

Forecasting the Yuan-Dollar exchange rate evolution (2010)

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Appreciation of Chinese Yuan has generated so much discussion in the last period. Some people assert that Yuan has the potential to become a world's reserve currency. In fact, HSBC predicts that by 2012 nearly \$2 trillion of annual trade (over 40% of China's total) could be settled in Yuan, making it one of the top three currencies in global trade. Even though China has political reasons to have a strong currency, it is also true that depreciation of dollar (in special after the recent crisis) has worried China. In fact, China is the largest creditor of US and having huge foreign exchange reserves, largely dollar-denominated, and the value of these assets may shrink if the depreciation tendency of the dollar continues.

Yuan currency accelerated its appreciation since June 2005 when the People's Bank of China instituted a modest floating regime. Yuan-Dollar exchange decreased 2.5%, in 2005-2006, 3.4% in 2006-2007 and 7.02% in 2007-2008. After this acceleration China decided to peg to dollar in 2008. The Yuan has been pegged at about 6.83 to one U.S. dollar since July 2008. Note that in 2008-2009 Yuan appreciated 5.59% and taking October 2008 and October 2009 the appreciation is just 0.13% (see Table 1). However, there are reasons to think that China may have to adjust its policy and increase the flexibility of Yuan, with the almost inevitable appreciation of the Yuan.

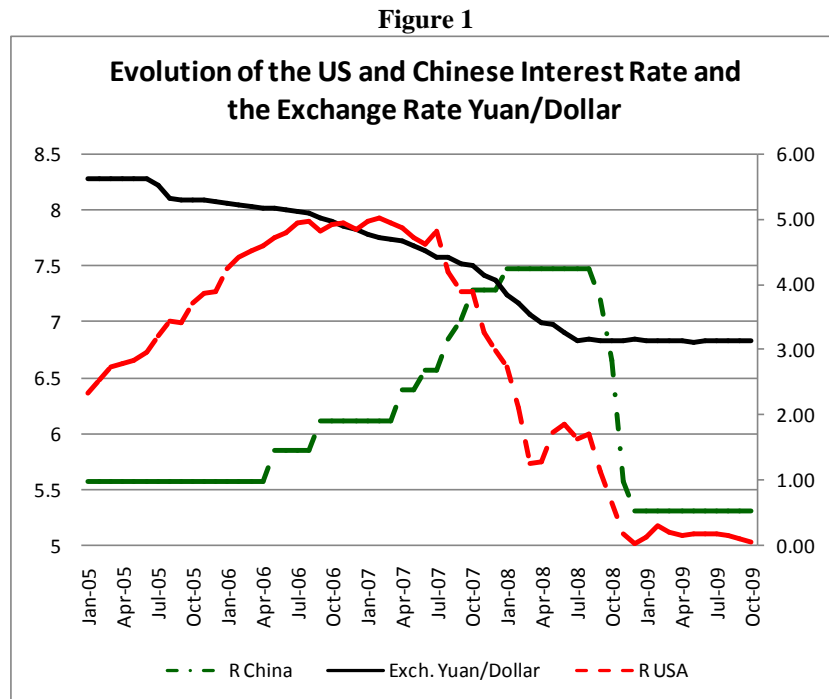
**Table 1: Annual Variation of the Exchange rate Yuan/Dollar,
US 3-month T-Bills and Interbank Chinese rate.**

Period	Exch. Yuan/Dollar	US interest	Chinese Int.
2005-2006	-2.551%	81.974%	0.000%
2006-2007	-3.444%	17.453%	9.677%
2007-2008	-7.025%	-44.779%	22.059%
2008-2009	-5.587%	-95.273%	-28.916%
oct.08-oct.09	-0.133%	-89.552%	-20.270%

On November 17, 2009, US President Barack Obama called on Chinese counterpart Hu Jintao to make good on a commitment to allow the Yuan to appreciate to help prevent trade imbalances that exacerbated the global economic crisis.

China has to evaluate the evolution of the US economy. After the crisis US has depreciated its currency, in particular respect to the currency of emerging countries. US budget deficit has exploded in the last time after the government plan to save the financial system. It is probably that US will apply a fiscal policy increasing taxes and reducing public expenses, it could contract a bit the US economy. The 3-month Treasury bills present the lowest levels in its history 0.07% (at October 2009). There is almost no margin to reduce the interest rate helping to increase production and depreciating even more the dollar. On the contrary, an increase in the US interest rate would be contractive policy but could help to appreciate dollar. Even if it is likely that US increases its interest rate but it is not sure that it will be enough to stop the Yuan appreciation.

I decided to evaluate a simple model to forecast the evolution of the Yuan-Dollar exchange rate for the next year. This model is a simplification in order to capture just a few variables determining the exchange rate.



Let E to be the exchange rate between Yuan and Dollar, P_{US} the level of price in US, P_{China} the level of prices in China, and R_{US} and R_{China} , the respective 3 month interest rate in US and China. According to the purchasing power parity (PPP) hypothesis we know that the following equation should be taken in the long run:

$$E \cdot P_{US} = P_{China} \tag{1}$$

Therefore the exchange rate is determined by:

$$E = P_{China} / P_{US} \tag{2}$$

As known the US economy uses the interest rate as monetary policy in order to control inflation and China has also used this policy. Defining the level of prices as a decreasing function of the interest rate we obtain the following equations:

$$P_{China} = A(R_{China})^{-\beta_1} \tag{3}$$

$$P_{US} = B(R_{US})^{-\beta_2} \tag{4}$$

Substituting (3) and (4) in (2) and taking logarithms, we obtain our econometric model.

$$e_t = \beta_0 - \beta_1(r_{China})_t + \beta_2(r_{US})_t + u_t \tag{5}$$

I take monthly data from January 2005 to October 2009 for the exchange rate, the US 3 Month T-Bill interest rate and the Chinese interbank interest rate. Using the Johansen Cointegration test and the test of weakly exogeneity I obtain the following equation.

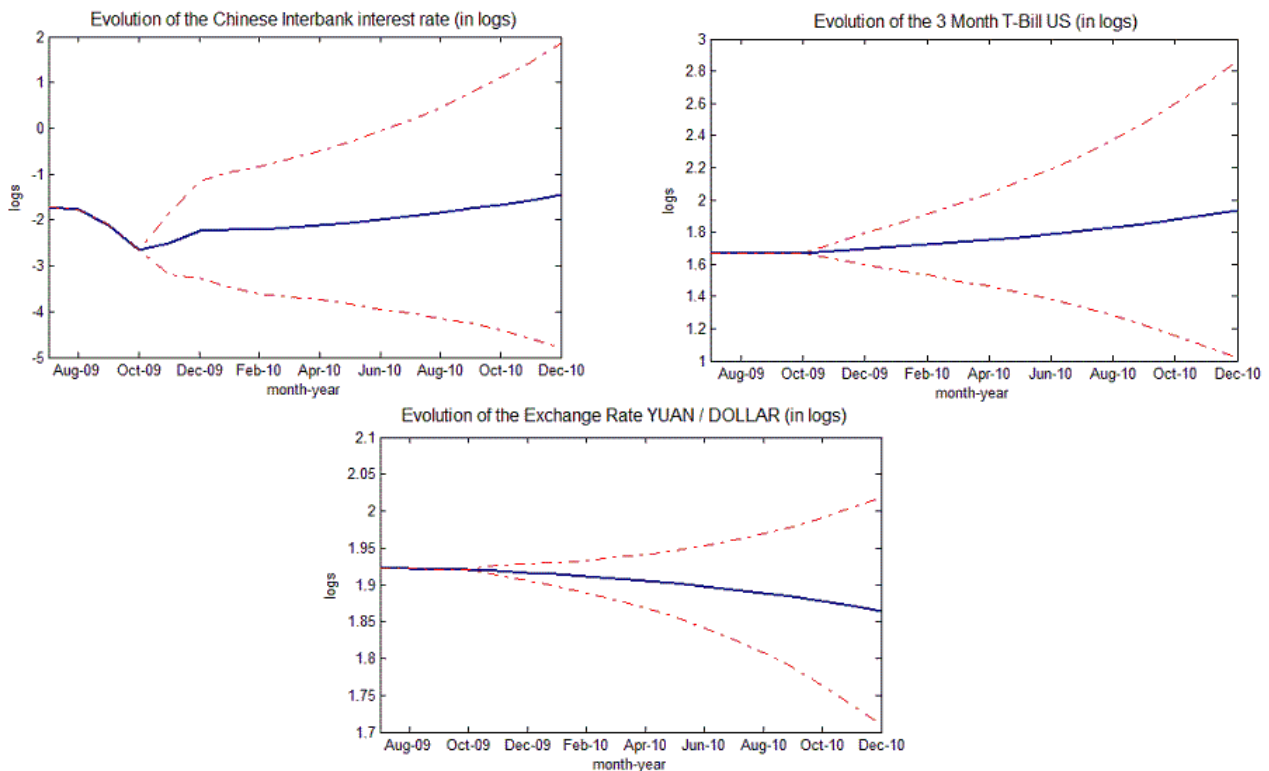
$$e_t = 3.399 - 0.827(r_{\text{China}})_t + 0.055(r_{\text{US}})_t \quad (6)$$

[9.979]
[-4.174]
[3.947]

The signs are the expected and the coefficients are significant. Furthermore, the Chi²-statistic of 9.44 shows that the r_{China} and r_{US} are weakly exogenous at 1%.

Using the Vector Error Correction model and 10,000 Montecarlo simulations, I forecast the following months until December 2010. Figure 2 shows the results.

Figure 2: Forecasting of Chinese and American interest rate and Exchange rate Yuan/Dollar for the period Dec-2009 to Dec-2010.



The results shows that in average is expected to have an increase in the interest rates, 117% the US interest rate and 27% the Chinese interest rate from Dec-2009 to Dec-2010. On the contrary, the Yuan will appreciate even more, in fact the exchange rate is expected to decrease 5% in the same period. Of course, the uncertainty increases as the time goes on, note that the confidence intervals growth as the time advances.