

Exchange Rate Regime Verification: Has China Actually Moved from a Dollar Peg to a Basket Peg?*

Imad Moosa, Monash University

Tony Naughton, RMIT

Larry Li, La Trobe University

Abstract

An attempt is made to verify the exchange rate regime that China has been following since 21 July 2005 when a policy shift was implemented, presumably taking China from a dollar peg to a basket peg. The results show that while a regime of simple and strict dollar peg has indeed been abandoned, the evidence does not support the proposition that the current exchange rate regime is a basket peg. It is suggested, based on the empirical results, that the current Chinese regime is some sort of a discretionary crawling peg against the U.S. dollar. It is argued that this regime is consistent with the Chinese objectives of maintaining a competitive advantage while avoiding a trade war with the U.S.

JEL Numbers: F31, F33

Keywords: China, Exchange Rate Regime Verification, Basket Peg, Crawling peg.

* A grant from the Melbourne Centre for Financial Services to finance work on this project is gratefully acknowledged. We thank Nisreen Moosa for excellent research assistance with the empirical work.

Introduction

The long-awaited change in China's exchange rate policy was implemented on 21 July 2005, when the Chinese authorities announced a 2.1 per cent revaluation of the yuan against the dollar, followed (allegedly) by a shift from a currency peg to a basket peg.¹ The announced policy shift would have marked a change from the previous regime (lasting some ten years) whereby the yuan was pegged to the U.S. dollar at the fixed exchange rate of 8.28.² The Chinese authorities described the policy shift as a "switch to a managed float regime with reference to a basket of currencies", while allowing $\pm 0.3\%$ in bilateral exchange rates on any one day.³

The announced policy shift has come as a result of pressure by the U.S. (and other countries), as Chinaphobia has led to the emergence of the widely accepted proposition that the undervalued Chinese currency is the main reason for the U.S. trade deficit (at least the bilateral deficit against China). "America's fear of China", which is what the Economist chose as a title for its leader in the 19 May 2007 issue, has led to the introduction of bills in the U.S. Congress to declare "China's cheap currency" as "an illegal subsidy". By shifting to the new regime, China would presumably allow its currency to appreciate against the dollar as other currencies do so. This declaration of an

¹ We are not sure what to call the Chinese currency, as it has two names: yuan and renminbi. We have decided to call it yuan, probably because this name is consistent with the currency symbol, CNY.

² Frankel and Wei (2007) argue, without elaboration, that China's official policy has never been a pegged exchange rate. They do not suggest what it was, although their empirical results seem to indicate no change from the previous policy (of dollar peg) in the second half of 2005.

³ It is not clear if the $\pm 0.3\%$ band is applied to the bilateral exchange rate against the dollar only or to all bilateral rates. Most likely the band refers to the bilateral exchange rate against the dollar only. The Economist (2007b) describes the 18 May 2007 announcement of the People's Bank of China of a widening of the yuan's daily trading band against the dollar from 0.3% to 0.5% as a "symbolic gesture coming just days before the second Strategic Economic Dialogue between China and America".

exchange rate policy shift was initially taken at face value, but the actual behaviour of exchange rates showed little tendency for the Chinese currency to appreciate against the U.S. dollar, at least in the months immediately following the policy shift.

It has become an undisputed fact of life that, with respect to exchange rate regime choice, countries do not necessarily practice what they declare. This phenomenon has led to the emergence of a new strand of research in international finance, appearing under the headings “exchange rate regime verification”, “*de facto* versus *de jure* regimes” and “fear of floating” (also fear of fixing or fear of pegging).⁴ Countries do not adhere to the declared regime for a number of reasons. In the case of China, the desire to cling to a dollar peg (as opposed to moving to the announced basket peg) may be motivated by the belief that this arrangement seems to have served China well, sheltering it from the 1997-98 Asian crisis. Some go as far as arguing that China’s decision to remain on a dollar peg is a deliberate choice to gain competitive advantage (for example, Goldstein, 2003, 2004; Goldstein and Lardy, 2003, 2005). It is plausible to think that the Chinese do not want to let the yuan appreciate too fast to secure domestic employment, but it is far fetched to blame America’s deficit on the Chinese currency. The Economist (2007a) argues that “China’s overall surpluses and U.S. deficit have less to do with the value of the yuan than with Chinese saving and American profligacy”. China may be a scapegoat in this respect, but this is not our concern here.⁵

⁴ For a detailed discussion of these issues, see Moosa (2005).

⁵ The positive question of what determines the Chinese surplus has attracted a lot of attention (see, for example, Prasad and Wei, 2005).

The objective of this paper is to verify the Chinese exchange rate regime and to find out if there is a divergence between the *de facto* post-July 2005 regime and the *de jure* regime. In particular, the objective is to determine whether or not China has moved away from the 10-year peg to the U.S. dollar. While exchange rate regime verification is an important topic in international finance, it has special importance with respect to China, not only because of the claim that the Chinese cheap currency is the cause of the U.S. external deficit but also because of the important role of China in the global economy and its likely challenge to the hegemony of the U.S.

Frankel and Wei (2007) investigate the Chinese exchange rate regime by stating the underlying research question as follows: “Is the precise exchange rate regime that China has put into place since 2005 a genuine departure from the earlier dollar peg, in the direction of flexibility?”. They seem to believe that China’s exchange rate policy has recently started to give some weight to some other currencies with the result that the cumulating trend against the dollar has gradually accelerated but the process is very slow. So, they seem to believe that the answer is “no” initially and “yes... but” subsequently. They summarise their findings by stating that “the Chinese currency continues to assign heavy weight to the U.S. dollar” but “there are signs of some modest but steady increase in flexibility since the spring of 2006”. They also find some evidence indicating that U.S. officials’ complaints tend to be associated with gradual (though modest) reductions in the weight of the dollar in the basket. In this paper we evaluate the methodology of Frankel and Wei and re-examine their results and the interpretation thereof.

A Look at the Literature

Exchange rate regime verification is aimed at ascertaining that observable exchange rate behaviour is consistent with the pre-announced policy. If the announced exchange rate regime is a simple peg, verification is easy: it requires no more than checking that the exchange rate today is the same (or almost the same) as the exchange rate yesterday. If the announced regime is a pure float, this can also be checked easily: by finding out whether the central bank has intervened in the foreign exchange market as indicated by changes in reserves. It is relatively easier to verify fixed than floating arrangements. However, the verification of a system like a basket band requires a massive amount of data to find out if the announced policy is implemented. It is rather difficult to verify systems like a band around a basket peg or an adjustable peg when the central bank has an explicit or implicit rule of abandoning the peg when an exogenous shock of a particular size occurs and when a particular percentage of foreign exchange reserves have been exhausted. This seems to be the problem hampering attempts to verify the new Chinese exchange rate regime.

Hernandez and Montiel (2001) made an attempt to identify how exchange rate regimes changed in Asian countries from the pre-crisis to the post-crisis period. The crisis presumably forced Asian countries to abandon their *de facto* fixed exchange rates and resort to floating. However, it is arguable that these countries tend to use practices that are similar to those of the pre-crisis period by attempting to stabilise their exchange rates against the dollar without any strong commitment mechanism. The evidence provided by Hernandez and Montiel indicates that the crisis countries are “floating more than before,

though less than real floaters do”. This practice resembles to a considerable extent what is observed in the case of China since the policy shift of July 2005.

Exchange rate regime verification is invariably based on statistical testing. A general model that encompasses various pegged exchange rates can be written as

$$E_{0,t} = \alpha + \beta t + \sum_{i=1}^n \gamma_i E_{i,t} + \varepsilon_t \quad (1)$$

where $E_{0,t}$ is the exchange rate of the underlying currency against a numeraire, t is time, β is the rate of crawl, and $E_{i,t}$ is the exchange rate of currency i against the numeraire ($i \neq 0$). The stochastic error term reflects the error made by the central bank in setting the exchange rate. For a simple peg, $n = 1$ and $\beta = 0$; for a basket peg, $n > 1$ and $\beta = 0$; for a crawling peg $n = 1$ and $\beta > 0$; and for a crawling basket $n > 1$ and $\beta > 0$.

Exchange rate regime verification does not have to be based on a formal model such as that represented by equation (1). It can also be based on some volatility criteria. For example, Hernandez and Montiel (2001) suggest that a fixed bilateral exchange rate would exhibit variation of no more than 2.25 per cent, whereas a clean float would exhibit no intervention in the foreign exchange market, as indicated by changes in reserves.

By taking at face value the claim that China has indeed moved to a basket peg, some attempts have been made to calculate the weights of the basket components (or at least to assess the weight of the dollar) to obtain some indication as to whether or not it is a pure

dollar peg. Jen (2005), for example, estimated the weight of the dollar to be 85 percent. The problem with these studies, however, is the failure to question the proposition that China has actually moved to a basket peg. For example, Frankel and Wei (2007) start by assuming “that the value of the RMB is indeed determined by a currency basket” and proceed to unravel its structure by calculating the weights of the components. Astonishingly, even when their results produce no evidence for a basket peg, they do not acknowledge the possibility that China may still be on a dollar peg.

To calculate the weights of the basket components, Frankel and Wei (2007) advocate the use of a model in first log differences of the form

$$\Delta e_0 = \alpha_0 + \sum_{i=1}^n \alpha_i \Delta e_i + \varepsilon \quad (2)$$

where $e_i = \log(E_i)$ and E_i is the exchange rate (per unit of a numeraire) of currency i , such that E_0 is the exchange rate of the yuan against the numeraire. Frankel and Wei justify the use of a first difference model as opposed to a model in levels on the basis of the nonstationarity of exchange rates. In this case α_i ($i = 1, \dots, n$) is interpreted as the weight assigned to currency i in the basket.

Shah et al (2005) used this model specification and found that the yuan was still pegged to the dollar even after 21 July 2005. Frankel and Wei cast doubt on the validity of this result, arguing that it may be due to the use of four possible currencies in the basket

(dollar, yen, euro, and pound).⁶ The problem with the argument of Frankel and Wei is that if none of these four currencies shows any effect on the yuan, it is unlikely that any of the other seven would. Frankel and Wei actually used the 11 currencies and found that the yuan was still pegged to the dollar in the second half of 2005. Similarly, Eichengreen (2006) used daily observations over the period 22 July 2005 to 21 March 2006 and found the weight of the dollar to be 0.9, no evidence for a downward trend in this weight, and no significant coefficient on the non-dollar currencies.

Yamazaki (2006) used the following model in levels

$$E_0 = \beta_0 + \sum_{i=1}^n \beta_i E_i + \varepsilon \quad (3)$$

where the same notation applies. He found that some weight has shifted to the euro, yen and won, which are presumably the main currencies in the basket. Frankel and Wei cast doubt on the validity of Yamazaki's results because of the use of a model in levels, not allowing for a trend, not allowing for other currencies, and because of only a small number of bimonthly observations were used.

A variety of numeraires have been tried for the purpose of estimating the weights of the component currencies. Frankel (1993) used purchasing power over a consumer basket of domestic goods; Frankel and Wei (1995) used the SDR; Frankel and Wei (1994, 2006), Ohno (1999) and Eichengreen (2006) used the Swiss franc; Benassy-Quere (1999) used

⁶ Presumably, there are eleven currencies in the basket, four of which are deemed to be the main ones. The pound is not one of the main currencies but the other three used by Shah et al are. The basket currencies will be specified later.

the U.S. dollar; Frankel et al (2000) used a GDP-weighted basket of five major currencies; and Yamazaki (2006) used the Canadian dollar. Frankel and Wei (2007) argue that if the exchange rate regime is truly a basket peg, the choice of the numeraire is immaterial, as the weights will be estimated accurately regardless. The problem here is that the use of mummies other than the U.S. dollar is inconsistent with the actual formula used by the underlying central bank to represent the basket as we are going to show later on.

The most comprehensive piece of work on the Chinese exchange rate regime remains to be that of Frankel and Wei (2007). They used the first difference log model represented by equation (2) to estimate regressions involving all 11 currencies, producing a diversified set of results. For the purpose of conducting the empirical work, they used daily exchange rates covering the period 21 July 2005 to the beginning of 2007 and the SDR as the numeraire currency. By trying all of the 11 currencies, only two currencies turned out to have significantly positive weights (coefficients): U.S. dollar and Malaysian ringgit (0.904 and 0.053, respectively). While this result makes sense for the dollar, it does not make any sense for the ringgit, which is neither one of the four core currencies, nor is it important in terms of the bilateral trade with China.⁷ Frankel and Wei explain this result by referring to the desire of the Chinese authorities to preserve trade competitiveness against major Asian rivals than with minimizing variability vis-à-vis the world's most important currencies or China's most important export markets. This explanation, which is not clear at all, does not make sense. To preserve competitiveness,

⁷ In terms of total trade (imports and exports), Malaysia accounts for 3.3% of China's trade with the eleven countries, compared with 24.2% for the EU, 23.6% for the U.S., 19.7% for Japan, and 11.9% for Japan.

a country must at least prevent its currency from appreciating, which is inconsistent with pegging or assigning a big weight to a currency that is depreciating against the domestic currency. Even stranger is that Frankel and Wei argue on the basis of this result that there is a “tight peg to the basket”, when in fact the results should be interpreted to indicate that there is no basket peg.⁸

Frankel and Wei subsequently argue that since “the situation is changing rapidly over time estimates that impose unchanging coefficients could well be misleading”. That is absolutely right, except that they did not use an appropriate procedure to remedy this shortcoming, as they estimated the model over six subperiods. Not only is this inappropriate but it also produced results that are not consistent with the conclusion of increasing flexibility. The results show a very high coefficient on the dollar in the first two subperiods, but then the coefficient goes down then up then down then up. In any case, using subperiods is hardly an appropriate technique for revealing the time evolution of the weights. Instead, rolling regressions should be used, but it is arguable that even this technique does not produce time-varying parameters, which require the use of state space modelling.

A number of robustness checks were used by Frankel and Wei, including the use of different numeraires, obtaining similar results and concluding that there is no evidence

⁸ Frankel and Wei (2007) run the same regression for the Hong Kong dollar, which follows a currency board that implies a very tight peg to the dollar. As expected, they found a very close result to that of the Chinese currency (in terms of the coefficient of determination, it is 0.99 compared with 0.95). It is strange, therefore, that they did not conclude that the Chinese currency is pegged to the dollar and not to a basket.

for a positive weight assigned to either the euro or the yen. They also allowed for a steady acceleration in the shift (time trend), because “everything we know about Chinese government officials, from their history of economic reforms to their own words, points to policy change that is gradual”. They added another variable, the number of complaints by U.S. officials about China’s exchange rate policy, to obtain evidence indicating that “cumulative complaints are associated with a reduction in the RMB’s weight on the US dollar”. They also tried a model in which the sum of the weights is constrained to be one.⁹

Finally, they allowed for nonlinear trends in the weights to find out if the gradual appreciation of the yuan against the dollar is attributable to a shift of weights in the basket away from the dollar or rather an appreciation against the dollar. They found that the “action comes from the decline in the weight of the dollar”. Further suggested extensions include the use of the method of moments and intra-day data, and the inclusion of an explanatory variable representing market pressure (defined in terms of changes in the exchange rate and reserves).

Unfortunately, the rather comprehensive study of Frankel and Wei has a number of shortcomings. As we have said, they interpreted their results in a rather peculiar way, having started with the assumption that China has actually moved to a basket peg, when in fact their extensive results are more supportive of a dollar peg. The other problem is

⁹ In this case, the dependent variable becomes $\Delta e_0 - \Delta e_1$, whereas the explanatory variables are $\Delta e_i - \Delta e_1$ for $i = 2, \dots, n$.

model specification, because although the first log difference model makes it possible to retrieve the weights, the models used in practice to calculate the exchange rates pegged to baskets are actually written in levels.¹⁰ It is true that a nonstationarity problem may arise here, but this problem can be solved by using the Phillips-Hansen (1990) fully-modified OLS.¹¹ But then there is another problem with the first difference model if the underlying exchange rate regime is a truly basket peg. This is because a basket peg represents a cointegrating relation, which renders the first difference model misspecified as it should be an error correction model instead.¹² Yet another problem was mentioned earlier about the necessity of using a time-varying parametric (TVP) estimation technique to capture any change in weights over time (if any). The final problem is that the use of the SDR as a numeraire is not consistent with the true model used in practice by peggers.

Model Specification and Related Issues

In this section we consider model specification with respect to the literature surveyed in the previous section. We argue that in actual practice countries adopting a basket peg use the U.S. dollar as the numeraire (like the case of the SDR). To start with, we introduce the notation used henceforth. Let E_{ij} be the level of the exchange rate between currencies i and j , measured as the price of one unit of currency j , so that E_{01} is the exchange rate of the base currency (yuan) against the numeraire, which is the U.S. dollar (measured as the

¹⁰ For example, the model used to calculate the USD/SDR exchange rate by the IMF is written in the levels of the exchange rates of the component currencies. There is also the case of the Central Bank of Kuwait (see Moosa, 2005).

¹¹ The problem here is that an OLS regression involving nonstationary variables will produce t statistics that are invalid to derive inference on the significance or otherwise of the estimated coefficients. This problem can be circumvented by using fully-modified OLS.

¹² Grangers Representation Theorem states that cointegration implies and is implied by the existence of a valid error correction representation.

price of one dollar).¹³ By ignoring the error term for the time being, the basket can be represented by the equation

$$E_{01} = \alpha_1 + \sum_{j=2}^n \alpha_j E_{j1} \quad (4)$$

where $j = 2, 3, \dots, n$ represent the other currencies in the basket. Equation (4) says that the exchange rate between the yuan and the dollar is determined by the exchange rates (against the dollar) of the currencies in the basket. In August 2005 the Central Bank Governor, Xiaochuan Zhou, disclosed a list of 11 currencies as the constituents of the basket: U.S. dollar (USD), euro (EUR), Japanese yen (JPY), Korean won (KRW), Singapore dollar (SGD), British pound (GBP), Malaysian ringgit (MYR), Russian Ruble (RUB), Australian dollar (AUD), Thai bhat (THB), and Canadian dollar (CAD) (Zhou, 2005). The first four currencies are thought to be the major components of the basket, whereas the other seven are the secondary components.¹⁴ The weights assigned to these currencies in the basket are unknown, which is an issue that has generated a significant amount of research that will be discussed in this paper.¹⁵

In equation (4), the coefficient α_j is not the weight assigned to currency j in the basket but it is a coefficient that is related to the weight. In the formula used to calculate the

¹³ That is, a direct quotation (domestic per foreign) from a Chinese perspective.

¹⁴ If this is true, we should expect the first four currencies to be more heavily weighted than the other seven.

¹⁵ It is typical for countries adopting a system of basket peg not to reveal the components of the basket, let alone the weights. Between March 1975 and January 2003, Kuwait adopted a system of pegging to a basket of currencies without revealing the components of currencies or their weights (see, for example, Moosa, 1983a, 1983b, 1989, 2001, 2005; Moosa and Al-Loughani, 2000). One reason for non-disclosure is the desire to combat speculative activity against the currency. Moosa (2003) shows formally that if the interest rate on the domestic currency is not calculated as a weighted average of the component currencies, where the weights are identical to the basket weights, then it is possible to make riskless arbitrage profit by going long on the domestic currency and short on the components of the basket, or vice versa, depending on the configuration of exchange and interest rates.

exchange rate of the SDR versus the dollar, these coefficients are called “currency amounts”.¹⁶ Weights are effectively measured as elasticities, which means that

$$w_j = \left(\frac{\partial E_{01}}{\partial E_{j1}} \right) \left(\frac{\bar{E}_{j1}}{\bar{E}_{01}} \right) = \alpha_j \left(\frac{\bar{E}_{j1}}{\bar{E}_{01}} \right), \quad j = 2, 3, \dots, n \quad (5)$$

where a bar indicates the mean value of the underlying exchange rate.¹⁷ We also have

$$w_1 = \frac{\alpha_j}{\bar{E}_{01}} \quad (6)$$

Hence, equation (4) can be rewritten as

$$E_{01} = w_1 \bar{E}_{01} + \sum_{j=2}^n \left(\frac{w_j \bar{E}_{01}}{\bar{E}_{j1}} \right) E_{j1} \quad (7)$$

where $w_1 \bar{E}_{01}$ is the amount of the U.S. dollar and $w_j \bar{E}_{01} / \bar{E}_{j1}$ is the amount of currency j .

To examine the exchange rate relations that can be used to formulate stylised facts, we go back to the original equation (4), which gives us the following

$$\frac{\partial E_{01}}{\partial E_{j1}} = \alpha_j > 0 \quad (8)$$

$$\frac{\partial E_{01}}{\partial (\sum \alpha_j E_{j1})} = 1 \quad (9)$$

¹⁶ For details, see International Monetary Fund (2005), particularly Box 3 on page 8 and Appendix II, pp 30-31.

¹⁷ It is not necessary or customary to use calculate the weights as elasticities at the mean values. To calculate the exchange rate of the SDR, the IMF uses exchange rates at the base period and the “transition date”. The weights and currency amounts are kept constant over a long period of time to ensure that the exchange rate of the SDR against the U.S. dollar changes only in response to changes in the bilateral exchange rates of the component currencies against the dollar.

which means that if the yuan is pegged to a basket, then appreciation of the dollar against other currencies is associated with appreciation of the dollar against the yuan. Under a dollar peg, however, $E_{01} = \alpha_1$ and $\partial E_{01} / \partial E_{j1} = 0$.

Other stylised facts that are associated with a basket peg pertain to the cross rates between the base currency and the non-dollar currencies in the basket. The cross exchange rate between the base currency, 0, and currency j , is calculated from their dollar exchange rates as

$$E_{0j} = \frac{E_{01}}{E_{j1}} \quad (10)$$

which gives

$$\frac{\partial E_{0j}}{\partial E_{01}} = \frac{1}{E_{j1}} > 0 \quad (11)$$

$$\frac{\partial E_{0j}}{\partial E_{j1}} = -\frac{E_{01}}{(E_{j1})^2} < 0 \quad (12)$$

Equation (11) tells us that appreciation of the U.S. dollar against the yuan is associated with appreciation of other currencies against the yuan. Equation (12), on the other hand, shows that appreciation of the dollar against other currencies is associated with depreciation of other currencies against the yuan. Under a dollar peg, $\partial E_{0j} / \partial E_{01} = 0$, whereas $\partial E_{0j} / \partial E_{j1} < 0$.

To obtain more insight into the relations between the exchange rates, we substitute equation (4) into equation (10) to obtain

$$E_{0j} = \frac{\alpha_1 + \sum_{j=2}^n \alpha_j E_{j1}}{E_{j1}} = \frac{\alpha_1}{E_{j1}} + \alpha_j + \sum_{\substack{k=2 \\ k \neq j}}^{n-1} \alpha_k \left(\frac{E_{k1}}{E_{j1}} \right) \quad (13)$$

or

$$E_{0j} = \frac{\alpha_1}{E_{j1}} + \alpha_j + \sum_{\substack{k=2 \\ k \neq j}}^{n-1} \alpha_k E_{kj} \quad (14)$$

From equation (14), it follows that

$$\frac{\partial E_{0j}}{\partial E_{kj}} = \alpha_k > 0 \quad (15)$$

$$\frac{\partial E_{0j}}{\partial (\sum \alpha_k E_{kj})} = 1 \quad (16)$$

which means that appreciation of currency j against currency k ($j = 2, \dots, n$, $k = 2, \dots, n$, $j \neq k$) is associated with the appreciation of currency j against the yuan. Under a dollar peg, $\partial E_{0j} / \partial E_{kj} = E_{0k} > 0$. The exchange rate relations under a basket peg and a single currency peg are summarised in the appendix.

The proposition of the neutrality of the numeraire, in the sense that the same set of weights can be obtained irrespective of the numeraire used, warrants some consideration. It is true that any numeraire will give us similar results with respect to the relative importance of the component currencies, but the numerical values of the calculated weights are affected by the choice of the numeraire. To demonstrate this point, let the numeraire be currency $n+1$, in which case the basket equation becomes

$$E_{0,n+1} = \sum_{j=1}^n \beta_j E_{j,n+1} \quad (17)$$

Since $E_{j,n+1} = E_{j1} / E_{n+1,1}$, it follows that

$$E_{0,n+1} = \sum_{j=1}^n \beta_j \left(\frac{E_{j1}}{E_{n+1,1}} \right) \quad (18)$$

which means that $\alpha_1 = \beta_1$ if and only if $E_{n+1,1} = 1$. The weights, therefore, cannot be equal, irrespective of the numeraire. If the numeraire is the SDR (which is itself a basket of currencies), we have

$$E_{0,n+1} = \sum_{j=1}^n \beta_j \left(\frac{E_{j1}}{\gamma_1 + \sum_{j=2}^4 \gamma_j E_{j1}} \right) \quad (19)$$

where the denominator of the term inside the brackets represents the SDR basket, such that currencies 2, 3 and 4 are the non-dollar components of the SDR basket (euro, yen and pound). It is obvious that some nonlinearities are introduced by using the SDR as a numeraire.

We said earlier that the coefficients of equation (4) are not the weights as such. If the model is written in a logarithmic form, and given the definition of weights as elasticities, then the estimated coefficients of the model will represent the basket weights. By re-introducing the error term, the logarithmic model is written as

$$e_{01} = \alpha_1 + \sum_{j=2}^n \alpha_j e_{j1} + \varepsilon \quad (20)$$

And when it is written in a first difference form, we obtain

$$\Delta e_{01} = \sum_{j=2}^n \alpha_j \Delta e_{j1} + \varepsilon \quad (21)$$

which means that weights can be extracted directly. The problem with the first difference model, however, is that if equation (20) represents a cointegrating relation, then equation (21) will be misspecified because the error correction term will be missing.¹⁸ In this case, the correctly specified model is written as

$$\Delta e_{01,t} = \sum_{j=2}^n \alpha_j \Delta e_{j1,t} + \phi \left(e_{01,t-1} - \alpha_1 - \sum_{j=2}^n \alpha_j e_{j1,t-1} \right) + \xi_t \quad (21)$$

Grangers Representation Theorem actually provides a test to find out if the underlying exchange rate regime is a basket peg. If the coefficient on the error correction term is significantly negative, this implies the existence of a valid error correction representation and hence a cointegrating relation, or a basket. Pesaran and Shin (1995, 1996) have suggested a methodology whereby the coefficients of the error correction model (21) and the cointegrating relation (20) can be calculated from an ARDL model of the form

$$e_{01,t} = \gamma_0 + \sum_{j=2}^n \sum_{i=1}^q e_{j,1,t-i} + \zeta_t \quad (22)$$

By following the methodology suggested by Kremers et al (1992), the null hypothesis of no cointegration (and hence no basket) can be represented by $H_0 : \phi = 0$.¹⁹

A Look at the Stylised Facts

Before considering the formal empirical results, it may be useful to examine the stylised facts to find out if the actual exchange rate behaviour before and after 21 July 2005 is consistent with the predictions of the models representing a dollar peg and a basket peg.

¹⁸ The weight of the dollar cannot be extracted from the first difference model, unless we assume that the weights add up to one.

¹⁹ Kremers et al (1992) put forward a strong case for a cointegration test that is based on the coefficient on the error correction term, arguing that it is superior to the residual-based test.

This work is based on a sample of daily data on the exchange rates (against the dollar) of the yuan and the component currencies. The sample consists of 853 daily observations covering the period 2 January 2004-24 May 2007, thus encompassing the old and new exchange rate regimes. The data were obtained from the Pacific Exchange Rate Service of the Sauder School of Business (<http://fx.sauder.ubc.ca>).

Figure 1 shows the exchange rates against the U.S. dollar of the yuan and the basket currencies over the entire sample period.²⁰ The revaluation of the yuan against the dollar in July 2005 is conspicuous, and so is the shift away from a dollar peg.²¹ However, it is not possible to tell by observing a graph of the yuan/dollar exchange rate what the underlying exchange rate regime has been since 21 July 2005. The continuous depreciation of the dollar against the yuan could be either a reflection of the weakness of the dollar against other currencies in general or a deliberate revaluation of the yuan (in what amounts to be a crawling peg) as the Chinese authorities try to please the Americans. Given the behaviour of the other currencies against the dollar, their behaviour against the yuan is shown in Figure 2. One would expect a currency to appreciate (depreciate) against the yuan if it appreciates (depreciates) more proportionately than the yuan against the dollar. Under a basket peg, however, the rates of the yuan against the dollar and other currencies are not independent, which would be the case under a dollar peg, be it a simple peg or a crawling peg.

²⁰ Observation numbers are labelled on the horizontal axis, where observation 1 corresponds to 2 January 2004, and so on.

²¹ Hence, it is not clear why Frankel and Wei (2007) think that China was not really on a dollar peg!

We will examine the stylised facts by concentrating on the main currencies in the basket: USD, JPY, EUR, KRW as well the GBP. Table 1 displays exchange rate correlations before and after the exchange rate regime shift (the latter are shown in parentheses) underneath the correlations for the earlier period of dollar peg.²² Consider first movements in the CNY/USD exchange rate in relation to the dollar rates of other currencies, which are shown in the top row of the table. Zero (or insignificantly different from zero) correlations in the earlier period are consistent with a dollar peg. In the second period, three of the four correlations are significantly positive, which is consistent with a basket peg. This observation is also consistent with other regimes. In general, they show more flexibility of the exchange rates. The negative correlation between the dollar rates of the yuan and the Japanese yen is not consistent with a strict basket. Consider now stylised fact 2 concerning correlation between the exchange rates of the yuan against the dollar and other currencies (reported in the first column of the table). Under a dollar peg, the rates should be independent, which is shown by insignificant correlations. But under a basket peg, they should be positively correlated, which is not what is shown in the table, as (with the exception of the yen) the correlations are negative. Finally, consider the correlations reported on the diagonal of Table 1, all of which are statistically negative. These are consistent with both a single currency peg and a basket peg (and a crawling peg). In general, therefore, the correlations reported in Table 1 confirm without any doubt the dollar peg regime of the pre-21 July 2005 period but, if anything, they provide evidence against a basket peg.

²² These are the total correlation coefficients. Partial correlations may be more useful for this purpose, but since the partial correlation coefficients are related to the regression coefficients that will be reported subsequently, we choose to report total correlations here.

Consider now Table 2, which shows changes in exchange rates before and after the regime shift (again, the results for the latter period are reported in parentheses underneath the figures for the first period). The table reports percentage changes over the two subperiods (the percentage change of the last observation over the first observation) and the mean and standard deviation of the daily changes.²³ Also reported are the t statistics for the null of the equality of the mean daily changes and the F statistics for the equality of the variances of the daily changes before and after the regime shift, which is confirmed by the increase in the changes in the CNY/USD exchange rate before and after the policy shift. It can also be observed that changes in the CNY exchange rates against other currencies are more related to changes in the exchange rates of these currencies against the dollar before the policy shift. The policy shift has made the CNY/USD more flexible, but since the flexibility of the exchange rates of the other currencies against the dollar were not affected by the Chinese policy shift, the flexibility of the yuan against other currencies did not change (the t statistic is significant only in the case of the CNY/USD exchange rate). The significant F statistics show that the Chinese policy shift has made the yuan more volatile against the U.S. dollar and less volatile against other currencies, which makes a lot of sense.

²³ A question was raised earlier about whether the $\pm 0.3\%$ daily band applies to any bilateral exchange rate or only to the bilateral rate against the dollar. The calculations show that only the CNY/USD rate does not breach the band. The band must, therefore, be applied to the exchange rate against the dollar only.

Formal Empirical Results

In this section, the results of estimating the basket weights as implied by equation (20) are presented. Because exchange rates are primarily integrated variables, OLS may not be a valid estimation method, which is why we resort to the use of the Phillips-Hansen fully-modified OLS (FMOLS). The estimates are based on the sub-period starting on 3 August 2005, ignoring the first few days immediately following the policy shift, just to make sure that the new policy settles in with the policy makers. Table 3 reports the results of estimating the coefficients of equation (20) using a variety of combinations of the declared currency components. In version A, all of the 11 currencies are used, in which case the equation contains a constant term (implying the weight of the dollar) and 10 dollar exchange rates as explanatory variables, such that the coefficient on a particular exchange rate is a measure of the weight of the underlying currency. When all of the currencies are used, three coefficients turn out to be significantly negative, hence they cannot imply weights. Moreover, the weight of the dollar is more than 1, which is implausible. It could be that the Chinese follow a basket but the components are not all of the eleven currencies. So, what we do next is to delete the currencies that have negative coefficients to obtain version B of the equation, but now two more currencies produce significantly negative coefficients. When we delete these two, we obtain the estimates of version C, which shows the weights of 0.146, 0.065 and 0.080 for the THB, MYR and GBP, as well as the implausible weight of 1.508 for the dollar. These results are not consistent with a basket peg, because the important currencies (JPY, EUR and KRW) are not there and because of the implausible weight of the dollar. What if the basket contains the first four currencies (USD, JPY, EUR and KRW)? This is version D, which again

produces results that do not make sense, with two negative weights and a weight of 3.880 for the dollar. What if the basket contains the five Asian currencies only? This is version E, which also produces two negative coefficients and an implausible weight for the dollar. Deleting the currencies producing negative coefficients from version E eventually produces version G, which tells us that the basket has two non-dollar currencies only: the THB, with a weight of 0.170 and the MYR, with a weight of 0.032. But this equation indicates more-or-less a one-currency basket.

The conclusion that can be derived from the results presented in Table 3 is that either that there is no basket or that the Chinese do not adhere to it. Or it could be that the basket is not precise and that the components are changed over time. But it has not been such a long time since the policy shift, while a change of the basket takes some time and experimentation. Then if there is any truth to the claim that the new Chinese exchange rate policy is conducted with reference to a basket of currencies, then the equation representing the basket should constitute a cointegrating relation. To find out whether or not whether this is the case we use the methodology proposed by Pesaran and Shin (1995, 1996) in combination with the methodology proposed by Kremers et al (1992). This procedure is applied to the seven versions of equation (20) referred to in Table 3. As the results displayed in Table 4 show, none of the error correction models produces a significantly negative coefficient on the error correction term, implying the failure to reject the null of no cointegration amongst the components of a basket. If we accept the proposition that adhering to a basket constitutes the existence of a cointegrating relation, the evidence presented in Table 4 shows no indication of a basket peg.

If the new Chinese exchange rate regime is not a basket peg, and given that China has definitely moved to a new system of more flexibility against the dollar, then what is it? By observing the behaviour of the yuan/dollar exchange rate since the policy shift, the first thing that comes to mind is a crawling peg, which seems to satisfy two conflicting desires of China: (i) to maintain competitiveness, and (ii) to allay the fears of Chinaphobics and avoid the risk of a trade war with the Americans. On the one hand, China wants to maintain a close link to the dollar, particularly if the dollar is China's currency of invoicing, but that is not all. China's central bank is probably the richest central bank in the world in terms of foreign currency reserves, most of which are U.S. dollar denominated. If China is concerned about capital account transactions, as well as current account transactions, then a dollar peg would make sense. But given also the objective of making the Americans happy, by introducing some revaluation of the yuan against the dollar, a crawling peg will be the perfect arrangement. A pure crawling peg is represented by an equation of the form

$$E_{0,t} = \alpha_1 + \beta t \quad (23)$$

where t is time. A small negative value for β in this equation ensures that the exchange rate of the yuan against the dollar declines each time period. But this is not what the Chinese are doing, as the actual behaviour of the exchange rate is not governed by such a simple relation. The Chinese are more likely using a discretionary crawling peg against the dollar, whereby the exchange rate is adjusted in a discretionary manner that is roughly governed by the equation

$$E_{01,t} = \alpha_1 + \beta t + \delta E_{01,t-1} + \varepsilon_t \quad (24)$$

The introduction of a lagged dependent variable in the equation may be justified on the basis of Nerlove's (1958) partial adjustment model, which is derived from the relation between the actual and desired levels of the CNY/USD exchange rate.²⁴ The underlying assumption here is that the Chinese authorities behave in such a way so that the actual change in the exchange rate between t and $t-1$ is related to the difference between the desired level of the exchange rate and the previous period's actual level.

While it is by no means possible to ascertain without a shadow of doubt that this is the current Chinese exchange rate policy, it is possible to find out if this policy is more likely to be the current policy than a basket peg. For this purpose, six non-nested model selection tests are used: N is the Cox test derived in Pesaran (1974); NT is the adjusted Cox test derived in Godfrey and Pesaran (1983); W is the Wald-type test proposed by Godfrey and Pesaran (1983); J is the Davidson and MacKinnon (1981) test; JA is the Fisher-McAleer (1981) test; and EN is the encompassing test proposed, *inter alia*, by Mizon and Richard (1986). All of the test statistics have t distribution, except for the encompassing test that has F distribution. The tests are run both ways by testing M1 versus M2 and M2 versus M1. When M1 is tested versus M2, the null hypothesis is that M1 is a better model (in terms of specification) than M2. A significant test statistic indicates that M1 is not a better model than M2. When M2 is tested against M1, the null is that M2 is a better model than M1. A significant test statistic indicates that M2 is not a better model than M1. If we obtain significant test statistics both ways, this means that the two models are misspecified (that is, neither a basket nor a crawling peg is the current Chinese exchange rate regime). If we get insignificant test statistics by testing M1 versus

²⁴ It could be that the adjustment is also guided by changes in reserves.

M2 and significant statistics by testing M2 versus M1, this means that M1 is preferred to M2. The econometrics of non-nested model selection tests can be found in Pesaran and Pesaran (1997).

The results of non-nested model selection tests are reported in Table 5, where all of the models are estimated over the period 3 August 2005-24 May 2007. In all cases M1 is the basket peg represented by equation (20), whereas M2 is the crawling peg represented by the logarithmic version of equation (24).²⁵ Three versions of M1 are tried, those corresponding to the baskets A, D and E in Table 1. No matter what M1 is taken to be, all of the tests unanimously reject M1 against M2 but do not reject M2 against M1. This means that M2 is the preferred model, which means that if anything, China is following a discretionary crawling peg rather than a basket peg.

Finally, we compare the actual CNY/USD exchange rate with what is predicted by the basket model and the crawling peg model. Figure 3 shows that the crawling peg model produces an exchange rate series that is hardly distinguishable from the actual rate, whereas the rate predicted by the basket peg model deviates significantly from the actual rate. Figure 3, therefore, provides further evidence for the proposition that the Chinese are more likely using a crawling peg rather than a basket peg.

²⁵ The logarithmic version of equation (24) is used so that the dependent variable in M1 and M2 are the same. However, testing the linear specification against each other (equation 4 against equation 24) produces similar results.

Conclusions

The results presented in this paper support the announced exchange rate regime shift of China in the period since 21 July 2005, when the yuan was initially revalued against the U.S. dollar. However, there is more support for the proposition that China has shifted to a regime of discretionary crawling peg than to a regime of a basket peg.

The proposition that China has shifted to a discretionary crawling peg is supported not only by the empirical evidence presented in this paper but also by intuition and a number of observations. To start with, the Chinese have not declared a shift to a basket peg in the strict sense. Rather, the new regime is described vaguely as a “managed floating regime with reference to a basket of currencies”. Neither of the terms “managed floating” and “with reference to” is consistent with the adoption of a basket peg in a strict sense. Moreover, the actual behaviour of exchange rates since the policy shift is not reflective of any sort of floating, managed or otherwise. For example, daily movements in the CNY/USD exchange rates have been much smaller than to be consistent with any sort of floating and much smaller than the declared upper limit of 0.3 percent (subsequently raised to 5 percent).

A discretionary crawling peg seems to be the optimal regime for China, given that the Chinese authorities want to maintain competitiveness while avoiding a trade war with the Americans. The Chinese have been trying to make symbolic gestures to please the Americans, by showing their willingness to accept more flexibility against a weak U.S.

dollar. A discretionary crawling peg is also consistent with the practice of stabilising exchange rates against the dollar without a strong commitment mechanism, which is what the Asian countries indulged in following the Asian crisis of the 1990s. Frankel and Wei (2007) correctly argue that “everything we know about Chinese government officials, from their history of economic reforms to their own words, points to policy change that is gradual”. If “gradualism” is the name of the game, and given that the Chinese want to appear co-operative with respect to the alleged yuan misalignment, a discretionary crawling peg makes a lot of sense, at least for the Chinese.

Appendix: Exchange Rate Relations under a Basket Peg and a Dollar Peg

	Basket Peg	Dollar Peg
E_{01}	$\alpha_1 + \sum_{j=2}^n \alpha_j E_{j1}$	α_1
E_{0j}	$\frac{E_{01}}{E_{j1}} = \frac{\alpha_1 + \sum_{j=2}^n \alpha_j E_{j1}}{E_{j1}}$	$\frac{E_{01}}{E_{j1}} = \frac{\alpha_1}{E_{j1}}$
$\frac{\partial E_{01}}{\partial E_j}$	$\alpha_j > 0$	0
$\frac{\partial E_{0j}}{\partial E_{01}}$	$\frac{1}{E_{j1}} > 0$	0
$\frac{\partial E_{0j}}{\partial E_{j1}}$	$-\frac{\alpha_1 + \sum_{j=2}^n \alpha_j E_{j1}}{(E_{j1})^2} < 0$	$-\frac{\alpha_1}{(E_{j1})^2} < 0$
$\frac{\partial E_{0j}}{\partial E_{kj}}$	$\alpha_k > 0$	$E_{0k} > 0$

References

- Benassy-Quere, A. (1999) Exchange Rate Regimes and Policies: An Empirical Analysis, in S. Collington, J. Pisani-Ferry and Y.C. Park (eds) *Exchange Rate Policies in Emerging Asian Countries*, London: Rutledge.
- Davidson, R. and MacKinnon, J.G. (1981) Several Tests for Models Specification in the Presence of Alternative Hypotheses, *Econometrica*, 49, 781-793.
- Economist, The (2007a) America's Fear of China, 19 May, 11-12.
- Economist, The (2007b) The Great Wall of Money, 26 May, 80.
- Eichengreen, B. (2006) China's Exchange Rate Regime: The Long and Short of it, Revision of Paper for Columbia University's Conference on Chinese Money and Finance, New York, 2-3 February.
- Fisher, G.R. and McAleer, M. (1981) Alternative Procedures and Associated Tests of Significance for Non-Nested Hypotheses, *Journal of Econometrics*, 16, 103-119.
- Frankel, J.A. (1993) Is Japan Creating a Yen Bloc in East Asia and the Pacific? In J.A. Frankel and M. Kahler (eds) *Regionalism and Rivalry: Japan and the U.S. in Pacific Asia*, Chicago, University of Chicago Press.
- Frankel, J.A. and Wei, S-J. (1994) Yen Bloc or Dollar Bloc? Exchange Rate Policies of the East Asian Economies, in T. Ito and A.O. Kruger (eds) *Macroeconomic Linkages: Savings, Exchange Rates and Capital Flows*, Chicago, University of Chicago Press.
- Frankel, J.A. and Wei, S-J. (2006) Currency Mysteries, Mimeo, 28 May.
- Frankel, J.A. and Wei, S-J. (2007) Assessing China's Exchange Rate Regime, NBER Working Papers, No 13100, May.

- Frankel, J.A. and Wei, S-J. (2007) Emerging Currency Blocs, in H. Genberg (ed) *The International Monetary System: Its Institutions and its Future*, Berlin, Springer.
- Godfrey, L.G. and Pesaran, M.H. (1983) Tests of Non-Nested Regression Models: Small Sample Adjustments and Monte Carlo Evidence, *Journal of Econometrics*, 21, 133-154.
- Goldstein, M. (2003) China's Exchange Rate Regime, Testimony before the Subcommittee on Domestic and International Monetary Policy, Trade and Technology, Committee on Financial Services, U.S. House of Representatives, Washington DC, 1 October.
- Goldstein, M. (2004) Adjusting China's Exchange Rate Policies, Working Paper 04-1, Petersen Institute for International Economics, Washington DC.
- Goldstein, M. and Lardy, N. (2003) Two-Stage Currency Reform for China, *Wall Street Journal*, 12 September.
- Goldstein, M. and Lardy, N. (2005) China's Role in the Revised Bretton Woods System: A Case of Mistaken Identity, Working Paper 05-2, Petersen Institute for International Economics, Washington DC.
- Hernandez, L. and Monteil, P. (2001) Post-Crisis Exchange Rate Policy in Five Asian Countries: Filling the "Hollow Middle"?, IMF Working Papers, No WP/01/170.
- International Monetary Fund (2005) Review of the Method of valuation of the SDR, Available from the IMF's Website.
- Jen, S. (2005) Chinese RMB Basket Still a Mystery, Global Economics Forum, Morgan Stanley, 19 August.

- Kremers, J.J.M., Ericsson, N.R. and Dolado, J.J. (1992) The Power of Cointegration Tests, *Oxford Bulletin of Economics and Statistics*, 54, 325-348.
- Mizon, G.E. and Richard, J.F. (1986) The Encompassing Principle and its Application to Non-Nested Hypotheses, *Econometrica*, 54, 657-678.
- Moosa, I.A. (1983a) Appreciating the KD's Futures, *Arab Banking and Finance*, June, 46-47.
- Moosa, I.A. (1983b) Dinar Dissent, *Institutional Investor*, June, 53.
- Moosa, I.A. (1989) Has the KD Been Devalued Against the Dollar?, *Arab Banker*, 9, 26-28.
- Moosa, I.A. (2001) Modeling and Forecasting the KD Exchange Rates, *Middle East Business and Economic Review*, 13, 39-49.
- Moosa, I.A. (2003) *International Financial Operations: Hedging, Arbitrage, Speculation, Financing and Investment*, London: Palgrave.
- Moosa, I.A. (2005) *Exchange Rate Regimes: Fixed, Flexible or Something in Between?*, London: Palgrave.
- Moosa, I.A. and Al-Loughani, N.E. (2000) An Exchange Rate Forecasting Model when the Underlying Currency is Pegged to a Basket, *Economia Internazionale*, 53, 537-550.
- Nerlove, M. (1958) Distributed Lags and Demand Analysis, *USDA Agricultural Handbook*, Washington DC, U.S. Department of Agriculture.
- Ohno, K. (1999) Exchange Rate Management in Developing Asia, Asai Development Bank Institute, Working Papers, No 1.

- Pesaran, M.H. (1974) On the General Problem of Model Selection, *Review of Economic Studies*, 41, 153-171.
- Pesaran, M.H. and Shin, Y. (1995) Long Run Structural Modelling, Unpublished Manuscript, University of Cambridge.
- Pesaran, M.H. and Shin, Y. (1996) Cointegration and the Speed of Convergence to Equilibrium, *Journal of Econometrics*, 71, 117-143.
- Phillips, P.C.B. and Hansen, B. (1990) Statistical Inference in Instrumental variables Regression with I(1) Processes, *Review of Economic Studies*, 57, 99-125.
- Prasad, E. and Wei, S-J. (2005) The Chinese Approach to International Capital Flows: Patterns and Possible Explanations, NBER Working papers, No 11306.
- Shah, A., Zeileis, A. and Patanik, I. (2005) What is the New Chinese Currency Regime? Mimeo, November.
- Yamazaki, K. (2006) Inside the Currency Basket, Columbia University and Mitsubishi UFJ Trust and Banking Corp., Working Paper, December.
- Zhou, X. (2005) Governor's Speech at the Opening of the Shanghai Headquarters of the People's Bank of China, www.hexun.com (in Chinese) and www.pbc.gov.cn/english/detail.asp?col=6500&ID=82 (in English).

Table 1: Correlation Coefficients of Exchange Rates

	CNY/USD	JPY/USD	EUR/USD	KRW/USD	GBP/USD
CNY/USD		0.08 (-0.59)*	0.06 (0.88)*	0.07 (0.76)*	-0.02 (0.90)*
CNY/JPY	-0.07 (0.83)*	-1.00* (-0.94)*			
CNY/EUR	-0.06 (-0.73)*		-1.00* (-0.96)*		
CNY/KRW	-0.07 (-0.46)*			-1.00* (-0.93)*	
CNY/GBP	0.02 (-0.80)*				-1.00* (-0.98)*

Top numbers are for the period until 20 July 2005. Numbers in brackets are for the period 21 July 2005 to 24 May 2007. * Significant at the 5% level.

Table 2: Changes in Exchange Rates

Exchange Rate	Total Change (%)	Mean Daily (%)	Std Dev	t	F
CNY/USD	0.05 (-5.64)	0.000 (-0.013)	0.026 (0.070)	-3.47*	7.24*
JPY/USD	6.07 (9.96)	0.017 (0.022)	0.611 (0.508)	0.26	1.45*
EUR/USD	4.53 (-9.80)	0.013 (-0.021)	0.643 (0.462)	-0.89	1.94*
KRW/USD	-12.79 (-10.06)	-0.034 (-0.022)	0.439 (0.387)	0.42	1.29*
GBP/USD	3.51 (-12.00)	0.011 (-0.027)	0.620 (0.457)	-1.01	1.70*
CNY/JPY	-5.68 (-14.18)	-0.013 (-0.032)	0.610 (0.503)	-0.49	1.47*
CNY/EUR	-4.29 (4.61)	-0.009 (0.011)	0.642 (0.461)	0.53	1.94*
CNY/KRW	14.73 (4.92)	0.036 (0.001)	0.440 (0.381)	-1.27	1.33*
CNY/GBP	-3.35 (7.23)	-0.007 (0.016)	0.620 (0.461)	0.62	1.81*

Top numbers are for the period until 20 July 2005. Numbers in brackets are for the period 21 July 2005 to 24 May 2007. Total change is the change over the whole periods under a dollar peg and since the regime shift. Mean daily is the mean value of the daily percentage change in the exchange rate and Std Dev is its standard deviation. t and F are the test statistics for the equality of the means and variances of the percentage changes in exchange rates before and after the policy shift. * Significant at the 5% level.

Table 3: Basket Weights Estimated by FMOLS

	A	B	C	D	E	F	G
USD	1.74 (8.86)	2.119 (24.22)	1.508 (47.90)	3.880 (13.57)	3.144 (17.16)	1.245 (43.87)	1.304 (92.46)
JPY	-0.125 (-12.32)			-0.294 (-10.51)	-0.102 (-9.78)		
EUR	-0.0215 (-0.69)			0.351 (12.82)			
KRW	0.035 (1.83)	-0.052 (-3.46)		-0.047 (-1.56)	-0.180 (-8.16)		
SGD	-0.147 (-4.08)				0.283 (6.91)	-0.052 (-2.39)	
THB	0.109 (10.18)	0.188 (14.34)	0.146 (11.86)		0.075 (6.58)	0.190 (12.35)	0.170 (12.99)
MYR	0.067 (3.47)	0.084 (2.94)	0.065 (2.21)		0.128 (5.02)	0.125 (4.00)	0.032 (3.72)
AUD	0.035 (1.82)	-0.058 (-3.67)					
GBP	0.117 (7.34)	0.158 (8.15)	0.080 (7.04)				
CAD	-0.068 (-7.34)						
RUB	0.111 (3.06)	-0.109 (-3.18)					

A, ... G represent seven different combinations of the possible basket components. The t statistics are placed in parentheses.

Table 4: The t Statistics of the Coefficients on the Error Correction Term

A	B	C	D	E	F	G
-1.71	-0.51	-0.75	-1.94	0.05	0.25	0.07

Table 5: Non-Nested Model Selection Tests

	M1=A	M1=D	M1=E
<u>M1 vs M2</u>			
<i>N</i>	-66.27	-101.29	-85.34
<i>NT</i>	-65.45	-100.65	-84.69
<i>W</i>	-20.69	-24.37	-22.11
<i>J</i>	66.03	123.89	99.51
<i>JA</i>	66.34	47.41	80.24
<i>EN</i>	2199.70	7662.61	9450.00
<u>M2 vs M1</u>			
<i>N</i>	-1.64	-1.90	-0.03
<i>NT</i>	-1.57	-1.88	0.01
<i>W</i>	-1.54	-1.86	0.01
<i>J</i>	1.64	1.88	0.04
<i>JA</i>	1.56	1.87	0.02
<i>EN</i>	1.28	1.31	0.49

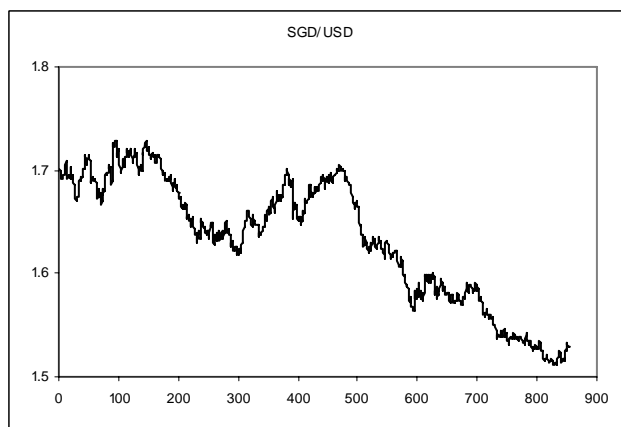
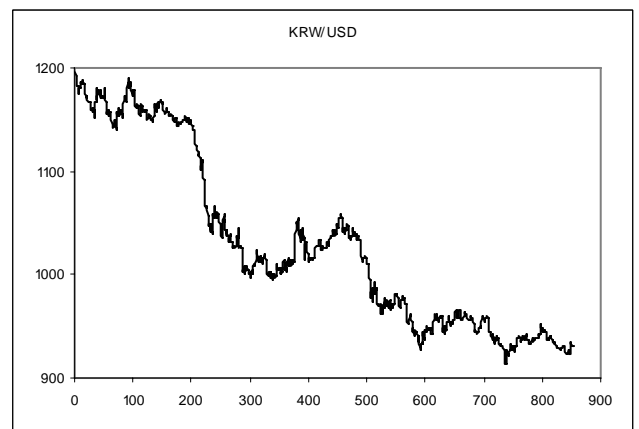
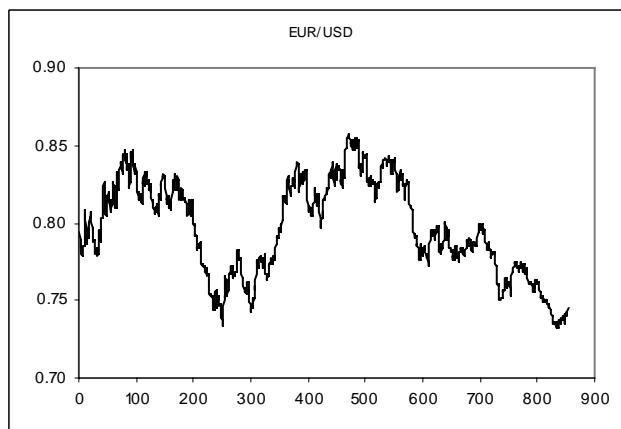
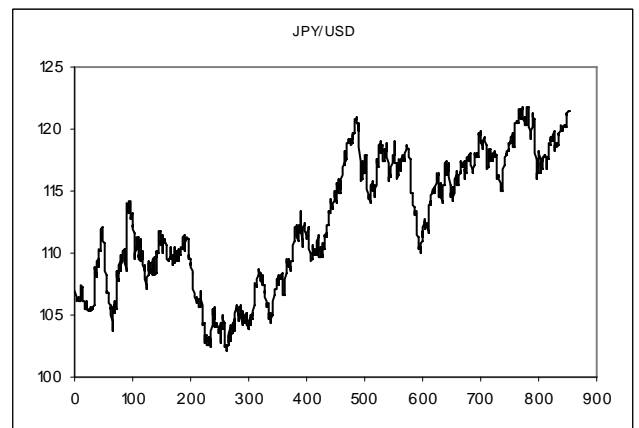
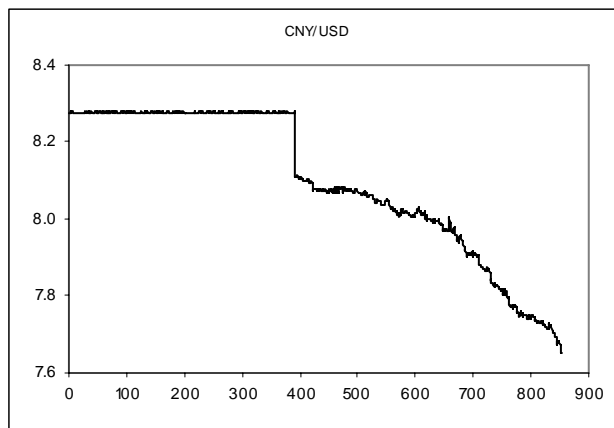
Figure 1: Exchange Rates against the USD

Figure 1: Continued

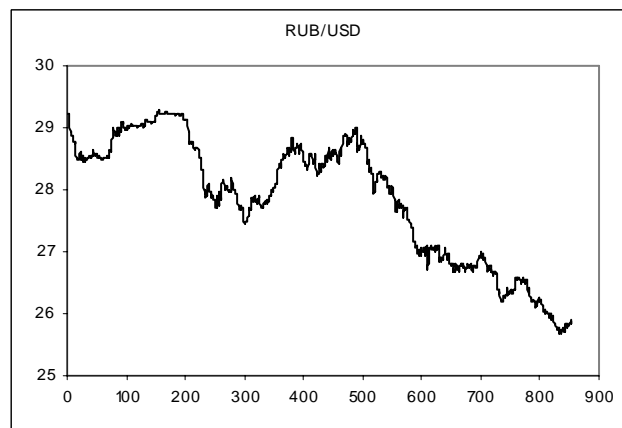
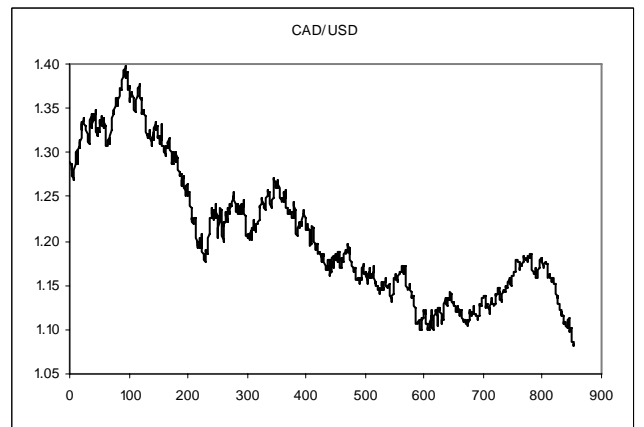
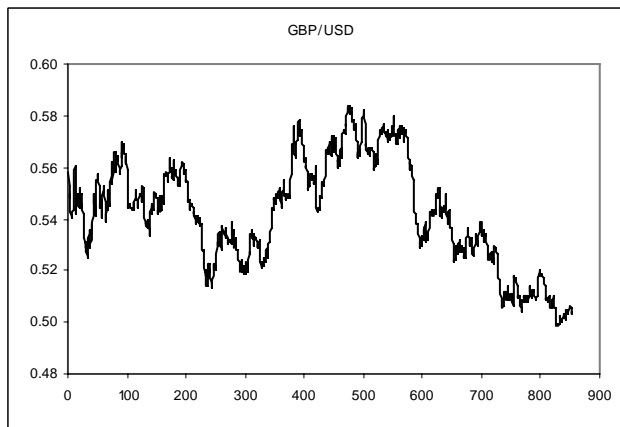
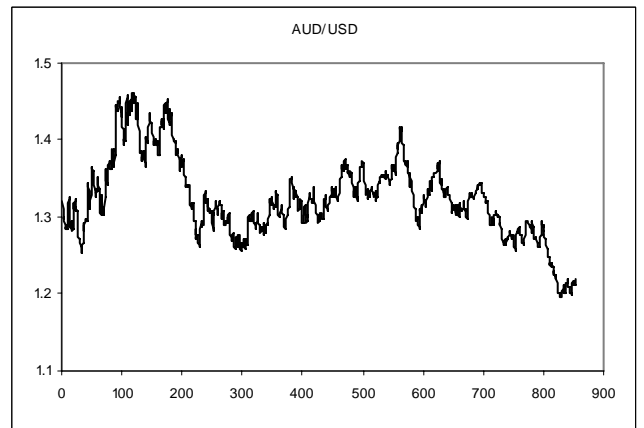
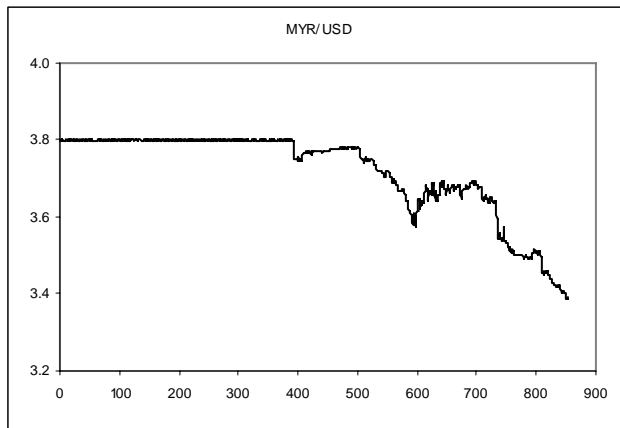


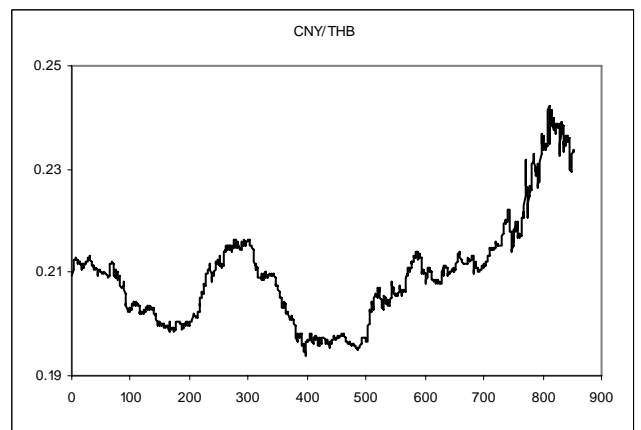
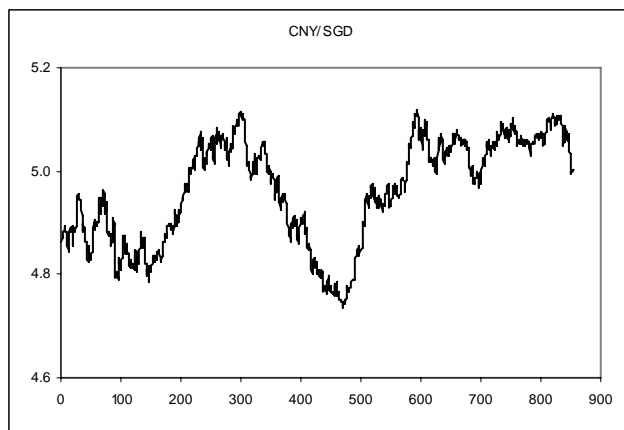
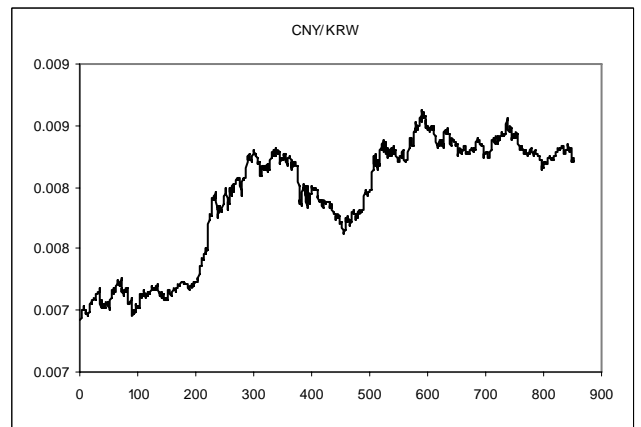
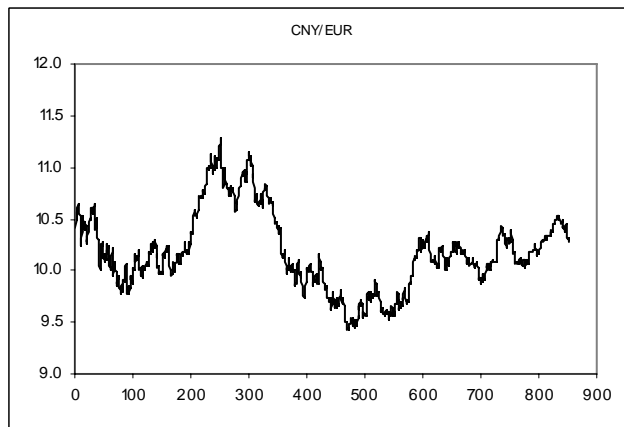
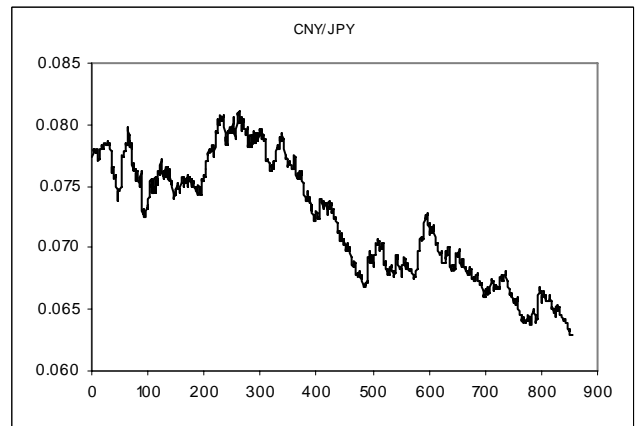
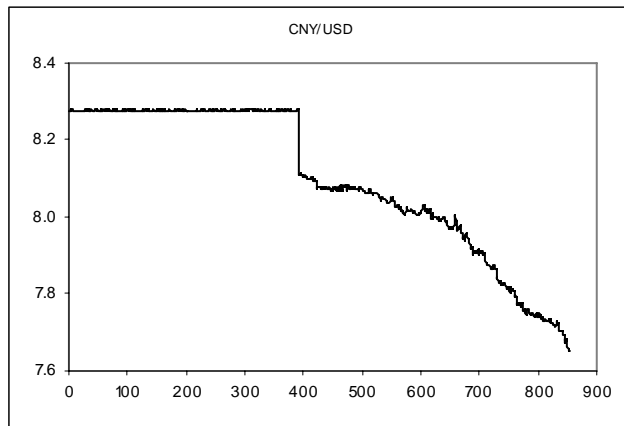
Figure 2: Exchange Rates of the Yuan

Figure 2: Continued

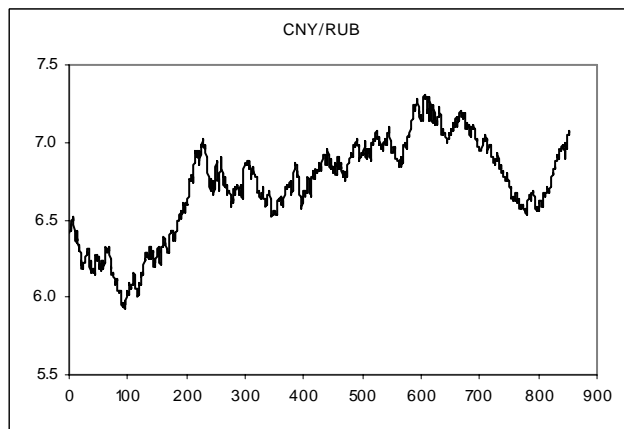
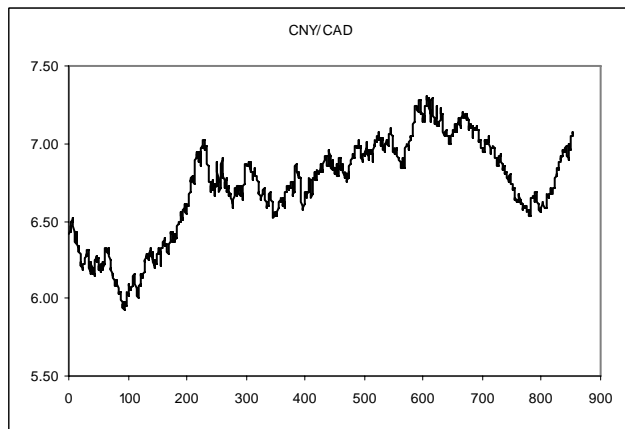
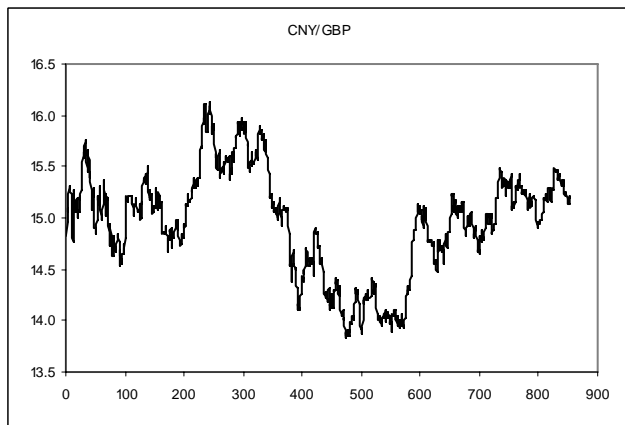
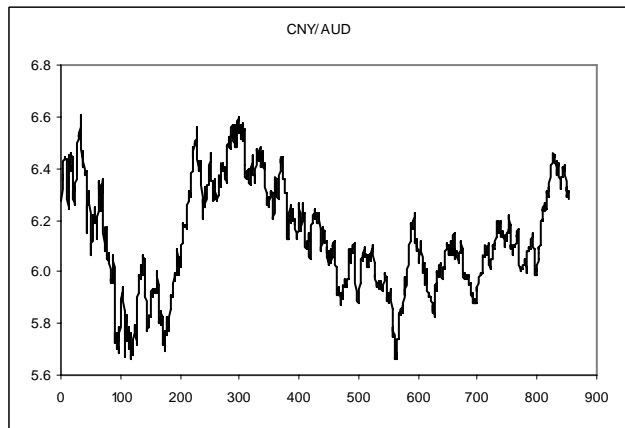
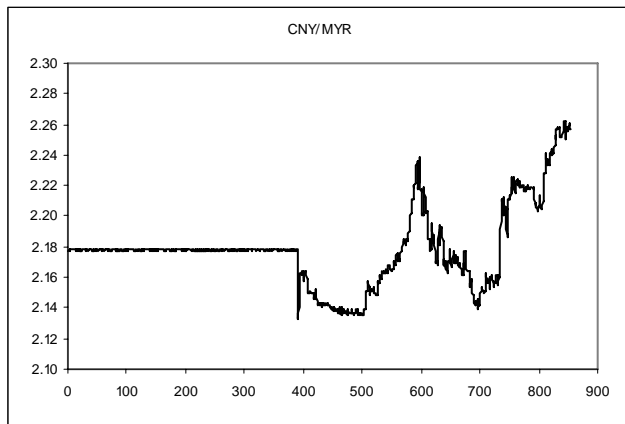


Figure 3: Predictions of a Basket Peg and Crawling Peg Models Relative to the Actual CNY/USD Rates

