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Abstract

The relationship between the current account and the macroeconomic development remains an important issue in an open economy. Recently, global current account imbalances, and more specifically the large deficit in the United States and the surplus in China and other Asian economies, continue to draw considerable attention in both policy makers and academics. The macroeconomic effects induced by China's current account surplus, especially the big trade balance surpluses against the United States, and the related adjustment policy in the rebalance will affect the China's economic growth and development in the future.

China's external current account surpluses are not unrelated to problems with its internal imbalances. This paper focuses on the saving channel. In particular, the objective of this paper is to study the relationship between precautionary savings and China's current account surplus.

Keywords: Precautionary Savings, Current Account, Endogenous Discounting
JEL Classification: C61 F32

1 Introduction

Recently, global imbalances continue to draw considerable attention in both policy makers and academics. The build-up of global imbalances poses a serious threat for the stable development of the world economy. Global imbalances have been seen as a key risk for the worldwide economic activity in the International Monetary Fund's (IMF) commentary on the global economy in its World Economic Outlook since at least the late 1990s. As for what are global imbalances, Rodrigo de Rato--the managing director of the IMF--points that global imbalances in the international economic system are referring to the large current account deficit of the United States, and the corresponding large surpluses in a few countries, mainly in emerging Asia.[①] What de Rato said describes the current economic issue of world economy. According to the April 2007 IMF's World Economic Outlook, the US current account balance is -856.7 billion dollars in 2006 which makes US as the most important part of the imbalances. At the same time, Euro area is -29.1 billion dollars, Japan is 170.4 billion dollars, other advanced economies are 152.2 billion dollars, newly industrialized Asian economies are 87.0 billion dollars, and China is 238.5 billion dollars.

Much focus has been directed to China's current account surplus when the increasing global imbalances are one of the most striking trends in the world economy. The reason may be as follows: first, China is becoming an important current account surplus country, and the proportion of China current account surplus to US current account deficit is increasing from about 5% in 2000 to 27.84% in 2006; Second, China has giant and swelling trade surplus against US, and it is criticized to be supported by the export promotion policies and deliberately undervalued currency. All of these make many US analysts who discuss the sustainability of the huge US current account deficit and how to cope with this problem blame so called China's "manipulated" exchange rate policies. They argue that the appreciation of China currency should be significant in order to get the rebalance. Although some economists in US give some reasonable analysis and think that the appreciation of Renminbi cannot resolve this problem, the pressure from US for a faster appreciation of China currency is higher. Furthermore, the pressure comes from not only the bilateral but also the multinational. For example, the Senate Finance Committee of US passes a new bill which will allow US companies to seek anti-dumping duties on goods from any country that maintains a fundamentally misaligned exchange rate after being formally cited by the US. Very recently, IMF adopts a new surveillance

[①] Global Imbalances and Global Poverty — Challenges for the IMF, Columbia University, New York, February 23, 2005

regime, which will permit firmer surveillance in areas such as insufficiently flexible exchange rates. As to the new surveillance, Hank Paulson, the Treasury secretary of US, said the new surveillance "has the potential to be a strong complement to bilateral diplomacy.[②] To resolve the imbalance, US's some measures challenge the free trade rule which is supported by the World Trade Organization. It is criticized by the economists for both the deviation from the normal economic idea and the nature of beggar-thy-neighbour policy. When somebody in US Congress consider ways to impose retaliatory trade measures against China, 1028 of American's top economists sign a petition in opposition to protectionist policies against China. [③] These economists urge lawmakers to work towards fostering stronger global economic ties through free trade. Obviously, it is not a wise way to apply the protectionism policies in the background of economic globalization.

The relationship between the current account and the macroeconomic development remains an important issue in an open economy. The macroeconomic effects induced by China's current account surplus, especially the big trade balance surpluses against the United States, and the related adjustment policy in the rebalance will affect the China's economic growth and development in the future. China's external current account surpluses are not unrelated to problems with its internal imbalances. There are at least as many explanations of the current account as the basic expression, CA=S-I+ (T-G). [④]In this paper I will focuses on the saving channel. In particular, the objective of this paper is to understand the relationship between precautionary savings and China's current account surplus. It doesn't imply that the saving tells the whole story about the China's current account. However, if we focus on the single most important quantitative factor that underlines the evolution of the current account, a compelling case can be made for looking at the saving channel. China's saving rate has been regarded as being excessively high. In some sense, the high saving rate reflects a high level of individual risk, relating to health costs, retirement, and the financing of education.

Intuitively, precautionary saving, which is a response of current spending to future risk, plays an important role in Chinese households saving actions during the course of the China's economic reform and openness to outside. There is obvious evidence suggesting that part of the saving reflects the precautionary motive in China. In a survey which was questioned by the People Bank of China in the first quarter of 2006, the saving motivations of Chinese individuals for the children' education, retirement,

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② Krishna Guha and Richard McGregor, US-China currency spat risks leaving IMF badly bruised, Financial Times, June 26, 2007.

③ More detail on www.ClubForGrowth.org.

④ Concerning US current account deficit, there are some popular arguments based on this equation. For example, some argue that the main reason for the increase in US current account deficit is the decline in US savings; some support the "twin deficits hypothesis" which stresses the fiscal deficit as the greatest blame.

house purchase and preparation for emergencies accounted for 56.5% totally.[5] In the previous series of surveys, there are also the similar results which show that the precautionary motive plays an important role in explaining the China households saving behavior. So it is interesting and significant to explore the factor underlying the widening of current account surplus in China from precautionary savings perspective.

An analysis of the current account balance has remained the major area of both theoretical and empirical research in open economy macroeconomics. In the 1980s the intertemporal optimizing models of the current account balance came into vogue. Based on the intertemporal analysis, there are plenty of explanations about the current account. Obstfeld and Rogoff (1996) have provided a comprehensive review of the intertemporal optimization models of the current account. Very recently, Singh (2007) gives an excellent survey about the intertemporal optimizing models of the trade and current account balance.

Agents reduce current consumption and increase saving as reaction to an increase of uncertainty with respect to future income, and this is result of a precautionary saving motive. [6] Because of the precautionary motive, the uncertain income will result in greater saving. In a two-period partial equilibrium model, Leland (1968) and Sandmo (1970) show that facing the uncertainty the risk-averse individual will save more when the third derivative of the period utility function is positive and there is only a single risk-free asset. The intuition for their result is that with convex marginal utility increases in earnings uncertainty increase expected future marginal utility of consumption for any fixed level of the second period wealth. Thus a sufficient and necessary condition for precautionary saving is strictly convex marginal utility. In the case of finite period some researchers generalize this result. On the aggregate precautionary savings Caballero (1991) and Aiyagari (1994) quantify the potential magnitudes of aggregate wealth accumulation due to the uninsured earnings uncertainty. They demonstrate that earnings uncertainty accounts for a positive fraction of aggregate wealth accumulation.

The exogenous fixed discount factor and the endogenous discount factor are the two popular preference formulations in the infinite-horizon open economy models under incomplete asset markets. An economy has incomplete markets if some risks are not fully insurable and others are not insurable at all. And it is well-known that the stationary state variables can not be generated under the formulation of the exogenous

[5] The survey is conducted by the People Bank of China quarterly on the urban households' savings, and fifty cities of various sizes are included. The number of valid responses is 20000.

[6] Carroll (2006) makes the clear classification between the precautionary saving and precautionary savings. According to Carroll, precautionary saving is additional saving that result from the knowledge that future is uncertain, and precautionary savings is the stock of extra wealth that results from the past flow of precautionary saving.

discount factor. The endogenous discount factor was first introduced by Uzawa (1968), and further developed by Epstein (1983). And this endogenous discount factor can produce a well-defined stationary equilibrium. Obstfeld (1982) introduced Uzawa's specification of the endogenous subjective discount factor in a deterministic small-open economy's model. This allows differences in subjective discount factor to explain systematic current account imbalance. However, the assumption that the agents become more impatient as they become wealthier has been questioned. By introducing the precautionary saving, Daniel (1997) shows that transitory systematic current account imbalance can be explained without that unappealing assumption. Mendoza (1991) allowed the endogenous subjective discount factor in the small-open economy real business cycle model. Schmitt-Grohe and Uribe (2003) analyze and compare the endogenous discount factor and alternative ways of inducing stationary steady-state in small open economy models.

This paper considers the precautionary savings and current account which are based on a simple small open endowment economy model with the endogenous discount factor. The remainder of this paper is organized as follows. Section 2 is the facts and different views. Section 3 is the model. Section 4 is the calibrations and results. Section 5 is the conclusions.

2 The Facts and Different Views

Figure 1 shows the position of China current account. It is the annual data which is from 1982 to 2005. The ratio of current account to GDP is measured as their nominal value, and all the data in this section are obtained from the International Monetary Fund's International Financial Statistics Yearbook (IFSY). The current account data is in US dollars, and GDP data is in China domestic currency Renminbi in the IFSY data set. When the ratio is calculated, the current account data is converted into the Renminbi by using the official average annul exchange rate. The China's current account has been surplus since the early 1990s except in 1993 which is deficit, and reaches a moderate level of 3.8 percent of GDP in 1998. Subsequently the ratio of current account to GDP is slowing down, but it is still surplus. In 2005 it hits 7.1 percent of GDP. In fact China becomes an important current account surplus country only very recently. China's current account surplus surged from 2004. Before 2004, China current account surplus is lower than Japan, and the average proportion of China current account surplus to Japan is 23.2% from 1999 to 2003. In 2005, its value is nearly equal for these two countries, and the next year China surplus exceeds Japan. By comparing the ratio of the China surplus to US deficit, we also can find the same result. This ratio increases from 5.24% in 1999 to 27.84% in 2006.

From the identity of national income, we can conclude that a country's current account is the difference between what it invests and what it saves. It is instructive to analyze the relative importance of changes in investment and changes in saving. As for East Asian economies, except China, the higher current account surpluses from the late 1990s can be explained by a drop in investment. By contrast, China's economic growth is pushed by the investment. The increasing China current account surplus can not be explained by a fall in investment but by a significant rise in saving. There several different concepts of the saving rate. Here the private sector saving rate are plotted in Figure 2 which is measured by the equation $(Y-C-G)/(Y-G)$. Figure 2 shows that the private saving rate is kept at high level, and from 1978 to 2005 the average annual private saving rate is 44.7 percent. By contrast, some other countries private saving rates are reported in Table 2. We can find that China's private saving rate is higher relatively than the other countries'. As for the household saving, Kuijs (2006) points that China's household saving is relatively high compared to OECD countries. In the late 1990s, the reforms of China's state-owned enterprises increase uncertainty on pensions, health and education, which are previously provided by the enterprises. These changes promote the saving in China at a high level.

What are the factors behind the China's current account surplus? Different analyst holds different view. Some analysts argue that the exchange rate policies influence or create the current account surplus. They point that China manipulate the exchange rate at very competitive levels which has favored the widening of trade surpluses. Thus it has forced the central banks to intervene to stabilize the undervalued exchange rates, leading to a massive accumulation of international reserves. If this view is true, we will find that China's current account surplus directs the accumulation of international reserves. However, from the actual data Prasad and Wei (2005) show that the dramatic surge in China's foreign exchange reserves since 2001 is mainly attributable to non-FDI capital inflows, rather than current account surpluses or FDI.

Based on the analysis of historical episodes of large and sustained imbalances and the related reversal, IMF's World Economic Outlook (2007) points that a market-led realignment of real exchange rates can play an important complementary role to demand rebalancing across countries to facilitate a smooth unwinding of external imbalances, and as for advanced economies and emerging market countries, reversals of current account surpluses have tended to involve real appreciations of their currencies.

About the role of the exchange rate adjustment on the external rebalance, China holds a different view. The People's Bank of China, the central bank, states that exchange rates can help ease external imbalance, but only as part of a much broader

set of equally important policy tools. From China official perspective, an unregulated and massive adjustment of exchange rate will not only worsen external instability, but also influence the sustainability of domestic economic growth, and therefore global growth and the stability of international financial market.[7] Although the view that China currency must be appreciated significantly is very popular in US, there are some reasonable opinions from the US economists. For example, opposed to the conventional view in US that a necessary step to bring the global economy into sustainable balance is a significant appreciation of China currency, Cooper (2006) claims that a revaluation of China currency, far from alleviating global imbalances, would run the risk of precipitating a financial crisis. The divergence between the China and US about the external imbalance is very clear, and Yu Yongding (2007) makes a deep analysis about global imbalances from China's perspective, especially he discusses China's twin surplus (current account and financial account surplus) in detail. In his analysis, China's external imbalances are both the result of growth strategy featured by trade promotion and FDI attraction as well as the increasing of saving-investment gap.

3 The Model

The theoretical analysis is based on the standard model in the small open endowment economy. Consider an economy inhabited by a single, infinitely-lived, representative agent with the preferences described by the utility function:

$$E_0 \sum_{t=0}^{\infty} [\beta_t u(c_t)] \tag{1}$$

Where E_0 denotes mathematical expectation, c_t denotes consumption, β_t denotes the time preference function, and $u(c_t)$ denotes the period utility.

Period utility $u(c_t)$ has the standard Constant Relative Risk Aversion (CRRA) form, with γ as the relative risk aversion coefficient, that is:

$$u(c_t) = \frac{c_t^{1-\gamma}}{1-\gamma} \tag{2}$$

The time preference function β_t is defined as:

$$\beta_t = \exp[-\sum_{\tau=0}^{t-1} \rho \ln(1+c_\tau)],\ \rho > 0 \tag{3}$$

Where ρ denotes the elasticity of the discount factor with respect to utility. The discount factor depends on the level of the consumption in the previous periods. This functional form of the endogenous discount factor implies that an increase in the

[7] Richard McGregor. "China Tells IMF not to Back U.S. on Renminbi", Financial Times, June 21, 2007.

current consumption will decrease the weights to all future utility, and then the representative agent will become more impatient.

In the incomplete markets there are no state contingent markets for the agent, and the agent can only purchase a single risk-free foreign asset. The absence of insurance opportunities induces the agent to borrow or save as much as he or she wants by buying or selling the foreign financial assets to acquire self-insurance.

The representative agent chooses the consumption and foreign financial assets in order to solve the utility maximization problem subject to the period-by-period budget constraint. Letting b_t denotes the representative agent's foreign financial assets at the end of current period, b_{t+1} foreign financial assets at the end of next period, and y_t the income at end of current period, and then the period-by-period budget constraint faced by the representative agent is given by:

$$b_{t+1} = y_t + (1+r)b_t - c_t \tag{4}$$

Where foreign financial assets are one-period bonds traded in a frictionless global credit market, and a net risk-free real interest rate which is equal to r will be paid at the end of holding the bonds period. So the gross interest rate is given by $R = 1 + r$. Each period the representative agent receives a shock to his or her income, which is denoted by $\varepsilon \in \mathrm{E} = \{\varepsilon_1 < \varepsilon_2 < \cdots < \varepsilon_m\}$.

From the budget constraint (4) and the income subject to random shocks the consumption can be determined by:

$$c_t = \varepsilon_t y - b_{t+1} + (1+r)b_t \tag{5}$$

The agent chooses processes for c_t and a_{t+1} for $t \geq 0$, so as to maximize utility function (1) subject to the budget constraint (4). CRRA preference implies the marginal utility of the consumption goes to the infinity as the consumption approaches zero. To rule out this state, following Aiyagari (1994) I impose an ad-hoc debt limit ϕ, which is subjected to $b_{t+1} \geq \phi \geq -\min(\varepsilon_t y / r)$.

The optimality condition associated with this problem is the following Euler equation:

$$u'(c_t) = (1+r)\exp[-\rho \ln(1+c_t)]E_t u'(c_{t+1}) \tag{6}$$

The interpretation of the Euler equation is simple. If the agent sacrifices one unit of consumption in period t and invests it into foreign financial assets, its period t utility falls by $u'(c_t)$. In period t+1 the agent receives the unit of goods invested plus interests, yielding $(1+r)\exp[-\rho \ln(1+c_t)]E_t u'(c_{t+1})$ utilities which are related to consumption in the period t.

The competitive equilibrium of the small open, endowment economy with incomplete asset markets can be characterized by the following Bellman equation:

$$V(b,\varepsilon) = \max_{\tilde{b}} \{\frac{c^{1-\gamma}}{1-\gamma} + \exp[-\rho \ln(1+c)]E[V(\tilde{b},\tilde{\varepsilon})]\} \tag{7}$$

Where $\tilde{b}$ and $\tilde{\varepsilon}$ denote the next-period values of foreign financial assets and stochastic shocks.

Since analytical solutions are not available for the model, numerical techniques will be applied to character the equilibrium. Before proceeding to calibration, it is necessary to formalize the definition of some variables. First of all, it is the definition of precautionary savings. The precautionary demand for saving usually is described as the extra saving caused by future income being random, so precautionary savings are defined as the excess savings that the representative agent accumulates due to presence of the income shock. Here precautionary savings is measured as the difference between the foreign financial assets predicted by the model and the level of foreign financial assets that the same model would predict in the deterministic steady state case. That is to say, precautionary savings is the excess of the long run average of assets relative to the deterministic steady state, and in the endogenous discounting setup the deterministic steady state is determined so as to equate the endogenous rate of time preference with the world interest rate. Another variable of interest is the current account balance to the output ratio (ca_t), which is given by:

$$ca_t = (b_{t+1} - b_t)/y_t = (y_t - c_t + rb_t)/y_t \tag{8}$$

4 Calibration and Results

In the following quantitative analysis, value function iteration is implemented to solve the Bellman equation. In order to reduce numerical approximation error, the number of the grid for the net foreign financial assets is set to n=1000. Tauchen and Hussey (1991) provide a simple way to discretize VAR processes. By using their method, I will parameterize the process for $\varepsilon \in \mathrm{E} = \{\varepsilon_1 < \varepsilon_2 < \cdots < \varepsilon_m\}$ into the discrete Markov chains which can be used for model simulation.

There are six parameters which are needed to pin down. I fit these values so that in equilibrium the model economy matches some statistics from China's actual economic data. The baseline parameters are listed in Table 3. In the baseline calibration the coefficient of relative risk aversion is set to $\gamma = 2$. For comparing the results, a higher risk aversion, that is $\gamma = 4$, is considered. The mean of income is normalized to $y = 1$. The steady state ratio of net foreign financial assets to GDP is set to -2.6 percent, which is the average of China's net foreign financial assets to GDP ratio during the period 1981-2004 in the database constructed by Lane and Milesi-Ferretti (2006). The steady state ratio of consumption to GDP is set to 47.3 percent, which is averaged by the China's annual ratio of consumption to GDP during the period 1978-2005. The real interest rate is set to $r = 5\%$, and then the gross interest rate is obtained from $R = 1 + r = 1.05$. The following parameter to be

calibrated is the value of the time preference, and it follows from the steady state condition that sets the rate of time preference equal to R, then $\beta = \ln(R)/\ln(1+c) = 0.126$. This implies the subjective discount factor of the model is $(1+c)^{-0.126} = 0.95$.

The Markov process of income shocks is set to match the standard deviation and first-order autocorrelation of the Hodrick-Prescott-filtered cyclical component of GDP in China's annual data over the period of 1978-2005, then the values of standard deviation $\sigma_y = 3.983\%$ and the coefficient $\rho_y = 0.643$. The Hodrick-Prescott filter ensures that cyclical GDP follows a stationary process, and the first-order autoregressive process specification, that is $y_t = \rho_y y_{t-1} + \varepsilon_t$, can not be rejected. Thus, given the output standard deviation and autocorrelation coefficient the underlying standard deviation of output innovations is $\sigma_\varepsilon = \sqrt{\sigma_y^2(1-\rho_y^2)} = 3.05\%$. Using 5 nodes in the vector of realizations, the algorithm of Tauchen and Hussey (1991) produces the transition matrix and the possible states, and then the simulation of Markov chain is obtained. The standard deviation of the Markov process is 3.97 percent with 0.617 autocorrelation and 3.05 percent standard deviation in innovation. So the Markov process is an accurate approximation to the actual data of China's cyclical GDP.

After having solved the model by value function iteration, we have in hand a collection of points for the state variable and a decision rule that related the control variable to this collection of points. We use Chebychev polynomials to approximate the rule in order to avoid multicolinearity problems in the least square algorithm. Then the model can be used in the usual way, and precautionary savings, consumption, and current account can be computed using their definitions. Table contains the estimates of the statistical moments which characterize the stochastic steady state of the model. The table also shows the results for alternative calibrations with the different parameters as follows. First, the lower and higher output autocorrelations are considered, and they are 0.4 and 0.8 respectively. Second, the lower and higher variability in output innovations are also used for the calibration, and they are 1.53 percent and 4.60 percent which yield the output standard deviation 2 percent and 6 percent. Finally, the higher risk aversion is considered which is equal to 4.

The main result in Table 4 reveals the role of the precautionary savings. The result of the baseline analysis shows that the precautionary savings measure nearly 4.55 percent of output averagely. When the variability and persistent of output are changed, the quantitative features of the precautionary savings is different. At the lower

variability in output innovations ($\sigma_\varepsilon = 1.53\%$), the mean of the precautionary savings is 0.1 percent of the output, and at the higher variability ($\sigma_\varepsilon = 4.60\%$) it is 11.21 percent of the output. While the autocorrelation of the output is set to 0.4 and 0.8, the mean of the precautionary savings decreases from 7.22 percent of the output to 3.57 percent of the output. The higher risk aversion coefficient yields the larger precautionary savings. When the risk aversion coefficient is set to $\gamma = 4$, the mean of the precautionary savings is 6.94 percent of output.

The results about the precautionary savings reported in Table 4 indicate that the representative agent build a buffer stock of savings to face the income uncertainty. However, these results do not provide direct evident about the relationship between the precautionary savings and the current account. By using the calibrated data, we can find some evidences in the model economy. The coefficient of correlation between the precautionary savings and the current account is 0.3786 in the baseline result. This kind of positive correlation between the precautionary savings and the current account shows that the increases in the precautionary demand for the foreign financial assets can push the current account surplus up. So the precautionary saving must be reflected in the current account.

5 Conclusions

This paper studies the interaction of the endogenous discount with precautionary savings in the analyses of the current account. The standard small open endowment model is applied to the research. Since analytical solutions are not available for the model, numerical methods are used to character the steady state. By using some China's actual economic data, I evaluate the size of the precautionary savings in the model economy. I find that the precautionary savings account for nearly 4.55 percent of output averagely in the baseline result. And I also find that the current account is positively related to the precautionary savings in the model economy.

Based on the results of the calibrations, the policy advice is given to cope with China's current account surplus as follow. First of all, it is important to strengthen the system of social protection. Although China's economic growth is extremely outstanding, the system of social protection has collapsed to a large extent since the deepening reform and opening of 1990s. Coupled with the rapid pace of change during the transition, uncertainty has been increased significantly. In order to reduce the precautionary savings preparing for the uncertainty, the necessary reform must be directed to the system of social protection. For example, the urban-based pension system, old-age security for the rural population, and the minimum income program. Second, financial sector reforms will also be necessary to provide the households

with efficient instruments of saving which at present go mainly into low-return bank deposits. Because the net income of enterprises in China lack the mobility and almost all of that is saved, new policies should be stimulated the net income of enterprises to finance the private consumption. Another reason that the net income of enterprises is saved and used for investment is that the credit is constrained for the enterprises especially for the non-State-Owned Enterprises. The financial sector needs to supply efficient and sufficient credit for the medium and small size enterprise.

The road to rebalancing may be long, and it is share-responsibility for both deficit and surplus economies in the global economy. It is not a good way to blame each other and apply to beggar-thy-neighbour polices. As for the adjustment of China's current account surplus, it may be a process to cope with the related issue since these are connected with the structural reform.

References:

1. Aiyagari, S Rao. "Uninsured Idiosyncratic Risk and Aggregate Saving." The Quarterly Journal of Economics, Vol. 109(3), pp.659-684.
2. Blanchard, Olivier and Giavazzi, Francesco "Rebalancing Growth in China: a Three-handed Approach." MIT Department of Economics Working Paper Series 05-32, November, 2005, http://ssrn.com/abstract=862524.
3. Caballero, Ricardo J. "Consumption Puzzles and Precautionary Savings." Journal of Monetary Economics, January 1990, 25(1), pp.113-136.
4. Carroll, Christopher D. "Buffer-Stock Saving and the Life Cycle/Permanent Income Hypothesis." The Quarterly Journal of Economics, Vol. 112, No. 1. (Feb. 1997), pp. 10-55.
5. Carroll, Christopher D. "Precautionary Saving and Precautionary Wealth", Working Paper in Department of Economics, Johns Hopkins University, 2006, http://econ.jhu.edu/people/ccarroll/PalgravePrecautionary.pdf.
6. Cooper, Richard N. "Living with Global Imbalances: A Contrarian View." Journal of Policy Modeling, 28 (2006), pp.615-627.
7. Daniel, Betty C. "Precautionary Saving and Persistent Current Account Imbalance." Journal of International Economics, 42 (1997), pp.179-193.
8. Durdu, Ceyhun Bora, Mendoza, Enrique G. and Terrones, Marco E. "Precautionary Demand for Foreign Assets in Sudden Stop Economies: an Assessment of the New Mercantilism." The Conference on New Perspectives on Financial Globalization held at the IMF, April 2007.
9. Epstein, Larry G. "Stationary Cardinal Utility and Optimal Growth under Uncertainity." Journal of Economic Theory, 31(1983), pp.133-152.
10. Ghosh, Atish R. and Ostry, Jonathan D. "Macroeconomic Uncertainty, Precautionary Saving, and the Current Account." Journal of Monetary Economics, 40 (1997), pp.121-139.
11. IMF "World Economic Outlook Spillovers and Cycles in the Global Economy April 2007", Washington, D.C., U.S.A.
12. Kuijs, Louis. "How Will China's Saving-Investment Balance Evolve?" World Bank Policy Research Working Paper 3958, July 2006.
13. Kraay, Aart. "Household Saving in China", The World Bank Economic Review, Vol.14, No.3, Sep 2000, pp.545-570.
14. Lane, Philip R. and Gian Maria Milesi-Ferretti. "The External Wealth of nations Mark II: Revised and Extended Estimates of Foreign Assets and liabilities, 1970-2004." IMF Working Paper WP0669, 2006.

15. Leland, Hayne E. “Savings and Uncertainty: the Precautionary Demand for Saving.” Quarterly Journal of Economics, 82(1968), pp.465-473.
16. Ljungqvist, Lars and Sargent, Thomas J. Recursive Macroeconomic Theory, MIT Press, 2000.
17. Mendoza, Enrique G. “Real Business Cycles in a Small Open Economy.” The American Economic Review, Vol.81, No.4. (September, 1991), pp.797-818.
18. Obstfeld, Maurice. “Aggregate Spending and the Terms of Trade: Is There a Laursen-Metzler Effect?” the Quarterly Journal of Economics, Vol.97, No.2 (May, 1982), pp.251-270.
19. Obstfeld, Maurice and Rogoff, Kenneth. “Foundations of International macroeconomics”. MIT Press, 1996.
20. Prasad, Eswar and Wei, Shang-Jin. “The Chinese Approach to Capital Inflows: Patterns and Possible Explanations.” NBER Working Paper 11306, April 2005.
21. Sandmo, A. “The Effect of Uncertainty on Saving Decisions.” Review of Economic Studies, 37(1970), pp.353-360.
22. Schmitt-Grohe, Stephanie and Uribe, Martin. “Closing Small Open Economy Models.” Journal of International Economics, 61(2003), pp.163-185.
23. Singh, Tarlok. “Intertemporal Optimizing Models of Trade and Current Account Balance: A Survey.” Journal of Economic Surveys, Vol. 21(2007), No.1, pp.25-64.
24. Uzawa, H. “Time Preference, the Consumption Function, and the Optimum Asset Holdings.” In: Wolfe, J.N.(Ed.), Value, Capital, and Growth: Papers in Honor of Sir John Hicks. University of Edinburgh Press, Edinburgh.
25. Yu Yongding. “Global Imbalances: China’s Perspective”, the International Conference on Global Imbalances, Organized by Peter G. Peterson Institute for International Economics (IIE), Washington, Feb. 8, 2007.

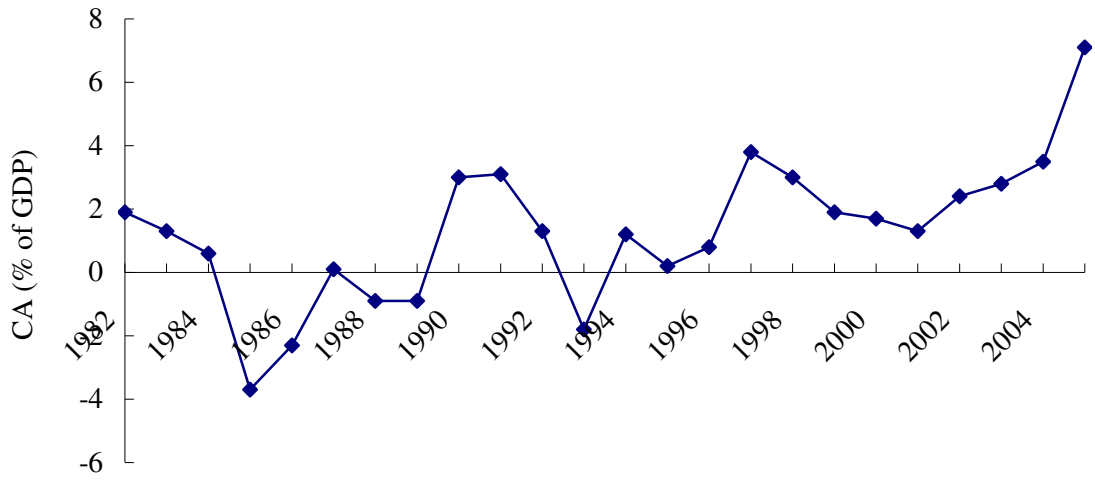

Figure 1 the ratio of China current account to GDP (1982-2005)

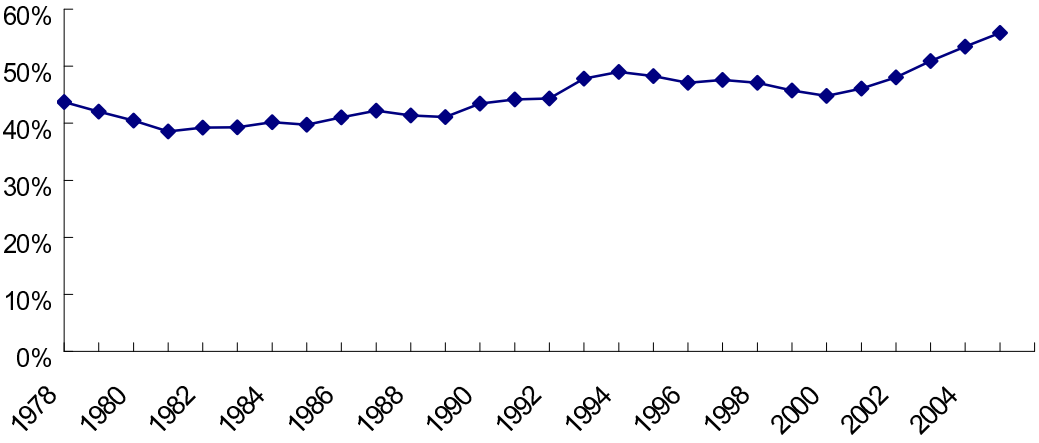

Figure 2 the private sector saving rate in China (1978-2005)

Table 1 China comparing private saving rate with other countries (in percent)

	China	US	Japan	France	India	Mexico	Korea
1990	43.4	20.6	38.9	26.8	23.0	24.1	41.6
1995	48.3	20.5	35.2	25.9	27.7	25.1	41.1
2000	44.8	19.8	32.1	29.4	26.7	24.5	38.6
2005	55.9	16.7	30.0	26.1	----	22.8	38.7
Average	47.7	19.4	33.8	26.9	26.5	23.1	40.1

Source: Author's calculations. The data is from IMF's International Financial Statistics Yearbook. The periods of the average are from 1990 to 2005, but India's value is from 1990 to 2004.

Table 2 China, Japan and US current account balance (in billions dollars)

	1999	2000	2001	2002	2003	2004	2005	2006
China	15.7	20.5	17.4	35.4	45.9	68.7	160.8	238.5
Japan	114.5	119.6	87.8	112.6	136.2	172.1	165.7	170.4
US	-299.8	-415.2	-389	-472.4	-527.5	-665.3	-791.5	-856.7

Source: IMF, World Economic Outlook, April 2007, Table 25.

Table 3 the parameters

Notation	Parameter/Variables	Values
γ	Coefficient of relative risk aversion	2
β	Discount factor	0.95
R	Gross world interest rate	1.05
y	Mean of income	1
c	Consumption to GDP ratio	47.3%
b	Steady state ratio of net foreign assets to GDP	-2.6%
σ_e	Standard deviation of output innovations	3.05%
ρ_y	Autocorrelation of output	0.643

Table 4 Summary of statistical moments in the stochastic stationary state

	Baseline	Auto Corr.		Std Dev		Risk Aver
		0.4	0.8	2%	6%	4
Means						
Precautionary savings	0.0455	0.0722	0.0357	0.0012	0.1121	0.0694
Output	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Consumption	1.001	0.9883	0.9829	0.9988	1.0046	0.9955
Net foreign financial assets	0.0399	0.0482	0.0148	0.0534	0.0489	-0.0019
Current account	0.0014	0.0005	0.0003	0.0017	0.0020	-0.0002
Coefficient of variation (in percent)						
Output	4.12	3.03	4.08	2.10	5.33	4.36
Consumption	7.03	3.27	3.97	4.08	6.45	6.04
Net foreign financial assets	127.4	50.61	294.98	96.13	79.56	-22.11
Current account	35.07	41.56	92.01	21.34	12.16	18.53
Normalized coefficient of variation (relative to output)						
Consumption	1.71	1.08	0.97	1.94	1.21	1.39
Net foreign financial assets	30.92	16.70	72.30	45.78	14.93	-5.07
Current account	8.51	13.72	22.55	10.16	2.28	4.25
Output correlations						
Consumption	0.7074	0.7358	0.7593	0.3659	0.9249	0.7857
Net foreign financial assets	-0.0791	0.2924	0.2913	0.6227	0.1655	0.1443
Current account	-0.1423	0.3047	0.4203	0.213	-0.2059	-0.0542
Autocorrelations						
Output	0.5404	0.3809	0.5301	0.6431	0.2522	0.6640
Consumption	0.2430	0.3934	0.3734	0.2854	0.3995	0.4024
Net foreign financial assets	0.5330	0.5816	0.8103	0.7179	0.7688	0.6338
Current account	-0.0709	-0.0164	-0.0411	-0.0774	-0.0944	0.0493

Source: Author's calculations.