	(.071)	(.057)	(.061)
Secondary School Enrollment	.030	.0056	.023
	(.021)	(.018)	(.017)
Social-Political Instability	-1.99***	-3.10***	-3.59***
	(.814)	(.604)	(.718)
Legislative Effective	.0045	.003	.010
	(.030)	(.020)	(.017)
Sub-Sahara Africa	-4.92***	-4.08***	-3.25***
	(.940)	(.696)	(.764)
Latin American	-2.56***	-2.60***	-2.36***
	(.990)	(.785)	(.773)
Middle East & North Africa	-.627	-.538	-.694
	(1.12)	(.818)	(.827)
Constant	8.47	10.50	11.03
	(3.74)	(2.38)	(2.76)

Table 5. Endogenous Switching Regression
Joint ML Estimation of Equations (2.2) - (2.5)
(continue)

Exchange Rate Regime Equation

	IMF	**R&R**	**LY&S**
Black Market Premium (-1)	-.00056	-0.021***	-.00090***
	(.00045)	(.0046)	(.00033)
Terms of Trade Shock (ma5)	.016*	.014*	.0075
	(.0086)	(.079)	(.0058)
Openness (-1)	-.0021	-0.00013	-.0046
	(.0016)	(.0022)	(.0018)
Inflation (-1)	-.000065	.000060	-.00026
	(.00013)	(.00039)	(.00040)
GDP (-1)	-.392***	-.010	-.184***
	(.049)	(.045)	(.039)
PCGDP (-1)	0.0052	-.242***	-.102*
	(.065)	(.065)	(.061)
GDP Growth (ma5)	.073***	-.021	.038**
	(.020)	(.018)	(.015)
Reserve Volatility (-1)	-.034***	-.037***	-.0076
	(.011)	(.014)	(.0058)
Social-Political Instability	-.682***	-.465***	-.401***
	(.173)	(.166)	(.156)
Constant	9.51	1.95	4.88
	(.994)	(1.00)	(.797)
Log likelihood	-2290.34	-2104.28	-1977.34

Table 6. Hypothesis Testing

		H0*	H0**	H0***
Model under the Null		(2.1)-(2.3)	(2.2)-(2.5)	(2.2)-(2.5)
Model under the Alternative		(2.1)	(2.1)-(2.3)	(2.1)
d.f. of the limiting chi-squared		1	14	15
LR Test Statistics	IMF	1.27	22.40*	23.67*
	R&R	1.27	21.22*	22.49*
	LY&S	15.91***	38.94***	54.85***

Notes:
* Significant at 10% level
** Significant at 5% level
*** Significant at 1% level

Table 7. Predicted Growth Rate of China under Alternative Exchange Rate Regimes

		Average 1974-1993	Average 1980-1993	1993
Actual Growth Rate		7.07	7.81	11.51
Prediction	IMF Fixed	7.48	7.66	8.03
	IMF Flexible	4.32	4.27	5.04
Prediction	RR Fixed	1.35	1.23	1.99
	RR Flexible	6.46	6.41	7.00
Prediction	LYS Fixed	9.16	9.27	9.75
	LYS Flexible	7.70	7.72	8.15