Bureau
d'économie
théorique
et appliquée
(BETA)
UMR 7522

Documents de travail

« Motivations and strategies for a real revaluation of the Yuan »

Auteurs

Meixing Dai

Document de Travail n°2011 - **23**

Novembre 2011

Faculté des sciences économiques et de gestion
Pôle européen de gestion et d'économie (PEGE)
61 avenue de la Forêt Noire
F-67085 Strasbourg Cedex

Secétariat du BETA
Géraldine Manderscheidt
Tél. : (33) 03 68 85 20 69
Fax : (33) 03 68 85 20 70
g.manderscheidt@unistra.fr
http://cournot2.u–strasbg.fr/beta

cnrs

Nancy-Université
Université Nancy 2

UNIVERSITÉ DE STRASBOURG

Motivations and strategies for a real revaluation of the Yuan

Meixing Dai[‡]

Abstract: Most Western economists and policymakers agree that the Yuan is significantly undervalued and push for its quick nominal revaluation. This paper defends that many domestic and foreign factors could be responsible for the Yuan's undervaluation, and the People's bank of China (PBC) cannot optimally invest growing foreign exchange reserves. It provides a theoretical framework to discuss the optimal strategy associating a gradual nominal revaluation of the Yuan with higher inflation, and structural and macroeconomic policies to bring the real exchange rate to its equilibrium level. This strategy allows absorbing external imbalances while laying down the foundation for China's long-term growth.

Keywords: Real revaluation; Yuan; Renminbi (RMB); foreign exchange reserves; external imbalance; macroeconomic adjustment measures.

JEL classification numbers: E2, E5, E6, F3.

[‡] BETA, University of Strasbourg, 61, avenue de la Forêt Noire, 67085 Strasbourg, France; Tel : (33)-03-68-85-21-31; Fax : (33)-03-68-85-20-71; e-mail: dai@unistra.fr.

1. Introduction

Since its accession to the WTO in December 2001, China is rapidly increasing its trade surplus and foreign exchange reserves. China's strong growth despite the current global financial and economic crisis and its large trade surplus vis-à-vis the United States, experiencing sluggish economic recovery and high unemployment, have made passionate the US debate about the political pressure to put on China to force it to quickly revalue its currency, i.e. the Yuan (Renminbi/RMB). The end of Chimerica seems inevitable (Ferguson and Schularick 2011).

The issue of the Yuan's undervaluation is brought to the forefront because depreciating the USD now seems to be the only policy option available to stimulate the U.S. economy. Other American macroeconomic policies are subjected to insurmountable constraints, i.e., the solvency constraint for the fiscal policy and the zero lower bound (ZLB) on the nominal interest rate for the monetary policy while the very loose U.S. monetary policy seems to accentuate the USD's overvaluation.

China-bashing has become a popular U.S. media and political sport ever before the current crisis despite the consensus view among economists that a RMB appreciation is not likely to fix the trade imbalance with China (Tatom 2007). Many Americans believe that China manipulates its currency to unfairly create a trade advantage, contributing to large US trade deficits and hence the loss of US businesses and jobs, and consider the Yuan's nominal revaluation as the solution to reduce U.S. trade deficits (Frankel and Wei 2007). Some economists, e.g., Krugman (2009), consider China's Yuan policy as the origin of the subprime crisis and label China as "mercantilist". This accusation is considered as very vituperative by McKinnon (2010) because the U.S. trade deficit is due to the low saving rate.

The large literature on China's exchange rate policy mainly addresses four issues. The

first is the Yuan's undervaluation. While disagreeing about the degree and origins of undervaluation, most researchers agree that the Yuan is undervalued because China has a large and growing current account surplus.[1] Only a few economists contest that the Yuan is systematically undervalued (Chu 2005; Cheung *et al.* 2007, 2010; Wang *et al.* 2007; J. Chen 2009) and their empirical findings indicate that exchange rate policy may have played an insignificant role in China's trade surpluses. Wen (2011) suggests that the RMB may significantly depreciate once China abandons the exchange rate peg and China's massive precautionary savings are unleashed toward international financial markets in search for better returns.

The second issue is about the rhythm of revaluation. The *status quo* is defended by Liu (2004) and Mundell (2004) because currency appreciation would aggravate unemployment and financial fragility. Tung and Baker (2004), arguing that it boosts Chinese per capita incomes and purchasing power in USD terms, discard such destabilizing effects of a one-step maxi revaluation, while Voon *et al.* (2006) advance that the negative impact of the RER appreciation on exports may be diluted by the positive impacts attributing to a reduction in the RER misalignment. Yi.Z. Wang (2010) suggests a gradual appreciation of the RMB against the USD between 6% and 10%. If a one-step maxi revaluation is not adopted, macroeconomic policies and regulations and economic reforms must be skillfully implemented to ensure the external and internal equilibrium (Liu 2004; Dai 2006; Woo 2006; Eichengreen and Hatase 2007; Hong *et al.* 2008; N'Diaye 2010).

The third issue concerns the effect of capital account convertibility on exchange rate regime and monetary policy. Capital account convertibility remains China's long-term goal even though the literature on capital liberalization is confronted to an erosion of consensus on its benefits. Given the increasingly porous capital account, several proposals, from a one-step

[1] For an overview of the literature on the quantitative assessment of the Yuan's undervaluation, see Das (2009). For recent studies, see Peng *et al.* (2008) and Yi.Z. Wang (2010).

revaluation of the RMB, implementing a currency basket, widening the trading band to the adoption of managed but freer float in the medium to long term, are advanced to mitigate increasing external imbalances and the resulting distortions (Roberts and Tyers 2003; Tung and Baker 2004; Goldstein 2004; Frankel 2005; Eichengreen 2005; Obstfeld 2007). [2] Approaches other than one-step revaluation allow China to postpone financial account liberalization and the adoption of a flexible exchange rate, but with the risk of inviting more, not less, hot money inflows into China, thus exacerbating the very macro imbalances (Tung and Baker 2004). McKinnon and Schnabl (2009) are against floating the RMB, arguing that the build-up of foreign currency claims is due to that China's large saving (trade) surplus results in a currency mismatch because of its inability to lend in its own currency. However, the substantial openness of China's capital account implies ineffective sterilizations and a trade-off between exchange rate stability and monetary independence (Laurenceson and Tang 2007; Yo.Z. Wang 2010). To solve this trilemma smoothly, the PBC should continue to relax the exchange rate management, and to further deregulate capital outflows.

The RMB's recent and future international role constitutes the fourth issue. Lardy and Douglass (2011) show that China does not yet meet any of the major preconditions necessary for convertibility needed for playing the role of international currency, i.e. a strong banking system, relatively developed financial markets, and an equilibrium exchange rate. Nevertheless, the RMB already becomes a significant force impacting the exchange rates of the Asian currencies (Chen *et al.* 2009). Therefore, China can speed up its currency internationalization by following a regional approach while accelerating the reforms to make the RMB convertible, and to liberalize and open its financial system (Park 2010). During the process, since income and monetary policies and capital account controls remain of crucial importance for worldwide macroeconomic stability, they should be supported by

[2] Yao (2008) and Liu and Fan (2010) show that a more flexible RMB exchange rate regime is optimal.

internationally coordinated policies and cooperative monetary schemes to reduce global imbalances and destabilizing cross-currency speculation (Flassbeck and La Marca 2009; Schnabl 2011). China's currency reform could induce a reduction of its USD-dominated assets, triggering a further depreciation of the USD. The potentially costly consequences call for new rules for the world financial architecture (Oksanen 2010).

This paper suggests that multiple foreign and domestic factors lead to a real undervaluation of the Yuan, and it is impossible for the PBC to optimally invest growing foreign exchange reserves. This justifies a new strategy to revalue the Yuan. The central objective of the paper is thus to contribute to the literature on the China's exchange rate policy by providing a theoretical framework justifying a combination of strategies, i.e. associating a gradual nominal revaluation of the Yuan with higher inflation and structural and macroeconomic policies, to bring the real exchange rate to its equilibrium level. It also advocates some new policy measures to absorb China's external imbalances while laying down the foundation for the China's future growth.

The remainder of the paper is organised as follows. The next section analyses the factors leading to the Yuan's undervaluation. Section 3 argues for its revaluation. Section 4 theoretically justifies the combination of strategies for a real revaluation. Section 5 discusses policy measures helping achieve the latter. Section 6 concludes.

2. The factors leading to the Yuan's undervaluation

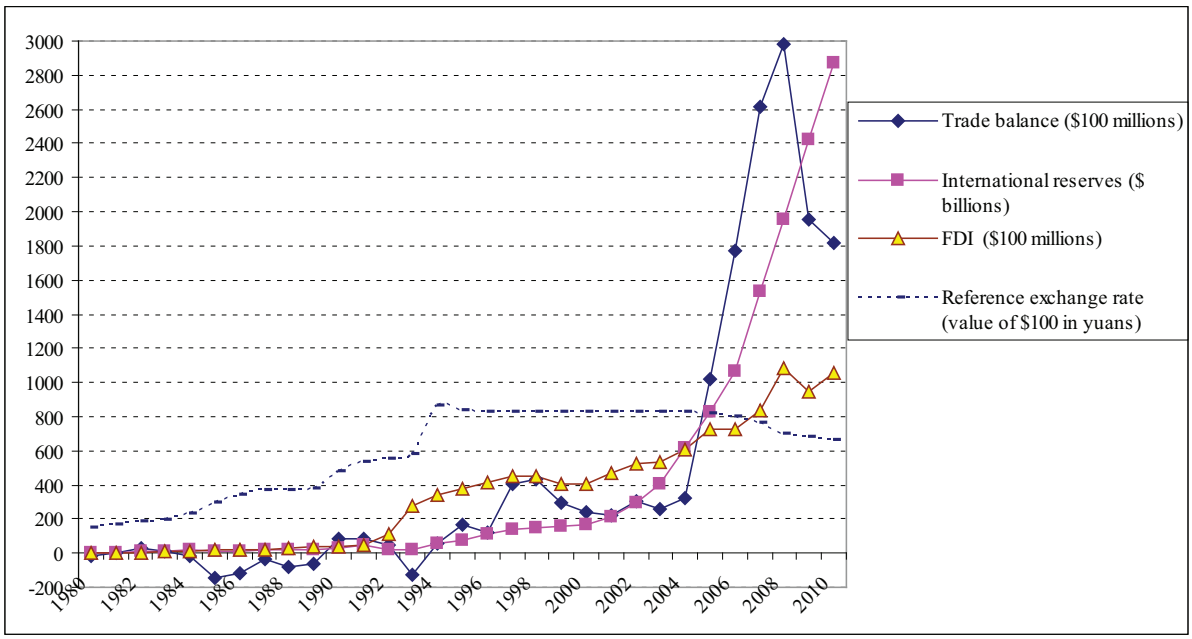
The appropriate measure for the Yuan's undervaluation is the continuous, one-directional and accelerating accumulation of Chinese foreign exchange reserves beginning in 1994 (Figure 1). The balance of payments is given by:

$$\Delta X_t = \frac{P_t^h}{E_t} Z(Y_t^*, T_t^*, i_t^*, \frac{P_t^* E_t}{P_t^h}, B_t^*) - P_t^* H(Y_t, T_t, i_t, \frac{P_t^* E_t}{P_t^h}, B_t) + i_t^* X_t + F(i_t - i_t^* - \frac{E_{t+1} - E_t}{E_t}, Y_t, \frac{W_t^*}{W_t}), \quad (1)$$

$$+ \quad - \quad - \quad + \quad - \qquad + \quad - \quad - \quad - \quad - \qquad\qquad + \qquad + \quad +$$

where $Z(...)$ and $H(.)$ represents exportations and importations respectively, P_t^h and P_t^* the price of home and foreign goods respectively, Y_t the output, T_t the taxes, i_t the nominal interest rate, E_t the nominal exchange rate (direct quotation), B_t trade barriers, X_t foreign exchange reserves. $F(...)$ is the capital flows including the foreign direct investment (FDI) which positively reacts to the output (i.e. market size) and the ratio of foreign wage (W_t^*) to domestic wage (W_t). Foreign variables are marked with an asterisk.

Figure 1. Exchange rate of the RMB, international reserves, FDI and Trade balance of China.



Sources: National Bureau of Statistics of China, UNCTAD, and PBC.

According to (1), many foreign and domestic variables could directly or indirectly affect the accumulation of reserves. Low wages, the Yuan's undervaluation and the FDI play an important role in the build-up of reserves since the middle 1990s, while China's accession to the WTO and the loose U.S. monetary policy greatly contribute to accelerate this

accumulation in the 2000s. Hereafter, we briefly analyse the evolution of these factors, notably the exchange rate policy, and their impact on the accumulation of reserves.[3]

When China opened its door to international trade and FDI in the early 1980s to modernize its economy, it was an insignificant player in international goods and financial markets. The average Chinese wage was only about 95.67 yuans (or USD 32.58) in 1985 per month against 2687 yuans in 2009 (USD 393.35).[4] Despite a very low labour cost, China often experienced trade deficits until 1993 because it did not supply goods needed by other countries. After higher inflation rates recorded during 1988-1989 and 1993-1994 triggered by the price liberalization and a loose monetary policy, the Yuan had to be devaluated by 33.16% against the USD in August 1994 despite its gradual devaluation since 1980, while official and swap rates were unified. Between August 1994 and July 2005, China adopted a monetary regime of exchange-rate targeting, which was named a managed float but was a *de facto* peg at around 8.28 Yuan/USD, as a nominal anchor against high inflation. It allowed successfully slow down Chinese inflation rate.

During the 1997 Asian crisis, many economists and international speculators considered that the Yuan was overvalued and predicted its large devaluation because the South-east Asian economies have sharply devalued their currencies. China maintained the Yuan's peg to avoid competitive devaluations, keeping its neighbours from an even more catastrophic financial and economic downturn.[5]

After its economic opening, China was facing a period of dollar shortage. This experience and financial turmoil experienced by some emerging countries due to dollar shortage have convinced China to accumulate dollars at all costs (Corden 2009).

---

[3] For a review of Chinese exchange rate policy, see Xu (2000), Lin and Schramm (2003), Huang and Wang (2004), Goldstein and Lardy (2009), and Sun (2010).

[4] The exchange rate was 2.9366 and 6.8310 for 1985 and 2009 respectively. See Ceglowski and Golub (2011), and Banister and Cook (2011) for international comparison of labour costs in manufacturing. For statistics of wages, see the official site of the National Bureau of Statistics of China.

[5] Instead, China sought to placate exporters by offering a 17% value-added export tax rebate.

The period of dollar shortage ended with the implementation of extremely loose US monetary policy, i.e. very low interest rates during prolonged periods, to stimulate the economy after the burst of the Internet bubble in 2000. The easier access to cheap credit by American businesses and households has resulted into an exceptional growth in the global dollar supply. The supplementary dollars hold by foreign central banks returned to American financial markets with the effects of plunging the median- and long-term interest rates, further stimulating credit activities. This policy induced a large bubble in property price which has excessively stimulated the U.S. consumption through the virtual wealth effect. In 2005-2007, annual U.S. trade deficits represented about 6% of U.S. GDP, indicating a large excess of money supply and a lack of savings.

Curiously, this extraordinary increase in the dollar supply did not translate into higher inflation in the USA or in the rest of the world, invalidating the prediction of monetarists. A plausible explanation is that central banks of emerging economies, having previously suffered dollar shortage, were only too happy to conserve additional dollars as reserves and use them to buy U.S. Treasuries and assets. This has led some economists to devise a theory of global saving glut (Bernanke 2005), which obscures the very loose U.S. monetary policy. Taylor (2009) challenges this theory by showing that saving in the rest of the world has decreased over the period.

The massive inflow of liquidity to emerging economies has led to more productive investment, particularly in China, to meet additional needs of U.S. consumers. China has furthermore received an important boost to its exports by joining the WTO, prompting many more multinationals to invest in China.

The FDI in China began to increase rapidly from 1992 due to three factors: a very favourable fiscal law voted in 1991, the reaffirmation of China's determination to open the economy and the Yuan's aggressive devaluation in 1994. Besides the flows of capital it

brought, the FDI has especially contributed to the accumulation of foreign exchange reserves through its stimulant effects on exportations by greatly increasing the labour productivity and the production of high quality goods desired by Western consumers (Whalley and Xin 2010; Ceglowski and Golub 2011). These effects have been largely amplified by the elimination of trade barriers after China's accession to the WTO. The resulting massive increase in foreign exchange reserves after 2001 has revealed the hidden real undervaluation of the Yuan against major currencies.

In the mid-2000s, China was under intense pressures from the USA, Japan and the EU to revalue the Yuan and to introduce a more flexible exchange rate regime. The Yuan's undervaluation against the USD was then estimated between 18 to 60% (Zhang and Pan 2004; Coudert and Couharde 2007). A nominal revaluation of the Yuan by about 22% against the USD is undertaken from July 2005 to July 2008, while shifting from the dollar peg to a peg to a basket of currencies, with a fluctuation range of ±0.3% per day. The PBC has kept the Yuan at about 6.83 per USD after July 2008, as part of stimulus measures to help China weather the global recession.

The Yuan's revaluation was incomplete. Its undervaluation was reinforced over times by the continuous depreciation of the real exchange rate induced by the capability of foreign and domestic firms in China to produce and export more goods of higher values at low costs. Hence, the previous revaluation of the Yuan had not significant negative effects on the U.S. imports from China, contrary to the prediction by empirical studies (Thorbecke and Smith 2010). There was therefore a one-way-bet in the foreign exchanges markets, which not only attracted hot money inflows but inhibited private capital outflows from counterbalancing China's huge trade surplus, leading to an undue build-up of official exchange reserves, erosion of monetary control and hence the instability of the Yuan's peg (Ma and Sun 2007), and increasing the pressure for the Yuan to revalue (McKinnon and Schnabl 2009; Mckinnon

et al. 2010) and the need for a more flexible exchange rate regime (Liu and Zhang 2009). In this context, the Yuan began in July 2010 to revalue against the USD under American pressures, bringing one dollar's value down to below 6.35 yuans in October 2011.

3. Why China should revalue the Yuan?

Despite recent higher increases in wages relative to productivity growth, China's unit labour costs remain extremely low compared to these in Western countries. In the long term, Chinese workers will likely be trained to perform as productively as Western ones. Hence, competitiveness will play in favour of China over a long period: as long as the cumulative adjustment of wages is smaller than the cumulative increase in productivity, and foreign and domestic firms improve the quality and the scope of goods produced to be exported, China will continue to experience a trade surplus with the real exchange rate depreciating over times. If the Yuan is not or insufficiently revaluated, given the nature of industrial and macroeconomic policies pursued by China and its Western trading partners, China will continuously increase its international reserves. Moreover, strong growth in China will attract not only the FDI but also hot money, further accentuating the problem.

The Yuan's revaluation, pleasing Western policymakers, could also be in the China's interest. It is necessary, inevitable and desirable just as much as it happened to be with the Deutschmark in 1969 and it would not damage Chinese development (Oberpriller *et al.* 2008). Besides, China needs it to ensure domestic financial market stability, and to avoid an overheating of the economy and a soaring inflation. According to international experiences, the Yuan's real appreciation could have a powerful effect in boosting job creation in the service sector and hence would contribute to restructuring the Chinese economy towards a domestic demand-based growth track (Xu 2009).

The accumulation of foreign exchange reserves was originally intended to stabilize the nominal exchange rate. Beyond a certain level, its utility becomes negative because assets bought with these reserves earn a real rate of return less than the rate of real appreciation of domestic currency in the future, and allow buying back a quantity of goods smaller than that sold initially to accumulate them.

China's actual reserves ($3197.49 billions in June 2011) have far exceeded the optimal level corresponding to its objective of exchange rate stabilisation. Four main policy options are available to China to correct this situation: spending and investing them, diversifying them through appropriate management of portfolios while avoiding unnecessary risks, gradual liberalization of the capital account, and a switch in their holders (Zheng and Yi 2007).

Given their importance and growth (if the Yuan is undervalued), it is unlikely that the PBC and sovereign fund managers can maintain or increase their value in terms of purchasing power because international investment opportunities are limited and risky.

First, many Western countries are likely to see their debt reaching a non-sustainable level because politicians favour the welfare of voters at the expense of future generations due to the quasi-absence of intergenerational altruism in the public sphere. They will eventually default or refinance public debt with money creation, as it is happening in the USA and the UK under quantitative easing policies.

Second, Anglo-Saxon hedge funds and speculators are much quicker to react to this new context by heavily speculating in commodity markets to protect against inflation. If they learn that Chinese sovereign funds also intend to massively enter these markets, they will bring commodity prices to levels such that it will be significantly risky in the short and medium term for newcomers in these markets.

Third, investment in well-managed Western firms could be blocked for political and/or regulatory reasons. The proposition by Q. Chen (2009) urging the PBC to invest its reserves in

major US banks is probably unrealizable as shown by the unsuccessful takeover of Conoco Phillips by China National Offshore Oil, that the U.S. Congress stymied on the pretext of national security. Assets in countries richly endowed with raw materials but underdeveloped are exposed to political struggles between countries with vested interests and newcomers. It is unlikely that China could invest there a significant portion of its reserves even if it consents to be accused of practicing so-called neo-colonialism. China must therefore not be overambitious in foreign investments and should focus more on its domestic market in following the example of international investors.

Due to progress in the labour productivity and the scope and quality of goods exported, the problem of undervaluation will worsen in the future if necessary adjustments are not quickly conducted. To avoid an ever massive loss on its growing foreign exchange reserves, China must now revalue its currency appropriately. Indeed, the longer China waits, the more the adjustment will be painful and difficult to conduct: major financial and economic crises for Chinese and World economies could result, with the final outcome in terms of economic, social and political stability uncontrollable for policymakers. The inevitable revaluation, if quickly carried out, improves the social welfare not only in the long term but also in the short term. To accomplish it, Chinese policymakers should think in terms of real revaluation of the Yuan. This avoids a focus on nominal revaluation, demanded by Western politicians and international speculators, while permitting a different political and economic outlook.

Chinese policymakers, who doubt a lot, must break completely with the illusion that it is good to increase the large digital number registered in the central computer of the Fed (or other central banks and financial institutions) which does not even have to run the printing press. A better alternative would be to buy goods in China and sell them to insolvent Chinese households granted perpetual USD-denominated bank loans destined to buy them.

The accumulation of international reserves imposes significant welfare costs on ordinary workers, because they are paid wages lower than they deserve. Moreover, competitive advantages gained with the Yuan's undervaluation do not necessarily allow China to acquire strategic positions in high-tech industries and services because low wages encourage firms to utilize low-skilled employees instead of investing in R&D. Growth gained through lower costs could latter be swept by the inevitable revaluation of the Yuan. Conversely, a moderate but continual increase in labour costs pushes firms to introduce new products, new production processes and new distribution techniques, thereby inducing endogenous growth.

Politically, China cannot refuse the Yuan's revaluation because China seems, with large trade surpluses, to be the country that benefits most from monetary and fiscal stimulus of industrialised countries. Many of them are unhappy with the fact that they benefit little of Chinese strong growth because China mainly needs raw materials, intermediate inputs and machineries. Despite that the Yuan's undervaluation is partly due to loose monetary and fiscal policies in developed countries, China cannot avoid the adjustment obligation although traditionally the needed adjustment is imposed on deficit countries. Time has changed since they are no longer emerging economies but called the USA or members of the EU.

According to (1), to ensure $\Delta X_t = 0$, Chinese policymakers can adjust the real exchange rate, $\frac{P_t^* E_t}{P_t^h} \equiv S_t$, through decreasing E_t or/and increasing P_t^h. They can also modify policies (affecting directly or indirectly $Y_t, T_t, i_t, B_t, i_t, W_t,$ and the sensibility of $Z(.), H(.)$, and $F(.)$ to variables) to reduce trade and capital imbalances and hence the necessary adjustment of S_t. Considering that China should adopt a flexible exchange rate regime in the medium term, I examine hereafter the strategies to realize the Yuan's real revaluation before the regime shift.

4. The combination of strategies for a real revaluation

While real appreciation via nominal appreciation is common among some low inflation OECD economies such as Germany and Japan, a far more frequent occurrence among economies that started at a very low per-capita income level is real appreciation via faster wage growth and inflation (Xu 2009). Therefore, China has three options to eliminate the Yuan's undervaluation: 1) fast nominal revaluation; 2) "uncompetitive inflation"; 3) the intermediate option.

Fast Yuan revaluation could be better than price policies because the latter require a long period to achieve trade balance and induce fluctuations of output and inflation (Huang 2010). However, recent evolutions show that Chinese wages and prices are quite flexible on the upside, limiting hence adjustment costs under price policies. While the domestic economy could pick up most of the external slack due to a large exchange-rate revaluation, the prospect of sharp decelerations in export growth will remain a concern for policymakers and warrants careful attention especially in developing countries (Kappler *et al.* 2011). In effect, such a policy provides huge capital gains to market operators holding Yuan-denominated assets but induces high adjustment costs for businesses not prepared for it. Hundreds of thousands of businesses could fail and dismiss tens of millions of workers, creating a social and political unrest in China. Furthermore, it could have serious undesired long-term effects on the Chinese economy if we refer to Japanese experiences. Following the Plaza accord imposing a fast Yen appreciation, Japan has experienced a short-term recession followed by a speculative boom and finally a lost decade (Hamada and Okada 2009). Symmetrically, a fast nominal revaluation of the Yuan could induce a large devaluation of the USD with the risk of seriously undermining macroeconomic stability of the world economy (McKinnon and Schnabl 2006).

No evidence shows that "uncompetitive inflation" has been deliberately conceived as a policy option. Its inverse, i.e. "competitive disinflation", was experienced with some success by France under fixed nominal exchange rate (Blanchard and Muet 1993; Fitoussi *et al.*

1993). Germany replicated this strategy to gain competitiveness after having joined the eurozone (Creel and Le Cacheux 2006). The success of such a strategy is based on the capacity of an economy to make internal adjustments in terms of wages, prices and production combined with restrictive monetary and fiscal policies to make the strategy credible. One limit to the competitive disinflation is therefore that it could lead to temporary higher unemployment if it takes time to be entirely credible or when nominal wages are rigid.

Using a theoretical model, we propose that, given that China is not constrained to carry out either the first or the second option, it is optimal to combine them to eliminate the Yuan's undervaluation.

The model has four equations similar to these used by Blanchard and Muet (1993) and Fitoussi *et al.* (1993). For simplicity, we adopt the assumption of perfect foresight. We add to their model the LM equation and an equation describing the balance of payments while modifying the IS equation as follows:

$$w_t = p_t - \gamma(y_t - y^n) + \varepsilon_{w,t}, \qquad \gamma > 0, \tag{2}$$

$$p_t = \alpha p_{h,t} + (1-\alpha)(p_t^* + e_t), \qquad 0 < \alpha < 1, \tag{3}$$

$$p_{h,t} = \beta(p_t^* + e_t) + (1-\beta)w_t + \varepsilon_{p,t}, \qquad 0 < \beta < 1, \tag{4}$$

$$y_t = -\varphi(i_t - \pi_{t+1}) + \theta(p_t^* + e_t - p_{h,t}) + \varepsilon_{d,t}, \qquad \varphi, \theta > 0, \tag{5}$$

$$m_t - p_t \equiv \varsigma(e_t + \chi_t) + (1-\varsigma)h_t - p_t = l_1 y_t - l_2 i_t + \varepsilon_{l,t}, \quad \varsigma \in [0,1] \text{ and } l_1, l_2 > 0, \tag{6}$$

$$\Delta\chi_t = -\eta_1 y_t + \eta_2(p_t^* + e_t - p_{h,t}) + \eta_3(i_t^* + \chi_t) + \upsilon(i_t - i_t^* - \Delta e_t) + \varepsilon_{f,t}, \quad \eta_1, \eta_2, \eta_3, \upsilon > 0, \tag{7}$$

where all variables except i_t and π_t are in log. The lower case variables correspond to the logarithm of the upper case variables defined previously. p_t is the domestic price level or consumer price, y^n the potential output, $\pi_t \equiv p_t - p_{t-1}$ the inflation rate, m_t the money supply, h_t the domestic component of money supply (or domestic credit). $\varepsilon_{w,t}, \varepsilon_{p,t}, \varepsilon_{d,t}, \varepsilon_{l,t}$

and $\varepsilon_{f,t}$ represent exogenous shocks (including policy shocks) affecting the labour market, the production, the goods demand, the money market and the foreign exchange market respectively. Equation (2) describes how the nominal wage adjusts with the price level and the output gap. Equation (3) shows that the consumer price is the weighted average of the prices of domestic and foreign goods. Equation (4) gives the price of domestic goods as a weighted average of the wage and the price of foreign goods. Equations (5) and (6) are the equilibrium condition in goods and money markets respectively. Equation (7) is a linear form of (1) with some variables neglected for simplicity.

The Chinese government stabilizes inflation and output around their respective targets. To realize the Yuan's real revaluation, it must fix an inflation target π_t^T higher than the foreign inflation but lower than what is tolerable for the population. This avoids the accumulation of inflationary pressures, induced by American and European quantitative easing policies to result in a stronger pressure for revaluing the Yuan. Moreover, it might also desire to smoothly reduce its foreign exchange reserves by fixing a transitory objective for the latter in each period. The government minimizes the loss function:

$$L_t = \sum_{j=0}^{\infty} \rho^j \frac{1}{2}\left[\lambda_1 (y_{t+j} - y_{t+j}^n)^2 + \lambda_2 (p_{t+j} - p_{t+j}^T)^2 + (\chi_{t+j} - \chi_{t+j}^T)^2\right], \quad \lambda_1, \lambda_2 > 0, \qquad (8)$$

where ρ is the discount factor, p_t^T the target for the price level (i.e. $p_t^T \equiv p_{t-1} + \pi_t^T$), λ_1 and λ_2 the weight assigned to output and inflation stabilization respectively.

Minimizing (8) subject to (2)-(7) leads to optimal targeting rules:

$$y_t - y_t^n = \frac{\lambda_2 \Theta}{\lambda_1 \eta_2}(p_t - p_t^T), \qquad (9)$$

$$\chi_t - \chi_t^T = -\frac{\lambda_2 \eta_3}{\eta_2}(p_t - p_t^T), \qquad (10)$$

$$s_t \equiv p_t^* + e_t - p_{h,t} = \frac{\lambda_2 \gamma (1-\beta)\Theta}{\lambda_1 \eta_2 [1-\alpha(1-\beta)]}(p_t - p_t^T) - \frac{1}{1-\alpha(1-\beta)}[(1-\beta)\varepsilon_{w,t} + \varepsilon_{p,t}], \qquad (11)$$

where $\Theta = \eta_1 + \frac{\upsilon}{\varphi} - \frac{\gamma(1-\beta)}{1-\alpha(1-\beta)}(\eta_2 + \frac{\theta\upsilon}{\varphi})$. Equations (5)-(7) and (9)-(11) determine optimal policy rules for h_t and e_t :

$$h_t = \Omega(p_t - p_t^T) + \frac{1}{1-\varsigma}(p_t - l_2\pi_{t+1}) - \frac{\varsigma}{1-\varsigma}(e_t + \chi_t^T) + \Sigma_\varepsilon^h \ , \tag{12}$$

$$e_{t+1} - e_t = -\frac{1-\varsigma}{l_2}h_t + \frac{\lambda_2\eta_3}{\eta_2\upsilon}(p_{t+1} - p_{t+1}^T) + \Psi(p_t - p_t^T) + \frac{1}{l_2}p_t - \frac{\varsigma}{l_2}(e_t + \chi_t^T) - \frac{1}{\upsilon}(\chi_{t+1}^T - \chi_t^T) + \Sigma_\varepsilon^e, \tag{13}$$

where

$$\Omega\frac{\lambda_2}{\eta_2(1-\varsigma)}\left\{\varsigma\eta_3 + \frac{\{(l_2+\varphi l_1)[1-\alpha(1-\beta)] - \gamma\theta\lambda_2 l_2(1-\beta)\}\Theta}{\varphi\lambda_1[1-\alpha(1-\beta)]}\right\},$$

$$\Psi = \frac{[\varsigma\upsilon - l_2(1+\eta_3)]\lambda_2\eta_3}{\upsilon l_2\eta_2} + \frac{\{\gamma\lambda_2\eta_2 l_2(1-\beta) - \lambda_2(\eta_1 l_2 - l_1\upsilon)[1-\alpha(1-\beta)]\}\Theta}{\upsilon\lambda_1\eta_2 l_2[1-\alpha(1-\beta)]},$$

$$\Sigma_\varepsilon^h = \frac{l_2+\varphi l_1}{\varphi(1-\varsigma)}y_t^n + \frac{l_2}{\varphi(1-\varsigma)}\left\{\frac{\theta}{1-\alpha(1-\beta)}[(1-\beta)\varepsilon_{w,t} + \varepsilon_{p,t}] - \varepsilon_{d,t} + \varphi\varepsilon_{l,t}\right\},$$

$$\Sigma_\varepsilon^e = (\frac{l_1}{l_2} - \frac{\eta_1}{\upsilon})y_t^n + \frac{\eta_3}{\upsilon}(i_t^* + \chi_t^T) - i_t^* - \frac{\eta_2}{\upsilon[1-\alpha(1-\beta)]}[(1-\beta)\varepsilon_{w,t} + \varepsilon_{p,t}] + \frac{1}{l_2}\varepsilon_{l,t} + \frac{1}{\upsilon}\varepsilon_{f,t}.$$

The policy rules (12)-(13) imply the simultaneous utilization of the monetary policy (a kind of "uncompetitive inflation") and the exchange rate policy by the government desiring to eliminate the Yuan's undervaluation while stabilizing the economy and reducing gradually foreign exchange reserves. The two policies are interdependent: the domestic credit depends on the nominal exchange rate while the optimal devaluation rate ($e_{t+1} - e_t$) depends on how the monetary policy (h_t) is conducted. The rule (13) does not imply a one-step nominal revaluation of the Yuan since its deviation from the equilibrium takes many periods to be totally absorbed. These rules imply that structural and macroeconomic policies could also affect the optimal combination of strategies through Σ_ε^h, Σ_ε^e and structural parameters. The use of complementary policies could reduce overall adjustment costs in the presence of

multiplicative model uncertainty (Brainard 1967) because each policy instrument is used with less intensity and is less likely to induce systemic risk for the economy.

5. Polices supporting the strategy of real revaluation

The Chinese government is concerned with that the Yuan's revaluation could induce high unemployment due to a weak growth, and severe financial and monetary crisis. This implies a gradual nominal revaluation of the Yuan, with the risk of continuously worsening external imbalances.

Taking account of China's trade structure, financial fragility and macroeconomic imbalance, some researchers advocate alternative structural and macroeconomic measures to effectively deal with the Yuan's valuation issue (Liu 2004; Dai 2006; Woo 2006; Eichengreen and Hatase 2007; Hong *et al.* 2008; N'Diaye 2010). They include reducing distortionary export subsidies and gradually removing excessive fiscal incentives granted to FDI-founded firms, expansionary fiscal policy with a focus on infrastructure investment, a package of policies to stimulate domestic consumption (including higher expenditures on education, health care, social safety nets and poverty reduction, income policies to reduce inequality and to increase wage income), the establishment of an efficient financial intermediation mechanism with good regulations and supervision, and reforms destined to level the playing field between the tradable and the non-tradable sector and to further open up the economy to foreign competition.

By implementing such policies, in complement to the strategy of real devaluation considered above, China could more quickly narrow external and internal imbalances and lower the excessively high savings rate, hence contributing to an orderly global rebalancing.

The Chinese government should give full consideration to these policies and apply them with diligence in the new international context.

The objectives set recently by the Chinese government show that it will abandon the export-led development strategy and adopt a growth strategy based on domestic demand. In this perspective, the above-mentioned measures and others, if properly and promptly implemented, could make effective the Yuan's real revaluation and hence reduce internal and external imbalances. Henceforth, I will discuss selectively some of these measures and advocate some new ones, such as abandoning one-child policy, policies to increase the growth potential or negotiating a less loose monetary policy in Western countries.

One consensus is to promote higher wages for workers who have sacrificed during several decades for China's development and *de facto* mainly in favour of foreign capital and consumers. Such a policy does not necessarily harm growth because foreign firms will still locate in China for production destined to export if the wage growth does not exceed that of productivity. Besides, higher purchasing power will encourage foreign firms to produce in China to satisfy a stronger local demand. Rising wages will likely eliminate some firms creating little added-value but will encourage others to innovate and to migrate to product segments with higher added value. This process will not easily jumpstart if wages remain very low and it is likely to break down in the event of abrupt and large revaluation of the Yuan because too many firms fail simultaneously.

Some measures could be put in place to reassure Chinese consumers, to encourage them to spend more or to stimulate their consumption needs. Without going as far as to build a system of social security which generates chronic deficits as in many Western countries, an appropriate social security for a larger part of the population allows to reduce precautionary savings. Previous reforms of education have significantly increased educational costs for Chinese households. More financial support for low-income households with children in

school and university allows them to forego less to finance the study while inciting the young to follow a fairly extensive training, favourable to the long-term growth.

An important measure is to end the one-child policy for urban dwellers. This policy has helped accelerate China's growth since 1980s by generating more savings but makes little sense today as China exports capital. It creates problems linked to an aging population (retirement funding, healthcare etc.), not to mention the difficulties faced by every young couple to take care of four aging parents. These concerns lead households to save more by reducing current consumption. Its reform can increase immediate consumption by diminishing these concerns and by inducing expenditures for raising more children. Given that cities are better endowed with educational facilities, children born there have better educational conditions than these in the countryside, abandoning the policy will allow effectively renewing the urban population of qualified professionals (and avoiding their shortage) to sustain long-term growth.

Public expenditures destined to improve supply conditions in the long term should be implemented and they could be partly financed by the purchase of government bonds by the PBC. The government can modulate their levels to avoid a slump in growth during the real revaluation process. Additional funds should be mobilised: 1) to improve superior and professional education, to develop basic research and to stimulate R&S in Chinese firms. They help build the foundation of a knowledge economy and enable China to narrow the technology gap with industrialised countries; 2) to improve the infrastructure. Numerous projects (airports, bridges, high-speed railways, highways, ports, subways, etc.) are to be realised, notably in underdeveloped areas, and medium and small cities; 3) to modernize agriculture to cope with the very strong inflationary pressure actually observed in food prices and with the likely shortage of agricultural products in the decades to come, by providing

more funds to farmers, developing farmer-training centres and financing more public and private food research.

The government should pay attention to macroeconomic and social risks that could compromise the real revaluation strategy partly based on higher inflation: 1) it should stabilise food prices to avoid that they amplify too much the inflation, making the life of low-income households too difficult; 2) it should cool speculative property development to avoid the risk experienced by Spain facing now an unprecedented economic and financial crisis. The consequences could be dramatic if important bubbles form in China and then burst (Ueda 2010).

To significantly reduce external imbalances, China could also reduce tax rebates for exports, cut tariffs and restrictions on imports, decrease the benefits given to foreign firms (while treating them equally with national ones), heavily tax capital gains realised by foreign corporations and financial institutions, while restricting short-term capital movements. The government should reduce the incentive for local officials to attract foreign investors by not linking political promotion to the amount of FDI. Enhanced environmental requirements could be implemented to reduce the transfer of polluting production lines in China.

These measures and others not discussed here, by increasing domestic demand, wages and inflation, and by reducing net exports and net inflows of capital, should gradually induce the real appreciation of the Yuan and the reduction of external imbalances while mitigating its negative effects on China's growth.

To absorb abundant domestic savings, the government should strive to create more domestic savings vehicles by increasing good-quality financial assets through, e.g., selling more shares of public enterprises at fair prices, debt emissions by firms and creation of venture capital funds. After the adoption of flexible exchange rate regime, the authority should relax its control on the foreign exchange settlement system, allow the private sector to

hold foreign currencies, and encourage foreign assets to be denominated in RMB (Zheng and Yi 2007; Zhu 2010).

Once the real revaluation strategy is adopted, China could negotiate for less loose monetary and fiscal policies in the USA because such policies are ineffective due to debt ceiling and the ZLB, and complicate the conduct of policies in China. China should counter the accusation of exchange rate manipulation by criticising the USA for manipulating its currency to maximize seigniorage revenues. Indeed, the USA enjoys unprecedented seigniorage revenues thanks to the accumulation of dollars by Asian central banks and countries exporting raw materials. The behaviour of the latter could radically change if the creation of USD accelerates again, destroying the optimism of Cooper (2009) about the long-lasting role of the USD as dominant international currency. An argument that could convince American policymakers is that excessively exploring this source of income, permitted by the status of international currency gained by the USD after the Second World War, will eventually lead to its disappearance or dry-up.

6. Conclusions

The Yuan's revaluation fuels the debate in China and abroad when some countries are likely to initiate a "war of currencies" by devaluing its currency to boost national growth to the detriment of other countries.

This paper has argued that the Fed's loose monetary policy is, among many factors, an important determinant of the Yuan's undervaluation, and China cannot efficiently invest its increasingly large foreign exchange reserves. The accumulation of the latter, originally intended to ensure the stability of nominal exchange rate, is not anymore beneficial because it becomes very excessive and induces an important loss of Chinese social welfare. The refusal

to revalue the Yuan implies more damaging future adjustments for Chinese and World economies, while a well managed revaluation of the Yuan will increase the social welfare without significant harms to China's growth in the short or long run. Conversely, fast nominal revaluation of the Yuan against other currencies (USD, euro and yen) must be rejected because of its important negative effects on China's short-run growth.

To tackle the problem, this paper has proposed, using a theoretical framework, an optimal strategy combining gradual nominal devaluation and higher inflation with other structural and macroeconomic policies to achieve the Yuan's real revaluation and to eliminate external imbalances represented by increasingly large foreign exchange reserves. Policy measures, e.g., higher wages, changes in fiscal and regulatory rules to reduce net exports and net inflows of capital, more public expenditures on infrastructure, additional funds for national education and R&D, reforms of the social security system, abandonment of the one-child policy, and negotiating a less loose US monetary policy, could help minimize the adjustment costs related to the Yuan's real revaluation while stimulating future growth.

References:

Banister, Judith and George Cook (2011), "China's employment and compensation costs in manufacturing through 2008," *Monthly Labor Review*, *US Bureau of Labor Statistics*, March, 39-52.

Bernanke, Ben S. (2005), "The Global Saving Glut and the U.S. Current Account Deficit," *Remarks by Governor* at the Sandridge Lecture, Virginia Association of Economics, Richmond, Virginia.

Blanchard, O.-J., and P.-A. Muet (1993), "Competitiveness through Disinflation: An Assessment of the French Macroeconomic Strategy," *Economic Policy* 8(16)**,** 11-56.

Brainard, William (1967), "Uncertainty and the Effectiveness of Policy," *American Economic Review* 57, 411-425.

Ceglowski, J. and S. Golub (2011), "Does China Still Have a Labor Cost Advantage?," *CESIFO Working Paper* N°3579.

Chen, Hongyi, Wensheng Peng and Chang Shu (2009), "Renminbi as an International Currency: Potential and Policy Considerations," *Working Papers* 182009, Hong Kong Institute for Monetary Research.

Chen, Jinzhao (2009), "Beyond Cheap Talks: Assessing the Undervaluation of the Chinese Currency Between 1994 and 2007," *Economie Internationale* 2009/3(n°119), 47-82.

Chen, Qianbing (2009), "Why China Should Invest Its Foreign Exchange Reserves in the Major US Banks," *China & World Economy* 17(4), 1-17.

Cheung, Yin-Wong, Menzie D. Chinn, and Eiji Fujii (2007), "The overvaluation of Renminbi undervaluation," *Journal of International Money and Finance* 26(5), 762-785.

Cheung, Yin-Wong, Menzie D. Chinn, and Eiji Fujii (2010), "China's Current Account and Exchange Rate," NBER Chapters, in: *China's Growing Role in World Trade*, 231-271.

Chu, Ted H. (2005), "The Chinese RMB: Its Value, Its Peg, and Its Future," *Business Economics* 40(2), 7-17.
Cooper, Richard N. (2009), "The Future of the Dollar," *Policy Briefs* PB09-21, Peterson Institute for international Economics.
Corden, W. Max (2009), "China's Exchange Rate Policy, Its Current Account Surplus and the Global Imbalances," *Economic Journal* 119(541), F430-F441.
Coudert, Virginie and Cécile Couharde (2007), "Real equilibrium exchange rate in China is the renminbi undervalued?," *Journal of Asian Economics* 18(4), 568-594.
Creel, Jérôme and Jacques Le Cacheux (2006), "The new European competitive disinflation (in French)," *Revue de l'OFCE*, 2006/3-no 98, 7-36.
Dai, Meixing (2006), "Inflation-targeting under a Managed Exchange Rate: the Case of the Chinese Central Bank," *Journal of Chinese Economic and Business Studies* 4(3), 199-219.
Das, Dilip K. (2009), "The evolution of renminbi yuan and the protracted debate on its undervaluation: An integrated review," *Journal of Asian Economics* 20(5), 570-57.
Eichengreen, Barry (2005), "Is a Change in the Renminbi Exchange Rate in China's Interest?," *Asian Economic Papers* 4(1), 40–75.
Eichengreen, Barry, and Mariko Hatase (2007), "Can a rapidly growing export-oriented economy exit smoothly from a currency peg? Lessons from Japan's high-growth era," *Explorations in Economic History* 44(3), 501-521.
Ferguson, N and M Schularick (2011), "The End of Chimerica," *International Finance*, 14(1).
Fitoussi, Jean-Paul, A.B. Atkinson, Olivier Blanchard, J. Flemming, E. Malinvaud, E.S. Phelps, Robert Solow (1993), *Competitive Disinflation: The Mark and Budgetary Politics in Europe*, Clarendon Press.
Flassbeck, Heiner, and Massimiliano La Marca (2009), "Currency speculation, domestic and international monetary systems: reforming China's and the global financial architecture," *Journal of Chinese Economic and Business Studies* 7(2), 237-258.
Frankel, Jeffrey (2005), "On the Renminbi: The choice between adjustment under a fixed exchange rate and adjustment under a flexible rate," *NBER Working Papers* N°11274.
Frankel, Jeffrey A. and Shang-Jin Wei (2007), "Assessing China's exchange rate regime," *Economic Policy* 22(51), 575-627.
Goldstein, Morris (2004), "Adjusting China's Exchange Rate Policies," *Working Paper* Series WP04-1, Peterson Institute for International Economics.
Goldstein, Morris, and Nicholas R. Lardy (2009), *The Future of China's Exchange Rate Policy*, Peterson Institute Press, Peterson Institute for International Economics, number pa87.
Hamada, Koichi and Yasushi Okada (2009), "Monetary and international factors behind Japan's lost decade," *Journal of the Japanese and International Economies* 23(2), 200-219.
Hong, Pingfan, Rob Vos and Keping Yao (2008), "How China Could Contribute to a Benign Global Rebalancing?," *China & World Economy* 16(5), 35-50.
Huang, Haizhou and Shuilin Wang (2004), "Exchange rate regimes: China's experience and choices." *China Economic Review* 15(3), 336-342.
Huang, Zhigang (2010), "Monetary policy and trade imbalance adjustment," *Journal of Chinese Economic and Business Studies* 8(3), 269-292.
Kappler, M., H. Reisen, M. Schularick and E. Turkisch (2011), "The Macroeconomic Effects of Large Exchange Rate Appreciations," *OECD Development Centre Working Paper* 296.
Krugman, Paul (2009), "Macroeconomic Effects of Chinese Mercantilism," *The New York Times* (12-31-09).
Lardy, Nicholas, and Patrick Douglass (2011), "Capital Account Liberalization and the Role of the Renminbi," *Working Paper Series* WP11-6, Peterson Institute for International Economics.
Laurenceson, James, and Kam Ki Tang (2007), "Opening China's Capital Account: Modeling the Capital Flow Response," *Journal of Chinese Economic and Business Studies* 5(1), 1-18.
Lin, Guijun, and Ronald M. Schramm (2003), "China's foreign exchange policies since 1979: A review of developments and an assessment," *China Economic Review* 14(3), 246-280.
Liu, Ligang (2004), "A Structural and Macroeconomic Approach to RMB's Valuation," *China & World Economy* 12(1), 11-20.

Liu, Xiaohui, and Conglai Fan (2010), "The model and empirical estimation of the optimal flexibility of RMB exchange-rate regime: A study based on the price-stabilization," *Frontiers of Economics in China* 5(2), 187-209.

Liu, Xiaohui, and Jing Zhang (2009), "RMB Exchange Market Pressure and Central Bank Exchange Market Intervention," *China & World Economy* 17(3), 75-92.

Ma, Yue, and Huayu Sun (2007), "Hot Money Inflows and Renminbi Revaluation Pressure," *Journal of Chinese Economic and Business Studies* 5(1), 19-36.

McKinnon, Ron (2010), "What Manipulation? *A Reply* to Krugman," *The International Economy*, Winter, 37-39.

McKinnon, Ronald and Gunther Schnabl (2006), "Devaluing the dollar: A critical analysis of William Cline's case for a New Plaza Agreement," *Journal of Policy Modeling* 28(6), 683-694.

McKinnon, Ronald, and Gunther Schnabl (2009), "The Case for Stabilizing China's Exchange Rate: Setting the Stage for Fiscal Expansion," *China & World Economy* 17(1), 1-32.

Mckinnon, Ronald, Brian Lee and Yi David Wang (2010), "The Global Credit Crisis and China's Exchange Rate," *The Singapore Economic Review* 55(02), 253-272.

Mundell, Robert, 2004, "China's Exchange Rate: The Case for the Status Quo," presented at IMF seminar on the *China's Foreign Exchange System*, Dalian, China.

N'Diaye, Papa M'B.P. (2010), "Transforming China: Insights from the Japanese Experience of the 1980s," *IMF Working Papers* 10/284.

Oberpriller, Christian M., Beate Sauer and Friedrich L. Sell (2008), "The Undervaluation of the Yuan Dispute: Is a Repetition of Germany's Experience in 1969 Necessary, Inevitable or Desirable? A Comment and Reply to John A. Tatom," *Global Economy Journal* 8(2).

Obstfeld, Maurice (2007), "The Renminbi's Dollar Peg at the Crossroads," *Monetary and Economic Studies* (Special Edition)/December, 29-55.

Oksanen, Heikki (2010), "Pegging the Renminbi to a Basket - Facts, Prospects and Consequences," *CESifo Working Paper* Series 3254, CESifo Group Munich.

Park, Yung Chul (2010), "RMB Internationalization and Its Implications for Financial and Monetary Cooperation in East Asia," *China & World Economy* 18(2), 1-21.

Peng, Tao, Minsoo Lee and Christopher Gan (2008), "Has the Chinese currency been undervalued?," *Journal of Chinese Economic and Business Studies* 6(1), 49-66.

Roberts, Ivan, and Rod Tyers (2003), "China's Exchange Rate Policy: The Case for Greater Flexibility," *Asian Economic Journal* 17 (2), 155-184.

Schnabl, Gunther (2011), "The role of the Chinese dollar peg for macroeconomic stability in China and the world economy," *Global Financial Markets Working Paper Series* 13-2010, Friedrich-Schiller-University Jena.

Sun, Jie (2010), "Retrospect of the Chinese Exchange Rate Regime after Reform: Stylized Facts during the Period from 2005 to 2010," *China & World Economy* 18(6), 19-35.

Tatom, John A. (2007), "The US-China Currency Dispute: Is a Rise in the Yuan Necessary, Inevitable or Desirable?," *Global Economy Journal* 7(3).

Taylor, John B. (2009), "The Economic Policy and the Financial Crisis: An Empirical Analysis of What Went Wrong," *Critical Review: A Journal of Politics and Society* 21(2&3), 341-364.

Thorbecke, Willem, and Gordon Smith (2010), "How Would an Appreciation of the Renminbi and Other East Asian Currencies Affect China's Exports?," *Review of International Economics* 18(1), 95-108.

Tung, Chen-Yuan and Sam Baker (2004), "RMB revaluation will serve China's self-interest," *China Economic Review* 15, 331-335.

Ueda, Kazuo (2010), "Japan's Bubble, America's Bubble and China's Bubble," *CARF F-Series* CARF-F-236, Center for Advanced Research in Finance, the University of Tokyo.

Voon, Jan P., Guangzhong Li and Jimmy Ran (2006), "Does China really lose from RMB revaluation? Evidence from some export industries," *Applied Economics* 38(15), 1715-1723.

Wang, Yajie, Hui, Xiaofeng and Soofi, Abdol S. (2007), "Estimating renminbi (RMB) equilibrium exchange rate," *Journal of Policy Modeling* 29(3), 417-429.

Wang, Yizhong (2010), "The internal and external equilibrium exchange rate of RMB: 1982-2010," *Frontiers of Economics in China* 5(2), 210-231.

Wang, Yongzhong (2010), "Effectiveness of Capital Controls and Sterilizations in China," *China & World Economy* 18(3), 106-124.

Wen, Yi (2011), "Making sense of China's excessive foreign reserves," *Working Papers* 2011-006, Federal Reserve Bank of St. Louis.

Whalley, John , and Xian Xin (2010), "China's FDI and non-FDI economies and the sustainability of future high Chinese growth," *China Economic Review* 21(1), 123-135.

Woo, Wing Thye (2006), ""The Structural Nature of Internal and External Imbalances in China," *Journal of Chinese Economic and Business Studies* 4(1), 1-19.

Xu, Yingfeng (2000), "China's exchange rate policy," *China Economic Review* 11(3), 262-277.

Xu, Yingfeng (2009), "Relevant international experience of real exchange rate adjustment for China," *China Economic Review* 20(3), 440-451.

Yao, Bin (2008), "Research on the choice of RMB exchange rate regime: Analysis based on the welfare," *Frontiers of Economics in China* 3(3), 356-379.

Zhang, Fan and Zuohong Pan (2004), "Determination of China's long-run nominal exchange rate and official intervention," *China Economic Review* 15, 360–365.

Zheng, Yongnian, and Jingtao Yi (2007), "China's Rapid Accumulation of Foreign Exchange Reserves and Its Policy Implications," *China & World Economy* 15(1), 14-25.

Zhu, Chao (2010), "Measuring Net Foreign Assets: The Case of China," *China & World Economy* 18(5), 90-104.

Documents de travail du BETA

2011–**01** *La création de rentes : une approche par les compétences et capacités dynamiques*
Thierry BURGER-HELMCHEN, Laurence FRANK, janvier 2011.

2011–**02** *Le Crowdsourcing : Typologie et enjeux d'une externalisation vers la foule.*
Claude GUITTARD, Eric SCHENK, janvier 2011.

2011–**03** *Allocation of fixed costs : characterization of the (dual) weighted Shapley value*
Pierre DEHEZ, janvier 2011.

2011–**04** *Data games: sharing public goods with exclusion (2nd version)*
Pierre DEHEZ, Daniela TELLONE, janvier 2011.

2011–**05** *Règle du taux d'intérêt et politique d'assouplissement quantitatif avec un rôle pour la monnaie*
Meixing DAI, janvier 2011.

2011–**06** *Ambiguity and Optimal Technological Choice: Does the Liability Regime Matter?*
Julien JACOB, février 2011.

2011–**07** *Politique budgétaire et discipline budgétaire renforcée dans une union monétaire*
Irem ZEYNELOGLU, mars 2011.

2011–**08** *L'évolution de la segmentation du marché du travail en France : 1973-2007.*
Magali JAOUL-GRAMMARE, avril 2011.

2011–**09** *The scarring effect of unemployment in ten European countries : an analysis based on the ECHP.*
Olivia EKERT-JAFFE, Isabelle TERRAZ, avril 2011.

2011–**10** *Almost common value auctions: more equilibria.*
Gisèle UMBHAUER, juin 2011.

2011–**11** *Increasing returns to scale in U.S. manufacturing industries: evidence from direct and reverse regression*
Xi CHEN, juin 2011.

2011–**12** *Cycle d'innovation dans les services, différences technologiques et similarités organisationnelles dans les entreprises de mécanique françaises et allemandes.*
Thierry BURGER-HLEMCHEN, juillet 2011.

2011–**13** *Reversibility and switching options values in the geological disposal of radioactive waste*
Oana IONESCU, Sandrine SPAETER, juillet 2011.

2011–**14** *Nuclear Waste Disposal in France : the Contribution of Economic Analysis*
Jean-Alain HERAUD, Oana IONESCU, juillet 2011.

2011–**15** *Assessing the impact of the EU ETS using firm level data*
Jan ABRELL, Anta NDOYE FAYE, Georg ZACHMANN, juillet 2011.

2011–**16** *The EU legislation game: the case of asylum law*
Jenny MONHEIM-HELSTROFFER, Marie OBIDZINSKI, août 2011.

2011–**17** *Fiscal disciplining effect of central bank opacity: Stackelberg versus Nash equilibrium*
Meixing DAI, Moïse SIDIROPOULOS, septembre 2011.

2011–**18** *Small Worlds in Networks of Inventors and the Role of Science: An Analysis of France*
Francesco LISSONI, Patrick LLERENA, Bulat SANDITOV, septembre 2011.

2011–**19** *Household behavior and individual autonomy: A Lindahl approach*
Claude D'ASPREMONT, Rodolphe DOS SANTOS FERREIRA, octobre 2011.

2011–**20** *A Schumpeterian model of growth and inequality.*
Hélène LATZER, octobre 2011.

2011–**21** *Trade in quality and income distribution: an analysis of the enlarged EU market.*
Hélène LATZER, Florian MAYNERIS, octobre 2011.

2011–**22** *Board of Directors' Involvement in Strategic Decision Making Process: Definition and Literature Review.*
Houda GHAYA, octobre 2011

2011–**23** *Motivations and strategies for a real revaluation of the Yuan.*
Meixing DAI, novembre 2011.

La présente liste ne comprend que les Documents de Travail publiés à partir du 1er janvier 2011. La liste complète peut être donnée sur demande.
This list contains the Working Papers written after January 2011, 1rst. The complet list is available upon request.