

Will both China and the US benefit from China's exchange rate reform?

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Abstract

This paper investigates whether China and the US will both benefit from China's recent shift from fixed to more flexible exchange rate regimes. The traditional theory suggests that a flexible exchange rate regime allows one country to run its own monetary policy and balance its economy. However, this paper finds that floating exchange rates do not allow one country to pursue a truly independent monetary policy if changes in exchange rates are not determined by domestic economic fundamentals, but instead, caused by significant changes in the US economic policies, safe haven flows, sustained market expectations and carry trades. As a result, a floating exchange rate regime will not have a significant role in China's rebalancing, but it will make China's monetary policy more dependent on the US policy. However, the US can benefit from China's floating exchange rate regime as US self-centered economic policies have a greater impact on floating exchange rates than on fixed exchange rates.

Keywords: floating exchange rate; fixed exchange rate; monetary policy; uncovered interest rate parity; China; rebalancing; international capital flows; foreign direct investment

JEL Classifications: E52; F33; F41

1. Introduction

China moved towards a more flexible market-determined exchange rate on August 11, 2015. This is a significant change in China's exchange rate policy and caused huge volatility in the global financial markets (Yellen, 2016a). The main reasons for China to implement a floating exchange rate are best summarized by the IMF (2015, 18): "A more flexible, market-determined exchange rate is needed for allowing the market to play a more decisive role in the economy, rebalancing toward consumption, and maintaining an independent monetary policy as the capital account opens". However, there is no conclusive empirical evidence from the literature supporting the view that floating exchange rate will guarantee an independent monetary policy, but there are arguments that self-centered policy decisions by individual countries under floating exchange rate regime actually have done harms to the global economy (Dorrucci and McKay, 2011; Krugman et al., 2015). Indeed, this paper finds that a floating exchange rate regime will not have a significant role in China's rebalancing, however, it will make China's monetary policy more dependent on the US policy.

The Chinese currency Renminbi (RMB) was largely stable relative to the US dollar until August 11, 2015 when it was devalued by 1.9% on that date. However, it has been floating against other currencies along with the US dollar. Therefore, the floating exchange rate of the RMB basically means that it will float against the US dollar.

There are two main problems arising from the stable RMB to US dollar exchange rate. One is the claim of the US that the RMB has been kept artificially undervalued to gain trade advantages against the US and US President Donald Trump declared China the "grand champions" of currency manipulation on February 23, 2017 (Holland and Lawder, 2017).

Even though Donald Trump backed away from his claim on April 12, 2017, “the reason he changed his mind on the currency issue was because China has not been manipulating its yuan for months and because taking the step now could jeopardize his talks with Beijing on confronting the threat from North Korea” (Lawder, 2017). Therefore, it is important for China to use a floating exchange rate regime to help with both external and internal rebalancing, and avoid accusations of currency manipulation.

The other is the claim that the Chinese monetary policy loses independency as capital accounts open. It is argued that an independent monetary policy is important for China to manage its specific economic conditions. As international capital flows increase, implementing floating exchange rate is fundamental due to the “impossible trinity” (inability to have an open capital account, independent monetary policy, and tightly managed exchange rate) (The Treasury, 2003; IMF, 2015). This is because if the RMB is not floating against the US dollar, then the Chinese monetary policy has to follow the US monetary policy to keep the real interest rate in China in line with that in the US, so that capital flows will not threaten the fixed exchange rate. If the RMB floats against the US dollar, China can use its monetary policy to address specific cyclical and structural conditions, and pursue low-inflation and pro-growth objectives ((IMF, 2015; The Treasury, 2003).

It is very difficult to justify the claim that China manipulates exchange rate when China maintains a stable exchange rate against the US dollar. This is because China often needs two-sided interventions to keep a stable exchange rate. However, it is possible for a country to engage in persistent, one-sided interventions to manipulate exchange rate using economic policies under a floating rate regime. In their popular economics textbook, N. Gregory Mankiw and Mark P. Taylor asked such a question: “Is the pegging of the Chinese currency against the US dollar an example of currency manipulation?” (Mankiw and Taylor, 2017:

602), and they pointed out that it is interesting that such accusation comes from the countries using quantitative easing to weaken exchange rates to boost economies.

This paper contributes to the literature by providing new evidence which does not seem to support the second claim either. It first analyses why and when monetary policy should react to exchange rate changes under a floating exchange rate regime. Then, it investigates whether the monetary policy of China has to respond to the changes in the RMB exchange rate under the floating exchange rate regime. Finally, it evaluates what benefits the RMB floating exchange rate will bring to the Chinese economy and the US economy as the US has been promoting the RMB flexibility for more than a decade and China's bilateral goods trade surplus with the US is extremely large and persistent for the past several years (Morrison, 2015; The Treasury, 2017).

It finds that it is difficult for China to pursue a truly independent monetary policy under floating. There are four main reasons: First, monetary policy has to react to exchange rate changes that are not determined by the economic fundamentals; Second, floating exchange rates are affected by many factors which may not be reflecting fundamentals; Third, floating exchange rates will not help external and internal rebalancing. Finally, the US self-centered policy decisions may have a greater impact on a floating exchange rate than on a fixed exchange rate.

However, the RMB floating exchange rate may benefit the US. The market-expected appreciation of the RMB will encourage more foreign direct investment (FDI) from China to flow to the US, and this will help the US economy and reduce the risk of maturity transformation and liquidity transformation for the US to perform the role as the banker of the world.

The remainder of the paper will proceed as follows: Section 2 discusses how monetary policy reacts to changes in exchange rates. Section 3 analyses how exchange rates are determined under the floating exchange rate regime. Section 4 investigates the cases under the floating exchange rate regime where monetary policy is not independent. Section 5 explores what may happen to China's monetary policy after the RMB floats. Section 6 discusses whether floating exchange rates will contribute to the rebalancing of the Chinese economy. Section 7 analyses why the US prefers the RMB to float. Section 8 concludes.

2. Why does monetary policy react to changes in exchange rates?

As exchange rates affect inflation and output, it is natural for monetary policy to react to changes in exchange rates. For large open economies, there is evidence that exchange rates affect interest rate policy (Chinn and Meredith, 2004). Indeed, in 2015 the US Fed delayed policy rate liftoff until December in 2015 because of the strong dollar and weak foreign demand (Fischer, 2015). And Yellen (2016b) acknowledges that in a world with highly integrated capital markets, monetary policy of any country should consider exchange rate movements which are spillovers of one country's monetary policy to other countries.

For small open economies, exchange rates are the primary focus of central banks as well as interest rates. Starting in the 1990s, several central banks have adopted a Monetary Conditions Index (MCI) which is a weighted average of changes in a short-term interest rate and a multilateral exchange rate from some baseline to guide monetary policy under floating exchange rates. As the change in MCI will affect aggregate demand leading to changes in inflation rate, the country will change its interest rate to realize its MCI target. Indeed, Gerlach and Smets (2000) find that the Bank of Canada and the Reserve Bank of New

Zealand, who use the MCI as an operating target, do respond quite strongly to movements in exchange rates.

Therefore, a general simplified function can be used to describe the reaction of monetary policy to the exchange rate (Taylor, 2001):

$$R_t = \alpha f(\pi_t, \pi_e, Y_t, Y_e) + \beta f(E_t, E_{t-1}, E_e) \quad (1)$$

where R_t is the short-term nominal interest rate set by the central bank for the period t ; $f(\pi_t, \pi_e, Y_t, Y_e)$ is a function of inflation rate (π_t), expected inflation rate (π_e), output gap (Y_t) and expected output gap (Y_e); $f(E_t, E_{t-1}, E_e)$ is a function of exchange rates which specifies the change in exchange rates in recent periods, and E_t and E_{t-1} are the exchange rates of the period t and $t-1$, and E_e is the expected exchange rate for the future period¹, and these exchange rates are in terms of domestic currency per foreign currency unit; α and β are coefficients.

Normally, α and β are positive as higher inflation and output gap need tightening monetary policy, and currency depreciation has an expansionary impact on aggregate demand (Taylor, 2001). Based on the analysis above, it may be true that the difference between α and β of small open economies may be much smaller than that of large economies.

¹ For the MCI target, exchange rate change can be estimated based on Equation (2) of Section 3 (e.g. Canada (Ericsson et al., 1998)).

It is easy to see that monetary policy reaction functions (Equation (1)) of different countries are linked by changes in exchange rates. For example, if the US increases interest rate, it will affect the exchange rate. And this exchange rate change may cause changes in the interest rates of other countries based on their Equation (1). Therefore, the degree of independence of monetary policy of each open economy depends on β of Equation (1). However, for large economies, their exchange rates respond to many influences other than monetary policy decisions and interest rates depend on an overall assessment of all information which might be relevant for price developments. Therefore, there are many periods, monetary policies of large economies move in different directions.

It is argued that one main benefit of floating exchange rates is that floating rates allow monetary policy independency by insulating one country from the inflation pressure from other countries. This is because floating exchange rates will move to offset exactly the differences in inflation rates of different countries according to the relative Purchasing Power Parity (PPP), that is nominal exchange rate changes will keep real exchange rates remain unchanged. In addition, monetary policy does not need to respond to some other exchange rate changes such as changes in exchange rates arising from the productivity change or a temporary random behaviour. This is because interest rate changes may not be effective for correcting structural problems which affect productivity, and temporary exchange rate changes may not have a lasting impact on inflation and output (Obstfeld and Rogoff, 1995; Taylor, 2001), and they may serve as automatic stabilizers.

However, if nominal exchange rate changes cause changes in real exchange rates, they will have impact on both inflation and output. In this case, changes in exchange rates cannot insulate domestic economy from foreign policy shocks. Therefore, it is important to

determine whether changes in exchange rates are due to the PPP, productivity or other factors, and whether they are temporary which can function as automatic stabilizers under the floating exchange rate regime. As a result, an appropriate monetary policy can be made to react to changes in exchange rates.

3. How are exchange rates determined under the floating exchange rate regime?

In open economies with free cross border capital flows, an adapted uncovered interest parity (UIP) model, assuming there is a risk premium for holding domestic bonds relative to the US bonds (ρ)², is appropriate for examining factors determining exchange rates. This model is widely used in the literature (e.g. Klein and Shambaugh, 2015; Batini and Dowling, 2011; Carlson and Osler, 1999; Chaboud and Wright, 2003), and some studies do find evidence which supports this model in terms of both short-term interest rates (e.g. Chaboud and Wright, 2003) and long-term interest rates (e.g. Chinn and Meredith, 2004; Obstfeld, 2009). The international Fisher effect (IFE) theory also supports the UIP. This is because if exchange rate changes reflect the difference of inflation rates between two countries based on the relative Purchasing Power Parity (PPP), then they will reflect the difference of nominal interest rates between these two countries based on the Fisher effect which claims that nominal interest rates will adjust to changes in the expected inflation rates. Indeed, Hauner, Lee and Takizawa¹ (2010) find evidence supporting the relative PPP, and therefore, the UIP model. The formula for the model is defined as follows:

² This paper is written from the perspective of any country other than the US for the convenience of illustration.

$$\frac{(E_e - E)}{E} = R_d - R_{us} + \rho \quad (2)$$

E_e is the expected exchange rate at the end of the period in terms of domestic currency per US dollar; E is the spot exchange rate in terms of domestic currency per US dollar. R_d and R_{us} are the interest rates of domestic money market and the US money market for the period. The basic idea of this model is that with free international capital flows, the expected percentage change in exchange rates should equal the interest rate differentials between two countries after considering the effect of a given ρ . Moreover, if there is a strong market expectation of future exchange rate E_e , then given interest rates and ρ , spot exchange rate E will follow such a market expectation of E_e .

However, there is evidence that ρ may change dramatically in some periods. For example, during financial crises, ρ can increase as global investors may sell other currencies (especially, those of emerging economies and small advanced economies) against the US dollar to take refuge in US Treasuries, i.e. safe haven flows may strengthen both the expected exchange rate and spot exchange rate for the US dollar (McCauley and McGuire, 2009; Kohler, 2010)³.

³ Some literature finds that safe haven effects are obvious for the Japanese yen, the Swiss franc and the US dollar as these three currencies appreciated during financial crises (Kohler, 2010).

Based on Equation (2), it is obvious that with fixed exchange rates, domestic interest rate has to be kept in line with the US interest rate as the expected change in exchange rate is zero, therefore, there is no independent domestic monetary policy given ρ . However, with floating rates, if there is no target for E_e , then domestic interest rate can vary from the US interest rate, and therefore, domestic monetary policy can be used to address domestic economic conditions. Indeed, for emerging markets with floating exchange rates, there is evidence that monetary policy is more independent, however, for advanced economies, interest rates move more closely no matter how exchange rate behaves because they are more integrated (Klein and Shambaugh, 2015).

4. When will floating exchange rates harm the independency of monetary policy?

However, exchange rate changes can affect domestic interest rate decision if they are significantly different from the values required by the domestic economy. Monetary policy has to respond to exchange rate changes based on Equation (1). There are four obvious cases where changes in exchange rates arise from causes which are not determined by the PPP, productivity or temporary irrational behaviour. And as a result, it is difficult for one country to run its own monetary policy with floating exchange rates.

4.1 Case one: Significant changes in the US economic policies

As changes in the US economic policies affect interest rates, they will affect the exchange rate. When such exchange rate changes are caused by the US policies addressing the US economic conditions that are very different from other countries, they will impact the

independence of monetary policies in other countries. This can be reflected in the fact that the US interest rates have had a greater influence on rates in other countries than the influence of other countries' interest rates on the United States. For example, Rey (2015) finds that the interest rates in the US have a positive effect on those of other countries. This is because that the US is less open to international trade in terms of the share of its GDP than other countries which are smaller and more sensitive to their exchange rates (Chinn and Frankel, 2005), i.e. β of Equation (1) for the US is smaller than that for other countries. In addition, Gray (2013) and Hofmann and Takáts (2015) also find evidence that the US interest rates have significant spillover effects on the interest rates of other countries in recent years.

One famous example is the prolonged appreciation of the US dollars from the spring of 1981 to early 1985. This appreciation was largely due to the US expansionary fiscal policy and tight monetary policy which led to high interest rates in the US relative to other countries such as Japan and Germany (Chinn and Frankel, 2005). But the appreciation of dollar hurt the US industry and caused inflation pressures in other countries. The Plaza Accord initiated a coordinated exchange market intervention to lower the dollar's value, and Japan raised short-term interest rates to appreciate Japanese Yen against the US dollar⁴. However, the sharp appreciation of Yen in 1986 created a serious downturn for Japanese economy and contributed to a "syndrome of the ever higher Yen" (McKinnon and Ohno, 2001).

The recent currency war debate (Eichengreen, 2013; Nelson, 2015) is another example. The US and other developed countries are depreciating their currencies using quantitative easing which causes economic over-heating in emerging countries with floating exchange rates. Talyor (2013a, b) argues that the unusually low US interest rates put pressures on other countries to choose unusually low interest rates because these countries want to prevent

⁴ Based on Equation (2), an increase in R_d indicates a decrease in E if E_e remains the same.

excessive exchange rate fluctuations and risk-taking. These countries worry about the negative impact of appreciation of their currencies on their exports which may outweigh the uncertain benefits from the US economic growth, and the risk from the increase in banks' borrowing from abroad due to the lower interest rates in the US.

Some argue that emerging countries can use fiscal policy tightening to cope with overheating (Eichengreen, 2013), or use macroeconomic stimulus to deal with trade losses because of exchange rate appreciation (Frankel, 2016b). This indicates that emerging countries actually do not have policy independence under the floating exchange rate regime. Moreover, Frankel (2016b) argues that emerging countries can intervene in the foreign exchange market to prevent the appreciation of their exchange rates. This basically supports the managed exchange rate regime.

This indeed occurred in Brazil. In March 2012, Brazil had to impose some short-term capital inflow controls to prevent its currency Brazil real from appreciating against the US dollar to protect its export sector (Pearson, 2012). Based on Equation (2), as quantitative easing in the US generates a lower r_{us} , it is easy to see that the spot exchange rate of Brazil real will appreciate if there is no capital inflow control. However, after the US Federal Reserve announced on May 22, 2013 that it was planning to scale back monetary stimulus, Brazil had to intervene in the foreign exchange market to support its currency real in August 2013 to fight inflation as capital flew out of Brazil (Leahy and Strauss, 2013).

The experience of Brazil also demonstrates that floating exchange rates may enhance the conflicts of monetary policy and fiscal policy when huge exchange rate changes are generated by international capital flows due to the change in the US monetary policy. This is because Brazil has experienced high inflation and weak economic growth since 2011. Strong exchange rates help Brazil central bank to contain its high inflation; however, Brazil fiscal

policy needs weak exchange rates to spur growth and jobs (Leahy and Strauss, 2013). In this case, stable exchange rates help monetary policy independence: increasing interest rate to fight inflation without worrying about the appreciation of exchange rate which hurt economic growth.

4.2 Case two: Safe haven flows

During financial crises, the US dollar appreciates sharply against many currencies due to the safe haven effects. Here interest rate differentials cannot explain the huge change in exchange rates. For example, the significant appreciation of the US dollar since July 2014 is partly attributed to the decrease in investor risk tolerance associated with the global outlook (Fischer, 2015). This occurs because E_e increases sharply as ρ increases dramatically and international capital flies out of these countries following herding behaviour. This makes it difficult for other countries to implement independent monetary policy. Fratzsche (2009) finds that some countries are much more vulnerable when they have more portfolio investment from the US, and have weaker current account and foreign exchange reserve positions.

One case where the safe haven flows affected monetary policy independency occurred in Korea in 2008. The Korean won depreciated sharply in 2008 and the Bank of Korea (BOK) documented that “During that period, herd behavior in the markets became more pronounced owing to the worsening of foreign currency borrowing conditions for domestic financial institutions and to the expanded outflow of foreign portfolio funds”(BOK, 2008:31). The economy was very weak with depressed domestic demand and worsening employment conditions which needed a monetary policy easing, however, the BOK had to raise interest

rate in August 2008 to contain the high inflation caused by the depreciation of the Korean won against the US dollar and the rising prices of international raw materials (BOK, 2008). But as the economy declined rapidly, the BOK had to reverse its monetary policy and cut interest rates six times in the following two quarters although the core inflation rate was well above its medium inflation target. And the BOK had to intervene in the foreign exchange market in order to stabilize the foreign exchange rate.

The main reason for the sharp increases in ρ in this case was the global financial market turmoil in 2008. In addition, the increase in credit risk in Eastern European countries from the beginning of 2009 also increased market concerns about a deterioration of foreign currency supply and demand conditions in Korea. Such increases in ρ which cannot be controlled by the BOK caused rapid depreciation of Korea won against the US dollar.

4.3 Case three: A sustained expectation of domestic currency appreciation

If under the floating exchange rate regime, the market has a sustained expectation of domestic currency appreciation (E_e), then market-determined domestic interest rate will remain below the US interest rate. Then, there is no independent monetary policy as the policy interest rate has to be lower than the US rate based on Equation (2). Indeed, this is case for Japan since 1980s (Krugman, 1998; McKinnon and Ohno, 2001), and a liquidity trap occurred in late 1990s in Japan⁵. One possible explanation is that because the sustained

⁵ As the Japanese yen is a safe haven currency, ρ can be assumed to near zero during normal times. However, when Japan falls in a liquidity trap while the US is not, ρ can be assumed to positive as Japanese bonds are very risky when the Japanese interest rate is near zero

appreciation of exchange rates, inflation rate decreases and economic growth slows so interest rates will decrease.

Since the global financial crisis in 2008, the US interest rates have been kept near zero, and Japan followed the US practice of quantitative easing. Recently following the ECB's lead, it implemented negative interest rate policy to depreciate Yen exchange rate and stimulate growth through exports. However, under the floating exchange rate regime, there is limitation for using negative interest rate policy as it is impossible for every country to depreciate its currency at the same time (Poole, 2016).

Huge volatilities of floating exchange rates also indicate that momentum effects and speculative bubbles can make exchange rates deviate substantially away from the fundamental values which are determined by interest rates, inflation rates and other economic factors over a long period. One possible reason is that cycles in the real rate of interest and in the growth rate of advanced economies can be important global push factors for repeated booms and busts in international capital inflows (Calvo et al., 1996).

Indeed, Menkhoff et al. (2012) find that there is evidence of return continuation and subsequent reversals in exchange rates against the US dollar for up to 48 currencies over a long horizons of up to 36 months. And these momentum effects are greater especially of those currencies that are hard to hedge and have high country risks.

(McKinnon and Ohno, 2001), and this may increase the real cost for Japan's investment as there is deflation and nominal interest rates cannot be decreased further.

Moreover, some studies find bubbles in exchange rates. For example, Krugman (1985) argues that the US dollar was subject to an irrational speculative bubble in 1985 which was based on market expectations that were inconsistent with the long term balance of payments conditions but were focused on the higher yield on dollar securities. And the bubble started to burst at the end of February 1985 which was likely arising from the market expectation of the shift in the US dollar policy in the year (Frankel, 2016b). Evans (1986) also finds evidence of bubbles in the sterling-dollar exchange rate from 1981 to 1984, and Van Norden (1996) finds evidence of bubbles in exchange rates of the Canadian dollar and the Japanese yen against the US dollar over the 1977-91 period.

4.4 Case four: Carry trade

When the UIP does not hold (Meese and Rogoff, 1983; Fama, 1984), carry traders can make positive payoffs to borrow a low interest rate funding currency to invest in assets in a destination currency with high interest rate without hedging for currency risk if the expected change in exchange rates does not follow Equation (2). For example, if R_d is greater than R_{us} , and $R_d - R_{us} - \frac{(E_e - E)}{E}$ is positive, then carry trade using the US dollar as a funding currency can make profits assuming ρ is zero. Such profits not only can come from $R_d - R_{us}$, but also can come from exchange rate changes if $\frac{(E_e - E)}{E}$ is negative indicating that the market expects US dollar will decline in value. Then carry trades may keep real exchange rates away from their fundamental equilibrium and contribute to extended periods of currency appreciations followed by sudden currency crashes (BIS, 2015). Indeed, Gilmore and Hayashi (2011) find that the US investors have earned excess returns by taking a short position in the US dollar and a long position in emerging market currencies despite their short-term losses because of the appreciation of the US dollars against almost all other

currencies during the financial crises. Löffler et al. (2012) find evidence of protracted carry trades for Asian currencies, and this lowers the autonomy of monetary policy of countries with floating exchange rates.

There are many papers explaining the positive payoff from carry trades. Using Equation (2), ρ is often used in the literature to explain the positive profits coming from $\frac{(Ee - E)}{E}$ including the interest rate differentials, i.e. the exchange rate change which does not follow the UIP but captures the invisible ρ in addition to the interest rate differentials. This indicates that the excess return of carry trades can be explained as compensation for the risk of holding assets denominated in currencies other than the US dollar such as country-specific and global risk factors; the risk of currency crashes, market liquidity, currency convertibility and capital controls risks (BIS, 2015). The VIX is widely seen as a market proxy for risk aversion and uncertainty⁶. And it is argued that carry trade flows tend to increase when the VIX is low and to collapse when the VIX spikes (Rey, 2015), and the surge in capital flows is associated with the lowering of the VIX (Forbes and Warnock, 2012).

However, Plantin and Shin (2014) argue that carry traders can earn positive excess returns by coordinating an excessive capital inflows to the country with a high interest rate. Such self-fulfilling currency attacks arise from an anticipated appreciation of the nominal exchange rate (Ee). But the process may end abruptly when interest rate differentials are reversed due to negative shocks.

⁶ The VIX is the Chicago Board Options Exchange Market Volatility Index. It is a measure of the implied volatility of S&P 500 index options (Rey, 2015).

5. What will happen if China let its exchange rate float?

If China let its RMB exchange rate float against the US dollar, will these four cases happen and make it difficult for China to pursue a truly independent monetary policy?

First, the US economic policy will have a much greater impact on the Chinese monetary policy. This is because China is more open to international trade than the US⁷. Moreover, the US monetary policy may have a much greater impact on the nominal exchange rate than the Chinese one under the floating rate regime due to its significant impact on international capital flows. The US monetary policy has a significant impact on the VIX with lower federal funds rate leading to lower VIX, and international capital flows including FDI, equity, credit and debt tend to be highly correlated with one another and negatively correlated with the VIX (except for FDI) (Rey, 2015).

Indeed, international capital flows to China are also affected by the VIX. A regression is run using the end of month value of RMB paid by the People's Bank of China (PBOC) to buy foreign exchange (FX) as dependent variable, and the end of previous month value of the VIX (vix) as independent variable over the period of Jan 2000 to Feb 2016. The VIX is found to have a significant negative impact on FX (see Table 1 for detail). As a result, China may

⁷ In 2014, China's exports of goods and services account for 22.6% of GDP and its FDI net inflows account for 2.8% of GDP; whereas for the US the figure for exports is 13.4% and that for FDI is 0.8% based on the World Bank's World Development Indicators.

have to implement a monetary policy which reacts more to the US monetary policy and is not aligned with domestic economic conditions⁸.

(Insert Table 1 here)

Indeed, the empirical evidence on Japan supports this argument. This paper investigates whether the US federal funds rate has had a significant impact on the Chinese one year deposit rate and the Bank of Japan's official discount rate over the period from January 2000 to February 2016. This period is analysed because China joined the WTO in December 2001 and its economy has made huge progress in opening up to the world economy since then. And the paper finds that the US monetary policy rate has no significant impact on the Chinese monetary policy rate; however, it has a significant positive impact on the Japanese monetary policy rate (see Table 2 for detail). This indicates that under the floating rate exchange rate regime, China's monetary policy may be less independent of the US monetary policy, and it supports Section 4.3 which discusses why Japan's monetary policy is not independent. The independent monetary policy of China up till now is due to the fact that under a fixed exchange rate regime, China can maintain a stable exchange rate by engaging in a sterilized intervention in the foreign exchange market.

(Insert Table 2 here)

Second, it is very difficult for China to avoid the scenario of case two. It is always possible that ρ may change significantly during financial crises. The RMB has been under huge pressure because of huge international capital outflows arising from concerns about the

⁸ However, the US recent interest rate decision has been affected by international developments, especially economic conditions in China (Yellen, 2016a), and this may reduce some of the conflicts of monetary policies between China and the US.

heightened volatility in the Chinese stock market (Song, 2016) and a slowing Chinese economy since July 2015. To some extent, case two has already occurred in China since 11 August 2015. The RMB lost nearly 3% from 11th August 2015 to early March 2016 with \$100 billion per month of average currency outflow recorded during November, December and January, despite China has been intervened aggressively to support the RMB (Chandran, 2016)⁹, and the RMB lost 6.5% in 2016 with around \$700 billion in net capital outflow in 2016 (The Treasury, 2017). However, as China has a huge amount of foreign exchange reserves and China's capital market is still relatively closed to foreign portfolio investors, it is effective for China to intervene in the foreign exchange market in the short term.

Third, case three can occur to China over the medium-term and long-term. It is probable that China will follow the Japanese case (McKinnon, 2006). The market may have a sustained expectation that the RMB will appreciate against the US dollar. This is because the huge current account deficit of the US will not be sustainable and the depreciation of US dollar is inevitable (e.g. Krugman, 2007), and in recent years, the biggest trade deficits of the US were recorded with China, Japan and Germany. Moreover, the US has been pressuring China to appreciate the RMB since 2003 (Frankel, 2016). Recently, even though IMF (2015) judges that the RMB is no long undervalued but the US treasury (2016) still argues that the RMB should appreciate over the medium-term: "Core factors that have been supportive of the RMB remain in place, including high net savings, strong external balances which include a sizeable and growing current account surplus, and improved terms of trade reflecting lower

⁹ China sold more than \$480 billion in foreign currency assets to support the value of the RMB from August 2015 through March 2016 (The Treasury, 2016), and sold than \$800 billion through February 2017 (The Treasury, 2017).

commodity prices.” (The Treasury, 2016: 16). And the US treasury (2017:15) requires China to let “the RMB rise with market forces once appreciation pressures resume”. If such case occurs to China, it is very difficult for China to have an independent monetary policy.

However, recent developments may have weakened the expectation that the RMB will appreciate against the US dollar in the long-term. First, the US has started its gradual process of increasing policy rate, and this has eased the pressure on the RMB. Second, China is moving towards a consumption-led economy which will ease its current account surplus. Third, huge capital outflows since China devalued its RMB in August 2015 have weakened the confidence of investors.

Fourth, carry trade may not have a significant impact on the RMB exchange rate as China’s financial markets are still in the process of opening to international investors. Several ways are used by carry traders to influence exchange rates. One way is the foreign purchase of domestic securities such as government bonds, which is not popular recently (BIS, 2015).

This requires that the destination currency assets market be open to foreign investors.

However, China is still relatively closed in terms of asset markets and its bonds market needs to be developed as well. The other ways that carry trade can be implemented include using FX swap market, non-deliverable forwards or futures (BIS, 2015). These transactions may have a huge impact on the RMB exchange rate as China have less control over the development of these derivatives offshore.

Overall, it seems that China cannot pursue a truly independent monetary policy after its RMB floats against the US dollar. This is because of the significant impact of the US economic policy, the safe haven capital flows and the expectation of the RMB’s appreciation over the medium-term and long-term.

6. Will floating exchange rates contribute to China's rebalancing?

Whether floating exchange rates will help balance current account depends on whether exchange rates are determined by current account balances. For example, if a country's current account deficit implies its currency will depreciate, then its current account deficit will decrease. Indeed, there is some evidence that changes in exchange rates do have a significant impact on exports after one year (Fischer, 2015) and current account after two years (Frankel, 2016b). However, "under floating, external imbalances have persisted for years before exchange rates have adjusted" (Krugman et al., 2015, 308). Therefore, the key question is whether exchange rates are determined by current balance under the floating rate regime.

The analyses so far suggest that exchange rates are determined by the asset market rather than current account balance, and there are many cases that exchange rate changes do not reflect fundamentals. Indeed, there are no obvious relationships between current account balances and exchange rates (Hauner et al., 2010). For example, even though the UK and Germany both have floating exchange rates, the UK's current account has constantly been in deficit since fourth quarter 1998 while the Germany's current account has constantly been in surplus since 2004. Therefore, the evidence does not support the claim that the RMB floating rate will correct the strong external balance of China. In fact, many argue that the US current account deficit arises from the savings imbalances between China and the US (McKinnon, 2006), and it is "a reflection of global supply chains, where China is often the final point of assembly for export oriented multinational firms" (Morrison, 2015, 3). Moreover, there is evidence that floating exchange rates result in larger misalignments (i.e., long swings in real

exchange rates that leave countries far from external balance) than fixed exchange rates (De Grauwe and Verfaillie, 1988), and such misalignments have inspired frequent protectionism (Krugman et al., 2015).

Indeed, the statistical evidence indicates that there is no significant difference between the actual change in exchange rates and the predicted change in exchange rates by the relative PPP for the Chinese RMB/US dollar exchange rate since 1999. However, such difference is significant for the Japanese Yen/US dollar exchange (see Figure 1 for detail). These findings predict that the RMB's floating exchange rate will deviate much more from fundamentals than its fixed exchange rate. And based on Figure 1, the RMB is actually overvalued against the US dollar since 2010 which is the exact opposite of the US claim in recent years.

(Insert Figure 1 here)

Some have argued that floating exchange rates are needed for China to shift away from investment-oriented and export-driven economy towards a consumption-oriented economy. One main reason is that under floating, the RMB will appreciate and this “will support the purchasing power of Chinese consumers and help shift production towards non-traded goods and services” (The Treasury, 2015, 4). However, this argument may be not convincing because such increase in purchasing power is in terms of foreign goods and services, therefore, it may increase the Chinese consumption of foreign goods and services rather than domestic non-traded goods and services. Therefore, aggregate demand may decrease because of currency appreciation.

However, there is evidence that currency appreciation decreases the productivity of traded sector due to the decrease in demand. This is because the behaviour of floating exchange

rates is not purely driven by productivity as predicted by the Harrod-Balassa-Samuelson model (Obstfeld, 2009). For example, because of the fact that there is price stickiness and immobility of factors between sectors, Obstfeld (2009) finds that the Japanese Yen appreciation actually decreased the productivity of exporters and there is no significant correlation between the productivity of trade sector and that of nontraded sector even though the demand for nontraded sector may increase. This indicates an overall decline of productivity which implies a slower economic growth rate.

China's domestic rebalancing involves two main aspects which are to increase the contribution of household consumption and decrease the contribution of investment to GDP growth. Consumption depends on many factors. Standard economic theories argue that household income and interest rates are two main factors that affect household consumption. As exchange rates have important impact on household income and interest rates, they should have important impact on consumption.

However, it is difficult to determine whether strong exchange rates have a positive impact on household income. This is because household income is affected by the profitability of corporate sector, the performance of assets markets and interest income from deposits, and exchange rates affect all these factors.

A strong RMB exchange rate will decrease corporate profits as overseas profits will be converted to less RMB profits. However, it may help China's assets market. This is because if the market expect exchange rates to be strong, it attracts capital flows to invest in China's assets market. And the increase in assets price will have wealth effects which increase household consumption (Mishkin, 2007). But such bubble-led consumption is very volatile.

Moreover, a strong RMB exchange rate may lead to the hollowing out of industries in China. This will decrease the investment in China and lead to weak domestic demand in China. Indeed, the strong Yen promoted Japan's outbound FDI in the US during the period 1975 to 1992 (Blonigen, 1997). And such hollowing out of Japan's industry by large translational firms is argued to be one main reason for the Japanese stagnation in 1990s (Cowling and Tomlinson, 2000). And such problem may happen to China when the RMB strengthens further as the Chinese outward FDI is growing rapidly and encouraged by government policies in recent years (Sauvant and Nolan, 2015)¹⁰. Moreover, if there is a significant increase in volatility of the RMB exchange rate, the FDI inflow to China may decrease (Crowley and Lee, 2003), and the FDI inflow has been argued to be one driver of the Chinese economic development and export success (The World Bank, 2010).

It is argued that independent monetary policy under the floating exchange regime can address domestic economic conditions. However, in China's case, even if monetary policy is independent, it is not enough to drive the transformation of the Chinese growth model. This is because China's household consumption is less than developed countries due to the fact that China's households need to save for precautionary reasons. The interest rate policy has limited impact, and it is important to build a social security welfare system (Bernanke, 2016). Also it is important to increase the distribution of corporate profits to households so that they can have more income to consume. Moreover, the supply side needs to enhance nontrade sectors. Therefore, China needs fiscal policy such as tax cut to both stimulate household consumption and encourage non-trade sector development. Indeed, Bernanke (2016) argues

¹⁰ In 2014, China's outward FDI exceeded Japan's outward FDI, and it was growing faster than China's inward FDI (UNCTAD, 2015).

that China should implement government spending and tax measures that aim specifically at aiding the transition in China's growth model. However, under floating exchange regime, the effectiveness of expansionary fiscal policy is limited and may be offset by undesired RMB's appreciation due to high interest rate.

7. Why does the US prefer the RMB to float?

The US has been pushing China to implement the floating exchange rate regime since September 2003 (The Treasury, 2003). If floating exchange rates cannot balance the US current account deficit, then what benefits can the US gain from them? One main reason is that the RMB floating exchange rate regime can enhance the role of the US as a main international currency provider.

Above analyses indicate that it is easier for the US to manage the exchange rate indirectly to its own benefits under the floating rate regime. Under the fixed exchange rate regime, it is very difficult for both China and the US to manage the nominal exchange rate according to their own requirements. Both countries can only use monetary policy indirectly to manipulate real exchange rate, and the effectiveness of such manipulation is limited due to price stickiness and immobility of factors between sectors in the short-term. However, over the long-term, as price is flexible and factors can move between sectors, the relative PPP can adjust to be in line with the fixed nominal exchange rate. Indeed, the findings of A of Figure 1 support this argument.

However, under the floating exchange rate regime, the US has more freedom than China in managing the nominal exchange rate indirectly. This is because the US has a much larger assets market than China. As result, the US policies have a much greater impact on international capital flows, and therefore, have a much larger impact on the nominal exchange rate. Moreover, the nominal exchange rate can deviate from the relative PPP in the long-term as can be seen in B of Figure 1.

Therefore, it is highly probable that the RMB appreciates under the floating exchange rate regime. A strong RMB exchange rate can generate more benefits to the US as the US will attract more FDI rather than securities investment from China. China holds a huge amount of securities investment which is much greater than its FDI in the US, whereas the US holds a much higher value of FDI in China than China's FDI in the US (Morrison, 2015). As the RMB is expected to appreciate, this will slow China's securities investment in the US which will benefit the US as there are some worries in the US that China might use its significant holdings of securities to affect the US foreign policy (Morrison, 2015). However, it may increase China's FDI in the US which will benefit the economic growth in the US. In addition, there is evidence that the increase in exchange rate volatility has a positive impact on the FDI flow to the US (Chowdhury and Wheeler, 2008). For example, Japan's FDI to the US has been growing since the 1980s and is now much greater than the US FDI to Japan while trade balances between these two countries have been relatively stable (Cooper, 2014).

Moreover, a weaker US dollar will help the US to increase its exports and decrease its foreign debt. It is argued that the depreciation of currency is to the benefits of the country as it helps its export industry. However, for emerging countries, this is not always true as sometimes a

strong currency may be helpful to the economy if a country has large debt denominated in foreign currency (Frankel, 2016b). But for the US, this is not a problem because its debt is denominated in the US dollar.

Therefore, the RMB floating rate will help the US to enhance its role as a main international currency provider. Under the fixed RMB exchange rate system, the PBOC has accumulated a huge amount of foreign exchange reserves invested in the US securities as the US runs current account deficits with China. These US securities are very liquid and safe assets, and the US uses these borrowings to invest in the US and other countries. Therefore, the outward FDI to China and other countries is one main channel used by the US to provide international currency in addition to current account deficit (Bini Smaghi, 2011), and in playing such role, the US assumes the risk of maturity transformation and liquidity transformation as the banker of the world. Even though the US does benefit from such role as the US FDI earns higher returns than the returns on its safe assets¹¹, it is very difficult for the US to manage these risks.

However, when the RMB is floating, the PBOC will not need to accumulate a huge amount of the US safe assets as international reserves. Instead, more private capital from China will flow to the US to invest in risky assets and long-term assets or engage in FDI for a higher return, and this will reduce the risks of the US performing the role of the banker of the world

¹¹ UNCTAD (2015, 76) estimates that “The rates of return on United States assets abroad are higher (3.8 per cent on average over 1999–2014) than those earned by foreign investors in the United States (2.7 per cent)”, and “returns for FDI were, on average, 7.0 per cent for United States outward FDI”.

as there will be less risk of maturity transformation and liquidity transformation. Moreover, the US can still profit from such role¹².

8. Conclusions

The RMB floating exchange rate cannot bring independency to China's monetary policy. Monetary policy of a country will react to changes in exchange rates which are not caused by fundamentals in the country as predicted by the UIP. Indeed, there are many cases where exchange rate changes are caused by significant changes in the US economic policies, safe heaven flows, sustained market expectations and momentums, and carry trades. As China is much more open to international trade and investment than the US, its monetary policy will be more affected by the US self-centered policy decisions under the floating exchange rate regime. In addition, because China has accumulated a huge trade surplus, the market will have a strong expectation that the RMB will appreciate over the medium-term and long-term. However, during financial crises, the RMB may depreciate dramatically due to the huge safe heaven flows. Therefore, it is hard for China to run its own monetary policy without considering the significant changes in the RMB exchange rate which are caused by these factors under the floating rate regime.

It is also difficult to claim that the floating exchange rate will help China to develop a much more consumption-oriented economy. One key driver of the imbalances of China's external and domestic economy is the high saving rate of the Chinese residents. And the expected

¹² UNCTAD (2015, 76) estimates "that returns for FDI were, on average, 7.0 per cent for United States outward FDI and 3.1 per cent for inward FDI".

appreciation of the RMB may help reduce the trade surplus but may not stimulate domestic demand because China's outward FDI may increase significantly. Therefore, fiscal policy is needed to decrease the high saving rate and improve the nontraded sector on the supply side. However, the floating exchange rate regime makes expansionary fiscal policy much less effective as it will push the RMB to appreciate further by increasing interest rates.

However, the US can benefit from the RMB floating exchange rate regime. It will have a much greater impact on the exchange rate than China because of its well-developed financial markets. And its economy and role of the banker of the world can be enhanced by more FDI and less portfolios investment from China under floating.

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Table 1

Rey (2015) finds that the VIX is one significant link between the US monetary policy and international capital flows. If international capital flows to China are significantly affected by the VIX, then they should be significantly affected by the US monetary policy. The international capital flows to China can be estimated by the value of RMB paid by the PBOC to buy foreign exchanges as China has been maintaining a stable exchange rate against the US dollar. The model is defined as $lfx_t = a + b \cdot lvix_{t-1} + \varepsilon_t$, where $lfx = \log(fx)$, $lvix = \log(vix)$, t = months over the period of Jan 2000 to Feb 2016, fx represents the end - of- month value of RMB paid by the PBOC to buy foreign exchange, and vix represents the end- of- month value of CBOE VIX. The Dickey-Fuller test is run for lfx and $lvix$, and finds no unit root for both series: MacKinnon approximate p-value for the test statistic $Z(t)$ is 0.0000 for lfx and 0.0011 for $lvix$. Regression is run with Newey-West standard errors. The following results do indicate that international capital flows to China are significantly affected by the VIX. The data are collected from the websites of PBOC and CBOE.

The results:

Number of obs = 194

F(1, 192) = 5.98

Prob > F = 0.0154

lfx	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
		(Newey-West)				
$lvix_{t-1}$	-.4928954	.2016228	-2.44	0.015	-.8905756	-.0952153
Constant	12.82124	.5806996	22.08	0.000	11.67587	13.96661

Table 2

To investigate whether the US monetary policy rate has different impact on the monetary policy rates for China and Japan, two models are used. For China, the model is defined as $\text{ChgChinadr}_t = a + b \cdot \text{ChgUSfedfr}_t + \varepsilon_t$, where $\text{ChgChinadr}_t = \log(\text{Chinadr}_t) - \log(\text{Chinadr}_{t-1})$, $\text{ChgUSfedfr}_t = \log(\text{USfedfr}_t) - \log(\text{USfedfr}_{t-1})$, $t = \text{months over the period of Jan 2000 to Feb 2016}$, Chinadr represents the end - of- month value of China's one year deposit rate, and USfedfr represents the US Effective Federal Funds Rate of each month.

For Japan, the model is defined as $\text{ChgBojloanr}_t = a + b \cdot \text{ChgUSfedfr}_t + \varepsilon_t$, where $\text{ChgBojloanr}_t = \log(\text{Bojloanr}_t) - \log(\text{Bojloanr}_{t-1})$, $\text{ChgUSfedfr}_t = \log(\text{USfedfr}_t) - \log(\text{USfedfr}_{t-1})$, $t = \text{months over the period of Jan 2000 to Feb 2016}$, ChgBojloanr represents the end - of- month value of Bank of Japan's official discount rate, and USfedfr represents the US Effective Federal Funds Rate of each month.

The Dickey-Fuller test is run for ChgUSfedfr , ChgChinadr and ChgBojloanr , and finds no unit root for all three series. Both regressions are run with Newey-West standard errors. The following results do indicate that the US monetary policy rate has no significant impact on China's policy rate but has significant impact on Japan's policy rate. The data are collected from the websites of PBOC, BOJ and ST Louis Fed.

The results for China:

Number of obs =193

$F(1, 191) = 2.57$

Prob > F =0.1109

ChgChinadr	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
(Newey-West)						
ChgUSfedfr	.0862142	.0538294	1.60	0.111	-.0199623	.1923907
Constant	-.0009112	.0028187	-0.32	0.747	-.006471	.0046486

The results for Japan:

Number of obs = 193

$F(1, 191) = 5.04$

Prob > F = 0.0259

ChgBojloanr	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
(Newey-West)						
ChgUSfedfr	.1981543	.088278	2.24	0.026	.0240293	.3722794
Constant	.0000876	.0097412	0.01	0.993	-.0191265	.0193016

Figure 1

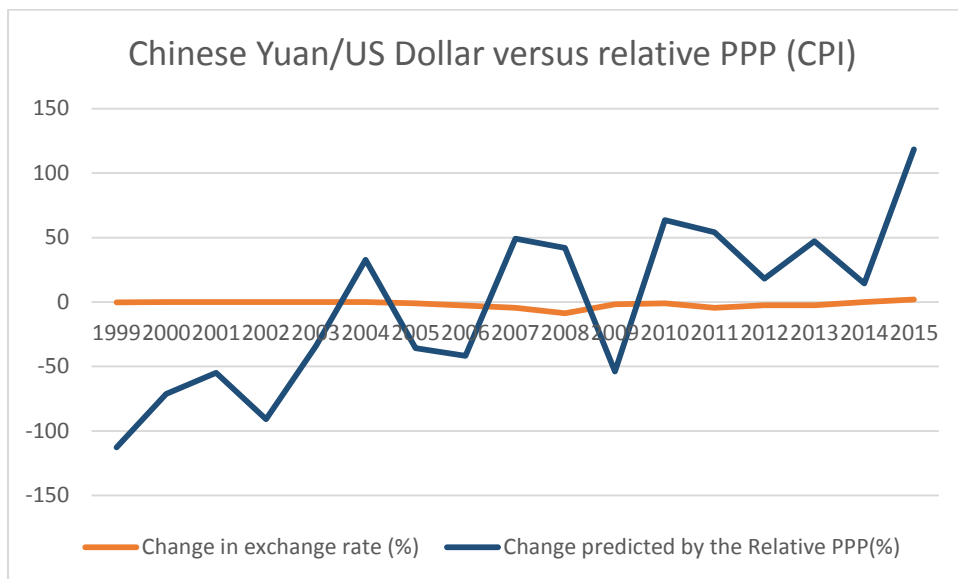
This figure shows that there are differences between the actual changes in exchange rate and the predicted changes of the relative PPP. The annual change in actual exchange rate is calculated using $\frac{(E_{t+1} - E_t)}{E_t}$, where E_{t+1} and E_t are exchange rates for period $t+1$ and t . And the change in exchange rate predicted by the relative PPP is calculated by using

$$\frac{1 + \text{Inflation rate of domestic economy}}{1 + \text{Inflation rate of the US}} - 1. \text{ The domestic economy is China or Japan.}$$

It can be seen from comparing A and B that the Chinese Yuan exchange rate has less difference than the Japanese Yen from the relative PPP. And the t statistic of the t -Test for two-sample assuming unequal variances for China is 0.11 (the P -value for two-tail is 0.91) and for Japan is 5.30 (the P -value for two-tail is 0.00), indicating that the Chinese Yuan exchange rate is not significantly different from the relative PPP whereas the Japanese Yen exchange rate is significantly different from the relative PPP.

The annual inflation rate (CPI) data is downloaded from the World Bank website and the actual exchange rate is annual average exchange rate downloaded from <http://www.usforex.com/forex-tools/historical-rate-tools/yearly-average-rates>.

A. The actual change in Chinese Yuan/US Dollar exchange rate and the change predicted by the relative PPP, 1999-2015



B. The actual change in Japanese Yen/US Dollar exchange rate and the change predicted by the relative PPP, 1999-2015

