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The Renminbi Challenge:
Is a Revaluation of the Chinese Currency a Wise Step Forward?

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Abstract:

The aim of this paper is to investigate if a revaluation of the Chinese renminbi is in China's interest and whether or not a renminbi revaluation can contribute to correct the US current account deficit. For that purpose, advantages and disadvantages of a revaluation for China are discussed. Furthermore, the fundamental causes of the US current account deficit are analysed to evaluate to what extent a renminbi revaluation can correct this imbalance. The discussion is based on previous research in this area. The main result is that a revaluation of the Chinese renminbi is primarily beneficial for China. Additionally it is found that the fundamental causes of the US current account deficit are domestic macroeconomic conditions and not China's exchange rate policy. Nevertheless, a renminbi revaluation can help to support to correct the imbalance situation. As evidence is found that a revaluation is beneficial for China, it is further analysed how the revaluation should be practically obtained. The basic result is that the renminbi revaluation should be initiated by more exchange rate flexibility rather than by a one-step appreciation.

Keywords: Renminbi, revaluation, foreign exchange accumulation, US current account deficit, exchange rate flexibility

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Abbreviations

A	Assets
C	Private consumption
CAB	Current account balance
D	Debt
G	Government spending
GDE	Gross domestic expenditure
GDP	Gross domestic product
GNP	Gross National Product
I	Private investment
NEER	Nominal effective exchange rate
NFA	Net foreign assets
REER	Real effective exchange rate
S	Savings
VAR	Vector Autoregressive

1. Introduction

1.1 Background

During the last years China has gained interest in both the economic and political world. China has not only become one of the global import and export players but has also moved to the centre of global imbalances. Since the beginning of the millennium China has accumulated huge amounts of foreign exchange reserves and registered enormous current and capital and financial account surpluses while other countries namely the United States suffer from a historical current account deficit.

Many researchers and politicians blame the Chinese exchange rate policy for being one reason for those imbalances. They argue that the Chinese renminbi is undervalued and far away from its equilibrium exchange rate. On the first glance this statement might seem trivial and it may be read without even recognizing the included difficulties. But then the questions arise what an undervalued currency actually is or how the renminbi equilibrium exchange rate looks like at all. The bad answer is that there is no single agreed upon definition of an undervalued currency among economists (Frankel, 2006, p. 261). However, many researchers have already tried to estimate China's equilibrium exchange rate and the degree of misalignment. Because of using different methods and variables determining the equilibrium rate they often come to very different conclusions.

Goldstein (2004) uses the underlying balance approach as well as the approach based on adjustment of global payments imbalances and concludes that the renminbi was undervalued by 15 to 25 percent in 2003. Estimations by Frankel (2006) are based on a modified purchasing power parity approach and result in a renminbi undervaluation of more than 30% in 2000. Since then the undervaluation has rather increased than decreased (Frankel, 2006, p. 261).

These two examples show that it would be naïve to expect precise estimations of the degree of misalignment. Thus, answering the question of undervaluation is not part of this paper. Rather the undervaluation of the renminbi in general is accepted and used as a starting point for a macroeconomic discussion on how to deal with this misalignment. Precisely the questions should be answered if a revaluation is in China's interest and whether or not a renminbi revaluation can contribute to correct the US current account deficit.

The basic result is that a renminbi revaluation might be first and foremost beneficial for China, especially with regard to the huge foreign exchange accumulation. In addition it is found that the Chinese exchange rate policy is not the primary reason for the US current account deficit. In contrast, the fundamental causes of the historical imbalance are domestic macroeconomic conditions. Nevertheless, a renminbi revaluation can help to facilitate the correction process.

1.2 Motivation

I have been motivated to investigate the question of renminbi revaluation by the political discussion regarding the United States and China in the financial press[1]. For the last several years, the United States has put enormous pressure on China to revalue its currency against the background of the large bilateral trade deficit. However, the behaviour of the United States might be motivated by political and national interests rather than based on economic rationalities. This is the main reason why I chose this topic: I want to leave the political discussion and investigate the topic on an economic level.

On the one hand the United States calls for a renminbi revaluation. On the other hand, many economists have found empirical evidence that the Chinese currency is actually undervalued. Nevertheless, the renminbi is China's currency and Chinese authorities should only revalue if it is beneficial for their country. This is the reason why I analyse advantages and disadvantages of a revaluation for China in this paper.

Additionally, I decided to investigate the relationship between China's exchange rate policy and the US current account deficit to evaluate on an economic basis if the demand for renminbi revaluation by the United States is justified or not.

1.3 Aim

The aim of the thesis is to discuss a renminbi revaluation with regard to China as well as to the US current account deficit. For this purpose, advantages and disadvantages of a revaluation for China are discussed to answer the question if a revaluation is beneficial for China. The investigation of the US current account deficit is included to study the relationship between China's exchange rate policy and

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[1] See for example Financial Times online: Guha et al. (2006) and Grant (2006).

the historical US current account imbalance. Considering the importance of the United States and the US dollar for the global economy, the later part can also be interpreted as the question if a revaluation of the Chinese renminbi is in the interest of the international community.

As evidence is found that a revaluation of the renminbi might be advantageous for China, the research question is extended to investigate whether the renminbi revaluation should be initiated by a one-step appreciation or by more exchange rate flexibility.

1.4 Limitation

As mentioned above, this paper investigates the impacts of a renminbi revaluation on the US current account deficit. It might be furthermore interesting to study the effects of a revaluation on other countries than the United States to be able to carefully answer the question whether or not a revaluation of the Chinese renminbi is in the overall interest of the international community. For example may be analysed which consequences a renminbi revaluation can have on China's neighbour countries and East Asian trading partners as well as on the European Union. A thorough study of these effects is not included in this paper to limit the complexity of the thesis.

1.5 Methodology

Literature review method is used to answer the overall research question if a revaluation of the Chinese renminbi is beneficial for China and if it can contribute to correct the US current account deficit. Thus, the discussion of advantages and disadvantages of a revaluation is based on previous research in this area, both theoretical and empirical.

The research method in previous studies connected with the renminbi exchange rate is mixed and includes empirical methods as well as verbal discussions which are partly backed by secondary data or previous studies respectively[2]. Empirical methods are sometimes used when the research question is more narrowed. For example Shi (2006) applies an econometric approach to investigate if currency

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[2] All papers which are quoted here are also used in the following thesis in more detail and should therefore only be mentioned here.

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appreciations are contractionary in China[3]. In contrast, researchers that cover a wider problem do often not do empirical estimations themselves but form their discussion strategy on previous research. For instance Tung and Baker (2004) use previous research as a basis to argue that a renminbi revaluation is in China's own interest. Thereby they evaluate the consequences of a revaluation on the whole and not with regard to one specific economic variable.

Besides the distinction between broader or narrower formulated research questions, the chosen method also depends on the source of the paper. Many papers in this specific research area are published by organisations and institutions and often argue on a verbal discussion basis rather than with the help of an econometric-based model. One example for this may be the IMF Policy Discussion Paper by Prasad et al. (2005) which investigates costs and benefits of greater exchange rate flexibility in China as well as capital account liberalisation. Another example is the paper prepared by Bown et al. (2005) and published by the Federal Reserve Bank of Chicago. This paper analyses the relationship between the US trade deficit and China.

Thus, the chosen method of literature review is not out of the ordinary with regard to the specific research area and the literature used. Furthermore it seemed important to me to answer the overall research question by discussing and evaluating different arguments rather than concentrating on one specific argument and testing this empirically. To carefully analyse on the whole whether or not China should revalue its currency, you should consider as many variables as possible which influence the decision-making. Therefore, this thesis has tried to capture and to combine arguments from previous research which are mostly brought forward in this context.

A considerable part of the literature which is used in this thesis is published by organisations such as the International Monetary Fund and central banks, or by research institutes like CESifo. Other literature sources are macroeconomic textbooks and economic journals, for instance China Economic Review.

Basing a discussion on a considerable part of research published by organisations and institutions is sometimes argued as being at the expense of objectivity. This must of course not be the case but should be mentioned and kept in mind while reading the thesis. Nevertheless, institutional research is used as a literature source because of two reasons: Firstly, the renminbi question is treated widely by organisations and institutions and secondly because of availability of literature. It should be noted however, that the basic result, which states that a revaluation of the renminbi might be primarily

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[3] This study and the method used are described in more detail in chapter 3.1.

beneficial for China, is also obtained by non-institutional literature, for instance Tung and Baker (2004). Though, results seem not to be distorted by using mostly research done by organisations and institutions.

As proposed by various guides how to write a literature review[4], this paper is divided into three main parts: introduction, body and conclusion. The body of the literature review is the core of the following thesis and groups existing literature into four main parts, each part dealing with an individual issue. These four topics comprise:

    i)   Analysis of arguments against a revaluation of the renminbi

    ii)   Analysis of arguments for a revaluation of the renminbi

    iii)   The US current account deficit and the role of China

    iv)   Analysis of the choice to revalue the renminbi by the use of a one-step appreciation or more exchange rate flexibility

Each individual investigation is summarized to provide the reader with the most important results to be better able to follow the paper's decision-making.

Throughout the thesis, secondary data is used to illustrate developments of certain economic variables and to evaluate theoretical arguments. This secondary data is provided by various sources. Chinese data is mostly provided by the ECOWIN database as well as by the "People's Republic of China: 2006 Article IV Consultation – Staff Report" prepared by the International Monetary Fund. Data on Chinese non-performing loans is taken from the China Banking Regulatory Commission. Data for the United States is provided by the Federal Reserve System and the US Department of Commerce. The IMF World Economic Outlook Database for April 2007 is used to obtain data both for China and the United States.

For most Chinese economic variables data is given on an annual basis for the period 2001 to 2005 or 2006, if data has been available for 2006. Exemptions are the exchange rate as well as data on non-performing loans. The development of the exchange rate is shown on a monthly basis since 1994 to be in line with the time horizon which has been chosen to describe China's exchange rate policy. Non-performing loan data is given on a quarterly basis by the China Banking Regulatory Commission and

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[4] See for example University of Wisconsin-Madison: "Review of Literature"
(http://www.wisc.edu/writing/Handbook/ReviewofLiterature.html).

has only been available for the period 2004 till 2006. Data for the United States is given for different time periods which have been chosen according to availability and appropriateness.

1.6 Outline

In detail the paper is organised as follows. Chapter 2 starts with an overview of the Chinese exchange rate policy since 1994. Furthermore, basic concepts such as the balance of payments and different exchange rate notations are explicitly defined. This chapter is not part of the actual discussion but should provide the reader with background information to better understand the following discussion. Chapters 3 to 6 form the above mentioned base of the literature review. Thus, chapter 3 concentrates on arguments which might be brought forward against a revaluation and chapter 4 deals with arguments for a revaluation. After this, chapter 5 turns to the renminbi discussion on the international level and investigates China's role in the US current account deficit. Chapter 6 finally is based on the results obtained in the previous chapters and analyses whether the revaluation should be initiated by a one-step appreciation or by more exchange rate flexibility. Chapter 7 concludes.

2. The Renminbi Exchange Rate and China's External Position

2.1 China's Exchange Rate Policy Since 1994

On 1 January 1994 the People's Bank of China, the Chinese central bank, implemented a managed floating regime after operating a dual exchange rate system for several years (Shi, 2006, p. 8). Key elements of this new exchange rate system were the announcement of a reference rate of 8,7 yuan[5] per US dollar and the limitation of daily movements of the renminbi against the US dollar to 0,3% on both sides (Deutsche Bundesbank, 2005, p. 44 / Kanamori and Zhao, 2006, p. 7). The movements of the nominal renminbi exchange rate against the US dollar can be seen in figure 1 and should be analysed in the following chapter in more detail.

Figure 1: The nominal spot exchange rate of the Chinese renminbi against the US dollar (CNY/USD), 1994-2007
(data source: ECOWIN)
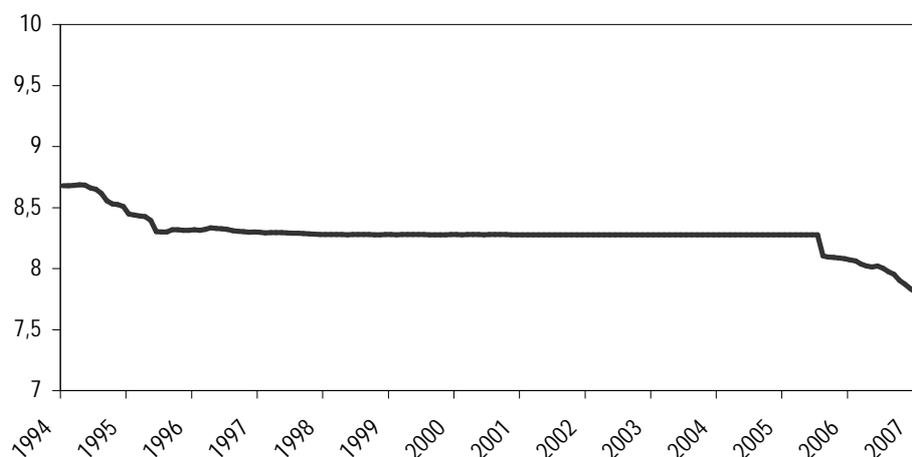
Since 1994 three main periods in the development of the renminbi exchange rate can be distinguished. During the first years of the managed floating regime, the renminbi appreciated modestly against the US dollar. This tendency stopped in the wake of the Asian financial crisis in 1997 when many of China's Asian trade partners were confronted with massive depreciations which gave rise to expectations that the renminbi might devalue as well. But instead of depreciating, China made a commitment to keep the renminbi stable at 8,28 yuan per US dollar (Kanamori/Zhao, 2006, p. 9).

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[5] Renminbi is the name of China's currency while yuan is the unit of currency. The use of "renminbi" and "yuan" is not clearly distinguished in the literature. In the following the term "renminbi" is used most of the time.

With this decision the managed floating regime became a de facto peg to the US dollar[6] (Shi, 2006, p. 8). The international community welcomed China's resolute commitment and celebrated it as an important contribution to achieve global economic and financial stability (Kanamori/Zhao, 2006, p. 9). Indeed, China's exchange rate policy during this time helped to limit competitive devaluations among Asian countries and helped them to come back to exchange rate stability (Shi, 2006, p. 8). Nevertheless this new reputation was not without costs for China. The massive depreciations in China's neighbouring countries and main trade partners led to deflationary pressure in China. As the exchange rate could not be used as an adjustment tool due to the firm commitment China had to find other solutions to deal with this pressure. One such measure was a huge expansion in government spending which was partly financed by the sale of government bonds and resulted in an increasing fiscal deficit (Kanamori/Zhao, 2006, p. 9). Besides this it can be concluded that China survived the Asian financial crisis relatively well in comparison to other countries[7].

During the following years the renminbi followed the movements of the US dollar against third currencies due to the de facto dollar peg. This included appreciation of the renminbi against the euro after 1999 and depreciation against the euro and other currencies in the course of the overall US dollar weakness from 2002 (Deutsche Bundesbank, 2005, p. 44).

Since 2003 the international focus has laid more and more on a possible revaluation of the renminbi and China was massively put under pressure namely by the United States (Eichengreen, 2005, p. 264). On 21 July 2005 China responded with an exchange rate reform and the third period of exchange rate movement began. First of all, the de facto dollar peg was abandoned and a managed floating regime with reference to a basket of currencies was introduced. Secondly, the renminbi exchange rate against the dollar was revalued by 2,1% to 8,11 yuan per US dollar. Daily allowed fluctuations depend on the currencies. While the daily fluctuation against the US dollar was set to ±0,3% as in 1994, the fluctuation band against the currency basket was set at ±1,5% and later widened to ±3% (Goldstein, 2005, p. 10).

Most parts of the international community welcomed China's reform but were nevertheless sceptical on the future development of the renminbi exchange rate (Rossi, 2005, p. 29). The managed floating system gave rise to more flexibility, for the renminbi exchange rate as well as for the Chinese

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[6] The literature states different dates when the managed floating regime became a de facto peg to the US dollar. While Shi (2006) sees this date in the course of the Asian financial crisis in 1997, many other researches write that the de facto peg was already implemented in mid 1995 (see for example Garton/Chang, 2006 and Deutsche Bundesbank, 2005).
[7] It is often argued that China's existing capital controls played an important role that China survived the Asian crisis so well. See for example Fernald and Babson (1999).

authorities. On the day of the exchange rate reform announcement China did not publish the composition and weights of the currency basket. One month later finally the People's Bank of China informed the international community on the currencies which form the basket, but the weights still remained unknown (Eichengreen, 2006, p. 1). This shows that the new managed floating regime is less transparent than the previously operated de facto dollar peg. The other question is the flexibility of the renminbi exchange rate which should be explained with the help of figure 2.

Figure 2: Determination of the renminbi exchange rate against the dollar
(see Kwan, 2005, p. 39 for a similar figure)
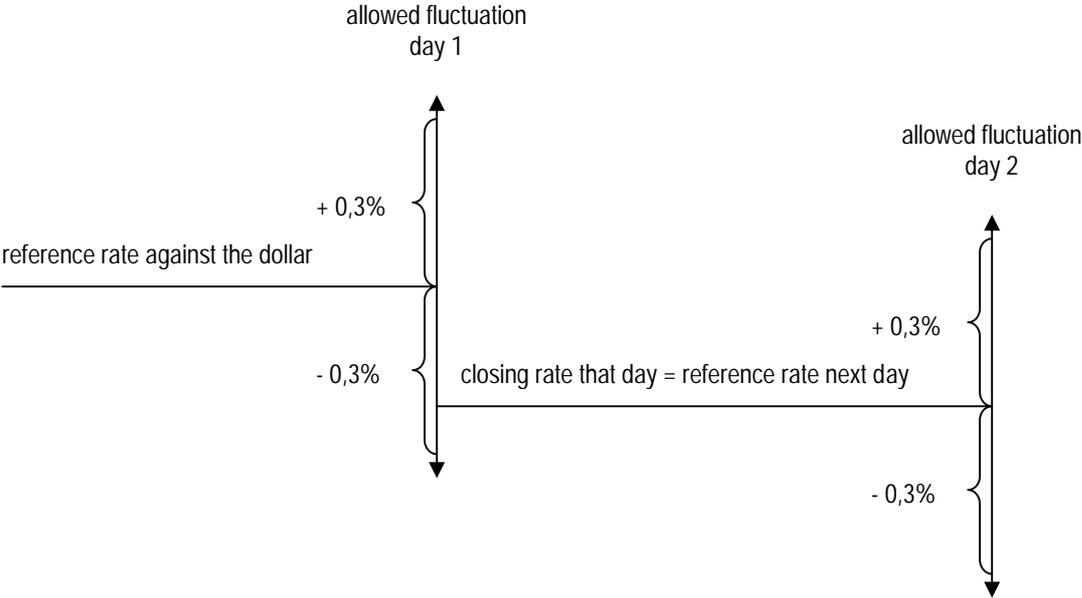
The concept of China's new managed floating regime works as follows: the reference rate for the coming working day is announced every day and based on the renminbi's closing price that means the reference rate can theoretically change every day by up till 0,3% and every week by up till 1,5%. Appreciation pressures could therefore easily have been eliminated if the exchange rate determination had been by market forces and without massive intervention (Kwan, 2005, p. 38). But having a look at the nominal exchange rate movements since then it can be doubted that this relative flexibility in the renminbi exchange rate was actually the case. So it can be concluded that the Chinese authorities still intervene a lot and that the renminbi exchange rate is less flexible than it can theoretically be. This conclusion can be supported by analysing the development of China's balance of payments which will be the focus in the next part.

2.2 China's Balance of Payments

According to the definition of the IMF the balance of payments summarizes all economic transactions of a country with the rest of the world which occurred during a specific time period (IMF, 1993, p. 6). The balance of payments consists of two major accounts: the current account and the capital and financial account.

A country's current account position is mainly determined by net merchandise trade, thus a current account surplus is generally caused by a trade balance surplus meaning that exports of goods were larger than imports of goods (IMF, 1993, p. 51 and p. 163). Figure 3 shows that China has been in a current account surplus situation for several years. Furthermore table 1 indicates that exports exceeded imports in China.

Figure 3: China's current account balance in billions of US dollar, 2001-2005
(Data source: IMF, 2006)
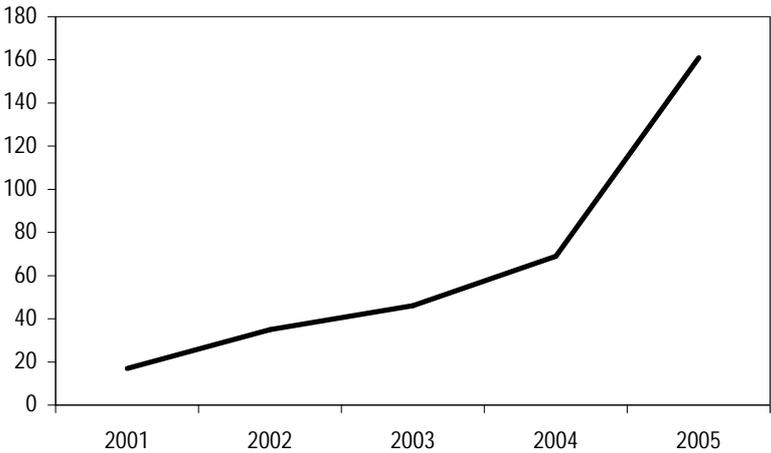
Table 1: Current account balance, exports and imports in China in billions of US dollar, 2001-2005
(Data source: IMF, 2006)

	2001	2002	2003	2004	2005
current account balance	17	35	46	69	161
exports	266	326	438	593	762
imports	232	281	394	534	628

The second component of the balance of payments is the capital and financial account with its two subdivisions capital account and financial account which record all changes connected with foreign ownership of domestic assets and domestic ownership of foreign assets. This includes for example foreign direct investment and portfolio investment. The net change between foreign ownership of

domestic assets and domestic ownership of foreign assets is the capital and financial account balance[8] (Jarchow and Rühmann, 2000, p. 9). Figure 4 points out that China has built an immense capital and financial account surplus during the last years. Until 2003 this was mainly driven by positive net direct investment inflows as can be seen in table 2. While net direct investment inflows have grown steadily during the last years, it was the portfolio investment balance which caused a rapid increase in the capital and financial account balance in 2003 and 2004 and a decrease in 2005. The sudden surplus in the portfolio investment balance might be motivated by speculation on renminbi appreciation (Garton and Chang, 2005, p. 95).

Figure 4: China's capital and financial account balance in billions of US dollars, 2001-2005
(data source: ECOWIN)
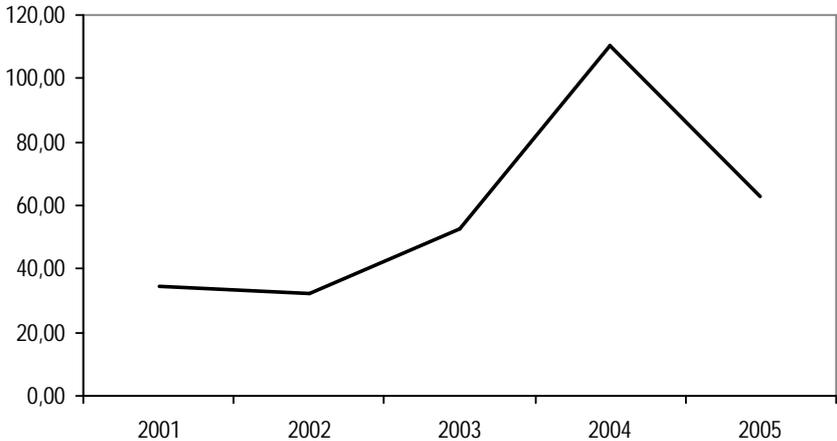
Table 2: Capital and financial account balance, direct investments inflows and
portfolio investment inflows in billions of US dollars, 2001-2005 (data source: ECOWIN)

	2001	2002	2003	2004	2005
capital and financial account balance	34,78	32,29	52,73	110,66	62,96
direct investment inflows (net)	37,36	46,79	47,23	53,13	67,82
portfolio investment inflows (net)	-19,41	-10,34	11,43	19,69	-4,93

Another important component of the balance of payments are reserve asset transactions by the monetary authority which are strictly spoken a part of the financial account but often mentioned separately (IMF, 2006, p. 31). Figure 5 shows the development of reserve assets[9] where foreign

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[8] According to the IMF's balance of payment manual reserve asset transactions by the monetary authority are captured by the financial account as well. Thus, the correct name for the balance of the capital and financial account excluding reserve asset transactions is "net capital and financial account". Nevertheless this position is often referred to as the capital and financial account balance and reserve asset transactions are recorded separately from the capital and financial account. As this method is widely used (see for example IMF, 2006, p. 31) this paper follows this method as well.

[9] It should be noticed that in the balance of payments an increase in reserve assets is indicated by "-".

exchange transactions have obviously played the dominant part. The foreign exchange reserve accumulation in figure 6 finally is the result of the annual increase in foreign exchange reserves.

Figure 5: Increase in reserve assets and foreign exchange in billions of US dollars, 2001-2005
(data source: ECOWIN)
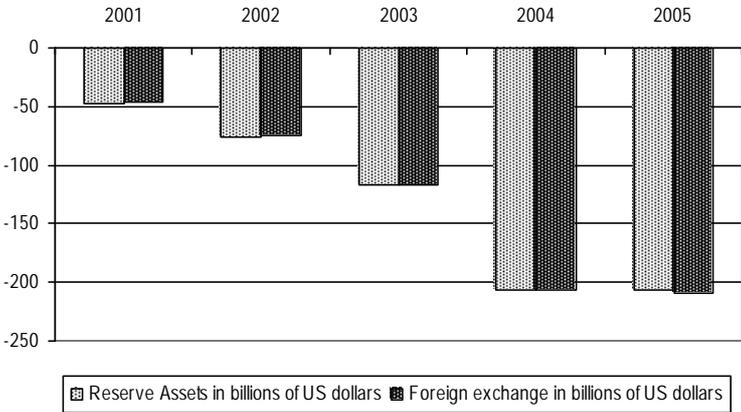
Figure 6: China's foreign exchange accumulation in billions of US dollars, 2001-2006
(data source: ECOWIN)
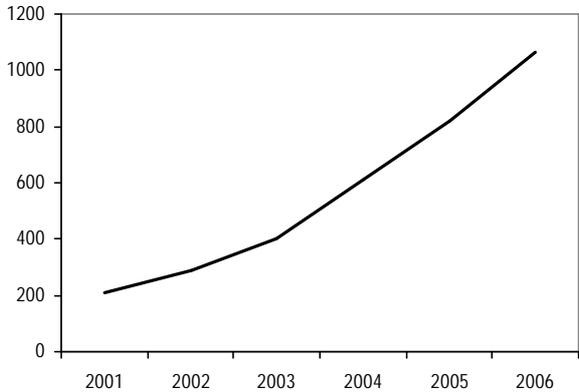
By now, China is the country in the world with the highest foreign exchange reserves (Green and Torgerson, 2007, p. 4).

The balance of payments identity is the important link in the balance of payments. Ignoring errors and omissions[10], the three other components must by definition sum up to zero[11]. The balance of payments identity[12] states that

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[10] Errors and omissions is a statistical account to ensure that the whole balance of payments is always balanced.
[11] The reason for this is the double-entry system of the balance of payments (IMF, 1993, p. 30).
[12] See Hallwood and MacDonald, 2000, p. 17.

current account balance + capital and financial account balance + change in reserve assets = 0

which is equivalent to

current account balance + capital and financial account balance = - change in reserve assets.

According to this identity the change in reserve assets is necessarily equal to the sum of current account and capital and financial account balance, thus the current account and the capital and financial account surpluses have been the driving forces behind China's incredible foreign exchange accumulation.

2.3 Exchange Rate Concepts

The discussion on the renminbi exchange rate and the demand for an appreciation usually focuses on the exchange rate in nominal terms and more precisely on the renminbi exchange rate against the US dollar (Garton/Chang, 2005, p. 2). But when regarding the question of undervaluation it is important to look at the real effective exchange rate (REER).

While the nominal exchange rate simply quotes how many domestic currency units have to be given for one foreign currency unit, the real exchange rate aims at the purchasing power and quotes how many units of domestic goods have to be given for one unit of foreign goods. So the real exchange rate offers some insight on international competitiveness (Willms, 1995, p. 26).

By regarding international trade and international competitiveness of a country in general it is often not sufficient just to regard the country's exchange rate with one other country. Rather one might be interested in the development of the domestic currency against all major trading partners. In this case it is worth considering the nominal effective exchange rate (NEER) which is a weighted-average exchange rate of the bilateral exchange rates between the country and its trading partners. The weights correspond to the importance of those countries in the domestic country's total trade. Similar to the difference between nominal and real exchange rates, the real effective exchange rate differs from the nominal effective exchange rate by adjusting for differences in relative prices. Both nominal and real effective exchange rates are usually quoted as indices. The real effective exchange rate is a good measure of a country's overall external competitiveness (Caspers, 2002, p. 72).

Figure 7: China's nominal and real effective exchange rate index, 1994-2006 (European Commission series)[13]
(data source: ECOWIN)
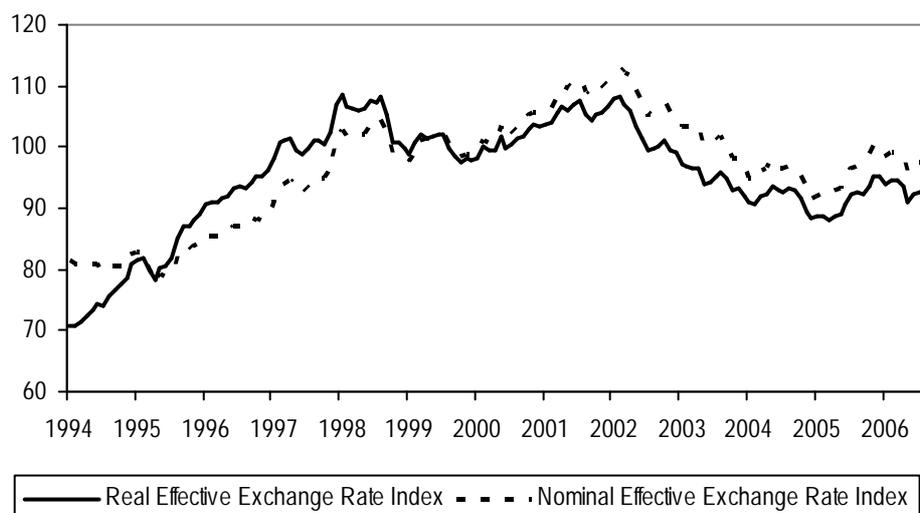
Figure 7 shows the development of China's nominal as well as real effective exchange rate index. The movements of China's nominal effective exchange rate were mainly determined by movements of the US dollar against the currencies of China's trading partners caused by the de facto dollar peg of the renminbi. Thus, the dollar appreciation in the 1990s lead to an appreciation of China's NEER and the dollar weakness after 2002 induced China's NEER to depreciate as well. Deviations between NEER and REER reflect inflation differences between China and its trading partners (Garton/Chang, 2005, p. 3).

The discussion on undervaluation is usually based on China's real effective exchange rate. One method to identify an undervalued exchange rate is the underlying balance approach. According to this approach the equilibrium exchange rate is the rate that generates a balance of payments equilibrium which is defined as a situation where the current account balance and the capital and financial account balance sum up to zero. According to the balance of payments identity there is no change in reserve assets in this situation. To consider outliers and year-to-year fluctuations calculations are usually based on averages by using data from recent past and weighting them appropriately (Goldstein, 2004, p. 4). The high exchange rate accumulation indicates that the current renminbi exchange rate cannot be the equilibrium one based on this approach. Indeed, to come to equilibrium the real effective exchange rate should appreciate (Goldstein, 2004, p. 10).

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[13] Note that an increase indicates an appreciation.

Real exchange rate appreciation can either be achieved by nominal exchange rate appreciation or by domestic price increases[14] (Frankel, 2005, p. 16). As large parts of the Chinese population, especially in rural areas, are still very poor, an increase in prices cannot be in China's interest because this would reduce the purchasing power of the Chinese and may threaten social stability (Goldstein, 2004, p. 31). Thus, real exchange rate appreciation should be obtained by a nominal appreciation. As mentioned before, due to the strong link to the US dollar, the Chinese renminbi follows dollar movements against third currencies. Therefore, the starting point for a renminbi exchange rate modification is the bilateral renminbi-dollar exchange rate.

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[14] For simplicity regard the bilateral real exchange rate between China and the United States. The real exchange rate is

defined as $e_{real} = \dfrac{e_{nom} \cdot p^{US}}{p^{C}} = \dfrac{\dfrac{yuan}{US\$} \cdot \dfrac{US\$}{q^{US}}}{\dfrac{yuan}{q^{C}}} = \dfrac{q_C}{q_{US}}$, where e_{nom} is the nominal exchange rate and q is the quantity of US or

Chinese (C) products (Willms, 1995, p. 26). Real appreciation (indicated by a decrease in e_{real}) can be achieved by nominal appreciation (indicated by a decrease in e_{nom}) or by an increase in Chinese prices (indicated by a rise in p^C).

3. Arguments against a Revaluation of the Chinese Renminbi

Although many researchers found that the renminbi is undervalued, the Chinese authorities seem to fear an appreciating renminbi or a more flexible exchange rate. This can be argued because of several reasons. First, the revaluation of 2,1% in 2005 seems small in comparison to estimations by how much the renminbi is actually undervalued. Second, the development of the renminbi against the dollar after the exchange rate reform in 2005 arouses suspicion that the Chinese authorities intervene heavily in the foreign exchange market to maintain the renminbi relatively stable. This suspicion can be supported by the growing foreign exchange reserves hold by the People's Bank of China.

The following chapter tries to investigate some drawbacks which might be connected with an appreciating renminbi and which seem to be feared by Chinese authorities.

3.1 Impact of an Appreciation on China's Growth and Employment

One often cited reason for keeping a relatively weak renminbi is the fear of contractionary effects which may be caused by a currency appreciation. According to traditional macroeconomic models an appreciation of the Chinese renminbi makes Chinese products relatively more expensive for foreigners and foreign products become relatively cheaper for Chinese. Thus, exports decrease and imports increase[15] (Jarchow and Rühmann, 2000, p. 45). Both export decrease and import increase lead to a reduction in the current account balance. The difference between exports and imports is one component of aggregate demand and therefore influences GDP (Jarchow and Rühmann, 2000, p. 19). If this difference decreases or even becomes negative, the growth of the economy can suffer as long as no other policy measures are taken to boost GDP.

In addition, a renminbi revaluation can have negative effects on the labour market as the export-oriented sector is an important employer in China. Furthermore many Chinese export products are labour-intensive. Because of these reasons a decrease in exports is seen even more threatening (Liao, 2004). Providing employment for China's population is one of the big challenges the country faces. First, natural population increase and the migration from rural to urban regions result in an increasing urban

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[15] Assuming normal supply and demand curves (Jarchow and Rühmann, 2000, p. 44).

labour supply. Second, the restructuring process of state-owned companies has been accompanied by a massive job loss in urban areas. Official figures indicate an urban unemployment rate of around 4% but independent estimates suggest the unemployment rate to be almost three times the official rate. Both official figures and independent estimates only measure urban unemployment rate, so rural unemployment is not even considered (Bergsten et al, 2006, p. 32). All in all, providing employment seems difficult enough with the support of the export industry. Thus, a drop in exports as a consequence of a renminbi revaluation is seen as a threat of social stability (Liao, 2004).

In contrast to the traditional macroeconomic models and the previous argumentation, another theoretical direction states that revaluations are likely to have an expansionary rather than a contractionary effect. This is called the contractionary devaluations literature[16] (Shi, 2006, pp. 5). In this context China's import structure comes to the fore. A considerable part of China's imports are raw materials and intermediate goods. In the course of a currency appreciation the domestic prices of those imports would become cheaper which would lower the production costs of all goods using imported input factors. On the one hand, this can at least partly offset the negative effect of an appreciation on export prices when cheaper imports are used in the production for exports goods. On the other hand, imports are also used for domestic consumption or for the production of domestic goods respectively[17]. Thus, a revaluation of the renminbi would increase the purchasing power of Chinese consumers (Tung and Baker, 2004, p. 333) and lead to higher output and employment (Shi, 2006, p. 6).

To sum up, economic theory does not give some simple answer to the question what happens when a country's currency is revalued. Therefore, it is appropriate to add some empirical results to the theoretical discussion. By using an econometric-based model, Shi (2006) finds that real appreciation of the renminbi has had contractionary effects on GDP during the past decade. Thus, these econometric results seem to be in line with the traditional macroeconomic models.

Shi adopts a VAR model technique to investigate the relationship between China's real effective exchange rate and real GDP. The researcher estimates a basic VAR model including four variables: China's GDP, the renminbi real effective exchange rate (REER), China's inflation rate as the intermediate variable between GDP and REER, and foreign gross domestic product to consider external shocks. Later, this basic model is extended by government spending, money supply and US real interest rates. Shi uses quarterly data for a period of almost 15 years (1991q1-2005q3). Data sources

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[16] See Shi (2006) for a more detailed description of the contractionary devaluations literature.
[17] Indeed, half of all imports are for domestic use (Garton and Chang, 2005).

include the International Financial Statistics Database of the International Monetary Fund, the IMF World Economic Outlook Database 2006 and various Chinese data sources: the State Statistics Bureau, the People's Bank of China, China Ministry of Finance and General customs of China.

Shi follows the familiar procedure to investigate the long-run relationship between the real effective exchange rate and GDP. After having tested for stationarity by using the augmented Dickey-Fuller test (ADF) as well as the Phillips-Perron test, the Johansen cointegration technique is applied. Then impulse response functions are used and show that a real effective exchange rate shock has a negative impact on China's GDP. This result is confirmed after having considered other variables to avoid spurious regression and by estimating a vector error correction model.

In contrast to these empirical results which confirm traditional macroeconomic models, Goldstein (2004) sees no massive deterioration of growth performance caused by a renminbi revaluation. On the one hand he argues that China's real effective exchange rate has experienced several appreciation phases during the last decade and economic growth has never slowed down to under 7,5%[18]. On the other hand he points out, that Chinese authorities have various policy instruments beside the exchange rate to promote aggregate demand and thus GDP (Goldstein, 2004, p. 37). Indeed, the focus should lay on boosting domestic demand instead of relying on exports.

This strategy has also been recognized by Chinese authorities but may be more complicated for China than for other countries. As direct taxes on household income are already relatively low and investment-based government expenditures already relatively high, the tax-cutting instrument to promote personal consumption and an increase in government spending may have only modest effects on domestic demand (Bergsten et al, 2006, pp. 27). A possibility to boost domestic demand in the long run is to decrease the savings rate of Chinese households which has always been on a high level but increased to almost 25% of disposable income during the last years (Kuijs, 2005, p. 8). The most important incentives for saving are missing basic health insurance and retirement provisions as well as financing of education. Therefore an increase in government expenditure on health, pensions and education can lead to a decrease in households' saving rates and rise domestic consumption in the long run. However, in the short run government consumption expenditures are needed as well to substitute the current export-led growth for a more consumption-driven growth path (Bergsten et al, 2006, pp. 27).

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[18] In this context it is worth mentioning that many researchers asses China's current growth rates of around 10% as unsustainable (see for example Lardy, 2005). According to Goldstein, the sustainable growth rate "is clearly less than that" (Goldstein, 2004, p. 37). This might explain why Goldstein does not regard some contractionary effects as threat.

To conclude, even the IMF admits that there might be adverse effects on exports and employment in export-driven industries caused by an exchange rate appreciation but the above mentioned measures can be used to manage those effects (IMF, 2006, p. 18). All in all, the fear of contractionary effects caused by a renminbi revaluation seems to be overestimated and does not hold as an argument against greater exchange rate flexibility.

3.2 Weaknesses in China's Financial System

A second argument against a revaluation of the renminbi is based on existing weaknesses in China's financial system. It is argued that the Chinese banking system is confronted with a massive problem in non-performing loans. Furthermore the risk management in the banking sector is not very sophisticated and needs further improvement. To sum up, according to revaluation opponents the banking system is not yet prepared to deal with more exchange rate flexibility. The concern is that a renminbi appreciation may lead to large capital inflows in the form of hot money in expectation that the renminbi will appreciate further. The capital inflow will cause China's foreign exchange reserves to rise and it could be impossible for China to fully sterilize this foreign exchange inflow. This in turn increases bank lending and the risk for inflation[19] (Liao, 2004).

Indeed, the weaknesses and problems of the Chinese banking system are well known in the relevant literature and according to the IMF the Chinese banking system needs further improvement (IMF, 2006). But regarding capital inflows in the form of hot money as a key determinant of increasing foreign exchange reserves and thus as the source of problems does not seem to hold.

On the one hand, it has been argued in chapter 2 that the sudden surplus in the portfolio investment balance in 2004 might be motivated by speculation on renminbi appreciation (Garton and Chang, 2005, p. 95). Nevertheless even this surplus of 19,69 billion US dollar accounted for less than 10% of the increase in international reserves in that year. Thus, the accumulation of foreign exchange reserves was primarily driven by the current account surplus and foreign direct investment inflows and not by hot money[20].

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[19] See chapter 4.2 for a more detailed definition and analysis of sterilization, its consequences and its link to bank lending.
[20] See IMF (2006), p. 31.

Secondly, portfolio investment flows are officially restricted in China (BIS, 2005, pp. 2). Even if those capital controls do not fully work as can be assumed by the portfolio investment position in the capital and financial account they can nevertheless prevent that hot money inflows become too large. All in all, bringing forward the argument of speculative capital inflows to prevent a renminbi revaluation does not seem to convince. Indeed, for the majority of economists the above mentioned problems of foreign exchange accumulation and banking sector weaknesses are rather a confirmation that a renminbi revaluation is required[21].

Another drawback of renminbi revaluation for the banking system might be connected with foreign exchange risk. The problem of foreign exchange risk is usually known in countries where a considerable part of banks' liabilities is denominated in foreign currencies and the domestic currency suddenly depreciates (Prasad et al., 2005, p. 7). Assuming those positions were not adequately hedged, banks may suffer from enormous losses. Indeed, many banking crises in emerging markets were triggered because of this (Mishkin, 1996, p. 23).

For China, the argument has to be reversed. As the renminbi is supposed to appreciate rather than depreciate, banks' balance sheets may deteriorate if a considerable part of banks' assets is denominated in foreign currencies and not adequately hedged[22] (Prasad et al., 2005, pp. 8). Indeed, the net foreign assets position in China's banking sector has increased considerably during the last years (IMF, 2006, p. 34). Nevertheless banks' net foreign assets have always been lower than 5% of broad money (M2)[23]. Also the IMF states that the foreign exchange exposure of the banking system and its clients is limited and there are instruments to hedge foreign exchange risk (IMF, 2006, p. 18). Thus, the fear of deteriorating balance sheets in the banking system cannot be accepted as a main argument against renminbi revaluation.

3.3 Impact of an Appreciation on Foreign Direct Investment

During the last years China has attracted considerable and increasing amounts of foreign direct investment (FDI) as can be seen from figure 8.

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[21] See for example Kaplan (2006, p. 1186) and Goldstein (2004, pp. 23) and chapter 4 for a more detailed discussion.
[22] A problem may also arise if not the bank itself is unhedged against foreign exchange risk but the banks' clients so that an appreciation and the following decrease in asset value leads to a credit default of the banks' customers (IMF, 2006, p.18).
[23] Data: Prasad et al. (2005) and own calculations.

Figure 8: Net foreign direct investment inflows in billions of US dollars, 2001-2005
(data source: IMF, 2006)
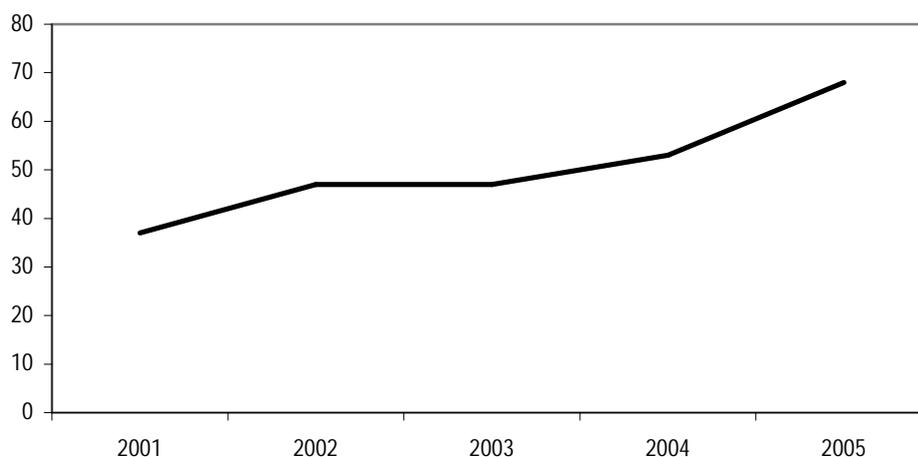
It is argued that low manufacturing costs in China and the huge domestic market potential are fundamental reasons for attracting FDI which is an important factor for boosting the Chinese economy (Liao, 2004). Indeed, Yao finds that FDI has had a strong and positive effect on economic growth (Yao, 2006, p. 339). Revaluation opponents now fear that an appreciation of the currency and the following decrease in exports would be harmful for FDI inflows as a substantial part of FDI inflows came from international corporations which produce export products in China (Liao, 2004).

To evaluate this argument you first have to distinguish between market-oriented and export-oriented FDI. While market-oriented FDI is attracted by the size and growth of the country itself, export-oriented FDI wants to use cost advantages to make exports more competitive. According to previous studies China attracts market-oriented as well as export-oriented FDI (OECD, 2000, p. 11). Thus, the export industry is by far not the only source of FDI attraction. In addition to the size and development of the domestic market also the regulatory environment, political and macroeconomic stability and investment protection are important determinants of FDI (OECD, 2000, pp. 11). Therefore it is assumed that exchange rate appreciation is not likely to result in a negative effect on FDI (Prasad et al, 2005, p. 10). In contrast, Mercereau (2005) finds that a real exchange rate appreciation rather increases FDI flows than cutting them (Mercereau, 2005, p. 12).

3.4 Conclusions on Arguments against a Renminbi Revaluation

After having analysed three major concerns which are often associated with a revaluation of the Chinese renminbi, no clear economic evidence can be found that justify the enormous intervention activity of the People's Bank of China to keep the renminbi relatively stable.

The most convincing of the above mentioned three concerns seems to be the effects on growth and employment due to a decline in exports. But as already noted, Chinese authorities have the possibility to absorb this negative shock by various policy measures. Indeed, the IMF states that there are more appropriate policy instruments to deal with negative short-term effects of a renminbi revaluation than avoiding more exchange rate flexibility (IMF, 2006, p. 28).

4. Is a Revaluation of the Renminbi in China's Interest?

4.1 Consequences of Foreign Exchange Accumulation: Return and Opportunity Costs

As already mentioned several times throughout this paper China has accumulated a huge amount of foreign exchange reserves. According to the latest figures China's foreign exchange position rose by 135,7 billion US dollar to 1202 billion US dollar in the first quarter of 2007 and it is assumed to rise even further at this rapid pace (McGregor, 2007).

In general holding a certain stock of foreign exchange reserves is not negative for a country. In contrast, foreign exchange reserves can help to protect against currency crises and reduce volatility in nominal exchange rates by using them for intervention, but moving to an always higher level of foreign exchange reserves can create drawbacks as well. In economic terms one might say that after having reached a certain level of foreign exchange reserves marginal costs of accumulating one further unit will exceed marginal return (Green and Torgerson, 2007, p. 7).

It is almost impossible to determine the exact optimal level of reserves[24] but nevertheless Chinese foreign exchange reserves seem to have reached a dimension far beyond the optimal level (Garton and Chang, 2005, pp. 102 / Green and Torgerson, 2007, pp. 4). Two drawbacks of holding excess foreign exchange reserves should be explained here. While the first drawback considers the return of foreign exchange reserves, the second deals with foregone domestic investment and opportunity costs. A third problem with accumulating excess foreign exchange reserves is connected with monetary policy and is dealt with in the next part.

The return of a position, for example a bond, denominated in a foreign currency consists of two parts. On the one hand you get the stated interest rate on this security. On the other hand the development of the nominal exchange rate determines if you make gains or losses because interest and principal payments denominated in the foreign currency have to be converted into the domestic currency. So both, interest rates as well as changes in nominal exchange rates determine the overall profit of a foreign investment (Saunders and Cornett, 2006, p. 424).

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[24] Although it may be very difficult to determine the exact optimal level of foreign exchange reserves, there are various approaches to define specific benchmarks for foreign exchange adequacy, for example the "reserves to GDP"-ratio or the "reserves to short-term external debt"-ratio. See Green and Torgerson (2007) for a more detailed description.

For China it is almost impossible to calculate the overall return of its exchange rate reserves. First of all, according to the Bank of International Settlement (BIS) the currency composition of China's foreign exchange reserves is not known (Woolridge, 2006, p. 30 and 40). Nevertheless it can be assumed that China holds a significant amount of foreign exchange reserves in US dollar and mainly in US-Treasury securities (Frankel, 2005, p. 17).

But even with this assumption reliable estimations are difficult because the maturity decomposition of China's foreign exchange reserves is unknown as well (Goldstein, 2004, p. 27). Regarding the fact that the US term structure of interest rates has been significantly upward-sloping during the last years[25], knowing the maturity composition is essential to calculate the return on China's dollar-denominated foreign exchange reserves. Nevertheless US Treasury securities generally pay relatively low returns because of high market liquidity and apparently no default risk (Frankel, 2005, p. 17).

Besides the relatively low stated return on the dollar fraction of China's foreign exchange reserves, the other problem is the future development of the renminbi exchange rate against the US dollar. If the dollar depreciated relative to the renminbi in the future, the return on dollar-denominated assets converted in Chinese currency would decrease. In light of the massive undervaluation of the Chinese renminbi this future development is more than likely (Frankel, 2005, p. 17).

Furthermore the People's Bank of China is confronted with a massive balance sheet risk as dollar-denominated foreign exchange reserves would lose their value in domestic terms in case of an appreciation of the renminbi relative to the US dollar (Green and Torgerson, 2007, p. 9). According to estimations a 10% appreciation of the renminbi against the dollar leads to a currency loss equivalent to 3% of GDP assuming that 80% of foreign exchange reserves are dollar-denominated. The situation worsens the longer the Chinese central bank continues to accumulate foreign exchange reserves (Garton and Chang, 2005, p. 102). Under the same assumption a 10% appreciation today leads to a currency loss equivalent to 3,6% of GDP[26]. This simplified example demonstrates that the further accumulation of foreign exchange reserves increases the central bank's risk of significant losses.

The second drawback of holding excess foreign exchange reserves are foregone domestic investment and opportunity costs. Foreign exchange reserves are a part of the central bank's assets. Thus, China

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[25] See Economics Department of the Ohio University (http://www.econ.ohio-state.edu/jhm/ts/ts.html#arch).
[26] Using latest available data of 2006: Foreign exchange reserves accounted for 40,5% of GDP in 2006. Assuming that 80% are dollar-denominated, the loss caused by a 10% appreciation would be 0,45*0,8*0,1=0,036.

has lent money to foreign countries, for instance to the USA. Indeed, China is a net-creditor nation. At the end of 2005 the People's Bank of China held net foreign assets equivalent to more than one third of GDP (IMF, 2006, p. 31 and 35). But this position narrows resources which are available for domestic investment, for example to boost domestic demand and to support economic development in rural areas (Kaplan, 2006, p. 1188).

4.2 Foreign Exchange Accumulation, Sterilization and Monetary Base

Foreign exchange accumulation threatens the central bank's control over the monetary base, at least in the long run. This should be explained by introducing a simplified central bank balance sheet.

Figure 9: A simplified central bank balance sheet (IMF, 2006, p. 35 / Jarchow, 2003, pp. 101)

assets	Central Bank Balance Sheet	liabilities
net foreign assets		currency in circulation
net domestic assets		deposits of commercial banks
monetary base		monetary base

According to the balance sheet, an increase in foreign exchange reserves results in an increase in the monetary base in equal measure which in turn raises the money supply (Jarchow and Rühmann, 2000, p. 154) and can lead to inflation (Caspers, 2002, p. 255). Therefore the central bank might wish to counteract the increasing effect on the monetary base and can do so by using open market transactions (Goldstein, 2004, p. 25). This is called sterilization policy. More precisely, sterilization policy means that the People's Bank of China sells renminbi-denominated bonds to domestic banks in exchange for banks' deposits held by the monetary authority. These open market transactions increase the central bank's domestic liabilities and thus reduce the net domestic assets position on the left-hand side of the balance sheet. As a conclusion the increase in the monetary base by purchasing foreign exchange reserves can be fully offset by decreasing the domestic component of the monetary base (Jarchow and Rühmann, 2000, p. 154).

While solving the inflation problem with sterilization policy in the short run at least two other problems may arise. First, sterilization policy does not bring a country back to balance of payments equilibrium but rather prolongs external imbalances. Therefore sterilization policy is no solution for China's actual problem (Frankel, 2005, p. 18). Another problem might be sterilization costs. The sterilization process is only successful if the central bank finds enough purchasers for the renminbi-denominated bonds. The People's Bank of China can make those bonds more attractive by offering a relatively high interest rate. But in this case there might be the danger that the central bank has to pay a higher return on the sterilization bonds than it earns on the foreign exchange reserves and the result is running a deficit (Frankel, 2005, p. 18).

The calculation of China's exact overall sterilisation costs is almost impossible as the relevant information to calculate the return on the foreign exchange reserves is not known[27]. As interest rates on central bank bills, the main sterilization instrument, are still relatively low, it is generally argued that sterilisation costs have not become a problem for China so far (Prasad et al., p. 12). But it is questionable if these low interest rates are healthy for the banking system because banks could use their funds for other investment projects instead of buying central bank bills.

This arouses suspicion that government involvement in the Chinese banking system is still very present. On the one hand this complicates the estimation of reliable and true sterilisation bond costs because in China's case they consist not only of the stated interest rate on central bank bills but also of the banks' opportunity costs over foregone alternative investments (Goldstein, 2004, pp. 28). On the other hand, continuative government involvement in the banking sector disagrees with the intention that banks should work to a greater extent on a commercial basis (IMF, 2006, pp. 18 and 22).

China seems to divide the burden of accumulating foreign exchange reserves. While researchers estimate that the Chinese central bank sterilizes a considerable part of foreign exchange inflows (Ouyang and Rajan, 2005, p. 20) an increase in the monetary base can be noticed as well.

Figure 10 gives an illustrative explanation how the Chinese central bank manages the foreign exchange inflow. On the one hand, the domestic component of the monetary base has been reduced significantly during the last years while net foreign assets have, indicating that the People's Bank of China has been very actively used the sterilization instrument. On the other hand, the monetary base has increased. Thus, foreign exchange inflows have not been completely offset by open market transactions.

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[27] See chapter 4.1 for this discussion.

Figure 10: The development of China's monetary base and its components, 2000-2005
(data source: IMF, 2006)
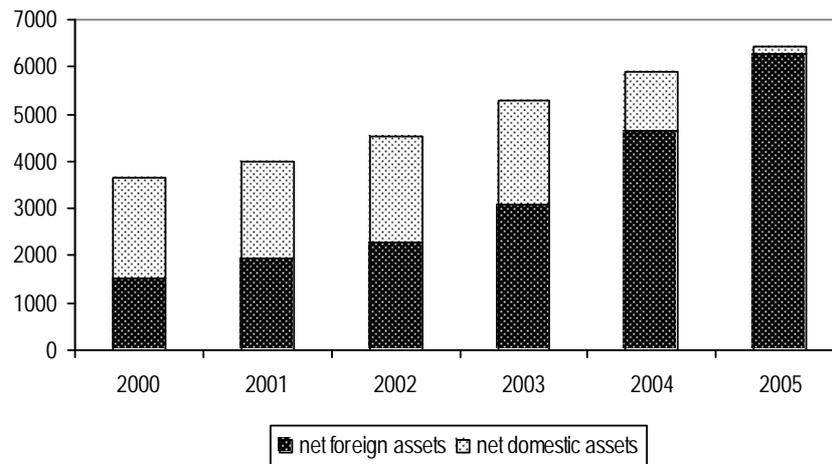
To summarize, sterilisation policy is connected with problems. Indeed, holding the monetary base on a permanent lower level by using the sterilization instrument is no stable equilibrium in classic macroeconomic models. Sooner or later the People's Bank of China will probably not be able to successfully counteract foreign exchange inflows and will lose control over the monetary base (Jarchow and Rühmann, 2000, p. 163). The following increase in inflation reduces the purchasing power of the Chinese and can threaten social stability (Goldstein, 2004, p. 31).

4.3 China's Banking System and Credit Policy

Experience from previous financial crises in the 1980s and 1990s has shown that there is a strong empirical link between rapid credit growth in the banking sector and financial crises. One explanation for this link stressed by Gavin and Hausmann (1996) focuses on the relationship between lending booms and the accumulation of non-performing loans in the banking sector (Gavin and Hausmann, 1996, p. 13).

The idea behind this argument is that there is a shock to the supply of loanable funds meaning that the banks suddenly have more funds at their disposal which they can use for additional credit. During those times of lending booms it might be difficult for banks to distinguish between good and bad borrowers. This has several reasons.

First the additional funds are not only lent to known customers but will also attract new customers. By definition the bank has little information on them. If more and more loans are granted to new borrowers the risk increases that some of them are not creditworthy and thus the risk of the overall loan portfolio increases (Gavin and Hausmann, 1996, p. 14). This is especially the case in countries where credit risk management is poor and a good credit allocation process not fully developed as it is still the case in China. Furthermore the Chinese banking regulation is still under development and improvement (IMF, 2006, pp. 21).

Secondly, poor borrowers might have it easier to find a lender during times of a huge supply of loans because they can directly look for one among the high numbers of lenders who does not demand such strict lending rules.

To conclude the rapid expansion of bank balance sheets during a lending boom is likely to generate a deterioration of the banks' balance sheets over time. Unfortunately the consequences of rapid credit growth can mostly not be observed immediately but will be visible later in the development of non-performing loans (Gavin and Hausmann, 1996, pp. 14).

After having explained the link between lending booms and the deterioration of banks' balance sheets, the question arises what the shock to the loanable funds supply causes. In the Chinese case the increase in the supply of funds available to banks can be initiated by foreign exchange inflow. When Chinese banks get foreign exchange they can sell it to the central bank in exchange for an increase in their deposits held at the monetary authority. If their deposits exceed the minimum reserve requirement the banks can withdraw the surplus funds and use them to grant loans (Goldstein, 2004, p. 25). Indeed, this process is an important function of the banking system. Banks have the ability to create money and thus allow the money supply in the economy to be considerably larger than the monetary base at the central bank (Jarchow, 2003, p. 85).

Figure 11 shows that broad money (M2) as well as lending has increased considerably during the last years. Both growth rates could temporarily been decreased in 2004 which was the result of extensive measures taken by the central bank to reduce liquidity in the banking sector (IMF, 2005, p. 8). Nevertheless, broad money growth has again increased notably since 2005 and credit growth has risen since 2006.

Figure 11: Broad money (M2) growth and credit growth in China, 2002-2006 (taken from IMF, 2006, p. 10)
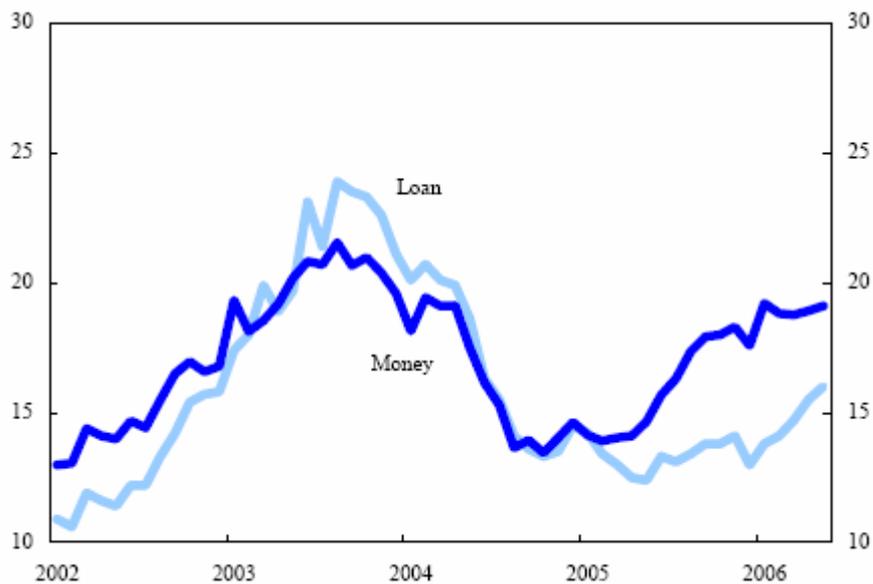
Obviously the accumulation of foreign exchange reserves and their imperfect sterilisation leaves substantial liquidity in the banking system (IMF, 2006, p. 10).

To reduce this liquidity the central bank can increase the reserve requirement which means that banks must hold a larger part of their account as a reserve at the central bank and thus have fewer funds to use for credit creation. Indeed, this policy tool has been used by the Chinese central bank several times during the last years. Only in 2007 the Chinese central bank increased reserve requirements three times up to now 10,5% (Chinese Economic Review, 2007).

Nevertheless researchers argue that it might be difficult to manage the increasing foreign exchange accumulation and its effects on the banking sector's liquidity without adjusting the exchange rate (Goldstein, 2004, p. 30).

In contrast to worrying developments of money and credit growth, the Chinese non-performing loan (NPL) problem presented in figure 12 seems to have been improved. Within two years the non-performing loan ratio could be halved. According to the IMF the restructuring of China's banking sector and the further development of banking supervision attributed to this improvement. Nevertheless the IMF stresses in its latest report that progress in banking supervision still has to be made to prevent that those figures rise again especially because of the rapid growth of loans (IMF, 2006, pp. 23 and 27).

Figure 12: Non-performing loan ratio of China's four state-owned commercial banks[28], 2004-2006
(data source: China Banking Regulatory Commission)
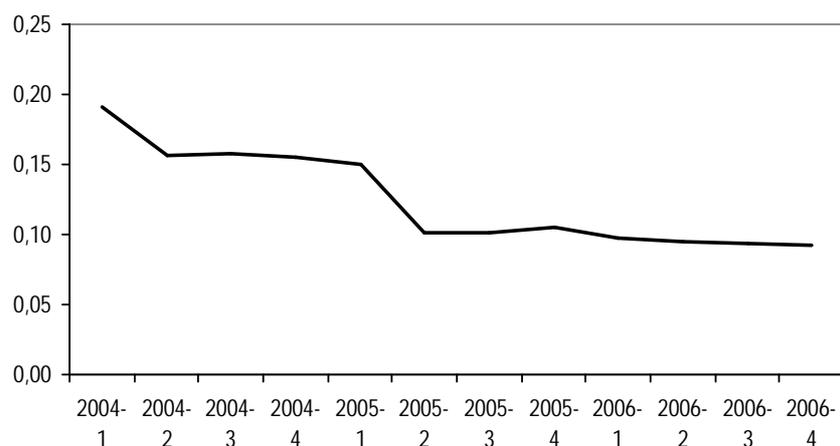
4.4 Conclusions on China's Interest in Revaluing the Renminbi

Lynchpin of the previous discussion has been the accumulation of foreign exchange reserves. Most researchers agree that China's reserve position has reached dimensions far beyond appropriate levels (Garton and Chang, 2005, pp. 102 / Green and Torgerson, 2007, pp. 4) and the discussion has shown that excess foreign exchange reserves likely turn out to be a burden rather than a blessing for China.

In the case of a renminbi appreciation against the US dollar, the Chinese central bank is confronted with massive currency losses and the overall return on dollar-denominated positions decreases. As these negative outcomes worsen the longer the Chinese central bank intervenes in the foreign exchange market and the more foreign exchange reserves are accumulated, the renminbi should increase in value rather sooner than later. Furthermore the ability to sterilise foreign capital inflows is limited and can threaten the successful implementation of the banking reform. Finally, the incomplete sterilisation of foreign exchange inflows leaves considerable liquidity in the banking system which put risk on the banking reform as well.

All in all based on the arguments presented above, Chinese authorities are better off to allow their currency to appreciate. This would reduce the need to intervene which in turn slows down the accumulation of foreign exchange reserves and its consequences.

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[28] The non-performing loan ratio is defined as non-performing loans as a share of total loans. The four state-owned commercial banks (SOCBs) comprise the Bank of China, the Industrial and Commercial Bank of China, the China Construction Bank and the Agricultural Bank of China.

# 5. The US Current Account Deficit and the Role of China

During the last years the increasing global imbalances have gained more and more attention by economists as well as politicians. Most prominent topics in this discussion are the historical US current account deficit and as the counterpart the East Asian surplus countries including China[29].

The following chapter tries to investigate China's position in this imbalance situation and to answer the question in what way a revaluation of the Chinese renminbi can contribute to a reduction in the US current account deficit to improve the US external position. Considering the importance of the United States and the US dollar for the global economy, this chapter can also be interpreted as the question if a revaluation of the Chinese renminbi is in the interest of the international community (Goldstein, 2004, p. 40).

5.1 Current Situation and Link to Macroeconomic Conditions

Figure 13 shows the development of the Chinese and the US current account balance as a share of GDP. The United States have been a deficit country for many years but during the last decade the US current account deficit has moved to dimensions far beyond historical levels[30]. Additionally, the imbalances have become more distinctive as the US and the Chinese current account position have increasingly diverged. As mentioned in chapter 2, the trade in goods typically covers the largest part of a country's current account, thus the US deficit is mainly determined by a deficit in the trade balance[31].

Figure 13: Current account balance as a share of GDP for China and the United States, 1994-2005
(data source: IMF World Economic Outlook Database)
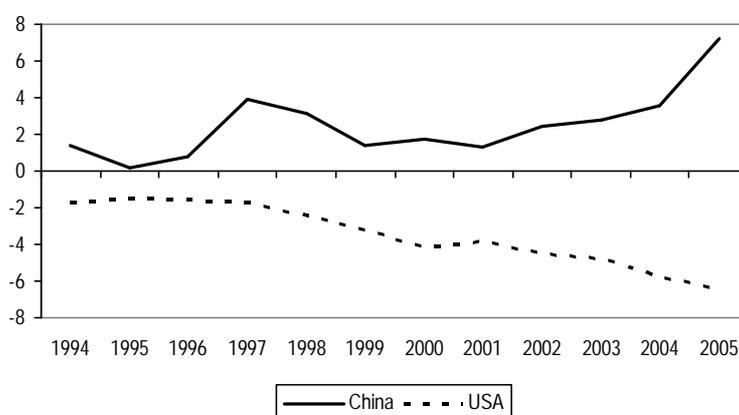
[29] See chapter 2 again for a more detailed description of China's position.
[30] See IMF, World Economic Outlook Database for April 2007.
[31] See also Garton and Chang, (2005), p. 103.

Many US politicians blame China for causing the immense US trade deficit. They demand an appreciation of the renminbi and threaten with stricter customs regulations to stop the flooding of the US market with Chinese products[32]. Some even argue that the artificially low renminbi has contributed to job losses in some US manufacturing industries (Kanamori and Zhao, 2006, p. 18).

By bringing forward the argument that the bilateral trade deficit with China is the reason for the overall trade deficit, it is implicitly assumed that a decrease in the deficit with China decreases the overall deficit as well (Bown et al., 2005, p. 3). Indeed, the bilateral US-trade imbalance with China is immense. Figure 14 shows the development of the overall US merchandise trade deficit as well as the development of the Chinese share in this position. As can be seen the Chinese contribution has always been considerable but while China's share counted for less than 20% in 1994, it exceeded 28% in 2006[33].

Figure 14: The US Merchandise Trade Deficit (in billions of US dollars), 1994-2006
(data source: TradeStats Express)
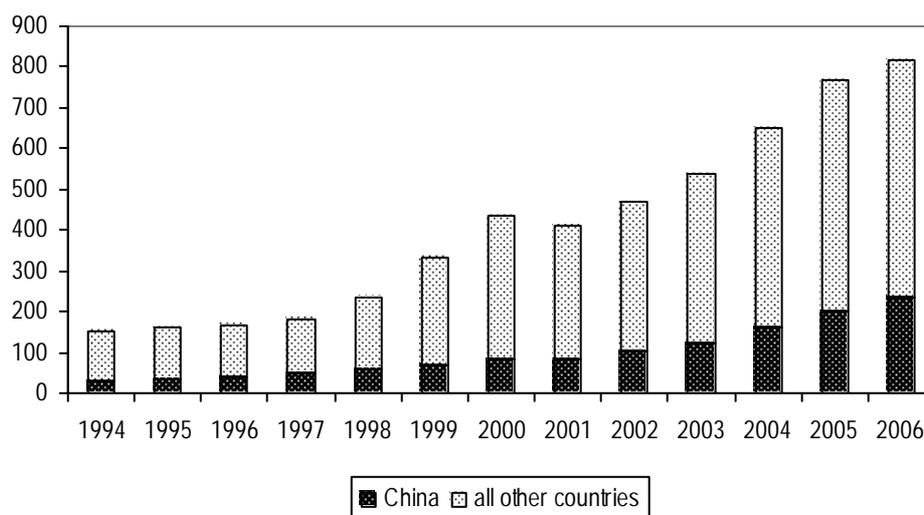
Nevertheless it is too simple to blame China for being the source of the overall imbalance. First of all, the US current account deficit has reached dimensions which are widely seen as unsustainable in the long run. The actual problem is not the current account deficit itself but the financing of this imbalance (Bown et al., 2006, pp. 4). Every country is subject to the following budget constraint: The value of gross domestic expenditure (GDE) plus the change of foreign assets hold by domestic residents (A-A$_{-1}$) must equal the value of gross national product (GNP) plus the change of domestic assets owned by foreigners (D-D$_{-1}$) (Kouparitsas, 2005, p. 2). Thus,

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[32] See Morrison and Labonte (2005, pp. 28) for a more details.
[33] See TradeStats Express.

(1) $$GDE + (A - A_{-1}) = GNP + (D - D_{-1})$$

which is equivalent to

(2) $$GNP - GDE = (A - D) - (A_{-1} - D_{-1}).$$

By defining the difference between foreign assets hold by domestic residents and domestic assets hold by foreigners (A-D) as net foreign assets (NFA), equation (2) can be rewritten to

(3) $$GNP - GDE = NFA - NFA_{-1}.$$

Therefore,

(4) $$GNP - GDE = \Delta NFA,$$

where ΔNFA is the change in a country's net foreign asset position.

According to equation (4) a country's net foreign asset (NFA) position decreases if domestic expenditure exceeds the country's overall income from domestic and foreign sources (GNP). The difference between GNP and GDE represents the current account balance (CAB). By using this definition, equation (4) becomes

(5) $$CAB = \Delta NFA.$$

Equation (5) is the balance of payments identity introduced in chapter 2. Thus, the balance of payments identity presents the budget constraint for the economy. According to equation (5) the US current account deficit has to be accompanied by a decrease in net foreign assets in equal measure, either by liquidating foreign assets $[(A - A_{-1}) < 0]$ or by increasing liabilities to foreigners $[(D - D_{-1}) > 0]$ (IMF, 1993, p. 160).

A problem for the deficit country arises if foreign lenders are no longer willing to finance the current account deficit (Bown et al., 2005, p. 5). Indeed, the composition of US creditors has already changed. While some time ago foreign investors supplied capital to the United States by investing in US corporations, today mainly Asian central banks accumulate US securities to prevent an upward movement of their currency's value. However, this strategy is connected with drawbacks as mentioned in chapter 4. Thus, at some point in time Asian central banks are likely to slow down US security accumulation, causing the dollar to depreciate against their currencies and urging US interest rates to rise (Ferguson, 2005).

When analysing the sustainability of the US current account deficit, researchers typically investigate the sustainability of the US net foreign asset position[34]. Analysts estimate that a current account deficit of around 3 to 4 percent of GDP might be sustainable for the USA in the long run, thus the ratio of current account deficit to GDP should decrease by 2,5 to 3,5 percent[35] (Bown et al., 2005, p. 5).

In 2005 the bilateral US trade deficit with China accounted for approximately 1,6% of GDP. Thus, even an elimination of China's bilateral trade surplus cannot bring the United States to a sustainable current account deficit level.

Furthermore, the overall trade balance is the sum of all bilateral trade balances. Therefore, reducing the bilateral trade deficit with one country does not automatically imply that the overall trade deficit decreases as well. In fact, decreasing imports from China can be substituted by increasing imports from other countries so that the effects on the overall US trade balance turn out to be only moderate (Bown et al., 2005, pp. 2).

To lower the US current account deficit, the focus should lie on macroeconomic fundamentals presenting the domestic counterpart of the current account balance. As mentioned before, the difference between the gross national product (GNP) and the gross domestic expenditure (GDE) is the current account balance. The gross domestic expenditure of a country comprises private consumption (C) and investment (I) as well as government spending (G)[36]. Therefore it can be written

(6) $CAB = GNP - GDE = GNP - C - I - G$

which is equivalent to

(7) $GNP = C + I + G + CAB$.

Furthermore the savings of an economy are defined as

(8) $S = GNP - C - G$.

Combining equation (7) and (8) gives an important relationship between a country's external position in the form of the current account and its internal counterpart:

(9) $CAB = S - I$.

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[34] See for example Kouparitsas (2005).
[35] According to the 2005 current account deficit.
[36] See IMF (1993), p. 13 for the following transformations.

In macroeconomic terms, the current account balance is the difference between the country's overall saving and its total investment spending. So, a current account deficit necessarily means that a nation lives beyond its means. Indeed, the United States faces considerable challenges in this area. The US current account deficit is accompanied by a federal budget deficit (Ferguson, 2005)[37]. Furthermore, the United States currently faces a negative personal saving rate[38]. Thus, to reduce the overall deficit, the saving and investment behaviour within the economy has to change.

5.2 Effects of a Renminbi Revaluation on the US Current Account

While domestic changes play an essential role in coming back to balance of payments equilibrium, external factors such as exchange rates can support this process notably (Garton and Chang, 2005, p. 105). This is because a country has two policy instruments to reduce a current account deficit. The first is the expenditure-reducing tool where monetary and fiscal policy instruments such as interest rate increases or fiscal consolidation are directly utilised to lower domestic demand. The second is the expenditure-switching instrument which aims at reducing import demand by a depreciation of the currency (Hallwood and MacDonald, 2000, p. 54). Thus, it should be analysed if a revaluation of the Chinese renminbi can contribute to a reduction in the US current account deficit.

According to classic macroeconomic models, a depreciation of the dollar relative to the renminbi can indeed reduce the bilateral trade deficit[39]. Chinese products become relatively more expensive for the US market while US exports become relatively cheaper for China. Therefore, US imports from China are likely to decrease and US exports to China are likely to increase which results in a reduction of the bilateral trade deficit (Jarchow and Rühmann, 2000, pp. 44).

It is worth mentioning that the demand for Chinese products in the United States only decreases if the stronger renminbi is actually passed through to the consumers in the form of higher dollar prices. Thus, the renminbi appreciation should reach a certain dimension to have reducing effects on US demand and to lower the bilateral trade deficit.

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[37] The joint appearance of current account and budget deficit is known as a "twin deficit" in economic literature.
[38] See U.S. Department of Economic Commerce for this data.
[39] Actually, the argumentation here is the opposite of the classic macroeconomic discussion for the Chinese case in chapter 3.1. As in chapter 3.1 normal supply and demand curves are assumed.

Nevertheless as mentioned above, the reduction of the bilateral deficit does not necessarily imply a decrease in the overall trade deficit as well because Chinese imports can be substituted with imports from other countries (Bown et al., 2005, p. 14). In this context it is crucial how other countries react on a renminbi appreciation. Indeed, some economists argue that China's reluctance to revalue the renminbi has also made other Asian countries unwilling to allow their currencies to become stronger because of the fear to lose competitiveness to China (Bown et al., 2005, p. 5). Therefore, China has to be the precursor in this situation (Goldstein, 2004, p. 41).

All in all, it is not sufficient to regard bilateral dollar exchange rates whose changes can effect bilateral US trade positions as long as the reduction of one bilateral trade deficit is accompanied by a deterioration of bilateral trade balances with other countries.

To reduce the overall trade deficit, the real effective exchange rate (REER) has to be considered. Researchers estimate that 10 to 20 percent real dollar depreciation would be needed to reduce the ratio of current account deficit to GPD by 1 percent. Estimations vary because of different estimated trade price elasticities which measure how responsive US trade volumes are to exchange rate movements (IMF, 2007, pp. 93 and 105).

Figure 15 shows the development of the US real effective exchange rate. As can be seen, the dollar has depreciated on a trade-weighted basis since the peak in 2002 but this was mainly determined by depreciations against the euro, the Canadian dollar and other mostly non-Asian currencies. Further dollar depreciations should be accompanied by appreciations of Asian currencies to achieve real dollar depreciation big enough to support the reduction of the current account deficit and to share the burden of reducing global imbalances (Goldstein, 2004, pp. 40).

Figure 15: US Real Effective Exchange Rate Index[40], 1999-2007
(data source: Board of Governors of the US Federal Reserve System)
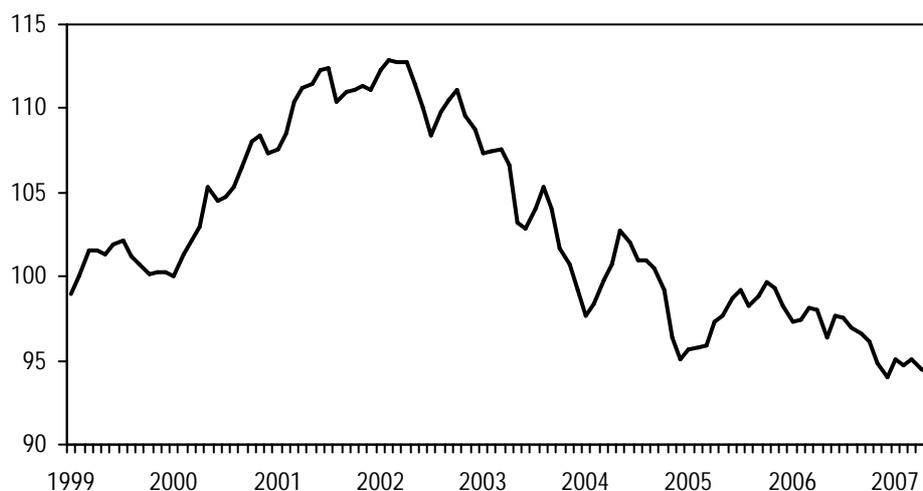
Nevertheless, the real effective exchange rate has depreciated by over 15% in comparison to its peak in 2002 and the US current account deficit has rather increased than decreased. Thus, the impact of exchange rate movements on the current account position should not be overstated[41].

Domestic fundamentals such as the investment-savings behaviour should set up priorities in improving the US external position. Therefore, the expenditure-reducing instrument plays a key role. However, exchange rate movements can support the adjustment process. Indeed, experience shows that successful external adjustment should be a combination of exchange rate movements with increases in saving rates and fiscal consolidation (IMF, 2007, p. 106).

The previous discussion shows that an individual revaluation of the Chinese renminbi may have only minor impacts on the US current account deficit and even if other Asian economies join with an upward trend of their currency's value, the United States have to bear a considerable part of the adjustment process domestically.

However, a revaluation of the Chinese renminbi can be effective through a second channel. If China allows its currency to appreciate, the need to accumulate foreign exchange reserves decreases and with this the demand for US securities. This might lead to rising US interest rates which tend to have a

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[40] Note that an increase in REER indicates an appreciation.
[41] However it should be noted that the real depreciation actually started to have a reducing impact on the non-oil trade deficit. Nevertheless, the overall current account deficit deteriorated because other components of the current account such as the oil trade (rising oil prices) worsened (IMF, 2007, p. 105).

decreasing effect on US expenditure (Bown et al., 2005, p. 14). Because of reducing domestic demand in general through this channel and not only import demand from China, a renminbi revaluation can indeed contribute to lower the US current account deficit[42].

5.3 Conclusions on China's Role in the US Current Account Deficit

The previous discussion has shown that it is not justifiable to blame China for causing the US trade or current account deficit. The fundamental causes of the historical imbalance lie in domestic macroeconomic conditions and concern the personal saving behaviour as well as the fiscal policy.

Nevertheless, a renminbi revaluation can support to adjust the US current account. On the one hand, it can induce a rise in US interest rate which lowers US demand. On the other hand, it can encourage other Asian countries to allow their currencies to appreciate against the US dollar. Because of this, a revaluation of the Chinese renminbi might also be in the interest of the international community. As mentioned, the dollar should decrease on a trade-weighted basis to support the adjustment process. If Asian countries carry on to refuse a further appreciation of their currencies, the depreciation burden should be borne by countries which have already appreciated against the dollar in the previous years, for instance the euro. However, this could have negative effects on the euro area growth performance (Goldstein, 2004, p. 41).

To sum up, it should be emphasised once again, that a renminbi revaluation is no magic formula to correct global imbalances but can contribute to make the adjustment process less painful.

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[42] However, rising US interest rates will probably increase demand for US securities from other investors. Thus, the upward pressure on US interest rates because of the renminbi revaluation can be partly offset (Bown et al., 2005, p. 16).

6. Proposals for the Future Development of the Chinese Renminbi

The basic result from previous sections is that a modification in the renminbi exchange rate is beneficial for China as well as a support to correct global imbalances. Based on this result the next task is to investigate how a modification in China's exchange rate should look like. The following chapter tries to analyse this issue. More precisely, the discussion is based on two questions.

(1) Is a simple one-step appreciation the solution to the above mentioned problems and challenges or a more flexible exchange rate in general?

(2) If a more flexible exchange rate is preferable, what is the most appropriate flexibility for China?

A well-known trade-off in international economics is the so-called impossible trinity which states that a country cannot simultaneously pursue exchange rate stability, open capital markets and independent monetary policy. Only two of these three goals can be reached at the same time. First, while pursuing a fixed exchange rate and open capital markets, monetary policy is needed to stabilize the exchange rate. Thus, an independent monetary policy in the long run is not possible. Second, by combining exchange rate stability and independent monetary policy, international capital movements have to be limited because permanent capital in- and outflows can threaten the pursued goals. Third, by placing emphasis on open capital markets and independent monetary policy, fluctuations in the exchange rate have to be accepted (Caspers, 2002, pp. 150).

Now the question arises which combination might be best for China.

So far China is not confronted with perfect international capital mobility. Indeed, there are still extensive capital controls. Nevertheless, restrictions on capital movements are likely to erode over time and it becomes increasingly difficult to effectively avoid capital in- and outflows (Prasad et al., 2005, p. 16). This process has already started in China.

As mentioned in chapter 2, a considerable part of China's capital and financial account surplus in 2003 and 2004 was determined by a sudden increase in portfolio investment inflows. Officially, those non-FDI capital inflows are restricted. Therefore it can be assumed that China's capital account controls in this area do not fully work (Ma and McCauley, 2005, pp. 2). Furthermore the errors and omission position on the balance of payments can be regarded as an indicator for capital in- or outflows which are officially not recorded. Thus, the errors and omissions position of -17 billions US dollars in 2005 is a strong

indicator that capital has found a way out of the country despite capital controls (IMF, 2006, p. 31 / Ma and McCauley, 2005, p. 3).

In addition to the unofficially erosion of capital controls, also Chinese authorities plan to further liberalise capital account transactions (People's Daily Online, 2005). Thus, in the long run China cannot count on adequate limitation of capital movements to support an independent monetary policy and exchange rate stability.

By sticking to a more or less stable renminbi exchange rate against the dollar, it is the independent monetary policy which cannot be pursued in the long run. In the short run, the monetary base can remain under China's control by using sterilisation policy but as explained in chapter 4 this policy instrument is connected with drawbacks and cannot be used endlessly. Actually, sterilisation policy becomes more difficult in a less restricted capital market environment because increasing foreign capital inflows put additional pressure on the monetary base. Thus, in the long run autonomous monetary policy is likely to suffer.

However, abandoning independent monetary policy cannot be in China's interest. In contrast, China needs monetary policy instruments such as interest rate changes to be able to react on external shocks and to positively influence economic activity. This has become even more important during the last years because of China's increasing integration into the world economy (Prasad et al., 2005, p. 6).

All in all, capital account liberalisation cannot be fully avoided in the long run and China is better off by having more autonomy in monetary policy decisions. Therefore more exchange rate flexibility is required and in China's own interest. Furthermore, experience has shown that flexibility in the exchange rate should precede capital account liberalisation to avoid crises (Prasad et al., 2005, pp. 18/ Eichengreen, 2006, pp. 9).

The exchange rate reform in July 2005 has already taken the first steps towards more flexibility but by regarding the daily changes of the spot renminbi exchange rate against the dollar it can be noticed that the theoretical flexibility has not been used.

Figure 16: Daily changes in the nominal spot exchange rate of the Chinese renminbi against the US dollar (CNY/USD), July 2005-January 2007 (based on calculations from ECOWIN data on exchange rate closing prices)
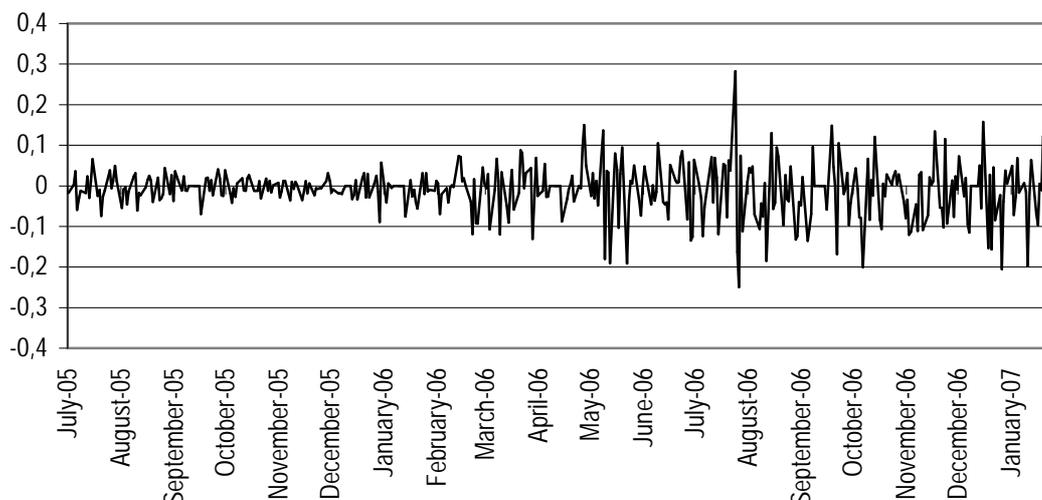
As can be seen from figure 16 the fluctuation band against the US dollar of ± 0,3% has never been fully used although a move towards more flexibility can be observed during the last months.

After having come to the conclusion that more exchange rate flexibility is preferable, it should be analysed how much flexibility is best for China.

After the financial crises in the 1990s economists have developed the idea of the so called "bipolar view" which states that the corner solutions "hard pegs" on the one hand, such as currency boards or monetary unions, and independent floating on the other hand are the most sustainable exchange rate arrangements for emerging market economies with capital mobility in the long run (Solans, 2003).

However, China might not be ready at the moment to leave the determination of the exchange rate completely to market forces because this would include the simultaneous reduction in capital account transactions. At the current state, the Chinese banking system is too fragile to be able to manage enormous capital flows (Goldstein, 2004, p. 45). However, more exchange rate flexibility in combination with restrictions on international capital movements might be best for China at the moment (Garton and Chang, 2005, p. 106).

The currently operated managed floating regime can theoretically provide this. Indeed, the IMF states that the needed flexibility is captured by the new exchange rate system but Chinese authorities have to use it and lose the fear of a more flexible exchange rate (IMF, 2006, pp. 18). When time passes and China's banking system has become stronger, the next step might be to further open the capital account and thus let the market more and more determine the exchange rate (Prasad et al., 2005, p. 20).

7. Conclusions

This paper has tried to investigate on a literature review basis if a revaluation of the Chinese renminbi is in China's interest and whether or not a revaluation can contribute to correct the US current account deficit.

After having introduced the problem and some basic concepts, the actual discussion has been divided into four main components. While the first component has critically dealt with drawbacks China might have to face in the case of a renminbi appreciation, the second part analysed arguments in favour for an appreciation.

The main result from these two parts is that a renminbi revaluation is in China's own interest. China's foreign exchange accumulation has reached dimensions which are difficult to manage in the long run. Firstly, they pay no high return and create opportunity costs. Secondly, the People's Bank of China runs the risk to lose control over the monetary base in the long run as the sterilisation process cannot be continued indefinitely. Finally, the foreign exchange accumulation still leaves substantial liquidity in the banking system resulting in alarming credit growth. All in all, a revaluation of the Chinese renminbi followed by less intervention in the foreign exchange market is desirable.

However, it should be admitted that the revaluation process will probably not be without costs for China. There might be temporary adverse effects on exports and employment in export-driven industries but Chinese authorities have policy instruments to counteract them.

The third component of the overall investigation has turned to a global perspective and has analysed China's role in the US current account deficit. The often cited statement that the Chinese undervalued currency significantly contributes to the US deficit situation cannot be confirmed. In contrast, the fundamental causes of the historical imbalance are domestic macroeconomic conditions. Nevertheless, a renminbi revaluation can help to facilitate the international adjustment process. In this respect, a revaluation of the Chinese renminbi is in the interest of the international community.

All in all, based on the arguments presented in this paper, a modification in the renminbi exchange rate is advantageous.

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The fourth part finally proposes more exchange rate flexibility.

Thus, the overall question of the thesis can be answered in the following way: Based on the analysed arguments, a revaluation of the renminbi is in China's interest and can to some extent contribute to correct the US current account deficit. The revaluation should be initiated by more exchange rate flexibility rather than by a simple one-step appreciation. The currently operated managed floating regime offers this flexibility but Chinese authorities have to make use of it.

This clear message is in line with a considerable part of the literature on this topic[43]. Furthermore Chinese authorities are better off not to wait too long to permit more flexibility. On the one hand, experience has taught that the transition towards more flexibility should be done during times of strong growth, net capital inflows and while the exchange rate is expected to appreciate rather than depreciate (Eichengreen, 2006, p. 12). On the other hand, exchange rate flexibility should precede capital account liberalization to protect the financial sector (Prasad et al., 2005, pp. 18). As capital controls are likely to erode over time, greater exchange rate flexibility should be allowed soon.

As mentioned in the introduction, the research started in this paper can be extended by analysing the consequences of a renminbi revaluation on China's neighbour countries and East Asian trading partners as well as on the European Union.

As a conclusion, it should be emphasized that the renminbi question is not answered once and for all with this thesis. In contrast, China is a dynamic economy and the discussion treated in this paper should be also seen as a dynamic process which has to be updated and complemented when new information is available. Political decisions for example considerably change the general framework. On 19 May 2007 the People's Bank of China widened the fluctuation band of the renminbi exchange rate against the US dollar from ±0,3% to ±0,5% (People's Bank of China, 2007). With this decision, Chinese authorities opened the theoretical way towards more exchange rate flexibility. It will be highly interesting to observe if Chinese authorities make use of this theoretical flexibility and which consequences more exchange rate flexibility actually has in reality.

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[43] See for example IMF (2006), Frankel (2006) or Prasad et al. (2005).

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