Global Imbalances
–
Fractures in the world monetary system

A thesis presented by

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THE GRADUATE SCHOOL OF ECONOMICS

In partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

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University of Verona

February 2014

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I Introduction

The last years have economically been dominated by a financial crisis that started as the so called sub-prime crisis in 2007 and became known as the world financial crisis in the following years. Figure 1 shows the development of GDP growth in the western world. The world has still not fully recovered from this crisis. After there were some signs of recovery in 2010, the world was hit by another crisis, which should become known as the euro crisis.

Figure 1: GDP growth in per cent
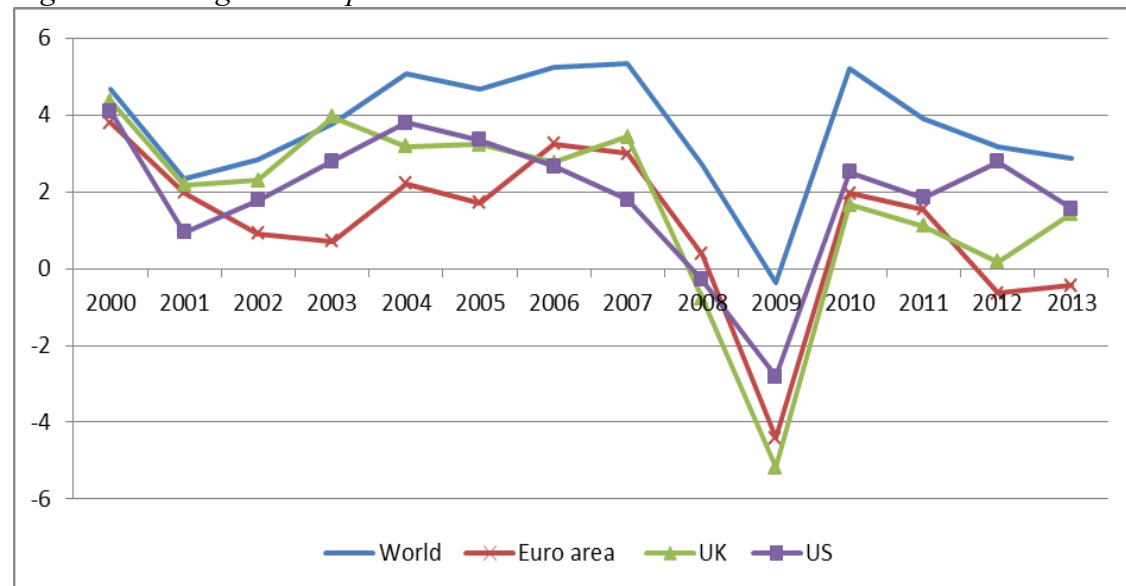
Source: IMF

The purpose of this thesis is to better understand the underlying causes of the crises and the deficiencies of the financial system that allowed a series of crises to arise. What were the flaws in the world financial system and how did they translate into a period of crises so severe?
We find that the composition of the world monetary system is of an asymmetric nature. The US-Dollar functions currently as the reserve currency of the world. More than 60% of the world trade is executed in US-Dollar. Being the issuer of the world's reserve currency allows the US to operate with a soft external constraint. Instead of exporting goods and services to finance their imports, they are in the unique position to finance their import by exporting their currency, in the form of treasuries. On the positive side, this allows them to postpone tightening reforms and to consume foreign goods by persistently running current account deficits. But this has also negative implications. Not only does it suppress labour in the US export sector (one simply doesn't need many labourers to export T-bills), it also causes massive distortions to the world economy.
It is important to understand that the same mechanisms that were considered benign and delivered solid rates of world economic growth during most of the 2000s were ultimately responsible for the turmoil that started in 2007. The world was basically split into surplus countries that provided goods and deficit countries that consumed. The problem was that every current account surplus comes with a financial account deficit and vice versa. This means that if one half of the world continuously runs huge

surpluses, this half has to provide the other half of the world with the credits to finance their deficits. The corresponding inflow of capital automatically leads to bubbles and inflation, which in our world have further been fuelled by a low interest rate environment. When interest rates started to rise, the whole system collapsed.

The first chapter starts with an investigation on current account imbalances and why the Asian emerging economies finance the American deficits. We show that the level of current account imbalances has been more severe than in former periods and the unwinding is far from being completed. This leads us to the conundrum of how the US managed to maintain a positive return on a negative portfolio of net foreign assets. We find a variety of means that allow the US to maintain a net foreign asset position, which is less negative than their cumulative current account deficits would suggest. The excessive use of Seigniorage seems to be one of the key factors. To understand the mechanisms behind this procedure better, in the second chapter we conduct a two country Dynamic General Equilibrium model that shows the dynamics of an asymmetric world monetary system. The model allows a deeper understanding of the consequences that follow from an asymmetric monetary system. On the one hand it softens the US external constraint, but on the other hand it leads to a permanent decay in the US current account and the external value of the US-Dollar. It forces the rest of the world into a permanent wealth transfer towards the US.

Figure 2: World current accounts
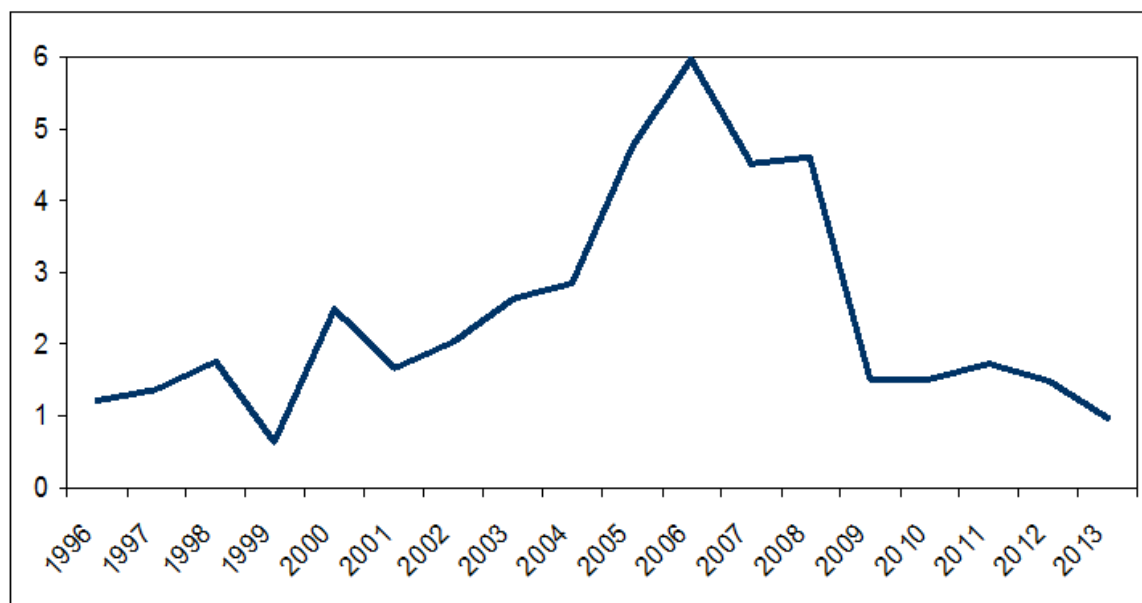
Source: IMF weo (October 2013)

On a global scale, there are the US as the main deficit- and China as the main surplus country. On a regional scale, the European Monetary Union (EMU) has been divided into north (surplus) and south (deficit). The underlying mechanism in both cases show striking similarities. Therefore the last chapter of my thesis is devoted to the crisis in the EMU.

Capital flows from north to south substituted savings in the peripheral EMU countries, what led to current account imbalances, similar to the ones described above. Further the EMU is challenged by an asymmetric structure. External capital inflows were pooled in France and Germany, which then channelled them into the peripherals. This added a mismatch of financial accounts to the already unbalanced

current accounts in the EMU. When these capital flows ceased, the euro-system allowed the peripheral EMU countries to defer a rebalancing of their current accounts by replacing these private funds by public funds.

The thesis enhances the existing literature by firstly providing a coherent story of the economic environment that laid the ground for the financial crisis. At the point where academic literature fails to explain how the US finance their deficits, the thesis provides a newly developed model which demonstrates how the excessive use of Seigniorage is responsible for many of the observed imbalances. The thesis further finds new explanations why the world financial crisis turned into a euro crisis. It uses a new approach by focusing on the bilateral financial accounts of the EMU countries and displays what challenges lie ahead of a rebalancing in the EMU.

For many years, the US benefitted from trillions of US-Dollars of free credit that the world had to provide, given the role of the Dollar. This could end soon, as there are signs the world loses faith in the American currency. Unless the world economy finds a more balanced growth path, we will be stuck in an endless series of bubbles and a spiral of exchange rate devaluation.

The structure of this thesis will be as follows. We will begin by defining what global imbalances area and who are their main contributors. Section 3 will explain the underlying financial flows and the mechanisms that had been established in the years preceding the global financial crisis. In section 4 we will conduct a two country model to explain the connection between the role of the USD and the global imbalances, section 5 will conclude.

A View on Global Imbalances
and their Contribution to the Financial Crisis

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Abstract

The Global Imbalances that contributed to the financial crisis (2007-2010) are still present, and the world still has not fully recovered from recession. There is no consistent explanation of the Global Imbalances and their interaction with simultaneous events yet. The current state of the literature is that papers contradict each other and the main questions remain unsolved.

This paper aims to provide a coherent story of the economic environment that laid the ground for the financial crisis, focusing on the evolution of Global Imbalances. It will reconcile the discrepancies of the different strands of existing literature and hypotheses. Hypotheses which can be rejected will be discarded. The paper will try to explain what mechanisms (inside and outside of the US) worked within these Imbalances, how they were motivated and if these mechanisms are sustainable.

The single most important result will be that there is no obvious reason why China and the other emerging Asian economies finance the US. Further, the US finance themselves by means that are not fully understood yet and can only partially be explained. One important factor appears to be the use of the Exorbitant Privilege via Seigniorage. Other factors remain unknown.

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1. Introduction

Over the last decade political attention was drawn more and more to the growing imbalances between surplus countries on the one side and deficit countries on the other side. Surplus countries are mainly comprised of China, the Oil exporting countries, Japan and Germany, whilst deficit countries contain the US, the UK and southern Europe. Since China became the largest surplus country in bilateral US trade over the last few years, I will focus on the relationship between the high Chinese savings and the low American ones, being the most important sources of Global Imbalances. By 2009, the Chinese central bank held more than 2000 billion of USD reserves, composed of US-treasuries mainly.

The main questions on the Global Imbalances are still unanswered. What were the driving forces behind these imbalances and to what extend did they contribute to the financial crisis that hit the world economy in 2007-2010. Even though they peaked in late 2008, the Global Imbalances still haven't gone away.

Some argue that the decline in the US savings rate and the current account deficits were mainly due to external factors, such as the Global Savings Glut (Bernanke, 2005) or the Bretton Woods II system, whilst others consider internal factors like the expansionary monetary policy stance of the Federal Reserve Bank the driving factor behind a monetary glut inside the US. Figure 1 shows the different strands of literature that try to explain the capital flows preceding the events starting in 2007.

Figure 1
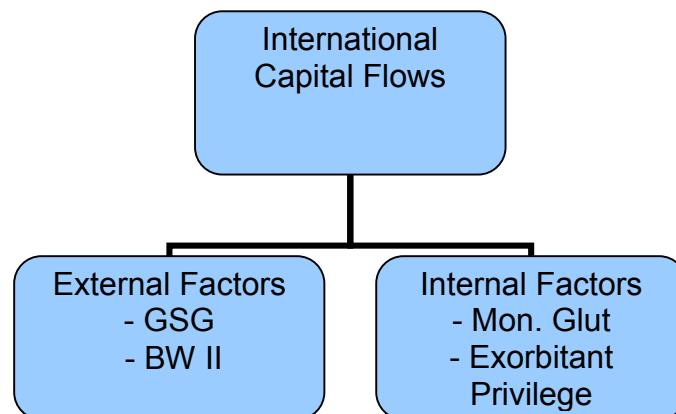
Global Imbalances are not something bad per se. They are a natural by-product of free trade (Haldane, 2010). Global Imbalances reflect differences in the level of development, demography or other factors, but they can also reflect distortions, externalities and risk (Blanchard and Milesi-Ferretti, 2009).

In the current case they resulted from a high public and private expenditure and a low saving rate in the US combined with a high saving rate in the emerging Asian economies which furthermore pegged their currency to the US Dollar (USD).

Was there a widening of Global Imbalances preceding the crisis? Did the US banking system actually collapse, before the system of "financial terror" collapsed, as Costabile (2009) mentioned? The understanding of the topic is still incomplete. There have been several papers focusing on single aspects of it which in part contradicted each other. The purpose of this paper is to provide a coherent story of the link between the Global Imbalances and the financial crisis. It will be structured as follows. Section 2 will provide definitions of Global Imbalances and discuss the question whether they were growing in the decade preceding the crisis and what

makes them different from imbalances in former times. A closer look will be taken on the deregulation of the American financial sector. Section 3 develops the argument that the Global Imbalances (external and internal of the US) were the fundamental driver of the financial crisis and examines possible explanations for the imbalances. It discusses the Monetary Glut hypothesis and the Global Saving Glut hypothesis, considers the Bretton Woods II system with it's relative merits of the mercantilist and precautionary motives for the surge in Chinese savings. Section 4 elaborates the Exorbitant Privilege of the US and how it has been possible for them to maintain a positive rate of return on their foreign assets. Section 5 will conclude.

2. Global Imbalances

Global Imbalances mirror the difference between gross capital inflows and outflows.
As we will see, the current Global Imbalances mainly reflect an excess of US absorption over domestic savings on the deficit side and a large accumulation of US financial assets in the portfolios of the emerging Asian economies on the surplus side, where savings exceed investment. In section 3 we discuss what makes these economies willing to finance the US deficit and if this situation will be sustainable in the Future.
Approaching the questions of how to measure Global Imbalances and whether a widening of current account positions can be observed, we follow Bracke et al. (2010), using the simplest approach to measure Global Imbalances by taking the sum of the absolute values of all current account positions as percentage of GDP. These Imbalances remained stable in the 80s and early 90s and doubled since mid 90s. Figure 2 shows the evolution of Global Imbalances from the mid 90s reaching their peak above 5 per cent in 2006.

Figure 2: Global Imbalances
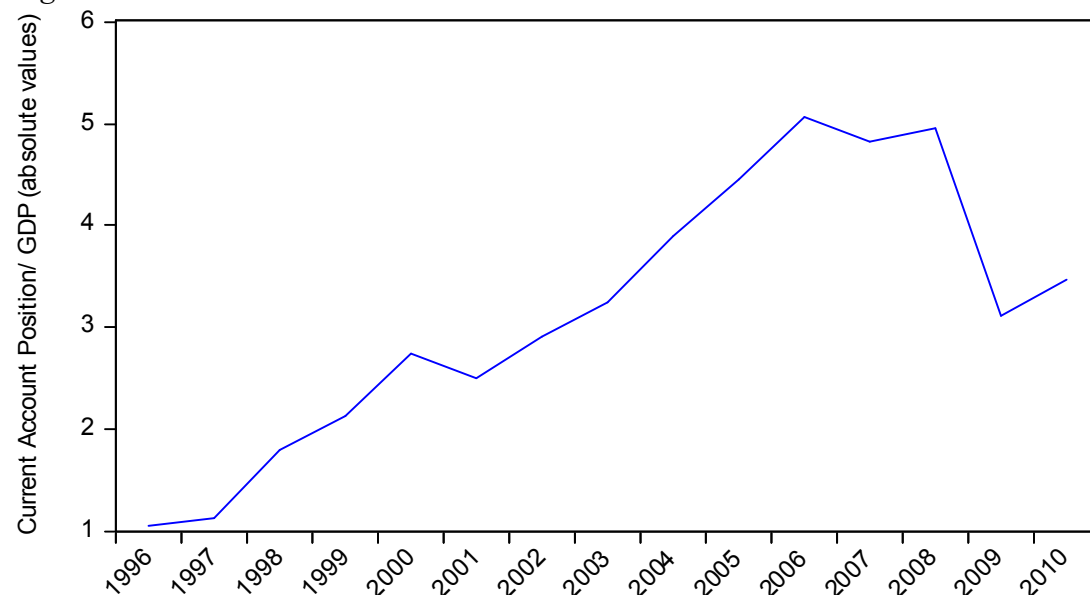
Source: Authors own estimations after IMF World Economic Outlook Update (2011)

From 1996 to 2000, the deficit widened what, according to Blanchard and Milesi-Ferretti (2009) mainly reflects an excess of US investment over savings (during a period of strong economic growth in the US). Table 1 only partly confirms this

position. There was a widening of the US current account deficit in that period, but it did not start before 1999 and 2000, the two years preceding the dot-com crisis. Simultaneously there was a collapse in investment in Emerging Asia, as a consequence of the Asian crisis[1] in the late 1990s.

*Table 1: US Gross National Savings and Investment as Percentage of GDP*

	Investment	Savings	S-I		Investment	Savings	S-I
1996	18.94	17.15	-1.79	2003	18.72	13.94	-4.78
1997	19.70	18.31	-1.39	2004	19.73	14.53	-5.20
1998	20.17	18.81	-1.36	2005	20.29	15.06	-5.23
1999	20.62	18.26	-2.36	2006	20.54	16.23	-4.31
2000	20.87	18.09	-2.78	2007	19.57	14.32	-5.25
2001	19.29	16.49	-2.80	2008	18.04	12.42	-5.62
2002	18.7	14.67	-4.04	2009	14.82	10.86	-3.96
		Standard Deviation			1.72	2.44	

Source: International Monetary Fund, World Economic Outlook, October 2010

The unwinding of the dot-com bubble led to a recession in the advanced economies so that imbalances narrowed in 2001 (even though the US deficit remained at the pre crisis level), but expanded again from 2002 onwards, now mainly caused by a fall in domestic savings in the US, also shown in table 1.

Between 2002 and the beginning of the crisis, there was a boom in economic activity and international capital flows, with widening imbalances[2]. The US current account increased further. Blanchard and Milesi-Ferretti (2009) suggest that in the first part of this period (2000-2004), a deterioration of US public saving was the dominant factor, whilst private saving remained broadly stable. Figure 3 confirms this view.

Figure 3
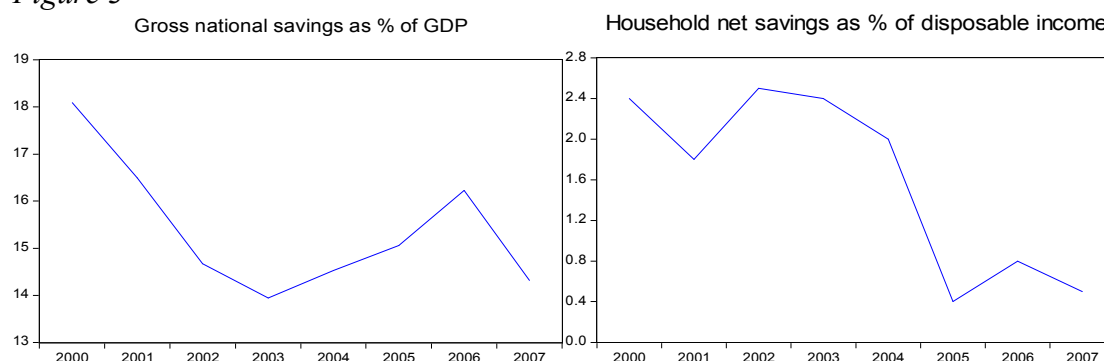
Source: International Monetary Fund, World Economic Outlook Database, October 2010 (Gross National Savings); OECD Factbook 2009 (Houshold Savings)

When around 2004 public savings started to increase, the household saving rate dropped massively and investment increased. Consequently, the US current account deficit increased even further until 2005. The effect of a weakening USD was offset by a sharp increase in Oil prices. Figure 4 shows the development of the exchange rate and the oil price over time.

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[1] Investment fell by about 16 per cent between 1996 and 2000, according to IMF data.
[2] World trade grew by an average of about 7.3 per cent per annum, from 2002 to 2007. Data: IMF, World Economic Outlook Database, October 2010.

*Figure 4: Trade weighted exchange index of the USD vs. the major currencies[3]
and Oil price*
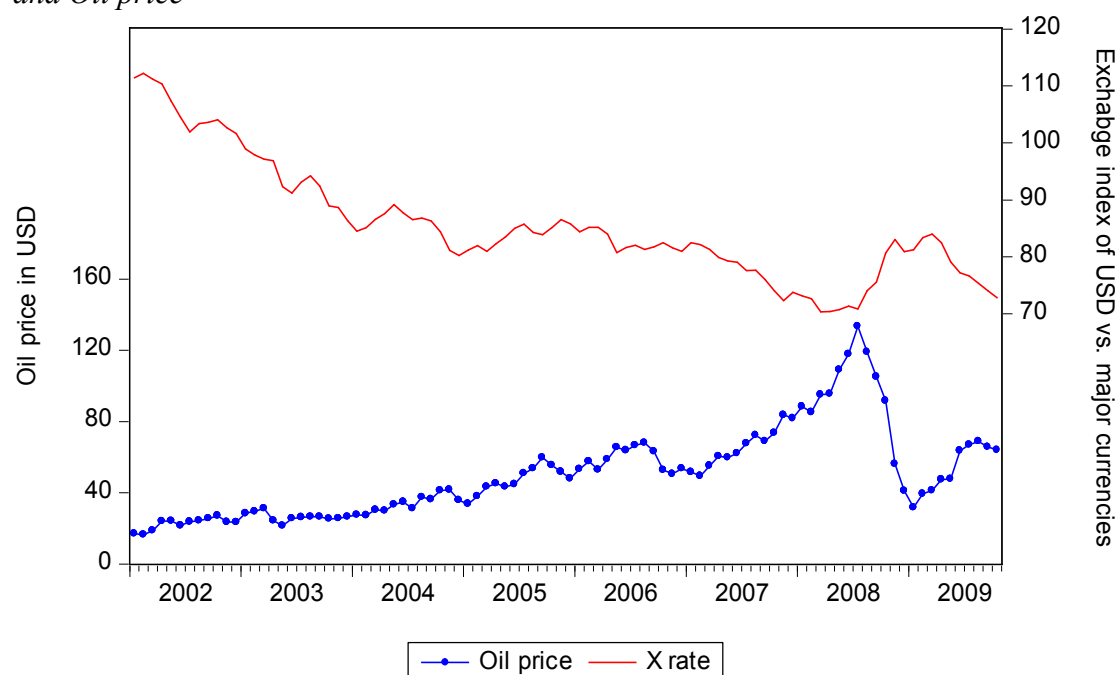
Data: Board of Governors of the Federal Reserve System; Energy Information Administration

Table 2: Chinese current account balance

	In Billion USD	In per cent of GDP		In Billion USD	In per cent of GDP
1996	7.2	0.8	**2003**	45.9	2.8
1997	37.0	3.9	**2004**	68.7	3.6
1998	31.5	3.1	**2005**	160.9	7.1
1999	15.7	1.4	**2006**	253.3	9.3
2000	20.5	1.7	**2007**	371.8	10.6
2001	17.4	1.3	**2008**	436.1	9.6
2002	35.4	2.4	**2009**	297.1	6.0

Data: International Monetary Fund, World Economic Outlook, October 2010

In 2006, some smoothing was on its way, until another drop in the saving rate let the current account deficit reach its maximum. The main counterpart during this period was China[4], with a 12-fold increase of its current account surplus between 2002 and 2008 (see Table 2).

China used these surpluses to accumulate vast amounts of US foreign exchange reserves. Treasury, corporate and agency bonds accounted for the major part of U.S. external financing. The Chinese holdings of US treasuries increased almost 8-fold, from 95,200 to 757,112 million USD[5], between 2002 and 2009. According to Blanchard and Milesi-Ferretti (2009), the Chinese surpluses originated in faster growing savings than investment in China. In section 3.2, we will go deeper into

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[3] Major currency index includes the Euro Area, Canada, Japan, United Kingdom, Switzerland, Australia, and Sweden.
[4] Besides the oil exporters and Germany.
[5] Data: U.S. Department of Treasury.

analysing the factors behind that increase of Chinese savings, which contributed to the phenomenon which Ben Bernanke called the Global Savings Glut (GSG).

When the crisis became more severe in 2008, cross-border capital flows declined[6] and the deleveraging American companies repatriated some of their funds. Nevertheless, for the whole year 2008, Global Imbalances did not decline, mainly because the high Oil price did not allow the US current account deficit to decrease (see figure 4)[7]. 2009 was a year of narrowing current accounts around the world, and thus falling Global Imbalances. The Chinese surplus and the US deficit decreased. Nevertheless, the US savings rate dropped to a low of 10.86 per cent, offset by an even bigger fall in Investment. This drop in the savings rate came from a sharp increase in government spending, offsetting the increase in the private saving rate[8]. After the shock related to the collapse of Lehman brothers, investors around the world considered the US as a safe haven. The net capital inflows to the US were a stabilising factor and the US never experienced an external funding problem (Caballero, 2010). Hence the fear of a "sudden stop" (of financing the US) in case of a crisis, turned out to be unjustified.

To summarise, the Global Imbalances increased prior to the crisis, especially after 2001.

Prime mover behind the widening imbalances over the observed period was the US saving behaviour. The standard deviation of the saving rate was somewhat higher than the one of the investment rate (Table 1). Haldane (2010) reasons that imbalances resulting from this savings behaviour could just be reflecting differences on countries' time preferences. Aging countries should save and run current account surpluses in anticipation of the dissaving that occurs once the workforce shrinks and the number of retirees rises. In addition to the savings behaviour, Blanchard and Milesi-Ferretti (2009) name two more examples where Global Imbalances would lead to a better allocation of capital across time or space: The investment behaviour and the portfolio behaviour. The investment behaviour implies that a country with attractive investment opportunities will finance a part of them from abroad and thus run a current account deficit. Portfolio behaviour means that a country with a deeper and more liquid financial market will attract investors, which leads to a current account deficit. The savings and portfolio behaviour seem to describe part of the current situation quite well. We find aging societies not only in the classical surplus countries of Germany and Japan, but also in China (Population Reference Bureau, 2010). This gives support the GSG hypothesis. Furthermore, the US financial market is deeper compared to other countries (especially compared to the Chinese one), attracting capital inflows from abroad.

Considering the investment behaviour, on the one hand a reason for the rising Global Imbalances might just be that they are the result of a change in the Feldstein-Horioka coefficient. This coefficient measures the correlation between savings and investment (Haldane, 2010). Historically, there has been high correlation between national savings and investment. During the last two decades this correlation has weakened[9]. Thus the rising imbalances could just be a result of financial liberalisation and

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[6] From the year 2008 to 2009 by about 11 per cent, according to the IMF, World Economic Outlook Database, October 2010.

[7] In theory, the devaluation of the USD could even be responsible for the increase in the oil price (Campanella 2009). Consequently, after an appreciation of the USD in late 2008, we would observe a decreasing oil price.

[8] Data: BEA, National Economic Accounts.

[9] The coefficient was close to 1 from 1930 to 1980 and dropped to almost 0 ahead of the crisis.

increased capital flows in recent years. But on the other hand, a fact that is at odds with theory in the current situation is, that capital seems to be flowing from the emerging economies "uphill" into the US, and not as economic theory suggests "downhill" from the US into the emerging economies where the expected returns would be higher. Widening current account balances only reflect an efficient allocation of capital if relative prices (e.g. exchange rates) are not distorted. Section 3 will show in which ways the exchange rate between the Chinese Renminbi and the US-Dollar has been subject to political interventions and in how far this affected Global Imbalances.

What makes the development of recent years different from former times of widening Global Imbalances (such as the interwar period or the time after the collapse of the Bretton-Woods System)? Bracke et al. (2010) name three differences. First, there is more dispersion on the surplus side this time. Besides the usual surplus countries Japan and Germany, there are a number of new players. China, the most important, followed by the other emerging Asian economies and the commodity exporters. On the deficit side we find less dispersion compared to former periods, reflecting the growing US deficit[10]. This means that the world economy is more and more dependent on a single countrie's ability to absorb the excess savings of the world. Second the recent growing Global Imbalances fell in a period, preceded by a time of favourable macroeconomic and financial development with high growth and low volatility, the "great moderation" (Bernanke, 2004). The decline in business cycle volatility led to lower precautionary savings in the US. At the same time we observe a rise in precautionary savings in Asia, after the experiences made in the Asian crisis in the late 90s.

And third the financial globalisation that happened during the last decade and led to an increase in international capital flows which were not everywhere accompanied by an approximation of the level of development in the respective financial markets. In the US, we saw 20 years of deregulation of financial markets. It is worth having a closer look at the main steps of deregulation. According to Skidelsky (2010), it's main flaws were the repeal of the Glass-Steagall Act, the decision of the Clinton Administration not to regulate Credit Default Swap (CDS) and the decision to allow banks to increase their leverage ratio from 10:1 to 30:1 by the US Securities and Exchange Commission (SEC).

In 1999, the Gramm-Leach-Bliley Act (GLBA) repealed parts of the Glass-Steagall Act from 1932 that separated commercial banking from insurance business. It widened the range of activities that banks can conduct and permits single holding companies to offer banking, securities and insurance services (Barth, Brumbaugh, Wilcox, 1999). The reasons for the repeal were manifold[11], but in a way just ratified developments that were already there[12].

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[10] Bracke et al (2010) mention that the U.S. absorbed 75 per cent of worlds net savings during the 2000s.

[11] There seemed to be empirical evidence that securities activities of commercial banks were not responsible for the Great Depression. The regulators allowed banks to undertake limited securities and insurance activities with few problems at the end of the 1990s. Finally, the technological advance made it more profitable to sell insurance and security products, because of a cost reduction in data processing.

[12] MBS were already exempt from Glass-Steagall Act and investment banks were also not subject to it. In 1996, operating subsidies ("op subs") of national banks were permitted to engage in activities not allowed for banks. Also since the early 1980s, there were "Nonbank banks" which were not qualified as banks and less restricted.

The repeal led to a convergence of banks and securitisation firms. Broad banking emerged and banks were permitted to perform many additional activities. Subsidiaries of banks were allowed to conduct most financial activities. State regulators were prohibited from restricting any financial activities permitted by GLBA.

The market for derivatives is organised as exchange or Over the Counter (OTC). Whilst the Exchange at the Chicago Board of Trade is regulated, OTC is unregulated. In 2000 the congress eliminated oversight by Commodity Futures Trading Commission (CFTC) and the United States Securities and Exchange Commission (SEC) over the OTC derivatives market. The key OTC derivative was the CDS. The purchaser of a CDS transferred default risk, but made periodic payments to the seller. The seller in return offered protection. These swaps were not regulated. The Purchaser could even speculate on a loan he does not own ("naked credit default swaps"), which inflates potential losses (FCIC, 2010). In 2000, the New York State insurance department determined "naked" CDS as not being an insurance, so they were not subject to regulation. In contrast to an insurance, these CDS could be sold by firms with no reserves or collateral. The CDS risk was concentrated in few very large banks and other companies (such as AIG). Finally, in 2004, the SEC allowed banks to increase their leverage ratio from 10:1 to 30:1 which further multiplied potential losses. The Basel agreements for a maximum leverage ratio could be circumvented by the banks by including Mortgage Backed Securities (MBS) into their definition of capital. In China, on the contrary, financial markets did not keep the pace of deregulation of the industrial sector, and are still considered as underdeveloped[13]. Bracke et al. (2010) call it an incomplete financial globalisation. This incomplete financial globalisation was laying the ground for the transformation of incoming financial flows into an asset price bubble, as the next section will show.

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[13] For example are interest rates not market oriented. Deposit rates are subject to ceiling, which limits the income of lenders.

3. Global Imbalances played the primary role for the financial crisis

This chapter will show how the Global Imbalances contributed directly and indirectly to the financial crisis. What made China and the East Asian emerging economies over-fund the US? How did the US economy adapt? Was this driven by factors inside the US (monetary glut) or were the current account deficits in US just a passive response to external dynamics (savings glut, Bretton Woods II) where savings were pushed into the US, mainly by foreign purchases of US government bonds?

Figure 5 shows how the cumulative amount of US treasury bonds held by China increased from 2002.

How did these capital inflows affect the US economy? First there was an impact on the US external position by allowing the US to finance their deficit easily. Warnock and Warnock (2009) argue that in the absence of substantial foreign inflows into US government bonds, the 10-year treasury yield might be 80 basis points higher. As a consequence, the US had to pay less interest than expected to finance their debt. Second, this had an impact on internal actions, which will be discussed below.

Figure 5: Chinese holdings of US treasuries in million US dollar
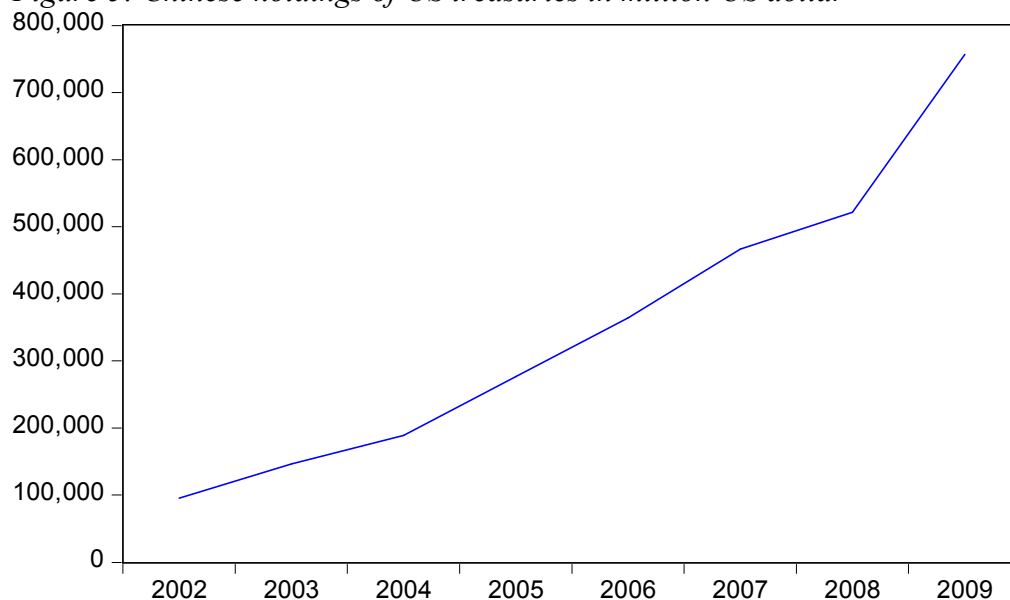
Source: U.S. Department of Treasury

3.1 Internal Factors

Capital inflows depressed the long-term interest rate in the United States which led to a credit boom and thus increased borrowing for investment and consumption (Corden, 2009). Some authors question this view, by arguing that the "US bond yield conundrum" (Alan Greenspan, 2005) of the long term interest rate was not surprising but could be mainly explained by macro economic dynamics[14] and the effect was only augmented by the rising share of foreign treasury holdings. Nevertheless, there is some evidence that the increasing purchase of US government bonds did have a

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[14] Bandholz, Clostermann, Seitz (2007) particularly name monetary policy, the business cycle and inflation expectations as reasons.

depressing impact on the saving rate[15]. Figure 6 shows the US short-term versus the long-term interest rate.

Figure 6: US Long Term and Short Term interest rate
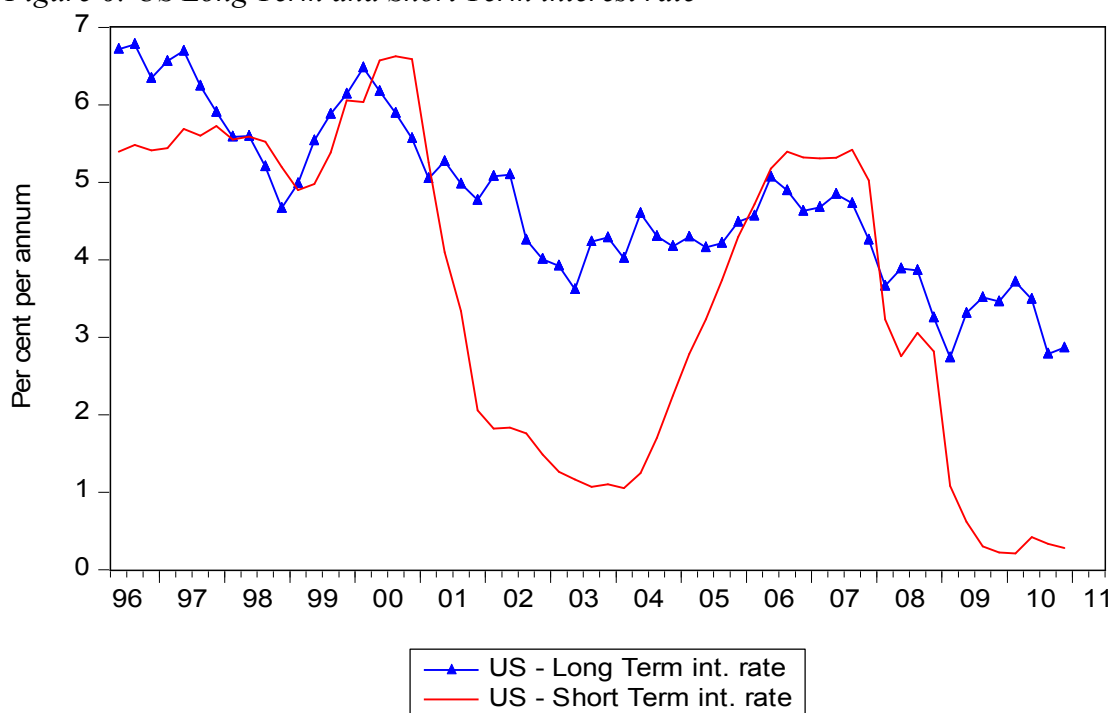
Source: OECD.Stat

A depressed long-term interest rate affected the housing prices, the mortgage rates, led to higher investment, to the so called "search for yield" and had a moderating effect on the US fiscal deficit.

I will begin with the housing sector. As an interest rate sensitive sector, it reacts to a lower long-term interest rate with depressed mortgage rates. The low mortgage rates in the US led to an expansion of mortgage lending and accordingly to a declining saving rate.

Second, as noted by Rajan (2010) a lower long-term interest rate increases the value of long-term assets, such as houses or equity, because returns are discounted at a lower rate. The increased household wealth consequently increased household spending[16] and, according to Roubini and Setser (2005), allowed Americans to let asset price appreciation substitute for savings, which led to lower private savings and an increased current account deficit in the US[17]. Via Mortgage Equity Withdrawal (MEW), American consumers could borrow money against the real value of their houses. Carroll, Otsuka and Slacalek (2006) state that the increase in consumption coming from housing wealth is substantially larger compared to an increase in equity wealth, since more people own houses than equity. Also Backus et al. (2005) explained the high spending of the US consumers with the high value of their assets at the time.

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[15] Despite some data problems in the observation of Warnock and Warnock (2009), various authors like Corden (2009) support this view.

[16] The household net worth to GDP ratio increased through most of the 1990s and 2000s, with a short dent after the dot-com crisis.

[17] Obstfeld and Rogoff (2009) even find a negative correlation between the current account balance and the housing prices of a country.

In a purely theoretical economic view, it remains doubtful whether a lower interest rate actually leads to lower savings by making saving relatively less attractive and e.g. consumption more attractive (which implies a strong substitution effect), or if the income effect would offset this. According to Guidolin and La Jeunesse (2007), the US household saving rate remains a puzzle. But the US saving rate did decrease steadily, as can be seen in figure 8, and also the argument that increased household wealth led to a higher absolute indebtedness of households appears striking.

Third, a lower long-term interest rate gives corporations incentives to invest more, by making today's value of future investments higher, which also provides them with a greater ability to borrow. Obstfeld and Rogoff (2009) stated that investments rose with real estate prices.

Forth, it led to the "search for yield". Astley et al. (2009) describe how the lower interest rates put pressure on banks' margins and encouraged investors to buy riskier assets. Focussing only on data of the "great moderation" caused a false sense of security. This "myopic" behaviour led to the assumption that financial market risk had declined and thus to an underpricing of risk. This led to credit expansion (Asteley et al., 2009) and reduced the discrimination between assets of different credit quality which corresponded with a lower risk premium. As Corden (2009) states, lending took place for more risky purposes, especially housing and consumption.

Finally, there was the moderating effect of the fall of the world real interest rate on the US fiscal deficit. This kept the US government from introducing more restrictive fiscal policies. The US fiscal deficit (resulting from tax cuts and the Iraq war) filled the gap in the world demand for funds, but might have shifted the demand for foreign savings upward and increased the current account deficit, as Dooley, Folkerts-Landau and Garber (2005) show. In any way, it helped the US to sustain their current account deficit.

So we find a situation in the US of high consumption and investment and low savings. At the same time, the US government used easy housing credit as a tool for income redistribution (Rajan, 2010)[18]. This easy borrowing was not driven by demand, but by a greater willingness to supply credit to low income households. President Clinton announced in 1995 to boost homeownership in America to an all time high. Any increases in the value of houses could be withdrawn (MEW) and used for consumption. Since the housing prices increased between 1999 and 2007, low income households were able to indebt themselves more and more (See figure 7).

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[18] Rajan explicates how a stagnancy in the proportion of College graduates led to stagnating or falling incomes for most Americans. The US government tried to compensate for this by allowing low income families to buy mortgage financed houses.

Figure 7: Quarterly real and nominal housing price data
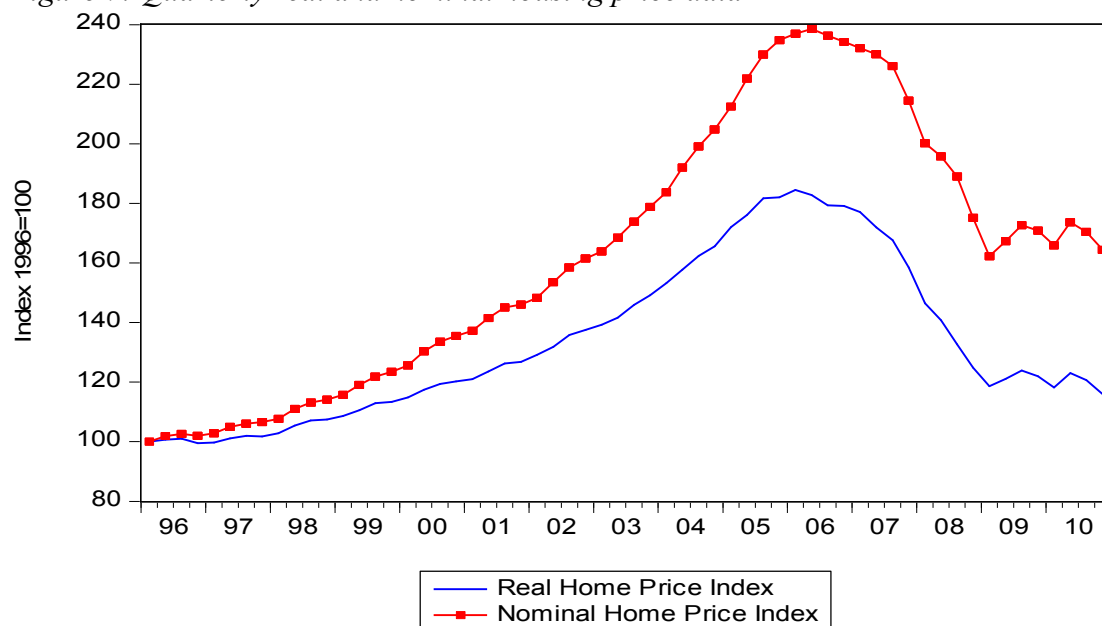
Source: Online Data Robert Shiller

Simultaneously, the Fed pursued expansionary policies (monetary glut) throughout most of the 1990s and 2000s (Fiorentini and Montani, 2010). This was caused by an overestimation of deflation risk in a low inflation environment[19]. Thus the Fed focused on it's second target, to stimulate employment (unemployment was relatively high after the dot-com crisis) and drove up the prices of assets and housing with its expansionary monetary policy (Rajan, 2010). Focusing on low core inflation kept the Fed from tightening monetary policy[20] encouraged excessive risk taking and increased leverage. A low short-term interest rate also signals easy borrowing conditions to the markets. Roubini and Setser (2005) explicate this should encourage corporate investment, but as long as this is a by product of central bank intervention to maintain an undervalued currency they hardly encourage investment in the tradable sector. The intervention encourages over-investment in sectors like housing and under-investment in the production of tradable goods.

Even more immediate than the long-term interest rate, the low short-term interest rate affected the economy via adjustable-rate mortgages, which fall with this interest rate and leave more household money for consumption. The flat yield curve preceding the crisis implied that markets required a lower term premium[21] (Figure 6), which means that interest rates were expected to remain low or to decrease even further. When the Fed in 2004 started to increase the short-term interest rate, households struggled to repay their loans and banks had problems to finance themselves. The events that followed have been widely discussed.

Further cyclical drivers of an increase in household wealth were an increase in permanent income due to a positive productivity shock associated with the investment

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[19] Core inflation remained low, due to cheap imports from China.

[20] Taylor (2009) mentions that according to the Taylor rule, the Fed should have started raising interest rates by early 2002.

[21] In fact, in the 1 ½ years directly before the crisis, the yield curve was even inverted, which is a good indicator for an upcoming crisis.

in the ICT sector (Bracke et al., 2010)[22] and financial innovation, which relaxed individuals' financial constraint, favouring consumption.

To summarise, we observe a declining saving rate and it seems that the savings inflow into the US led to a lower risk and term premium and the depressed interest rates led to high levels of leveraging, investment and consumption and riskier investments in the US financial system. The deregulated financial sector transformed the increasing money supply into an asset price bubble (via securitisation).

As the former US Treasury Secretary Hank Paulson mentioned: "…super-abundant savings from fast-growing emerging nations such as China and oil exporters –at a time of low inflation and booming trade and capital flows- put downward pressure on yields and risk spreads everywhere"[23].

The question of a Fed induced monetary glut or an external cause cannot be answered at this stage, since there is a link between the long-term interest rate (determined by capital inflows) and the short-term interest rate, determined by the Fed. If the US would not have responded this way to absorb the inflowing savings, the US deficit might have been moderated, but the worldwide decline of the interest rate and the credit boom would have been even bigger (Asteley et al., 2009/ Corden, 2009).

Next to these cyclical determinants of imbalances, there are also structural ones, the external factors.

3.2 External Factors

Why were foreign investors willing to finance the American economy?

Current Literature offers us two explanations for this phenomenon, the so-called Global Saving Glut (GSG) and a reestablished Bretton Woods system, called the Bretton Woods II (BW II) (Dooley/ Folkerts-Landau/ Garber, 2003), between the Asian countries (mainly China) and the US. Whilst the GSG is considered an international disequilibrium, the BW II system is considered a sustainable equilibrium (Portes, 2009). Some authors would even call it a benign phenomenon. I will begin by analysing the GSG.
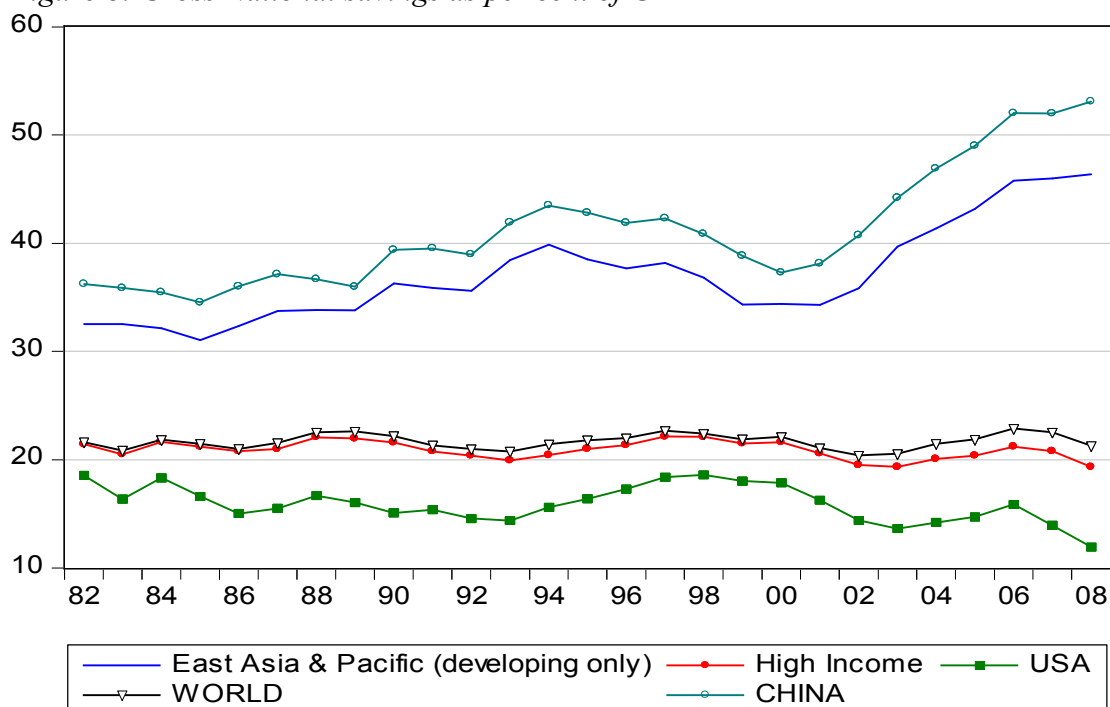
- The Global Saving Glut -

The Chairman of the US Federal Reserve, Ben Bernanke stated in his famous speech on 14th April, 2005 that the US current account deficit and the low level of long-term interest rate in the world can both be explained by the increase in global savings, the global saving glut. These savings were transformed into large inflows of foreign capital into the US[24] through mainly Chinese purchases of (existing) US treasury bonds, which show a superior performance to domestic assets. Were these capital flows actually caused by a glut of savings in the emerging economies or a shortage of savings in the US (Haldane, 2008)?

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[22] They also show how a productivity differential between tradable and non-tradable sector might have triggered a widening in the US current account deficit.
[23] Valedictory interview to the FT, January 1, 2009.
[24] Dooley/ Folkerts-Landau/ Garber (2005) state that all additional world savings were absorbed by the US.

Figure 8: Gross National savings as per cent of GDP

Source: World Development Indicators (World Bank)

Is there support for Bernanke's view? On the global level, there was no savings glut. Figure 8 shows that world savings remained fairly constant. The increase of savings in the emerging economies has been compensated by slightly lower savings in high income countries (Wolf, 2008). This rise of savings in the emerging economies, first and foremost in China[25], has been directed into the US. Looking at the Chinese savings rate, two observations can be made. First, the Chinese savings have continuously been very high, in the last thirty years and second, they increased by 17 percentage points between 1999 and 2007. Where did this surge after 1999 come from?

According to Yang, Zhang and Zhou (2011), the highest contribution came from government savings which rose by 8.2 percent to 10.8 percent of GDP in 2007. A fiscal reform in 1994 and the high GDP growth in that period led to higher tax revenues. Since the state consumption remained stable, government savings increased. The household sector rose by 5.5 percentage points to 22.2 percent of GDP during this period. The biggest share, coming from the wealthiest quartile of the population which experienced the fastest growth of the saving rate and had a 27 percentage points higher saving rate than the poorest quartile. Thus increased household savings might just reflect a growing inequality in China. The demographic changes also contributed to higher household saving. Since the Chinese society is aging and there is the one child policy, households substituted children (as old age provision) by savings. The lack of a social security system and the privatisation of state-owned enterprises (SOEs) after 1998, which de-linked the provision of social services from the employers, led to higher household savings, as well.

Finally, corporate sector savings rose by 4.2 percentage points to 18.8 percent of GDP, coming from an increased profitability within the sector. Two factors were

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[25] Caballero, Farhi and Gourinchas (2008) showed in a simple model that these increased savings can result from an underdeveloped domestic financial market.

responsible for this. The increased productivity, and the continuously low costs of production. Both, the privatisation of the SOEs and the growth of private enterprises contributed to higher profitability, as well as the Labour market reforms[26]. After the Asian crisis, China initiated trade promoting policies in 1998. Tax rebates for exports were implemented, which remained high and further increased earnings and profitability of the Chinese firms. In addition, SOEs were given loans with interest below market rates. This in connection with the control of labour compensation and the fact that SOEs were not asked to pay dividends helped them to maintain a production at low costs. The higher productivity and the maintained low costs resulted in higher corporate savings.

Even though the surge between 1999 and 2007 was caused by Chinese government savings mostly, if one takes into account the last two decades, the core of the Chinese savings story was the rise in corporate savings. Haldane (2010) observes around 2/3 of Chinese savings derive from the corporate sector. As stated above, the Chinese government has not drawn the increased profits of the corporate sector as dividends or used it to finance a safety net for displaced workers, but left the money with corporate insiders (Wolf, 2008). Consequently, also precautionary private savings increased as a response to reduced social welfare and a lack of public pensions in China (Corden, 2009).

All three factors contributed to a rise in Chinese savings from 35 percent of GDP in the 80s to 53 percent of GDP in 2007.

Since China was the largest surplus country in the last ten years, the GSG hypothesis would require a strict time sequence between a high Chinese net saving rate and a low American one (Fiorentini and Montani, 2010). But, as the Governor of the People's Bank of China, Zhou Xiaochuan (2009) mentioned, US savings declined before the surge in Chinas current account surplus. Tables 1 and 2 confirm this view. The US saving rate reached its peak (for the last two decades) in 1998 and steadily declined afterwards[27], whilst the Chinese savings soared only after 2001 and experienced another upward jump from 2005 on.

Has the US deficit just filled the lack of demand for funds for fruitful investment as Corden (2009) mentions?

The returns on US assets held by foreigners are not particularly high, compared to those earned by US owners of foreign assets. Thus, the GSG assumption that foreign investors prefer to invest in the US because of the better performance of US assets does not hold (Wolf, 2008). USD assets do not fully compensate for expected future devaluations (Roubini and Setser, 2005). So the view of Fiorentini and Montani (2010) that the GSG hypothesis alone cannot explain the sharp decline in the US saving rate appears to be reasonable. So what made the surplus countries finance the US, if it is more a burden than an opportunity?

Many authors like Fiorentini and Montani (2010) or Caballero (2010) mention the superior efficiency of the American financial market as the reason for the capital inflows[28]. But what makes this market more efficient than e.g. the Chinese one?

Since there is no superior performance of US assets (Wolf, 2008 and Forbes, 2008), there must be other reasons to invest in the American market. The most common reasons suggested in current literature are the Risk and Liquidity aspect. The sheer

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[26] The relaxation of worker mobility restrictions, the progressing urbanisation and the implementation of labour incentive schemes resulted in higher profitability of the corporate sector.
[27] The US personal saving rate shows a clear downward trend even from 1982.
[28] Forbes (2008) finds that a country with a less developed financial market invests a larger share of its portfolio in the US.

size and deepness of the US financial market provides e.g. bond investors with liquidity (Blanchard and Milesi-Ferretti, 2009) and safety that they cannot find in their own countries' financial markets or in European countries. The emerging market economies especially consider the US assets as a safe haven for their savings. The explanation of the Bretton Woods II system will provide further insight into the mechanism of money circulation driven by a flow of Asian savings into the US.

- Bretton Woods II -

The Bretton Woods II hypothesis is based on the assumption of an implicit bargain between the emerging Asian countries and the US, which states that several East Asian countries pegged their currency to the USD, to support their export led growth strategy by undervalued and heavily managed exchange rates, capital controls and official capital outflows in the form of accumulation of reserve asset claims on the centre country (Dooley, Folkerts-Landau and Garber, 2003). The unilateral pegging to the dollar led to a regime of quasi fixed exchange rates in the pacific area and implied current account surpluses in Asia, with deficits and low long-run interest rates in the US.

According to Fiorentini and Montani (2010), the Asian countries had high savings but their financial sectors were not efficient enough to transform savings into domestic investment. Yang, Zang and Zhou (2011) find that despite development and commercialisation in China, financing through bank loans is still limited. The importance of domestic loans even declined further in the last decade, whilst Foreign Direct Investment (FDI) contributed 7 percent of fixed asset investment in 2008.

Figure 9: By-pass effect
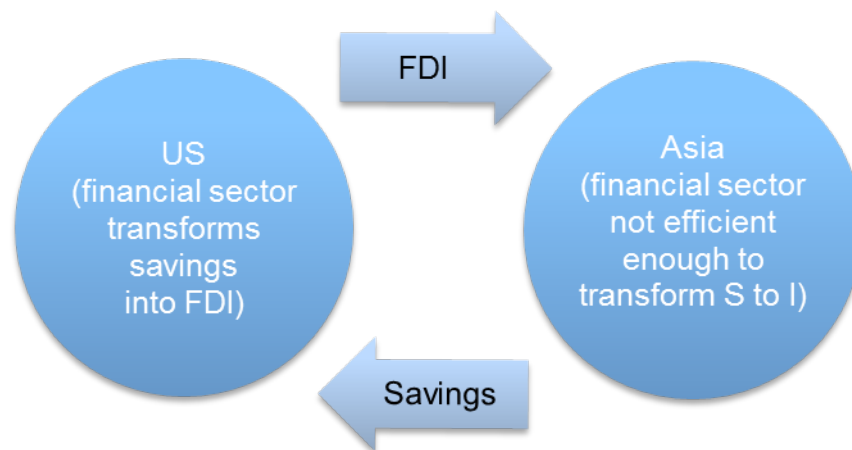
The growth strategy of these countries relied on development through the inflow of FDI and retained savings within the enterprises. The role of the US financial sector in this system would be to transform the incoming Asian savings into an outflow of FDI to the originating countries. China and other emerging market countries are net importers of FDI and net exporters of financial capital (by-pass effect). Ju and Wei (2007) confirm that the large volume of FDI inflow is rather a reflection of China's inability to allocate its household savings efficiently through its financial sector, than of its economic strength. Thus, FDI is a tool for Chinese private firms to circumvent the inefficient domestic financial sector. To maintain this mechanism, the surplus

countries kept foreign currency, as collateral for FDI[29] and to sustain solvency in case of a sudden stop. Referring to Astley et al. (2009) this policy is sustainable, because there is no fundamental constraint to the amount of foreign exchange reserves a country can accumulate. Dooley, Folkerts-Landau and Garber (2003) also consider this system as fundamentally stable[30].

Caballero (2010) states that the excess demand for safe assets from the periphery added to the US economy's own imbalance and put an enormous pressure on the US financial system.

Current literature provides several driving factors behind this mechanism which can be summarised as the mercantilist views.

- Mercantilist views -

a) Asset shortage hypothesis

Related to by-pass hypothesis is the hypothesis of an asset shortage in the emerging Asian economies, which sees Global Imbalances as a corollary of their backward financial markets. The hypothesis states that the emerging market countries were constrained to purchase US government bonds, because there was a shortage of safe and liquid assets in their domestic financial markets, which only the US market could offer. Weak bankruptcy procedures, chronic macroeconomic volatility or expropriation risk reduced the quality of the domestic assets. If China had an open capital account, citizens would seek assets abroad directly. Since it has not, the government accumulates international assets and issues implicitly collateralised sterilization bonds to its citizens (Caballero, 2006). Caballero (2010) concludes that the Global Imbalances observed in the capital accounts were just a consequence of the Global Imbalances in the ability of supplying safe assets. Or as Bracke et al. (2010) put it: The insufficient supply of safe assets in some countries trigger net capital flows to regions where safe assets are produced. If a country with a weak domestic financial sector experiences high productivity growth, the increased savings will lead to financial outflows. This is in accordance with the portfolio behaviour in section 2. Thus, the fall in the real interest rate in the US was just a market mechanism to overcome the asset gap (Caballero, 2006). By 2001, the demand for safe assets began to rise above what the US financial sector could naturally provide. Since the demand for safe debt instruments from foreign central banks could not be met, financial institutions began to search for mechanism to generate triple-A assets from riskier sources via the securitisation of payment streams[31].

b) Parking theory

Corden (2009) refers to the "parking theory" which he already mentioned in his 2007 paper. This theory says that Chinese savings are just parked in the US (safe haven), awaiting improvements in the capital market, before the accumulated funds could be invested efficiently in the domestic market.

If a country with an intermediate level of property rights and an underdeveloped financial sector integrates into the world economy, this causes capital flows and imbalances. The country becomes simultaneously a net exporter of financial capital and a net importer of FDI. Thus, the economic integration of China might have led to

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[29] So the US could expropriate these reserves in case of expropriation of their FDI (Portes, 2009)

[30] Even after the Outbreak of the financial crisis, the purchase of US government bonds remained positive (Astley et al., 2009).

[31] The problems arising from these kind of assets have been broadly discussed.

a lower saving rate in the US. As Bracke et al. (2010) mention, a deeper financial market allows lower domestic savings.

c) Exchange rate policy

If a country runs a continuous current account surplus, this puts an upward pressure on its exchange rate. China offsets this pressure by selling domestic assets and accumulating foreign currency reserves, mainly US bonds.

If the monetary policy of the anchor country is too lose (as in the case of the US), there is an upward pressure on inflation since it requires an increase in money supply in the surplus country. This was of no concern in China, because regarding Astley et al. (2009), the upward pressure on wages could be limited by the rapid increase in the workforce and productivity growth was sufficiently fast to keep inflation low[32]. Corden (2009) on the contrary describes that the primary goal of Chinese policy has been low inflation rather than the exchange rate. He shows how the increase in productivity and the WTO accession in 2001 improved the competitiveness and increased the savings of China[33]. This raised the potential for inflation[34] (which would be equivalent to an indirect appreciation of the currency), so China imposed monetary controls to reduce bank lending which induced a reduction in expenditure and thus improved the current account balance. Roubini and Setser (2005) share this view and state that the inflation fueled by only partially sterilized reserve accumulation and the resulting liquidity creation led to an investment bubble in China which was tried to be slowed down by controls on bank lending by China.

Thus, for Corden the surpluses since 2005 are rather a by-product of inflation limiting. Nevertheless, he confirms that besides inflation limiting, the prevention of excessive (nominal) appreciation of the Chinese currency has been a goal of intervention in the foreign exchange market. Beside the obvious purpose of maintaining profitability and employment in the export sector, it aims to create a stable exchange rate to avoid speculation and keep pressure from the fragile Chinese financial system[35].

d) Misallocation of capital hypothesis

Song, Storesletten and Zilibotti (2009) use another approach based on the inefficient Chinese financial sector, which states a misallocation of capital in China. Their hypothesis is that the combination of high returns to capital and a foreign surplus arises from the reallocation of capital and labour from less productive externally financed firms to more productive firms with less access to external financing. They create a model with firms, heterogeneous in productivity and access to financial markets. Since the high productivity firms crowd out the low productivity firms which have access to the financial markets, fewer and fewer domestic investment opportunities remain and domestic savings are invested in foreign assets.

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[32] The inflation rate in China was moderate with about 2 per cent on average. Data: IMF WEO 2010.
[33] Roubini and Setser (2005) state that apart from the exchange rate and the current account, China looks like East Asia before the 1997 crisis, with high levels of investment, a credit/ asset bubble and investment surge.
[34] In combination with a fixed exchange rate, it will also attract speculative capital which puts additional upward pressure on inflation.
[35] The undervalued currency allowed China to defer rebalancing its own economy (Obstfeld and Rogoff, 2009). Roubini and Setser (2005) name the interest of well-connected Chinese business men, who are heavily invested in the export sector as another possible reason for sustaining the peg.

There is a number of problems, arising from these mercantilist theories. Portes (2009) mentions that surplus countries' savings went into all kind of assets with different quality. Thus it is hard to justify why these savings went into the US with the superior risk aspect of American assets. As Obstfeld and Rogoff (2009) pointed out, the "win-win" situation of easier borrowing for the US, and the provision of safety and liquidity to the emerging markets seems to be flawed by the assumption that the US financial market functioned perfectly[36].

All the explanations set the focus on the accumulation of reserve assets via capital outflow from China. They lack an understanding of the FDI flow from the US to China. In fact, the US gross capital outflows went primarily to other advanced countries which contradicts the by-pass effect hypothesis. Moreover, the gross flows into the US did not primarily come from the private sector but from foreign central banks.

Finally, the mechanism was not "benign", because the inflows into the US financed consumption and government deficits, instead of financing investment (Portes, 2009).

Since high export growth has been the story of East-Asia during the last 50 years (Aizenman and Lee, 2005), the BW II story seems to be specific to the USA-China link, rather thank global (Wolf, 2008). Portes (2009) states that the whole exchange rate based analysis misunderstood the motivation for these surpluses. The holding of USD as collateral appears arguable. Roubini and Setser (2005) explicate how the Argentinian example has shown that foreign equity investors have not been able to establish a legal claim on the reserves. He is in line with authors like Aizenman and Lee (2005) who question the whole mercantilist view on reserve accumulation and refer to a precautionary approach.

- Precautionary savings -

The precautionary approach states that these surpluses were intended to build up precautionary reserves to deal with "sudden stops". In the aftermath of the Asian crisis, the emerging economies started to accumulate foreign exchange reserves, as insurance against "sudden stops". Empirical literature names the vulnerability of the capital account and the current account to "sudden stops" of capital inflow as the main reason to build up reserves[37].

Following the argument that China accumulated reserve assets for precautionary reasons, Jeanne (2007) raises the question if this level of accumulation was justified, or excessive in emerging market economies. The optimal level of reserve accumulation is defined by the costs of holding them (such as opportunity costs or the costs related to valuation effects of the USD denominated reserves), the probability of a current account crisis and the degree of risk aversion in a country holding reserves.

The opportunity costs of holding reserves are e.g. the difference in returns on these reserve assets, compared to the returns on other assets. Since the return on US assets was rather low in the observed period, this differential would be negative in the case of China[38]. Apart from the costs Jeanne (2007) states that it is not clear whether high reserves would actually prevent a crisis in the case of a "sudden stop" or just mitigate

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[36] After the financial crisis we know that the US financial sector also has difficulties with financial intermediation.

[37] A "sudden stop", according to Jeanne (2007) is a year in which the inflow of capital drops by more than five per cent of GDP.

[38] Jeanne (2007) estimates the costs of holding reserves for China as one per cent of GDP. Roubini and Setser (2005) state that a 33 per cent depreciation of the renminbi/ USD would generate losses of roughly 10 per cent of China's GDP. Section 4 will go deeper into the topic of valuation effects.

the fall in output that corresponds with it. Reserves could be used for mitigation through two channels. First, they could be sold to avoid the deterioration of the own currency and provide liquidity to the domestic financial markets. Since the Asian surplus countries rely on an export led growth model, they tend to be more concerned about appreciation of their currencies, thus this point does not seem convincing.

Second, they could be used to buffer the impact on domestic absorption. Since the current account equals the capital and financial account plus the net reserve assets, a buffer of reserve assets could mitigate the impact on the current account and thus keep pressure from domestic absorption. Jeanne (2007) mentions that empirically in a year of a "sudden stop", the decline in domestic absorption is mitigated to only three per cent. He concludes that the emerging economies accumulate reserves in good times, to deccumulate them in bad times.

Jeanne (2007) states that the opportunity costs, as well as the probability of a crisis rather suggest that reserve accumulation during the 2000's in China has been excessive. The probability of a current account crisis in China (or other emerging market countries) is rather low, taking into account their continuous current account surpluses. The opportunity costs of holding reserves on the contrary are rather high compared to other countries, given the profitable investment opportunities in China and possible alternative arrangements (Blanchard and Milesi-Ferretti, 2009). Jeanne (2007) mentions that expected costs of a current account crisis amounting to 60 per cent of GDP would be needed to justify this level of reserve assets and thus considers the view of reserve asset accumulation on a precautionary basis as rejected. Nevertheless, it is worth to have a closer look at the shift in the degree of risk aversion as a possible explanation. Fiorentini and Montani (2010) state that China and other Asian countries were importers of savings before the severe economic and financial crisis in 1997. Subsequently these countries became positive net savers. As mentioned above, the savings increased rapidly after 1999.

The conclusion might just be that higher precautionary savings are a response to an increased risk aversion after the Asian crisis. This raised demand of safe assets, which the Chinese market could not provide. So savings were redirected into the US market. This view is consistent with the observed shift from equity towards bonds in the Chinese US portfolio, after the dot-com crisis (Caballero, 2010). At the same time, the US experienced a decline in business cycle volatility, which led to lower precautionary savings in the US and made capital flowing "uphill" (Bracke et al., 2010). This does not justify the whole increase and there would have been other insurance mechanisms[39] but it contributed to it.

We support the view of Portes (2009) and other authors that this whole explanation is too focused on China. But since China accounts for most of the world's savings[40], and the hypothesis that the underdeveloped financial market and a shortage of appropriate domestic assets in China can not be neglected it surely contributed to the Global Imbalances. The inflow of FDI combined with the rising Chinese exports after the WTO accession in 2001 made the corporate sector more profitable and further increased Chinese savings, which then came back as FDI. Thus the mechanism was self enforcing. It is also important to state that the combination of a high marginal product to investment and a low return from safer external assets is dynamically inefficient. It creates a natural source of bubbles, in the case of capital repatriation

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[39] Central Bank swap-lines e.g.
[40] The Chinese share of global saving increased from less than 5 per cent in 1980 to about one fifth today. That makes China the single largest source of global saving (Haldane, 2010).

(Caballero, 2006). Also, as Roubini and Setser (2005) state, the Bretton Woods II system implies that the continued imports from Asia will lead resources to flow out of import competing sectors into sectors that are favoured by a low interest rate, what will additionally enhance the effects, studied in section 3.1 in the US.

To explain the whole international flows from the less developed countries to the US, we will need to focus on the role of the USD in the current international monetary system and the so called "Exorbitant Privilege" of the US.

4. The Exorbitant Privilege

The term "Exorbitant Privilege" refers to the benefits of the US connected with it's unique role of the issuer of the international reserve currency[41]. The USA is capable to borrow abroad by issuing assets in its own domestic money, so the debt burden does not depend on the exchange rate. Consequently, the US net foreign liabilities were growing at a rate, smaller than the US current account deficit (Campanella, 2009), which reduced the pressure of adjusting the US current account deficit and thus contributed to the evolution of Global Imbalances. The "Exorbitant Privilege" translates into a soft external constraint. The US can finance a significant amount of its imports through increases of low-income liquid liabilities held by foreign monetary authorities (Alessandrini and Fratianni, 2009). The higher the privilege, the bigger Trade Balance deficit can be run (long run), and the smaller adjustment is needed (Meissner and Taylor, 2006).

Figure 10 shows the development of the US foreign asset position measured in millions of USD.

Figure 10: US Net International Investment Position in Millions of USD
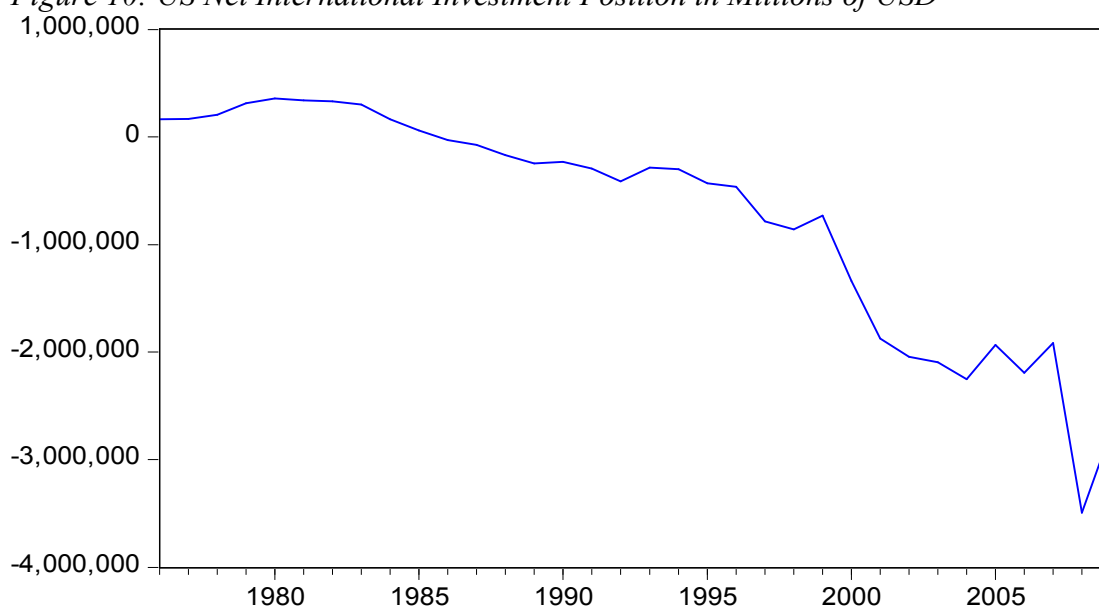
Source: U.S. Department of Commerce, BEA

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[41] The term was used by Valéry Giscard d'Estaing to describe the ability of the US to purchase imports by issuing their own currency in the Bretton Woods system. After the end of Bretton Woods in 1971, the USD maintained this role, because there simply were no real alternatives (Fiorentini and Montani, 2010).

Even when in 1986 the US turned form a net creditor to a net debtor, they continued to have a positive total return, which means they were able to indebt themselves for free[42]. Data from the U.S. Department of Commerce (used in figure 11) shows that during the years 2000 to 2007, the current account deficit grew by $4,592 billion whilst the net foreign debt increased by only $1,185 billion in the same period.

The Privilege is determined by the total rates of return (on external wealth), which consists of two factors. First the yield privilege and second the capital gains. Both factors contributed roughly equal parts to the US total return differential between 1981 and 2000. According to Meissner and Taylor (2006), the US maintained a privilege of about 0.5 per cent of GDP in the preceding two decades.

4.1 Yield Privilege

As Gourinchas and Rey (2005) notice, the foreign asset position of a country equals a leveraged portfolio. This portfolio is short in domestic assets and long in foreign assets. As noted by many authors, the US earn systematically higher returns on their foreign assets, than they pay for their foreign liabilities.

- Banker of the World -

Due to the unique role of the USD in the Bretton Woods system, the US became the "Banker of the World" (Kindleberger, 1965), a role that was played by the UK before the First World War. They borrowed low yielding short-term and lent higher yielding long term. After the end of the Bretton Woods era, the US kept that role. But, according to Meissner and Taylor (2006), there has been a downward trend in the yield privilege since 1981. This could be compensated in two possible ways. First the leverage effect and second, the composition effect (purchase more high yield foreign assets, issue less home equity).

As long as there is a positive return differential, it can be exploited by increasing the leverage ratio. This enlarging of the balance sheet has been used by the US since the 1960s and quadrupled the US foreign liability to GDP ratio between the 1980s and 2003 up to 99 per cent of GDP (Gourinchas and Rey, 2007). This was mainly offsetting the narrowing yield differentials. The use of the leverage effect is only possible to a certain extent. If the differential keeps shrinking, an explosion in leverage would be needed.

Thus, to maintain their positive yield differential, the US made use of the composition effect. They shifted their assets position from lending long-term, to FDI and buying equity. As Gourinchas and Rey (2005) stated, since the 1990s, the US changed from being the World Banker to being the World Venture Capitalist. This means they issued short-term and fixed income liabilities and invested direct and in equity abroad. Gourinchas and Rey (2005) observe that the total return differential between US foreign assets and liabilities increased from 0.26 per cent during the Bretton Woods period, to 3.32 per cent after 1973, despite the downward trend in the yield privilege. The increase results from a shift in assets (composition effect), whilst liabilities broadly remained the same.

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[42] Hausmann and Sturzenegger (2005) show how the US earned the same 30 billion return in 2005 than they did in 1980, even though they accumulated 4,5 trillion of current account deficit during that period, what change them to be a net debtor.

On the contrary, Meissner and Taylor (2006) state that the yield differential has fallen from 3 per cent to 1 per cent since 1960, despite the rise in risky FDI and was only offset by vastly expending the external balance sheet of the US. Since this is only possible until a certain level of leverage, they conclude that since the Privilege consists of the yield differential and capital gains, the latter must have compensated for declining yields. Even if the yield differential is falling and cannot be offset, there may be no consequence for the long-run budget constraint. The capital gains can come from price effects, exchange rates effects and other effects. These capital gains must have grown enormously, since in the Bretton Woods era there has been a negative capital gain for the US which improved every year, until reaching zero in 2000 (Meissner and Taylor, 2006).

4.2 Capital gains

With the end of the Bretton Woods era came also the initiation of a regime of floating exchange rates which left room for exchange range adjustments. Nevertheless, the US kept their role as the issuer of the Key Currency (KC). The KC country usually has its liabilities in its own currency. Thus the country (the US in this case) shifts the exchange rate exposure to the rest of the world. Gourinchas and Rey (2005) describe the mechanism as follows. A decrease in the value of the USD has two consequences. First, in the medium and long run, it fosters the exports via the trade channel[43]. Second, in the short run, there is an impact via the valuation channel. The value of the US liabilities in USD remains the same, whilst the value of US assets in foreign currencies increases (measured in USD). Thus, there is a wealth transfer towards the US and the US net foreign liabilities grow at a rate below the one of the cumulative current account deficit. Figure 4 showed the devaluation of the USD in the last decade. Alessandrini and Fratianni (2009) show that in 2001-2007, the USD exchange rate depreciation increased the dollar value of US foreign assets by $950 billion.

Figure 11: Components of Changes in the NFA position in Millions of USD
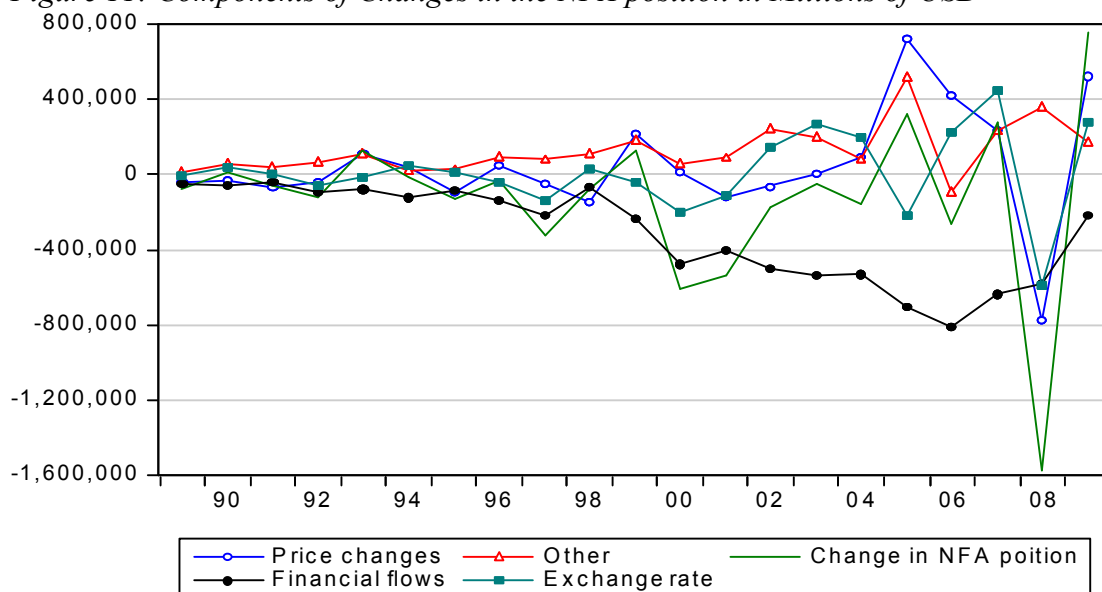
Data: U.S. Department of Commerce, BEA

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[43] Section three has shown how this mechanism works.

Figure 11 on the contrary shows how during the strong dollar periods of the mid 1990s and the early 2000s, Valuation effects were negative and the US Net Foreign Asset (NFA) position fell at a rate bigger then the current account deficit[44]. Looking at figure 11 reveals some interesting facts. The decrease in the NFA position went always slower then the current account deficit (indicated by the solid line being above the dotted line), meaning the US always profited from positive capital gains. The only exceptions are the year of the Asian crisis 1997, the years after the dot-com crisis and 2008, the most severe year of the financial crisis. One can see that the negative impact in 1997 resulted from negative price changes (due to a deterioration of the American equity in Asia) and from negative valuation effects, due to a peak in the value of the USD. In the early 2000s the negative effect resulted from valuation effects only, when the USD reached its 15 year peak (see also figure 4). Finally, in 2008 there was a huge impact of the negative price effects, resulting from a slump in world equity markets mainly. The massive impact on the US NFA position can be reasoned by the shift towards equity in the American portfolio in preceding years.

Despite these findings, the exchange rate channel is, according to Meissner and Taylor (2006), weak as an explanation in the long run. As seen above, it can also work in the opposite direction and thus there was hardly any valuation effect over the total last two decades. The price effect also accounted only for a small amount. The majority was indeed contributed by other effects.

Focusing on two periods separately shows a more differentiated picture and supports Alessandrini and Fratianni (2009)'s view.

In the years before 2001, the price and valuation effect were negative and offset by very strong other effects. This changed after 2001. The weight of the other effects declined drastically, whilst valuation effects and price effects increased. In the years preceding the crisis, the dollar depreciation (as seen in figure 4) and the gain on foreign asset prices each contributed almost the same to capital gains now as other effects. Thus, the US benefited from exchange rate effects not only through the trade channel, but also through the valuation channel. The price effects are in line with the fast recovery of the emerging Asian countries' assets after the Asian crisis, with a little dent in the two years following the dot-com crisis and the deterioration of the equity dominated US portfolio in 2008 ("World Venture Capitalist"). It remains contentious in literature, what the other effects consist of. One explanation might be the so called "Dark Matter" Hypothesis.

4.3 Dark Matter

Hausmann and Sturzenegger (2005) introduced the hypothesis of Dark matter. They assume, that if the US foreign income flows remained fairly stable over the last 25 years (before 2005), then consequently (from an accounting point of view), the NFA also should not have changed. This contradicts with the continuous current account deficits of the US. Thus, they conclude that the current account deficits were not measured correctly, the NFA position did not turn negative and the US are still a net creditor. The discrepancy to the official NFA position equals to what they call the Dark matter. The Dark matter reflects a three fold service transfer, hidden, but not reflected, in the capital account:

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[44] It is also important to notice that any devaluation of the USD reduces the value of US assets owned by foreigners and might impair the willingness the purchase of USD nominated bonds.

First, there is the knowledge service transfer. This is the most important factor, according to Hausmann and Sturzenegger (2005). They state that the value of American FDI is much higher than its booking value, because it generates a higher return. They consider this return as a kind of premium for a know-how transfer from the US abroad. Thus the American FDI yields higher returns than those made by foreigners in the US.

Second, there is the transfer of an Insurance service. This hypothesis states that the difference in the rates of return is an insurance premium the world pays to swap a safe American bond against riskier emerging market bond. This means that there is an unaccounted insurance service sold to the world, which generates a premium.

Finally, Hausmann and Sturzenegger state the hypothesis that there is an unaccounted value in the form of liquidity services provided to the world by the US (Seigniorage). The US earn a significant premium on the provision of liquidity[45]. They provide their currency as a superior store of value for countries with unstable domestic currencies[46].

The Hausmann and Sturzenegger paper is based on some odd assumptions. They set the net income rate of return at 5 per cent and derive a NFA position based on that assumption, ignoring the well established fact that the US can exploit a return differential in favour of their assets. Taking into account the return differential, the Dark Matter would shrink considerably.

Buiter (2006) further analyses each of the three service transfers. First, even if the US had unique technical and managerial skills and knowledge, foreign investors in the US should profit from this as well. He explicates that this view is not supported by data. Further he questions the reliability of FDI market value measure, since FDI is typically unlisted and not traded, and raises the assumption that also FDI in the US could be understated. Thus, the knowledge transfer hypothesis does not hold.

Buiter (2006) mentions secondly that it is only possible that US banks offer a return below risk adjusted market rates to foreigners[47] if some additional banking services are not priced in. These services could consist of a continued association with the bank. Considering the development of the financial sector since the 1980s, this association seems less important. Even if the world pays a premium for lowering risk, the risk adjusted return should not be different than elsewhere. He concludes that the opposite seems to be true. The ex-ante spreads between US treasuries and emerging market debt are barely sufficient to compensate for the likelihood of default. Thus, there rather seems to be negative dark matter, considering the insurance service aspect.

But, according to Buiter (2006), 2/3 of all Dollar notes in circulation were held abroad. US currency held abroad is in no sense a liability. Printing money equals an interest free loan to the US authorities. The US then use the proceeds from printing money (Seigniorage), to buy assets that generate returns. Buiter (2006) confirms the contribution of liquidity services to Dark Matter, but states that it accounts for only a small amount.

The reserve currency is a public good, provided by a single country, so there is an inherent conflict between the national dimension of economic policy and the global economy (Campanella 2009). Two severe consequences may arise. First the issuer of the key currency could make use of valuation effects, as seen above. Second, issuing

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[45] According to Gourinchas and Rey (2005), this ability has even strengthened over time.

[46] According to Obstfeld (2010), this can also be seen as an insurance payment for expected transfers in future crisis.

[47] And likewise US loans to foreigners pay above risk adjusted market rate.

the key currency helps the anchor country to easily finance an ongoing deficit through excessive use of Seigniorage.

According to Fiorentini and Montani (2010) this has been the case, preceding the crisis. After almost half a century in which foreign central banks financed approximately 6.5 per cent of US imports on average, this figure increased to 12 per cent in the 2001-2008 period[48]. It ensured ten years of rapid growth, but contributed to Global Imbalances.

To summarise, the evolution of the US privilege was as follows: During the Bretton Woods era, they simply exploited their function as the world banker. When their NFA position turned from being a net creditor into being a net debtor, they used composition effects, to gain a positive yield differential (World Venture Capitalist). When that yield differential started draining away, the US increased their leverage ratio, to magnify the declining yield differential. When the deficit reached an amount where this was not possible any further, the US compensated this by increasing capital gains through using the valuation channel (in a then floating exchange rate system) and, to a greater amount by other capital gains. Of these other capital gains, only the use of Seigniorage could be verified, but an excessive creation of dollars might erode the trust in the dollar. The rest of the other capital gains remains unknown.

5. Conclusion

To conclude, there is no single explanation for the events that started in 2007 and still continue. This paper tried to provide a coherent account of interaction of several events inside and outside the United States.

The US ability to finance macroeconomic imbalances through easy foreign borrowing allowed it to postpone tough policies (Campanella 2009). Whilst the original Bretton Woods system required the US to maintain the USD parity to gold, the BW II system fails to impose any limits on US policy. The excessive use of the "Exorbitant Privilege" by the US before the crisis, in combination with precautionary savings in China after the Asian crisis and a demand for (safe) assets in the fast growing, more and more integrated, emerging economy countries, which were not natural asset producers seemed to have played an important role in the evolution of the Global Imbalances that led to the financial crisis. One can conclude that China had a too closed capital account, whilst the US had a too open current account. Nevertheless, the Global Imbalances could only unfold their negative effects in connection with a deregulated American financial sector and the use of easy housing credit as a tool for income redistribution by the US government. This helped to transform the excessive money supply into an asset price bubble, increasingly indebted households and a booming consumption, which came to an end when the short-term interest rate began to rise in 2004. Households couldn't pay their adjustable rate mortgages, and banks saw their spread between borrowing short and lending long-term draining away. The situation led to the financial meltdown of the years 2007-2010. The Global Imbalances might not have been the immediate cause of these events, but created the conditions for this development.

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[48] Reaching its peak at 19 per cent in 2004.

An Asymmetric Model on Seigniorage and the Dynamics of Net Foreign Assets

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Abstract

The emergence of international current account imbalances has dominated the economic debate for several years and has been considered one of the main reasons for the turbulences in the world economy since 2007. Economic theory suggests that an economy cannot run persistent current account deficits without depleting its net foreign assets. Nevertheless, for most of the 2000s the US net foreign liabilities grew at a rate below the one of the cumulative current account deficit. To investigate on the mechanisms that allow the US to do so, this paper sets up a two country DGE model with asymmetric liquidity constraints. The model will show that there is a permanent wealth transfer from the world to the US. The unique position of the US not only allows them to run persistent current account deficits, but also imposes a permanent decay on the American current account. As the issuer of the world key currency in an asymmetric world monetary system, the US can make use of Seigniorage and valuation effects to be able to run a continuous current account deficit. These mechanisms work in favour of their net foreign bond holdings, but let their CA further deteriorate. The corresponding one-way capital flows were part of the distortions that laid the ground for the world financial crisis 2007-2009. Future will show if a multi polar world with several (regional) reserve currencies emerges.

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1. Introduction

Global Imbalances, the divergence of international current account (CA) positions, have been considered one of the main drivers behind the events that led to the world financial crisis from 2007 to 2009. Standard intertemporal international macroeconomics suggests that every current account deficit has to be mirrored by future surpluses. No country can run persistent current account deficits, without depleting its net foreign assets (nfa)[2]. Nevertheless, for most of the 2000s (the time of the widening US current account deficit), the US net foreign liabilities grew at a rate below the one of the cumulative current account deficit[3]. This paper will show how the unique position of the US in the world monetary system allowed them to do so. Figure 1 displays the change in the nfa position and the CA positions between 1989 and 2009. The dotted line being above the solid line indicates the US net foreign liabilities were growing at a rate smaller than the American CA deficit in most years. Triffin describes how the "disastrous result" of the use of a reserve currency as the sole instrument of international monetary reserves is that "the deficits of a reserve-centre country may be financed [...] with little or no decline of gross reserves for that reserve-centre country and, therefore no imperative pressure for the readjustment of inflationary policies"[4].

According to Triffin, the discrepancy between the two figures is explained by the use of Seigniorage. This has also been mentioned by other authors[5]. In that scenario, there is an unaccounted value in the form of liquidity services that the US provide to the world (Seigniorage).

The US earn a significant premium on the provision of liquidity[6]. The Americans use the proceeds from printing money as an interest free loan to buy assets that generate returns[7]. The US also benefit from exchange rate effects through the valuation channel. When the value of the US-dollar (USD) decreases, the value of the US liabilities in USD remains the same, whilst the value of US assets in foreign currencies increases (measured in USD)[8]. Thus, in both cases, there is a wealth transfer towards the US.

The fact that the dotted line is below the solid one in 1997 (Asia crisis), and the early 2000s, when the USD reached its 15 year peak, demonstrates that the valuation effect can also be negative for the US, in times of peaks in the value of the USD[9].

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[2] See Obstfeld et al. (1996)
[3] See Dettmann (2011)
[4] See Triffin (1992)
[5] See Fiorentini and Montani (2010)
[6] See Hausmann and Sturzenegger (2005)
[7] See Buiter (2006)
[8] See Gourinchas and Rey (2007)
[9] The extreme deterioration of the nfa position in 2008 derives from negative price effects, due to a slump in the world's equity markets in the context of the world financial crisis.

Figure 1: Development US CA deficit and NFA position in million USD
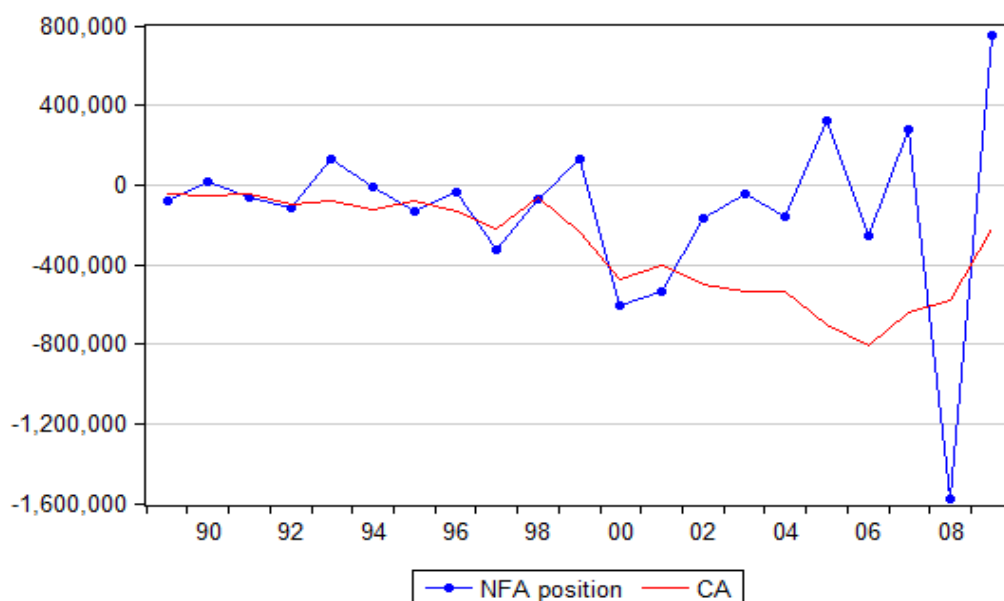
Data: U.S. Department of Commerce, BEA

The idea of this paper is to set up a deterministic two country dynamic general equilibrium model for an asymmetric world, where only one country can issue the world reserve currency and use it to purchase its imports, whilst the other country will have to collect foreign currency to pay for its imports.

We will analyse how the use of Seigniorage in one country leads to current account deficits and a deteriorating net foreign asset position. The paper relates to other contributions on global CA imbalances which stress the role of the USD and net foreign asset holdings in the US[10]. It is based on earlier models with asymmetric liquidity constraints that cover current account deficits and Seigniorage[11], but will extend them by the holdings of domestic and foreign bonds. Thus, we will be able to examine the development of the respective net foreign asset positions. We will establish that the fact that the US is the sole issuer of the world key currency not only helps them to run persistent CA deficits, but lets their CA deteriorate even further.

The paper will be structured as follows: The next section will set up the model and solve it analytically; whilst section 3 will run a numeric simulation and section 4 will conclude.

2. A two country pure endowment model with bond holdings and cash-in-advance constraints

A model of a world will be set up that contains only two economies: Europe (EU) and America (US). These two economies will only differ in the form of their cash-in-advance constraint.

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[10] Such as Lane and Milesi-Ferretti (2007) or Krugman (2007)
[11] Such as Fiorentini (2002)

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2.1 Europe

The utility for the representative European consumer is a functional of the following form:

$$U_t^{EU} = \sum_{s=0}^{\infty} (\frac{1}{1+\beta})^s (\ln C_{t+s}^{EU} + \ln C_{t+s}^{*EU}), \beta\varepsilon[0,1] \qquad (1)$$

C_t^{EU} stands for European consumption of domestic goods in period t, whilst C_t^{*EU} stands for European consumption of American goods in period t, both goods are normal goods.

Agents can acquire interest yielding one-period bonds or non interest yielding currency. They need to acquire cash in period t-1 for all goods they plan to purchase in period t. Consumption at each date is bounded by stock of money carried from previous period. Goods cannot be stored, so they must be entirely consumed in each period.

Cash-in-advance constraints:

$$M_{t-1}^{EU} \geq P_t C_t^{EU} \qquad (2)$$

$$M_{t-1}^{*EU} \geq P_t^* C_t^{*EU} \qquad (3)$$

The European consumers need to hold sufficient cash of each currency to purchase their goods from that economy.

The consumer's budget constraint has the following form:

$$P_t Y_t + M_{t-1}^{EU} + S_t M_{t-1}^{*EU} + B_{t-1}^{EU}(1+r_t) + S_t B_{t-1}^{*EU}(1+x_t) =$$
$$P_t C_t^{EU} + S_t P_t^* C_t^{*EU} + T_t + S_t M_t^{*EU} + M_t^{EU} + B_t^{EU} + S_t B_t^{*EU} \qquad (4)$$

The left-hand-side represents the total wealth of the European consumers. The nominal value of endowment $P_t Y_t$, the amounts of euros and dollars M_{t-1}^{EU} and M_{t-1}^{*EU}, where S_t is the dollar-euro exchange rate in period t, and the European holdings of domestic and foreign bonds carried forward from the former period B_{t-1} and B_{t-1}^*, with the interest payment r_t for European bonds and x_t on American bonds. These bonds are purchased at the end of period t-1 and carried into period t where they yield an income $r_t B_{t-1}^{EU}$ or $x_t B_{t-1}^{*EU}$.

The right-hand-side contains the expenditure for consumption of both goods, the amount of taxes the representative consumer faces (T_t) and the amount of money and bonds that are acquired in this period.

Since money neither yields any interest, nor enters the utility function directly, the rational consumer will strictly demand the quantity of money necessary for the expected consumption of the desired domestic and foreign goods, so that the cash-in-advance constraint will always be binding[12]:

$$M_{t-1}^{EU} = P_t C_t^{EU}, M_{t-1}^{*EU} = P_t^* C_t^{*EU} \qquad (5)$$

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[12] See Obstfeld et al. (1996)

If money supply is determined exogenously and consumers demand exactly the quantity of money necessary for their desired consumption, the prices will have to adjust so that all the money markets clear.

Plugging (5) into the budget constraint and some simplifications lead to:

$$P_{t+1}C_{t+1}^{EU} + S_t P_{t+1}^* C_{t+1}^{*EU} = P_t Y_t - T_t - B_t^{EU} - S_t B_t^{*EU} + B_{t-1}^{EU}(1+r_t) + S_t B_{t-1}^{*EU}(1+x_t)$$
(6)

To determine the optimal level of bond holdings we maximise the utility function with respect to holdings of foreign and domestic bonds:

$$\frac{dU_t}{dB_t^{EU}} : P_{t+2}C_{t+2}^{EU} + S_{t+1}P_{t+2}^{*EU}C_{t+2}^{*EU} = \frac{1+r_{t+1}}{1+\beta}\left(P_{t+1}C_{t+1}^{EU} + S_t P_{t+1}^{*EU}C_{t+1}^{*EU}\right)$$
(7)

$$\frac{dU_t}{dB_t^{*EU}} : P_{t+2}C_{t+2}^{EU} + S_{t+1}P_{t+2}^{*EU}C_{t+2}^{*EU} = \frac{S_{t+1}}{S_t}\frac{1+x_{t+1}}{1+\beta}\left(P_{t+1}C_{t+1}^{EU} + S_t P_{t+1}^{*EU}C_{t+1}^{*EU}\right)$$
(8)

From (7) and (8) we get the uncovered interest rate parity equation which states that the expected change in the exchange rate is determined by the interest rate differential between the two countries:

$$S_{t+1} = S_t \frac{(1+r_{t+1})}{(1+x_{t+1})}$$
(9)

Maximising the utility with respect to consumption of domestic and foreign goods gives:

$$P_{t+1}C_{t+1}^{EU} = S_t P_{t+1}^* C_{t+1}^{*EU}$$
(10)

Given the log utility function, it is not surprising that the agents want to consume the same nominal value on both goods. Because European consumers have to buy USD for their desired level of consumption of foreign goods before the beginning of the period, the exchange rate of the former period applies for their current consumption. The amount of money spent on both goods will be the same

$$M_t^{EU} = S_t M_t^{*EU} \Leftrightarrow S_t = \frac{M_t^{EU}}{M_t^{*EU}}$$
(11)

Equation 11 is a monetary model of the exchange rate[13]. It says that the exchange rate is determined by relative money spent on domestic and foreign goods by the Europeans. We can use it and the cash-in-advance constraints to simplify (7) to:

$$P_{t+1}C_{t+1}^{EU} = \frac{(1+r_t)}{(1+\beta)}P_t C_t^{EU}$$
(12)

Equation 12 is the Euler equation which says that in each period we expect tomorrow's consumption to equal today's consumption times the differential of the interest rate and the discount factor. A similar identity will apply for our consumption of foreign goods.

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[13] See Bilson (1978) or Mussa (1976)

2.2 The US economy

The utility function of the representative consumer in the US takes a similar form as the European one,

$$U_t^{US} = \sum_{s=0}^{\infty} (\frac{1}{1+\beta})^s (\ln C_{t+s}^{US} + \ln C_{t+s}^{*US}), \beta \varepsilon [0,1] \tag{13}$$

whilst there is only a single cash in advance constraint. American consumers can pay for their consumption of domestic goods C_t^{*US} and foreign goods C_t^{US} in USD and thus do not need to accumulate foreign currency reserves.

$$M_{t-1}^{*US} \geq \frac{P_t}{S_t} C_t^{US} + P_t^* C_t^{*US} \tag{14}$$

Thus, the consumer's budget constraint takes the following form:

$$P_t^* Y_t^* + M_{t-1}^{*US} + B_{t-1}^{*US}(1+x_t) + \frac{B_{t-1}^{US}}{S_t}(1+r_t) = P_t^* C_t^{*US} + \frac{P_t \, C_t^{US}}{S_t} + T_t^{US} + M_t^{*US} + \frac{B_t^{US}}{S_t} + B_t^{*US} \tag{15}$$

The American consumer strictly demands the quantity of money needed for consumption,

$$\Rightarrow P_{t+1}^* C_{t+1}^{*US} + \frac{P_{t+1} C_{t+1}^{US}}{S_{t+1}} = P_t^* Y_t^* - T_t^{US} - \frac{B_t^{US}}{S_t} - B_t^{*US} + B_{t-1}^{*US}(1+x_t) + \frac{B_{t-1}^{US}}{S_t}(1+r_t) \tag{16}$$

Maximising utility w.r.t. foreign and domestic bonds:

$$\Rightarrow \frac{dU_t^{US}}{dB_t^{US}} : \frac{P_{t+2} C_{t+2}^{US}}{S_{t+2}} + P_{t+2}^* C_{t+2}^{*US} = \frac{S_t}{S_{t+1}} \frac{(1+r_{t+1})}{1+\beta} \left(\frac{P_{t+1} C_{t+1}^{US}}{S_{t+1}} + P_{t+1}^* C_{t+1}^{*US} \right) \tag{17}$$

$$\Rightarrow \frac{dU_t^{US}}{dB_t^{*US}} : \frac{P_{t+2} C_{t+2}^{US}}{S_{t+2}} + P_{t+2}^* C_{t+2}^{*US} = \frac{(1+x_{t+1})}{1+\beta} \left(\frac{P_{t+1} C_{t+1}^{US}}{S_{t+1}} + P_{t+1}^* C_{t+1}^{*US} \right) \tag{18}$$

The expected exchange rate is as before:

$$S_{t+1} = S_t \frac{(1+r_{t+1})}{(1+x_{t+1})} \tag{19}$$

Maximising for consumption of foreign and domestic goods:

$$\frac{C_{t+1}^{US} P_{t+1}}{S_{t+1}} = C_{t+1}^{*US} P_{t+1}^* \tag{20}$$

$$\Rightarrow C_t^{*US} P_t^* = \frac{1}{2} M_{t-1}^{*US} = \frac{P_t \, C_t^{US}}{S_t} \tag{21}$$

The main difference to the European case is that American consumers do not have to change their money for their desired consumption before the period, thus the value of foreign consumption translates into domestic consumption using the current exchange rate, whilst the Europeans have to purchase foreign currency before the beginning of the period and thus the former exchange rate applies (10).

The Euler equation for the US consumer takes a similar form as the European one:

$$P_{t+1}^* C_{t+1}^{*US} = \frac{(1+x_t)}{1+\beta} P_t^* C_t^{*US} \tag{22}$$

American consumers will spend half their USD on each good. The nominal value of consumption in foreign and domestic goods will be the same.

2.3 Aggregate level

After deriving the individual consumption levels for both economies, we will now turn to the aggregate levels. On the aggregate level, taxes cannot be considered exogenous. The government budget constraint will enter the consumer's budget constraint in the aggregate. It will take the following form in the case of Europe:

$$G_t^{EU} = T_t^{EU} + M_t - M_{t-1} + B_t - B_{t-1}(1+r_t) \tag{23}$$

Taxes, the newly issued money and issued bonds will have to finance the government's expenditure and the repayment of last period's bonds plus interest. Rearranging (23) and Substituting T_t in the consumer's budget constraint yields to:

$$P_t C_t^{EU} + S_t P_t^* C_t^{*EU} = P_t Y_t + M_{t-1}^{EU} + S_t M_{t-1}^{*EU} + B_{t-1}^{EU}(1+r_t) + S_t B_{t-1}^{*EU}(1+x_t)$$
$$- G_t^{EU} - B_{t-1}(1+r_t) + M_t - M_{t-1} + B_t - S_t M_t^{*EU} - M_t^{EU} - B_t^{EU} - S_t B_t^{*EU} \tag{24}$$

Since only European consumers demand European currency, whilst European bonds are held in both countries, the following identities apply: $M_{t-1}^{EU} = M_{t-1}$, $M_t^{EU} = M_t$, $B_{t-1} = B_{t-1}^{EU} + B_{t-1}^{US}$, $B_t = B_t^{EU} + B_t^{US}$

Substituting into the consumer's budget constraint:

$$P_t C_t^{EU} + S_t P_t^* C_t^{*EU} = P_t Y_t + S_t M_{t-1}^{*EU} + S_t B_{t-1}^{*EU}(1+x_t) - G_t^{EU}$$
$$- B_{t-1}^{US}(1+r_t) + B_t^{US} - S_t M_t^{*EU} - S_t B_t^{*EU} \tag{25}$$

Note that on the aggregate level, domestic bonds are not part of the consumer's budget constraint, since the government will tax away all interest gains on domestic bonds in the next period (Ricardian equivalence)[14].

$$P_t C_t^{EU} + S_t P_t^* C_t^{*EU} = P_t Y_t + S_t P_t^* C_t^{*EU} + S_t B_{t-1}^{*EU}(1+x_t) - G_t^{EU}$$
$$- B_{t-1}^{US}(1+r_t) + B_t^{US} - S_t P_{t+1}^* C_{t+1}^{*EU} - S_t B_t^{*EU} \tag{26}$$

Applying (10):

$$P_t C_t^{EU} + P_{t+1} C_{t+1}^{EU} = P_t Y_t + S_t B_{t-1}^{*EU}(1+x_t) - G_t^{EU} - B_{t-1}^{US}(1+r_t) + B_t^{US} - S_t B_t^{*EU} \tag{27}$$

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[14] This differentiates this model from Lane and Milesi-Ferretti (2007), who assume non-Ricardian consumers.

$$\Leftrightarrow P_t C_t^{EU} + P_t C_t^{EU} \frac{(1+r_t)}{(1+\beta)} = P_t Y_t + S_t B_{t-1}^{*EU}(1+x_t) - G_t^{EU} - B_{t-1}^{US}(1+r_t) + B_t^{US} - S_t B_t^{*EU}$$

(28)

For the US, the government budget constraint takes a form similar to Europe:

$$G_t^{US} = T_t^{US} + M_t^* - M_{t-1}^* + B_t^* - B_{t-1}^*(1+x_t)$$

(29)

Since European consumers need to acquire USD for their imports, the demand for American assets is defined as:

$$M_{t-1}^* = M_{t-1}^{*US} + M_{t-1}^{*EU}, \quad B_{t-1}^* = B_{t-1}^{*US} + B_{t-1}^{*EU}$$

(30)

And:

$$M_t^* = M_t^{*US} + M_t^{*EU}, \quad B_t^* = B_t^{*US} + B_t^{*EU}$$

(31)

Substituting T_t^{US} by the government budget constraint:

$$P_t^* C_t^{*US} + \frac{P_t C_t^{US}}{S_t} = P_t^* Y_t^* - G_t^{US} - \frac{B_t^{US}}{S_t} + \frac{B_{t-1}^{US}}{S_t}(1+r_t) + B_t^{*EU}$$
$$- B_{t-1}^{*EU}(1+x_t) + M_t^{*EU} - M_{t-1}^{*EU}$$

(32)

Note that the level of American consumption rises with the amount of Seigniorage used $(M_t^{*EU} - M_{t-1}^{*EU})$[15], which equals the European consumption of American goods (remember: The nominal value of consumption of domestic goods equals the nominal value of consumption of foreign goods):

$$2P_t^* C_t^{*US} = P_t^* Y_t^* - G_t^{US} - \frac{B_t^{US}}{S_t} + \frac{B_{t-1}^{US}}{S_t}(1+r_t) + B_t^{*EU} - B_{t-1}^{*EU}(1+x_t) + \frac{P_{t+1} C_{t+1}^{EU}}{S_t} - \frac{P_t C_t^{EU}}{S_{t-1}}$$

(33)

Given the fact that goods cannot be stored, the good markets have to clear in every period. Total consumption of each good will equal total endowment for each country in each period. Thus, the resource constraints are given by:

$$\Rightarrow Y_t^{EU} = C_t^{EU} + C_t^{US} + \frac{G_t}{P_t}, \quad Y_t^{US} = C_t^{*US} + C_t^{*EU} + \frac{G_t^*}{P_t^*}$$

(34, 35)

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[15] Following Obstfeld et al. (1996), we define Seigniorage as the increase in the stock of USD held outside the US.

2.4 Solving the System

From equations 28 and 33 we get for holdings of foreign bonds in period t:

$$B_t^{*EU} = \frac{P_t Y_t + S_t B_{t-1}^{*EU}(1+x_t) - G_t^{EU} - B_{t-1}^{US}(1+r_t) + B_t^{US} + P_t C_t^{EU} - \dfrac{(1+r_t)}{1+\beta} P_t C_t^{EU}}{S_t}$$

(36)

And:

$$B_t^{US} = S_t \left[\begin{array}{l} P_t^* Y_t^* - G_t^{US} + \dfrac{B_{t-1}^{US}}{S_t}(1+r_t) + B_t^{*EU} - B_{t-1}^{*EU}(1+x_t) \\[2mm] + \dfrac{(1+r_t)P_t\, C_t^{EU}}{(1+\beta)S_t} - \dfrac{P_t C_t^{EU}}{S_{t-1}} - 2P_t^* C_t^{*US} \end{array} \right]$$

(37)

Since equations 36 and 37 both contain the holdings of foreign bonds and domestic bonds held by foreigners, they show the same position from different sides. We can summarise them in one equation:

$$\frac{1}{S_t}\left[B_t^{US} - B_{t-1}^{US}(1+r_t)\right] - \left[B_t^{*EU} - B_{t-1}^{*EU}(1+x_t)\right] =$$
$$P_t^* Y_t^* - G_t^{US} - 2P_t^* C_t^{*US} + (M_t^{*EU} - M_{t-1}^{*EU})$$

(38)

The left-hand-side of this equation just describes the change in American bond holdings abroad over two periods minus the change in foreign holdings of American bonds over two periods and thus can be expressed as:

$$\frac{\Delta B_t^{US}}{S_t} - \Delta B_t^{*EU} = P_t^* Y_t^* - G_t^{US} - \left(P_t^* C_t^{*US} + \frac{P_t}{S_t} C_t^{US}\right) + (M_t^{*EU} - M_{t-1}^{*EU})$$

(39)

The first term on the right-hand-side describes the American CA whilst the second term describes the American use of Seigniorage.

$$\frac{\Delta Total\ foreign\ bond\ holdings}{S_t} - \Delta Total\ foreign\ bond\ liabilities =$$
$$CA^* + (M_t^{*EU} - M_{t-1}^{*EU})$$

(40)

And thus, the change in the net foreign bond position.

$$\Rightarrow \Delta NFB^{US} = CA^{US} + US\ Seigniorage\ (SE^{US})$$

(41)

Similar for the European case:

$$S_t \Delta B_t^{*EU} - \Delta B_t^{*US} = (P_t \, Y_t - G_t^{EU} - P_t \, C_t^{EU} - S_t \, P_t^* C_t^{*EU}) - S_t \, (M_t^{*EU} - M_{t-1}^{*EU})$$
(42)

$$\Rightarrow \Delta NFB^{EU} = CA^{EU} - S \, SE^{US}$$
(43)

$$\Leftrightarrow CA_t^{EU} = -S_t \, CA_t^{US}$$
(44)

Equations 41 and 43 show that the use of Seigniorage is mitigating the deterioration of the American NFB position in case of a CA deficit, whilst it represents an additional burden on the European NFB position. Via the use of Seigniorage, the US can just swap interest free currency holdings for interest bearing bonds within their liabilities. Thus, the use of Seigniorage equals a net wealth transfer from the rest of the world towards the US.

Equation 44 shows that on a global level the sum of all current accounts has to be zero. The same result could be derived from dividing the European resource constraint (34) by the exchange rate S_t and adding it to American resource constraint (35).

To solve the system, we use equation 39, the two resource constraints (34, 35), the exchange rate (9) or (19) and the cash in advance constraints:

$$M_{t-1}^{EU} = P_t C_t^{EU}, \, M_{t-1}^{*EU} = \frac{M_{t-1}^{EU}}{S_{t-1}}, \, M_{t-1}^{*US} = 2P_t^* C_t^{*US}$$
(45, 46, 47)

The amount of Seigniorage used by the US is defined by:

$$SE_t^{US} = \frac{P_{t+1} C_{t+1}^{EU}}{S_t} - \frac{P_t C_t^{EU}}{S_{t-1}}$$
(48)

The two current accounts are given by:

$$CA_t^{EU} = P_t \, Y_t - G_t^{EU} - P_t \, C_t^{EU} - S_t \, P_t^* C_t^{*EU}$$
(49)

$$CA_t^{US} = P_t^* Y_t^* - G_t^{US} - P_t^* C_t^{*US} - \frac{P_t}{S_t} C_t^{US}$$
(50)

And for the separate consumption levels we get:

$$C_t^{*EU} = \frac{P_t^{EU} C_t^{EU}}{P_t^* S_{t-1}}, \, C_{t+1}^{EU} = \frac{(1+r_t)P_t \, C_t^{EU}}{(1+\beta)P_{t+1}}$$
(51)

$$C_t^{US} = \frac{S_t P_t^* C_t^{*US}}{P_t}, \, C_{t+1}^{*US} = \frac{P_t^* C_t^{*US}(1+x_t)}{(1+\beta)P_{t+1}^*}$$
(52)

Note once again that the Americans will face todays exchange rate when switching between domestic and foreign consumption whilst the Europeans face last period's rate.

The interest rates will be defined by the Euler equations as the growth of the monetary base:

$$r_t = \frac{(1+\beta)M_t^{EU} - M_{t-1}^{EU}}{M_{t-1}^{EU}}, \; x_t = \frac{(1+\beta)M_t^{*US} - M_{t-1}^{*US}}{M_{t-1}^{*US}} \tag{53}$$

The interest rate on European bonds only depends on money needed for domestic consumption, while the interest rate on US bonds rises with the American demand for domestic and imported goods.

The price level of European goods is given by:

$$P_{t+1} = \frac{G_{t+1}^{EU} + M_t^{EU}}{Y_{t+1}^{EU}} + \frac{M_{t-1}^{*US} M_t^{EU}}{2 M_{t-1}^{EU} Y_{t+1}^{EU}} \tag{54}$$

$$P_{t+1} = \frac{G_{t+1}^{EU} + M_t^{EU} + \frac{1}{2} M_{t-1}^{*US}(1 + g_t^{EU})}{Y_{t+1}^{EU}} \tag{55}$$

for g_t^{EU} being the growth rate of European money.

The price level of US goods is:

$$P_{t+1}^{*} = \frac{G_{t+1}^{US} + M_t^{*EU} + \frac{1}{2} M_t^{*US}}{Y_{t+1}^{US}} \tag{56}$$

The level of Seigniorage for t+1:

$$SE_{t+1} = \frac{M_t^{*EU} M_t^{*US}}{M_{t-1}^{*US}} - M_t^{*EU} \tag{57}$$

$$SE_{t+1} = M_t^{*EU} g_t^{*US} \tag{58}$$

for g_t^{US} being the growth rate of American money held in the US.

For the change in the American net foreign bond position:

$$\Delta NFB_{t+1}^{US} = \frac{M_t^{*EU} M_t^{*US}}{M_{t-1}^{*US}} - \frac{M_t^{*US}}{2} \tag{59}$$

$$\Delta NFB_{t+1}^{US} = SE_{t+1} + M_t^{*EU} - \frac{M_t^{*US}}{2} \tag{60}$$

Thus, the American CA in period t+1 can also be expressed as:

$$CA_{t+1}^{US} = M_t^{*EU} - \frac{M_t^{*US}}{2} \tag{61}$$

If the Europeans demand more money to be spent on American goods than the Americans themselves, the US will run a CA surplus in the following period. Consequently the European CA in period t+1:

$$CA_{t+1}^{EU} = S_{t+1}(\frac{M_t^{*US}}{2} - M_t^{*EU}) \qquad (62)$$

3. Numerical example

So far, we considered economies without economic growth. In a world without economic growth, there cannot be Seigniorage in the steady state. Since all variables are stable in the steady state, the amount of nominal consumption will remain unchanged, thus the European demand for USD will remain unchanged. Since we defined Seigniorage as the change in the amount of USD held in Europe (M_t^{*EU} - M_{t-1}^{*EU}), this difference will be zero.

To find a steady state, we ran a numerical simulation of the model. To determine the initial values, we assume that both economies are equal in GDP Y_t (5 units) and government spending G_t (1 unit) and have a similar discount factor β=0.02. Further we assume that domestic money supply is exogenous, whilst the (European) holdings of foreign currency will be determined endogenously. Both economies will start with 1 monetary unit for consumption of domestic goods and 1 unit for consumption of foreign goods. Given the asymmetric structure of the model, the US receive 2 units of USD each period, which they will spend half on domestic, half on foreign goods. The Europeans instead receive 1 unit of domestic currency and 1 unit of USD. In the following periods, they will receive 1 unit of EUR and will have to collect foreign currency to purchase imported goods. The initial exchange rate S_t will be equal to one.

The two economies will find a steady state for the following values

Europe:
P_t=0.61, C_t^{EU}=1.65, C_t^{*EU}=1.64, r=0.02
and a CA of: +0.0262

America:
P_t^*=0.59, C_t^{US}=1.70, C_t^{*US}=1.68, x=0.02
and a CA of: -0.0256

The CA equals in both cases the change in the NFB position and the American use of Seigniorage is zero. The exchange rate is S_t=1.03. It is interesting to see that the monetary asymmetry leads to an American CA deficit even in the absence of Seigniorage. According to equations 41 and 43, the US would permanently deplete their net foreign bond position, whilst Europe would permanently increase its position. The economy remains in its steady state, because the exchange rate compensates for these changes. The Americans can run a permanent CA deficit if the exchange rate works in their favour. This supports the idea of a permanent wealth transfer to the US through the exchange rate channel (valuation effect). The working of the valuation effects has already been described by Lane and Milesi-Ferretti (2007) who state that the valuation effect is unrelated to the underlying CA movements[16].

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[16] The authors state that between 2002 and 2005 the American nfa position improved despite their CA deficits, and vice versa in Europe.

If we now add growth to the model, there can be an additional wealth transfer via Seigniorage. We let both economies grow at a rate of 2 per cent, in line with government expenditure. The money supply will grow at the same rate, so there will not be inflation.

Starting from our steady state values, figure 2 shows the simulated values for 100 periods. It demonstrates how the use of Seigniorage (SE) lets the American CA (CAUS) further deteriorate but mitigates the depleting of the American international bond position (NFBUS). The interest rates jump to a higher level and remain there, which causes the little jump in the first period of our graphs.

Figure 2: Development of the CAs, Seigniorage and the American net foreign bond position
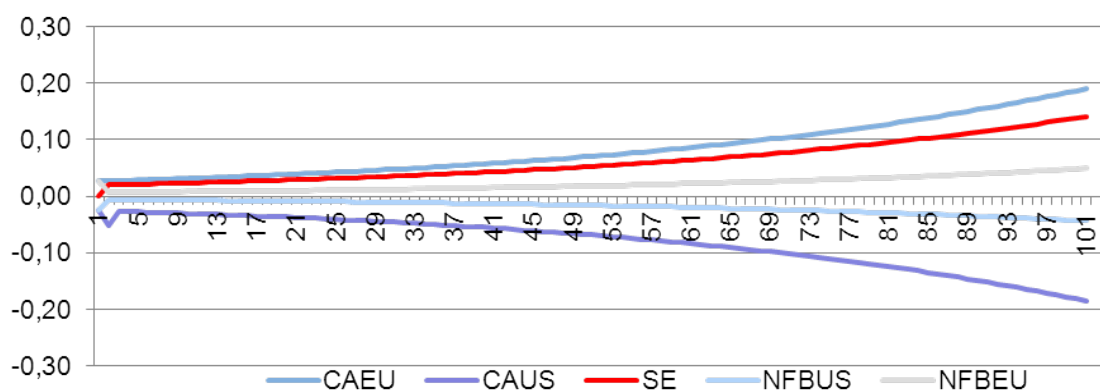
The possibility of Seigniorage has further worsened the American CA, but their NFB position did not deteriorate by the same amount. In Europe, on the contrary, the CA (CAEU) has further improved but the NFB position (NFBEU) did not improve by the same amount. In both cases, American Seigniorage accounts for the difference. The exchange rate additionally works in favour of the American NFA position. It further enhances the European demand for USD, for a given level of nominal consumption. Considering the international investment position, the US profit whilst it is an additional burden for Europe.

The figure shows how the change in the NFB position now diverges from the CA, in both cases. Since in a growing economy, European consumers will increase the nominal value of consumption on US goods in line with their nominal consumption of European goods, their demand for USD will grow continuously. Thus, European investors won't be hit by an abrupt decline in the value of the USD (Wile E. Coyote moment), as described by Krugman (2007) or Lane and Milesi-Ferretti (2007) in their disruptive scenario[17]. A rebalancing would rather require a slow adjustment, accompanied by a continued willingness of foreign investors to purchase US assets[18].

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[17] In the real world, we observe a three-pole structure in the international monetary system, with China being the biggest creditor and the CA of the Euro Area being roughly balanced. In that case, China would suffer the biggest valuation losses in case they abandon the peg of their currencies to the USD, when the USD would decline rapidly in an adjustment process.

[18] This is what Lane and Milesi-Ferretti (2007) called the "benign scenario".

4. Conclusion

In this paper we described a world with monetary asymmetry. By using a simple two country model, we could show that the fact that the US issues the world's reserve currency facilitates the running of CA deficits for them. The use of valuation effects and Seigniorage lets the American CA further deteriorate. Nevertheless, the deterioration of the NFA position is mitigated by the possibility to swap cash against interest bearing assets, or for interest bearing liabilities and through the exchange rate channel. The reserve currency issuing country is able to obtain real foreign resources for its currency. It can maintain a CA deficit, without having to fear a balance of payment crisis or quickly running down its foreign assets. This is not possible in that way for any other country.

Our results may contribute to the understanding of the state of the world economy. If one country is in the unique position to run continuous deficits and the rest of the world has to (partially) finance that, imbalances will be caused by these one-way capital flows. The capital flows into the US and the excessive use of their Seigniorage privilege laid the ground for the financial crisis 2007-2009. The events that happened in and after that crisis have shown that the provision of liquidity to the world by only one country is not a benign situation. Future will show if a multi polar world with several (regional) reserve currencies will emerge.

Determinants of Internal and External Imbalances within the Euro Area

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Abstract

The widening of global current account balances has been an important subject of academic debate in recent years. Several authors have pointed out that there has been a direct link between the world financial crisis in 2007/ 09 and the so called euro crisis since 2010. Structural imbalances, similar to the ones that caused the global financial crisis, might have also been the underlying cause for the events that finally triggered the euro crisis. The current state of literature focuses on the current account side of the problem rather than onto the financial accounts.

The purpose of this paper is to show that the capital flows that were created by the particular structure of the EMU were not sustainable. Therefore we will conduct a simplified three country model that shows the capital flows into the EMU and inside the EMU. We find that the core EMU countries served as intermediaries for external investors. We show how this caused the imbalances in the according financial accounts and that a rebalancing of internal current accounts will not be sufficient to stop the Target2 balances from diverging. The EMU ended in an equilibrium in which a system that seemed to have come to a halt after the beginning of the euro crisis is still going on, and there is no mechanism for the core countries to stop the unbalanced capital flows.

We will start by elaborating how the same trade shock that hit the US in a symmetrical way, hit the single EMU member states' Balance-of-Payments asymmetrically.

The current reforms only aim on the current account side of the problem and leave out the distortions in the financial accounts. A rebalancing of current accounts will not be sufficient, as long as the bilateral linkages with external trade partners are not balanced with the according financial accounts.

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1. Introduction

Given the concurrent nature of two severe crises hitting the world, with the euro crisis emerging right after the peak of the global financial crisis, it is not surprising that the question arose if there is a direct link between the two. The trade imbalances between the US and emerging Asia led to massive current account (CA) imbalances which laid the ground to the world financial crisis in 2007-2009. The EMU is also characterised by trade imbalances between the surplus countries in the north and the deficit countries in the south. In fact there is little doubt that the economic development within the EMU has been anything but balanced since the introduction of the euro in 1999.

The purpose of this work is to investigate on how the current account imbalances are related to the financial account imbalances and why that matters at all in a currency union, which blurs the concept of a member nation's Balance-of-Payments and where no individual country can be exposed to speculative attacks, as Imgram (1973) states.

We state the hypothesis that only the particular construction of the EMU allowed third countries to continuously export to an EMU country running a current account deficit, whilst investing their proceeds in EMU countries with a surplus, without facing devaluation risks. We find that the capital flows into the peripheral EMU countries were mainly intermediated by banks in France and Germany, whilst the trade flows of the peripherals with e.g. China were of direct nature. There is evidence that the external investors attributed different risk profiles to the single EMU countries, whilst the core EMU countries attributed similar risk profiles to all EMU countries. That left the peripherals in a dis-equilibrium of their bilateral current account and financial account that disturbed the automatic adjustment processes and ended in a Balance-of-Payment crisis.

The consequence was that the euro-system had to step in and take over the role of redirecting capital flows into the peripheral EMU countries, what led to rising Target2 imbalances. We identify one external and two internal drivers of diverging Target2 balances: The portfolio rebalancing of non-EMU countries which puts the peripherals' FAs under pressure from the outside, and internally, the capital flight from the peripherals to the core countries and the repatriation of funds from the EMU core countries. If a CA deteriorates and private investors (inside and outside the EMU) stop financing the deficit then the currency system has to step in and provide liquidity (to avoid a sudden stop of financing similar to the one observed in Asia in the late 90s). Thus, an internal rebalancing of the current accounts in the EMU might not be enough, as long as the bilateral linkages with external trade partners are not balanced with the according financial accounts. If the CAs and FAs amongst the EMU member countries are not balanced, the Target2 balances will always diverge. We will analyse if this provision of liquidity mitigated the crisis or if it prolonged it, and which distortions were caused by the crowding out of traditional means of deficit financing through the (cheaper) euro-system financing.

We further find that the same trade shock that hit the US in a symmetrical way, hit the single member states of the EMU asymmetrically. We will answer the question if there is a link between the global financial crisis and the euro crisis and if the Global Imbalances worked as direct forces on the EMU that have just been amplified by the particular structure of the EMU or if the particular composition of the EMU generated internal forces that worked in a comparable way and created imbalances internally.

One result is that the rise of China (and other emerging countries) during the 2000s formed an external shock that asymmetrically hit trade balances of the EMU

countries. Whilst China was demanding goods from core European countries, it was exporting goods similar to the ones the peripheral countries were exporting. Thus, China was competing with them for shares in the world export markets and maybe displaced exports from the peripherals.

The paper finds new explanations why the world financial crisis turned into a euro crisis. Our approach differs from the existing literature by using a new approach which focuses on the bilateral financial accounts of the EMU countries and displays what challenges lie ahead of a rebalancing in the EMU. Considering the EMU design, we develop a three country model to show the imbalanced capital flows that derive from the particular construction of the EMU and in which way the EMU intrinsic mechanisms prolonged the crisis and caused new distortions.

Overall, it seems as if the events in the aftermath of the world financial crisis have not brought the system of asymmetric trade and financial flows inside the EMU to a halt. It just led to a crowding out of private capital flows by public ones.

The reforms that were imposed onto the peripherals will establish a new equilibrium for the EMU. By now, we are in a crucial period. The current events will determine if the new equilibrium will be a more sustainable one or if the private capital flows that ceased will just be replaced by public ones and the asymmetric system continues to exist.

The structure of this paper will be as follows. Section 2 will present some stylised facts on the evolution of intra-EMU Imbalances. Section 3 will elaborate the external forces that worked onto the EMU. It will distinguish between current account and financial account distortions. Section 4 will investigate on the factors working inside the EMU, the mechanisms through which liquidity is provided and which effects this will have in the long run. Section 5 will conclude.

2. Stylised facts

Figure 1 shows the CA developments of the peripheral EMU countries and Germany. It confirms that the rise of the EMU CA imbalances started with the turn of the millennium, following the introduction of the euro (Schnabl and Freitag, 2012). The CAs of all peripheral EMU countries[2] deteriorated after the adoption of the euro, until the financial crisis of 2007 brought this development to an end. The detailed picture is somewhat more complicated. Some countries (Greece and Portugal) experienced a severe deterioration of their CAs with a subsequent harsh adjustment, whilst in others (Italy and Ireland), the development was more shallow. Interpreting the improvements of all countries' CA after the financial crisis broke out in 2007, one should be careful. Dettmann, Moebert and Weistroffer (2012) showed that the adjustment came mainly through a lack of domestic demand in these countries, after their access to credit markets dried up and less through a regained competitiveness.

To understand better what determined the depth of the CA crisis in each country, we will analyse the intra-emu imbalances in a broader picture. Schnabl (2011) states that crises seem to be more severe if debt is denominated in a foreign currency, which cannot be controlled, and when capital inflows are used in a speculative way or for consumption[3]. Where does the euro crisis fit in?

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[2] This term, "the peripherals" or the "EMU deficit countries" will be used in the following as an acronym for Italy, Portugal, Ireland, Spain and Greece.

[3] Schnabl (2011) differentiates between four different generations of international CA imbalances, which all contained some kind of boom, followed by a crisis. First, the boom in the so called tiger economies came to an abrupt end when a sudden stop of capital inflow caused the Asia crisis in

Figure 1: Current account figures for the peripherals and Germany[4]
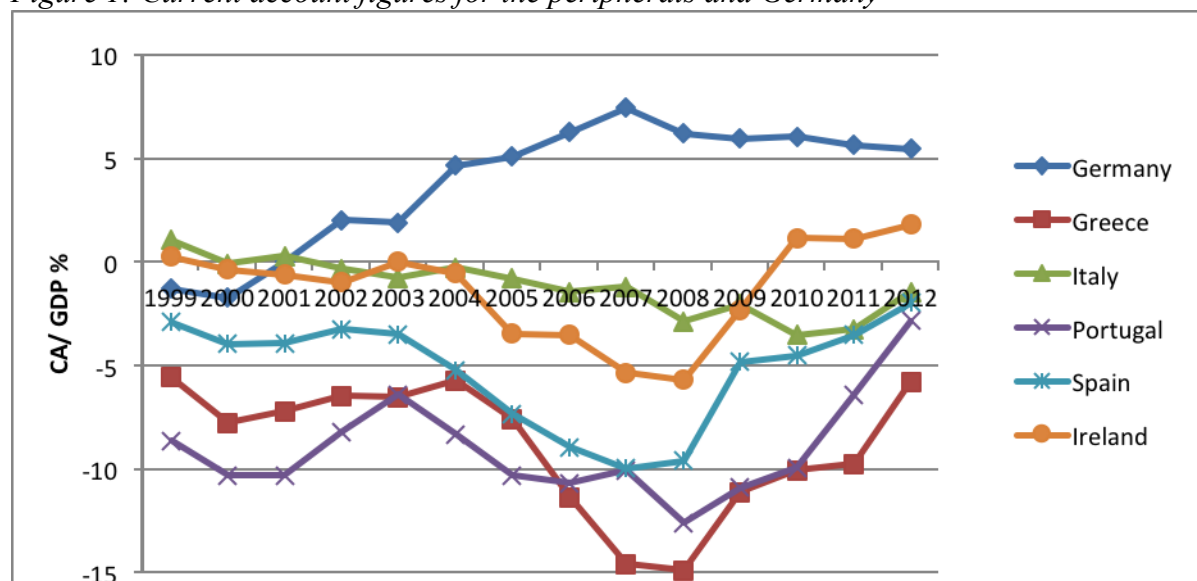
Data: IMF, World Economic Outlook Database, October 2012

In contrast to previous generations of imbalances, which were centred around the world's key currency (the USD)[5], this time the affected countries share their currency with the centre of their currency area, Germany. Despite having a centre, the currency area is constructed in a symmetrical way. The monetary policy is conducted by the independent European Central Bank (ECB) to suit the whole euro area[6]. None of the EMU countries can tailor their monetary policy to their own needs. So, the euro crisis is a special case of a CA crisis in the way that all the deficit countries indebted themselves in a currency that on the one hand was their domestic one, but on the other hand could not be fully controlled by their national authorities and thus they could not just monetarise their debt. Despite being similar in the structure of their indebtedness and the lack of an opportunity for a monetary expansion, the peripheral countries differ substantially in the way they used these capital inflows. Some countries used their foreign debt for consumption purposes mainly (Greece, Portugal); others (Ireland and Spain) used the inflowing money to invest in (mainly) the construction sector (see Giavazzi and Spaventa, 2010). Even though, the boom of investment and consumption led the GDP growth increase temporarily, in both cases capital was not invested in the tradable sector, where gains in productivity could have enhanced the long-term growth potential. Thus, the permanent inflow of foreign capital was hardly

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1997/1998. Next came the imbalances between the US and the oil exporting countries during the 2000s, which jointly with the subsequent US-Asia (mainly China) imbalances led to the financial crisis 2007/08. The last generation of CA imbalances are the intra-EMU imbalances that we are experiencing since 2009. He describes a crisis in a particular country by the following four features: First, the denomination of debt (domestic-/ foreign currency), second the type of creditor (public or private sector), third the way foreign credits are used (investment, consumption or speculative) and finally, if there is the possibility for a monetary expansion.

[4] Note that figures for 2012 are estimates.

[5] The first three generations of imbalances all had an asymmetric structure. The US would conduct their monetary policies and the dollar periphery would have to do what's necessary to stabilise their exchange rates.

[6] In contrast to the former DM zone, where the Bundesbank would determine the monetary policy and the rest had to follow. If one of the goals of the euro introduction was to break the power of the Bundesbank and to create a more symmetrical monetary structure in Europe, it succeeded.

sustainable in the long run and cannot be considered a healthy convergence of catching up countries in a currency area.

3. External Factors

The financial turmoil that led to the global financial crisis (2007-2009) was substantially driven by the divergence of the world's CAs. As Lin and Treichel (2012) state, the dynamics between core and non-core EMU countries in the euro crisis appear analogous to those that were the biggest contributors to the global CA imbalances (the ones between the East Asian surplus countries and the US), in the run-up to the global financial crisis.

Looking at figure 2 shows that the Euro area's external CA has been roughly balanced in the years preceding the crisis and even in the crisis. The EMU´s contribution on Global Imbalances therefore seems rather limited, which does not imply that the Global Imbalances, in turn did not have an impact on the intra-EMU imbalances. Maybe events that hit the US, causing the Global Imbalances, hit the EMU in a similar way. In that case the asymmetrical composition of the EMU would have translated that external shock into a widening of the internal CA positions.

Figure 2: CA positions as percentage of GDP
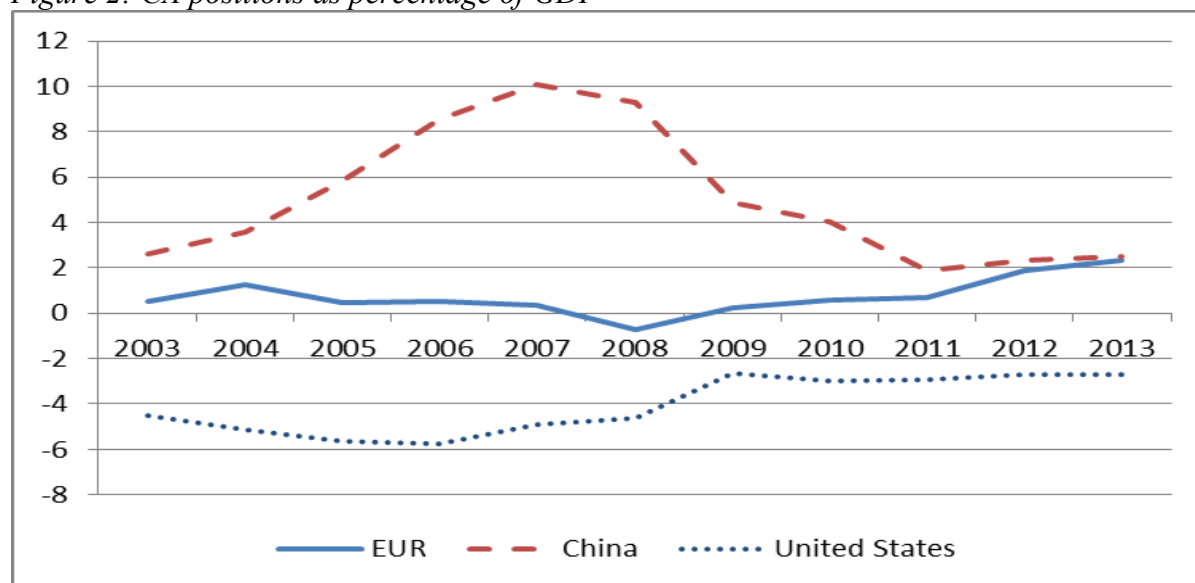
Source: OECD.stat

We will use this section to take a closer look at the developments outside the EMU, and how they hit the EMU asymmetrically and so affected the internal balance of the EMU. We will start with the trade side. Therefore we will examine the effect of the emerging Asian economies (China) on the CAs of the EMU countries, and how the EMU countries dealt with the rapid appreciation of the euro during the 2000s. Then we will have a look on the financial account side and on what explains the capital flows that were observed.

3.1 Current Account

Even though the EMU was constructed in a symmetrical way, shocks can affect it asymmetrically. Trade shocks or terms-of-trade shocks that hit the EMU will affect

the single countries differently. This section will show how this happened and how these shocks were translated into internal imbalances.

The economic rise of China (and other emerging countries) that found it's affirmation in the Chinese WTO membership in late 2001 (and accelerated ever since) affected the EMU countries in different ways. It worked rather in favour of the export sector of the surplus countries (mainly Germany), whilst it increased competition for the exports of the deficit countries. The Chinese demand for German goods (e.g. machinery) increased, whilst China competed with the deficit countries in goods such as textiles. We can consider it an asymmetric trade shock that hit the EMU.

Table 1: Correlation of CAs

	EAE*	EUR	EU	C	D	IT	PT	ES	IR	GR
EAE*	1.00									
EUR	-0.37	1.00								
EU	-0.63	0.89	1.00							
C	0.99	-0.38	-0.63	1.00						
D	0.93	-0.08	-0.39	0.92	1.00					
IT	-0.88	0.24	0.49	-0.84	-0.91	1.00				
PT	-0.93	0.40	0.65	-0.91	-0.88	0.86	1.00			
ES	-0.93	0.39	0.71	-0.93	-0.88	0.79	0.90	1.00		
IR	-0.83	0.51	0.76	-0.85	-0.72	0.60	0.82	0.94	1.00	
GR	-1.00	0.40	0.63	-0.99	-0.92	0.87	0.92	0.92	0.83	1.00

Source: International Monetary Fund, Balance of Payments Statistics Yearbook and data files. *Developing countries in East Asia and Pacific region.

Table 1 is a correlation matrix of CAs, showing how the German (D) and Chinese (C) CA are positively correlated. Germany profits from a positive development of the Chinese economy. The table also shows that the correlation of all peripheral countries´ CA was more negative with the Chinese one than with the German one (with the exception of Italy (IT)). The same observation holds if we compare the Asian emerging countries' (EAE) CA with the one of the peripherals. These results seem to work in favour of the asymmetric trade shock hypothesis. The higher the Chinese net exports, the worse for the peripherals´ CA and the better for the German CA. European Commission (2012) uses an export similarity index to describe the trade shock. Contrary to common believe, surplus countries´ exports were challenged as much as deficit countries´ by Chinese exports. The difference came rather through imports of China and other emerging countries. Chen, Milesi-Feretti and Tressel (2012) show how German exports to non EMU countries[7] doubled between 2000 and 2008, whilst the exports of the peripherals to these countries remained basically unchanged[8]. Figure 3 shows how German exports to China and the so called BRIC[9] countries in particular more than tripled during that period (from 9,4bn EUR in the whole year 2000 to 33,9bn EUR in 2008 for China and from EUR 23,1bn to 83,1bn for the BRIC countries).

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[7] Namely China, the oil and commodity exporters and Central and Eastern Europe.

[8] In the case of Italy, there was an increase in exports to these economies, but it was outpaced by the rise in imports form these economies.

[9] The acronym BRIC stands for Brazil, Russia, India, China and was first used by Jim O'Neill (chief economist of Goldman Sachs then).

Figure 3: German exports to EMU vs. non-EMU, monthly, Bn. EUR, s.a.
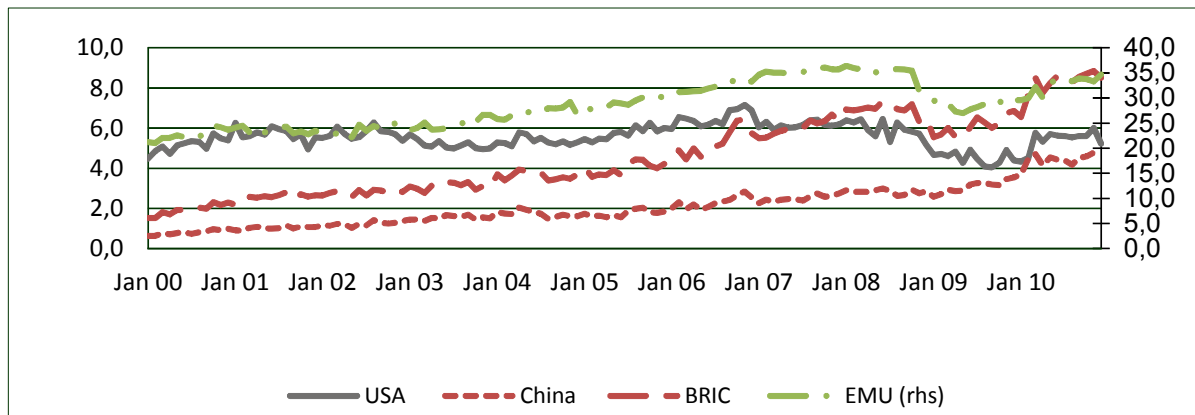
Source: Deutsche Bundesbank and DB Research

One of the reasons for the weak development of peripherals exports can be found in figure 4. It shows the development of the EUR exchange rate vs. the Chinese renminbi (CNY) and the USD[10]. From 2001 to 2008, the EUR appreciated vs. the currencies of the two world's biggest economies, what led to a significant deterioration in the terms of trade of the EMU countries which directly translated into an increase in the real effective exchange rate (REER) of these countries.

Figure 4: Exchange rate of the EUR vs. Chinese renminbi and US-dollar 2000-2008, 2002=1
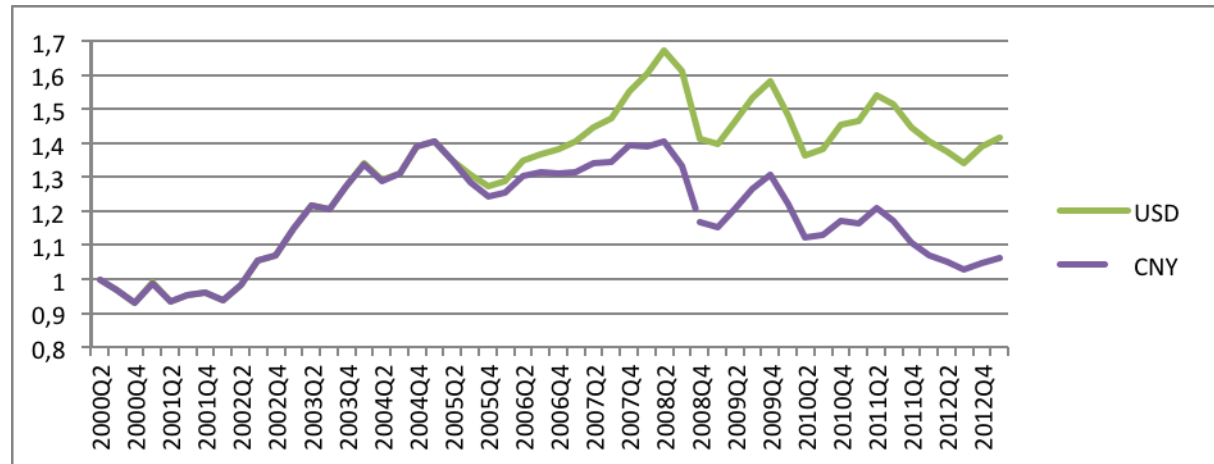
Source: European Central Bank (ECB). Frequency: Quarterly

That led to a crowding out of eurozone's manufacturing and exports[11]. But why did this not affect German exports in the same way as the ones from the peripheral EMU countries? One explanation was given by European Commission (2012). The price elasticity for low-tech peripheral goods was relatively high, whilst the elasticity for medium-high-tech goods from Germany, and other EMU-surplus countries was relatively low. They competed rather in

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[10] Note that the USD and the CNY developed in a rather similar way because of the peg of the CNY to the USD.

[11] Movements in the real exchange rate can be decomposed into two components: Movements in the external value of the currency (euro nominal exchange rate) and the internal inflation differentials, which means movements in domestic prices (or unit labour costs) relative to those of trading partners (Chen, Milesi-Feretti and Tressel, 2012 or Bibow, 2012).

quality than in price[12]. Another explanation is that Germany compensated for exchange based REER up by reducing its inflation based REER (via lowering its relative price level).

Figure 3 confirms that the increased German exports to the EMU compensated for sluggish exports to the US. Increasing exports to China and the BRIC countries also brought some relief, but in absolute figures, the increase in exports to the EMU countries was higher than the increase in exports to any other region or country (from EUR 271,3bn in 2000 to 418,7bn in 2008). Section 4 will demonstrate how the lower inflation in Germany and the easy access to credits in the peripherals helped the German economy to redirect their exports into the EMU, when the exchange rate of the EUR began to appreciate.

Another interesting observation is that the CA of the EU as a whole was more negatively affected by the CAs of China and the emerging economies than the euro area. This can be partially explained by the relatively bigger share of Germany in the EMU but also means that EMU membership alone is not a sufficient condition for a troubled CA. It rather looks like the EU as a whole has been hit by an asymmetric trade shock, depending on the similarity of every single country's exports to the one of the emerging countries and on the price elasticity of their products, but not solely depending on EMU membership.

The overall picture we see is that the price elastic export goods of the peripherals were put under pressure from outside the EMU by a worsening of the exchange rate based REER, and inside the EMU by a crowding out through German products based on the worsening of the inflation based REER vis-a-vis Germany[13].

3.2 Financial Account

So far, we focused on the CA side (which means the trade side) of the problem only, whilst there is some evidence that the imbalances in the euro area originated in the capital markets (EEAG, 2012). Therefore we will now take a look on the financial account side. The burst of the US subprime bubble in 2007 let the EMU interbank market freeze so banks would stop lending each other money, what formed a severe shock on the EMU. But was this shock purely an external shock that spilled over to Europe? Not only that the EMU banks had provided help for the US housing bubble, they had also fuelled a similar bubble in the euro peripherals (mainly Spain and Ireland, where housing prices rose at an average annual rate of 8 and 12 per cent, compared to 4.6 per cent in the US, during its bubble (Lin and Treichel, 2012)). This

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[12] Deutsche Bank Research (2009) confirms that typical German export products, such as Machinery and Chemicals are less vulnerable to changes in the FX market.

[13] It might be worth looking at other components of the CA than the trade balance, which might also explain a part of the CA divergence in the EMU. Holsinki, Kool and Muysken (2012) show that a part of the deteriorating current accounts can be explained by the change in net current transfer flows, rather than by the trade account. The inflow of current transfers went down from over 2 per cent to close to zero after '98, whilst it remained basically unchanged in northern Europe. Transfer flows into the peripherals started diminishing already in the mid '90s (the upcoming process to the euro). This dynamics further accelerated after 2004. The public transfer programs stemming from the Mediterranean enlargements of the EU in '81 (Greece) and '86 (Spain & Portugal) were expiring at that time, thus the drop in transfer payments might have happened coincidentally at the same time as the EU enlargement. The over optimistic business expectations of the converging peripheral countries might additionally have led to a decline in transfers of emigrants to their home countries. In any case, the change in current transfers does explain a big share in the deterioration of peripherals' CAs and should not be neglected as a reason for divergence.

bubble burst in line with the US bubble (Bibow, 2012). Throughout most of the 2000s, the US Fed conducted an expansionary monetary policy and reduced the interest rate (Schnabel/ Freitag, 2011)[14]. To avoid an appreciation of their exchange rate, the central banks in Europe (and Asia) had to adopt that stance[15]. Consequently the ECB followed an interest rate policy that has been too low for the peripherals and too high for the core countries[16]. Capital flows from north to south accelerated. What mechanisms led to these lush intra EMU capital flows that allowed asset prices to boom and substitute for domestic savings in the peripherals?

The German banks profited from cheap refinancing conditions and, in a lack of domestic investment opportunities, they looked for investment opportunities in other countries. Traditionally, German banks had a strong bias in their exposure towards domestic securities, since regulations allowed them only to take a limited exchange risk. After the EMU had abolished that risk for intra-EMU capital flows, the German banks were allowed to invest in other EMU countries and thus, the international investment position with respect to the EMU countries increased substantially. Consequently the German home bias was more and more transformed into an EMU bias (Bibow, 2012). Figure 5 displays the German international investment position (IIP) from 2005 to 2012. Whilst from 2005 to 2006 the IIP rose even more than the according CA surplus, from 2006 to 2008, the years leading into the world financial crisis, it did not rise as much as German CA surpluses would suggest. From 2008 to 2009 the IIP went in line with the CA surplus, and from 2009 to 2011 we have a similar situation as in 2006-2008. In 2012 the IIP increased faster than the CA surplus. Figure 6 shows a similar picture for France, with the difference that France was having CA deficits. Until 2006, France had a positive IIP, which then deteriorated quickly to 317 billion in 2011 (about 16 per cent of the French GDP), before surging in 2012.

German and French banks were heavily exposed to the peripherals and had to deal with negative price effects on their portfolio in the forerun of the financial crisis. In 2008, the financial crisis stopped this development, when banks repatriated their funds quicker than third countries´ banks drew capital from Germany and France. When the euro crisis broke out in 2010, we therefore observe the same phenomenon again. The pictures of the early stages of the two crises ´06 -´08 and ´10 -´11 look broadly similar. Consequently, in 2012 we observe a repatriation of funds again, being a lot harsher in France, due to the high level of involvement of French banks in the peripheral EMU countries. For the case of Germany, DIW (2013) showed how this led to a loss of EUR 600 bn. in foreign investments between 2006 and 2012.

What these figures suggest is that international investors use German and French Banks as intermediaries (Sinn, 2012) to invest in the euro zone, and as safe havens in a crisis. The real estate bubbles and consumption bubbles in the GIIPS countries were mainly financed by intra-EMU flows from German and French banks, but Germany and France in turn have been the main destination of capital inflows from outside the EMU (mainly UK banks)[17]. Later in this chapter we will use a three-country model to

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[14] The Fed took this stance as a reaction to the burst of the dotcom bubble.

[15] Mandler (2010) shows how the optimal monetary policy reaction function for the ECB implies strong reactions to shocks to US variables, particularly to shocks to the Federal Funds Rate.

[16] Using the Taylor rule, Ahrend et al. (2008) find that the policy interest rates over 1999-2007 were significantly too high for Germany and too low for Italy, Spain, Greece, Ireland and Portugal.

[17] The idea that banks in these two countries functioned as some kind of intermediary that redirected capital inflows into the EMU towards the peripherals was also described by European Commission (2012).

show how this is only possible (for a prolonged period) in a currency union and that this particularity will always have the consequence of internal imbalances.

Figures 5 and 6: German and French IIP vs. accumulated CA surpluses in Mio EUR
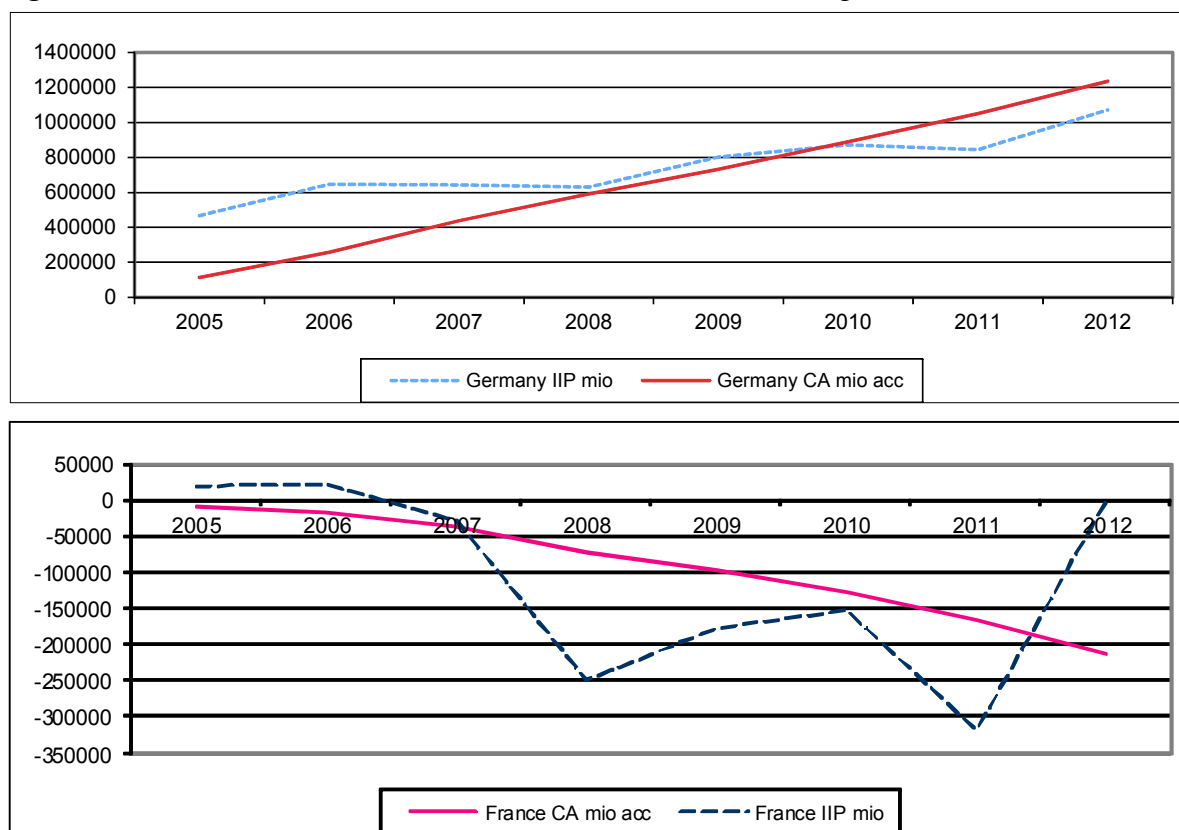

Source: IMF.stat, Principal Global Indicators

Figure 7 uses data from the Bank for International Settlements to compare the biggest international investment positions of German (D) and French (F) banks. We see that the by far highest level of exposure was from French banks to Italy (IT). As assumed above, German banks were involved in the peripherals to a lesser extent, mainly in Spain (ES) and (especially in relation to its size) in Ireland (IR). Considering the smaller exposures (not displayed), the figures show an about 56 per cent higher involvement of French banks in Greece, whilst German banks were about 40 per cent more involved in Portugal. For all country combinations we can observe the aforementioned repatriation of funds around 2008 and especially after 2010.

The external CA and FA of the EMU might be balanced, but if external investors prefer to invest their money in the core countries (which in turn channel these investments into the peripherals), the CAs and FAs amongst the single EMU member countries might have been in mismatch for a prolonged period.

As European Commission (2012) stated, a country might have a bilateral trade surplus with one country but invest the surplus in a third country. In case of the EMU, the rest of the world had a surplus with the peripherals but invested the capital in the EMU core countries. The core countries in turn financed the peripherals beyond their bilateral trade balances. They intermediated capital flows originating outside the EMU. Germany (D) for example, recorded CA surpluses of roughly the same size with the EMU and the rest of the world (RoW), but had much larger surpluses on its FA with the EMU.

Figure 7: German and French foreign bank claims in million USD
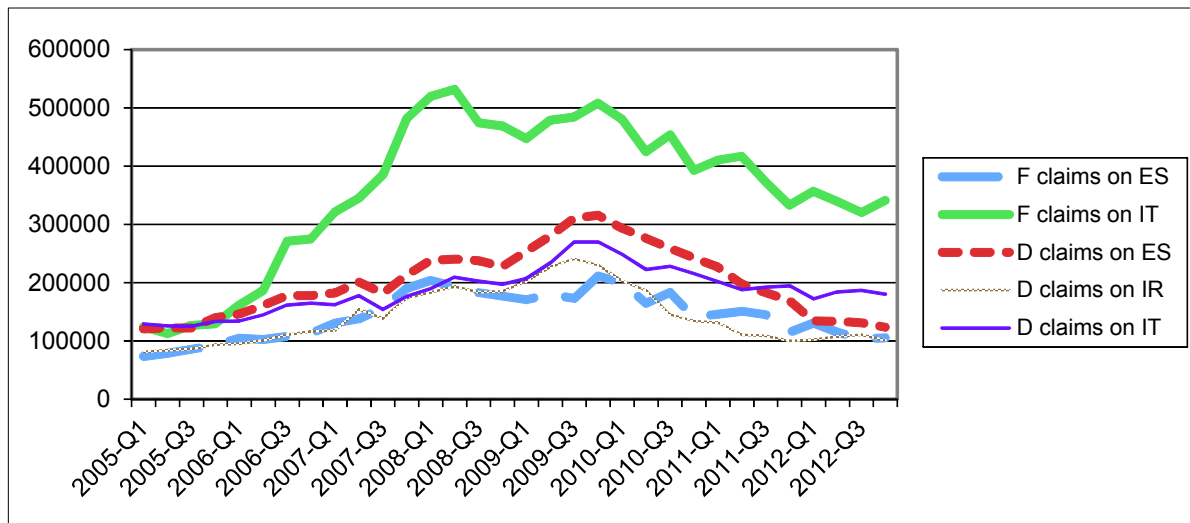
Source: Bank for International Settlements

Figure 8 illustrates in a simplified example the dynamics of these flows. Germany has a CA surplus with the EMU of 100[18], but an FA deficit of 200, which is paid by one half by funds originating outside the EMU (RoW). RoW has a CA surplus with the EMU (ex D) but prefers to invest their proceeds in Germany. Finally, the EMU has to borrow from Germany by more than their CA deficit with Germany, to finance their imports from the rest of the world. Thus, the total EMU (including D) has a balanced CA and FA with the world and is at the same time building up Balance-of-Payment (BoP) imbalances internally. As Meade (1957) states, it is not a problem per se if countries run bilateral BoP deficits, as long as they maintain an overall equilibrium in their BoP. In this example, the overall BoP of the EMU (ex D) is in balance. They can use their funds from Germany to pay their imports from RoW.

Figure 8: Flows of capital and goods inside and outside the EMU
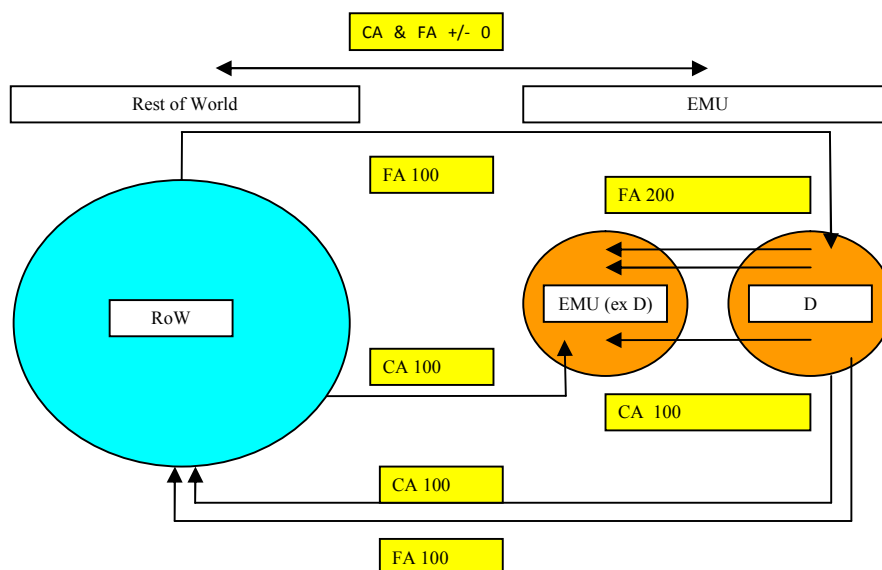
Source: Authors' own illustration.

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[18] All figures in this example are chosen randomly in size.

Table 2 shows how Germany financed Spain and especially Ireland beyond their bilateral CA positions. After 2009, the picture is reverted and we observe capital flight to Germany, especially from Spain.

Table 2: Bilateral CA and FA with Germany, in mio EUR

Date		2001-2008	2009-2012
Greece	CA	22.988	10.771
	FA	-23.146	-42.979
	CA+FA	-158	32.208
Ireland	CA	-80.277	-27.386
	FA	-220.951	46.534
	CA+FA	-301.228	19.148
Portugal	CA	30.492	17.083
	FA	-24.988	10.786
	CA+FA	5.504	27.869
Spain	CA	145.842	52.035
	FA	-180.766	57.430
	CA+FA	-34.925	109.465
Italy	CA	123.598	49.669
	FA	-70.521	-19.685
	CA+FA	53.077	29.984

Data: Bundesbank

Figure 9 demonstrates this graphically. Germany financed Spain and Ireland in the pre-crisis period by more than its bilateral CA surplus. The lines represent the difference of each countries´ CA and FA in million EUR. Since we took the negative of all figures, high values represent an FA that exceeds the amount necessary to finance the bilateral CA.

Figure 9: Bilateral CA plus FA for Germany and the EMU peripherals in EUR mio (negative)
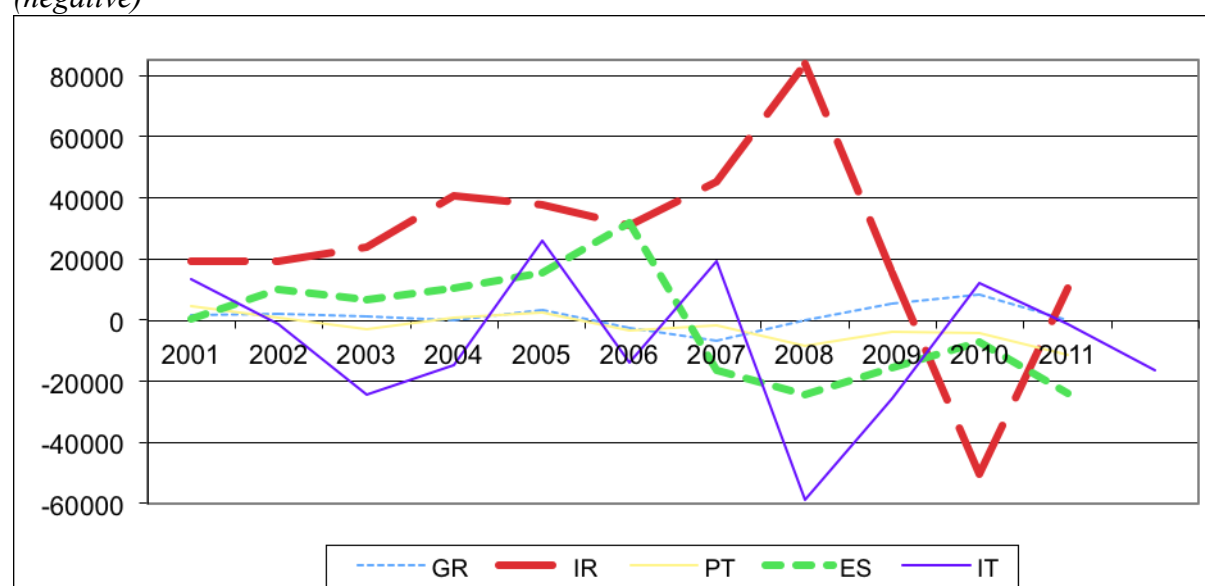
Data: Bundesbank

The bilateral German CA and FA were roughly in line for Greece and Portugal, whilst for Spain and Ireland the bilateral FA exceeds the CA heavily. Italy seemed to have experienced the opposite phenomenon, which was possible because, as seen before, they in turn received massive capital inflows from France.

As mentioned above, there is no problem if the bilateral FA of two countries exceeds the according CA for a prolonged period, as longs as each countries overall BoP is balanced. A problem does arise if the surplus country accumulates soft currency and wishes to invest in a hard currency country. Those countrys' exporters would than demand to be paid in the hard currency. It would be difficult for the deficit country to acquire sufficient hard currency for its imports. There would be an over demand for the hard currency and an over supply of the soft currency. In a flexible exchange rate regime, this would lead to an exchange rate adjustment. This would automatically lead to an adjustment of both countries' CA. The procedure of adjustment has been described in standard literature such as Meade (1957) or Frenkel and Mussa (1985).

In the case of the EMU, there is obviously only one currency for both countries, which changes the dynamics substantially. We will show how external investors can make use of that particularity, to avoid both, the exchange and the credit risk. The long-run economic identity that the FA mirrors the CA holds only for currency areas, not for separate countries. In the following we will use a simple model to show how the underlying dynamics depend on the exchange rate system. We will discuss two different scenarios, first for separate currencies then for the EMU.

In our simplified model, the world consists of only three countries: Germany (D), Spain (ES) and the rest of the world (RoW). We chose Spain as a representative for an EMU country experiencing an "overfinancing" in our example. Germany pays in Deutschmarks (DM), Spain in Pesetas (Pts) and the rest of the world pays in US-dollar (USD). In all four cases we will assume, analogue to our example above, that D has a bilateral CA surplus towards ES and a bilateral FA deficit. RoW has a trade surplus with ES, but a balanced bilateral FA. They prefer to invest their surpluses in D instead, so that the size of the bilateral German FA with Spain exceeds the CA by the amount of the RoW´s CA surplus with ES. Germany itself has a CA surplus with RoW and reinvests the proceeds in RoW. Germany and Spain combined have a balanced CA with RoW.

First we assume a scenario where all exchange rates are perfectly flexible. If RoW would prefer to invest their Pts surpluses in Germany, they would need to buy DM and sell Pts (unless they require their exports to be paid in DM directly). In a scenario like that, where everyone wants to buy DM and sell Pts, the value of the DM will go up whilst the value of the Pts will go down. ES eventually will have to reduce its imports whilst competitiveness and the nominal value of exports will rise. The subsequent adjustment of the CAs comes automatically. A divergence of bilateral CA and FA is therefore no stable equilibrium, if currencies of different quality are involved. Also the gradual adjustment of the FA will come automatically, because it will be harder and harder to sell the Pts and buy DM. If RoW wants to run persistent CA surpluses with ES, it will be forced to reinvest their Pts in ES. Given the low interest rate that D would have to pay for its financing in that scenario, it would be less and less attractive to invest in D. ES in turn would face more and more problems to buy DM for its imports. Consequently, in the long-run all CAs would be balanced with their corresponding FAs. Figure 10 describes the long-run equilibrium for this scenario. A country running a CA surplus would acquire assets denominated in the other country's currency.

Figure 10: Capital flows in system of separate national currencies
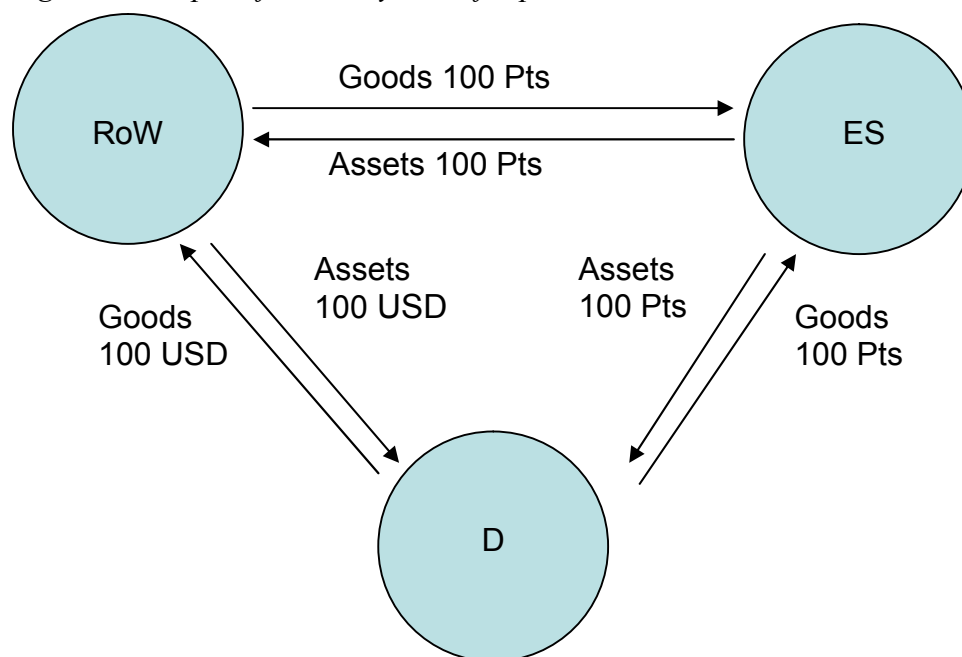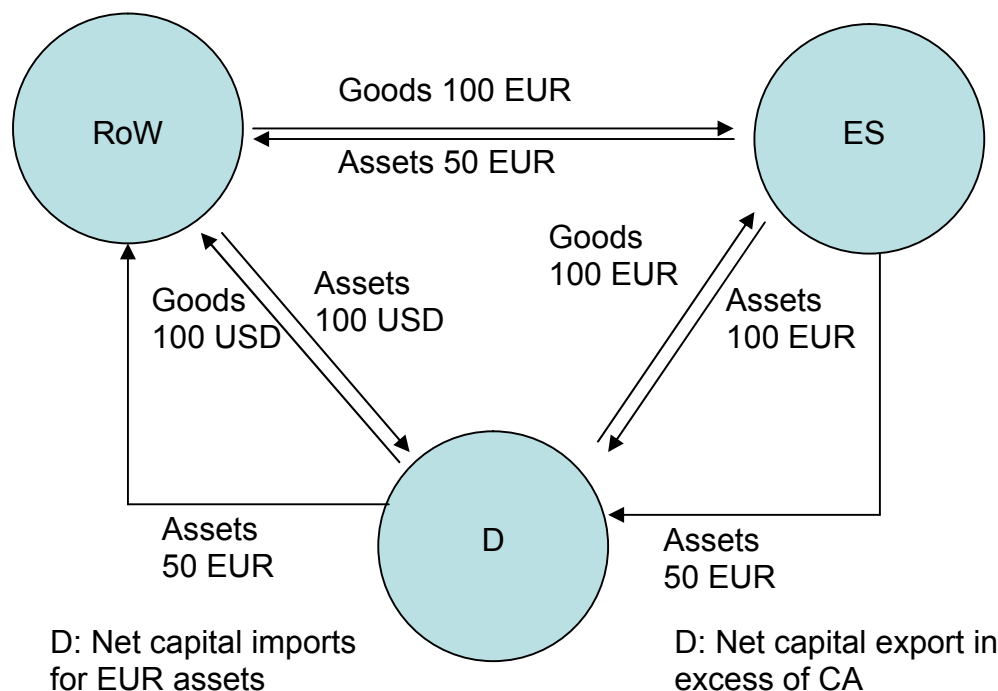

Source: Author´s own illustration.

Even, if we assume pegged exchange rates (similar to the Bretton-Woods system), the mechanism would function in a similar way. Spain would be forced to continuously buy Pts to maintain the parity value and thus, ES will deplete its foreign and gold reserves until the Pts finally has to devalue, and a new exchange rate will be fixed. The shrinking (deficit countries) and piling up (surplus countries) of reserves would also lead to restriction (increase) in domestic supply of money, leading to a deflation (inflation). The subsequent adjustment of prices and wages would improve (worsen) the country's competitiveness and thus the CA imbalances will close and investors' confidence will return eventually.

In the scenario described above, one will have to re-invest the currency in the country of a trade surpluses origin and thus face a devaluation risk of assets in that country's currency, and thus one will have to deal with the solvency risk of that country. If a country loses confidence in another country's solvency, it will reduce its exports to that country (the US being an exception, as the issuer of the world's reserve currency).

So far, we could show that in the absence of a currency union, the exchange risk forces a trade partner to keep the bilateral CA and FA in line, whilst the solvency risk forces them to ultimately balance their bilateral CA. In the following we will demonstrate how the EMU allows countries to run persistent CA deficits. Figure 11 below shows how the construction of the EMU allows its trading partners to avoid both, the exchange risk and the credit risk. The main particularity of the EMU is that its external trade partners deal with one currency but individual countries with individual risk profiles. This gives them the opportunity to export to countries with a substantial CA deficit and invest their proceeds in countries with a CA surplus, without having to exchange currency. This means, credit risk towards the peripherals could be pooled in the core countries, which in turn channelled these investments into the peripherals. Since the core countries did not demand a notable risk premium for

their intermediary role, they seem to have attributed the same risk profile to these countries that the external investors attributed to the core countries.

Figure 11: Capital flows in the euro-system

Source: Author's own illustration.

The first scenarios contained an automatic adjustment channel. In a separate currency scenario, a country that keeps exporting to another country, despite their negative CA, will accumulate vast amounts of their currency. To avoid the valuation losses, it is forced to keep on re-investing into that country and thus to finance their CA deficit. In the worst case, this could go on for a prolonged period until the surplus country loses confidence in the deficit country and suddenly stops financing its deficits. The debtor country would face a sudden stop of capital inflows and thus would be forced to balance their CA immediately. Figure 11 shows how this mechanism does not work in a currency union. We distinguish between the euro-system up to 2010 (before the "euro crisis"), and since (in the crisis).

In this scenario we have the case that D and ES have the same currency (EUR), so there cannot be an over- or under-supply of one of their currencies. RoW now is free to choose where to invest their proceeds from trading with ES, without facing the negative impact of devaluation. This also means that there is no direct adjustment of the individual CAs via the exchange rate channel. It is almost like the debtor could indebt himself in Pts, whilst the creditor holds a claim in DM. In this scenario, RoW prefers to invest their proceeds in D, which in turn channels them to ES. As described by Meade (1957), a country in a currency union can run a deficit towards RoW, if that is equalised by surpluses with other members of its currency union. In our example, the following system could be established. ES has a BoP deficit with RoW, which is financed by a BoP surplus with D. D in turn finances its BoP deficit with ES via a surplus with RoW. This circulation is sustainable as long as D is willing to finance ES. The problem is that most (risky) Spanish assets are pooled in D.

As mentioned before, D does not demand a notable risk premium for this intermediation. As long as RoW was willing to invest in D, and D had confidence in ES, the system was sustainable, without implying a devaluation of the EUR. D would acquire EUR assets from ES, whilst Row would acquire EUR assets in D. The problem is that this defers the adjustment mechanisms that are explained above.

When, after the outbreak of the euro crisis, D lost confidence in the solvency of ES and stopped to channel external investments into it, ES faced a severe funding problem. It was a situation as if Spain was running out of its own currency. Since the automatic adjustment via an external devaluation does not take place, the exchange rate of the currency EUR as a whole ends up being somewhere in the middle: Too high for ES (and other peripherals) and too low for D. Since this left the exports of ES remain weak (and the extra-EMU exports of D strong), ES could not finance its imports through exports. Consequently, ES could maintain a high import level only by "borrowing the money press". In the case of Spain, Spanish banks drew their capital via the Bank of Spain from the ECB. Ultimately liable for these ECB loans were the other ECB member states, such as France and Germany.

Section 4 will describe in detail how this procedure worked. In this scenario, it would not solve the problem if D and ES had a balanced bilateral CA. Imbalances could still continue to exist in the EMU, as long as external investors attribute different risk profiles to individual countries. The Target2 balances would always diverge, as long as EMU´s member countries´ bilateral CA and FA are not in line. Cecioni and Ferrero (2012) found empirical evidence that only for Greece the Target2 balance is significantly related to the CA deficits, whilst in Portugal, Italy and Spain, the large increase in Target2 liabilities is mostly related to the FA, predominantly since the outbreak of the euro crisis in mid-2010. Internal CA rebalancing is a necessary, but not a sufficient condition for FA rebalancing. The Target2 balances are the equivalent of the gold reserves in a gold-standard system. The main difference to the gold-standard is that deficit countries cannot run out of reserves. Thus, there is no pressure to restrict the domestic money supply. Also in surplus countries it is easier to control inflation and therefore the deficit countries will have to bear an over-proportional share of the adjustment process.

But why did the core countries invest in countries which were avoided by these extra-EMU investors and that, with hindsight, have proofed to be high-risk investments? Why was the market discipline weaker within the EMU than vis-a-vis external investors?

Two possible explanations have been mentioned before. Possibly the German and French banks did not believe in the no bail-out clause, thus assumed some kind of implicit government guarantee that was not available to non-EMU countries. An alternative hypothesis states that German and French banks valued government bonds[19] from other EMU countries higher because they could use them as collateral at the ECB which also was not an option for non-EMU countries, and thus have demanded a lower risk premium[20]. In that case intra-EMU loans would just have crowded out extra-EMU loans in the case of the peripherals.

Starting from the current situation, the EMU might end up in one of the two following equilibria. The first one would be that the peripherals use the euro-system financing, whilst gradually adjusting their CAs, and implement reforms to regain

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[19] This would only be the case for Greece, Italy and Portugal, where a huge share of the investment took place in the form of government bonds, whilst in Spain and Ireland investments mainly went into bank bonds (Chen, Milesi-Ferretti and Tressel, 2012).

[20] The aforementioned exchange risk regulations for German banks work into the same direction.

competitiveness and attract sufficient funds from outside the EMU. In the second equilibrium, the major part of financial inflows will keep on going into the surplus countries, which in turn finance the deficit countries indirectly via the euro-system. To achieve the first equilibrium, it is important that external investors invest in the peripherals directly, because of an improved competitiveness. The introduction of other instruments of risk pooling, such as euro-bonds, would just be a continuation of the system that was established before. Section 4 will help to understand the mechanisms in depth. We will show that, no matter what the reason for these asymmetric capital flows is, unless investors' confidence in the southern EMU countries returns, there will always be an imbalance inside the EMU.

4. Internal Factors

Section 3 described the financial flows and competitiveness issues. This section will reconcile the actual events that happened in the EMU. We will start by providing a quick overview on the events in Europe since the 1990s, which led to a build-up of intra-EMU imbalances.

Figure 12 shows how after the German reunification boom ended in the mid-1990s, German business sentiment deteriorated. This led to increased (precautionary) savings in the German private sector and to less consumption and less German fixed capital formation (tables 3 and 4). During the second half of the 1990s, these savings were absorbed by the fast growing equity markets (dot.com bubble). After the burst of this bubble, German growth slowed down, whilst growth in the GIIPS accelerated (figure 12). We have already shown how German excess savings were invested in those other, faster growing economies.

Figure 12: GDP in Germany and GIIPS (1995=1)
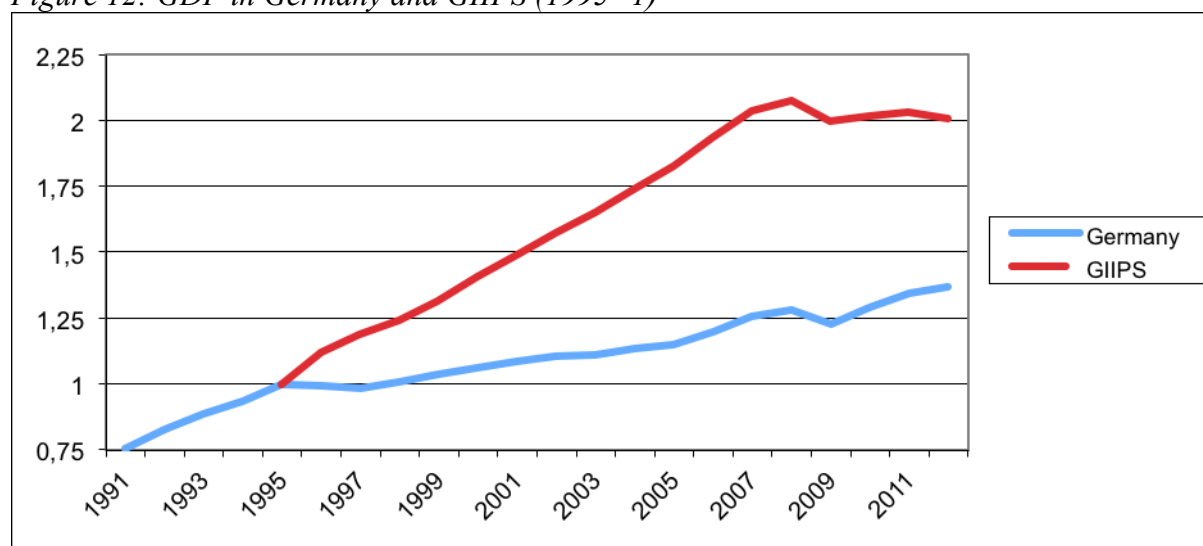
Data: Eurostat (GIIPS data starts in '95)

At the same time, slow growth in Germany put pressure on real wages and inflation fell in 2002 and 2003 to a level lower than before the euro introduction, and more important, to a level lower than in the southern EMU countries. Table 3 supports

Holsinki, Kool and Muysken (2012) in their point that the inflation rate between '00 and '07 in southern Europe[21] was 1.5 per cent higher than the one in northern Europe.

Table 3: Gross fixed capital formation and inflation

GEO/time	Capital formation*, % of GDP			Annual inflation (avg.)		
	95-00	01-08	09-12	96-00	00-08	08-12
Germany	21.35	18.26	17.58	1.06%	1.85%	1.49%
GIIPS	22.16	23.95	17.50	2.61%	3.22%	1.64%

* for '95-'99, GIIPS data without Greece

Table 4: Annual growth of household consumption and gross household savings rate

| GEO/time	HH consumption % change (avg.)*			HH savings rate**		
	95-00	01-08	09-12**	95-00	01-08	09-11
Germany	1.5	0.5	0.9	15.86	16.24	16.78
GIIPS	4.5	2.8	-2.8	14.74	11.33	12.35

* Data for GIIPS starts '96, Greek data starts '00, Spain data ends '11
** for '95-'99 only Italy and Portugal, for '00-'01 Spain, Portugal and Italy, from '02 GIIPS data without Greece
Data table 3 and 4: Eurostat

Figure 13 displays the convergence of nominal interest rates to a broadly similar level in the whole eurozone. In combination with the higher inflation rates in the peripherals, this let the real interest rate in these countries be too low, which led to a decline in their saving rates (table 4).

*Figure 13: Long term government bond yields in per cent*
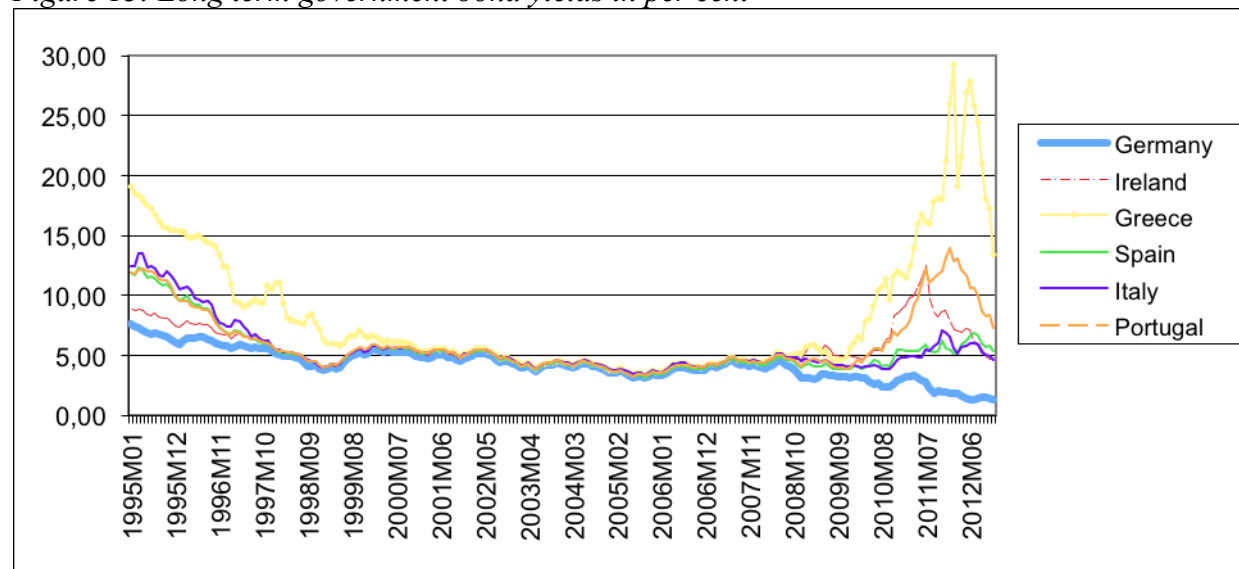
Data: Eurostat

The EMU ended up with a saving rate too high for the core EMU countries and too low for the peripherals. Financial liberalisation (which meant lower transaction costs) and easier access to international saving pools put additional pressure on saving rates in the euro peripherals (Sodsriwiboon and Jaumotte, 2010). The elimination of

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[21] The authors define north as Austria, Finland, Germany and the Netherlands, and south as Greece, Ireland, Portugal and Spain.

exchange rate risks and perceived convergence of sovereign bond default risks in the now integrated European bond markets (all EMU bonds had the same collateral value at the ECB) stimulated intra-EMU capital flows (Chen, Milesi-Feretti and Tressel, 2012) and made it increasingly attractive for German banks to lend to the EMU peripherals.

Figure 14: Foreign claims of German banks in USD million
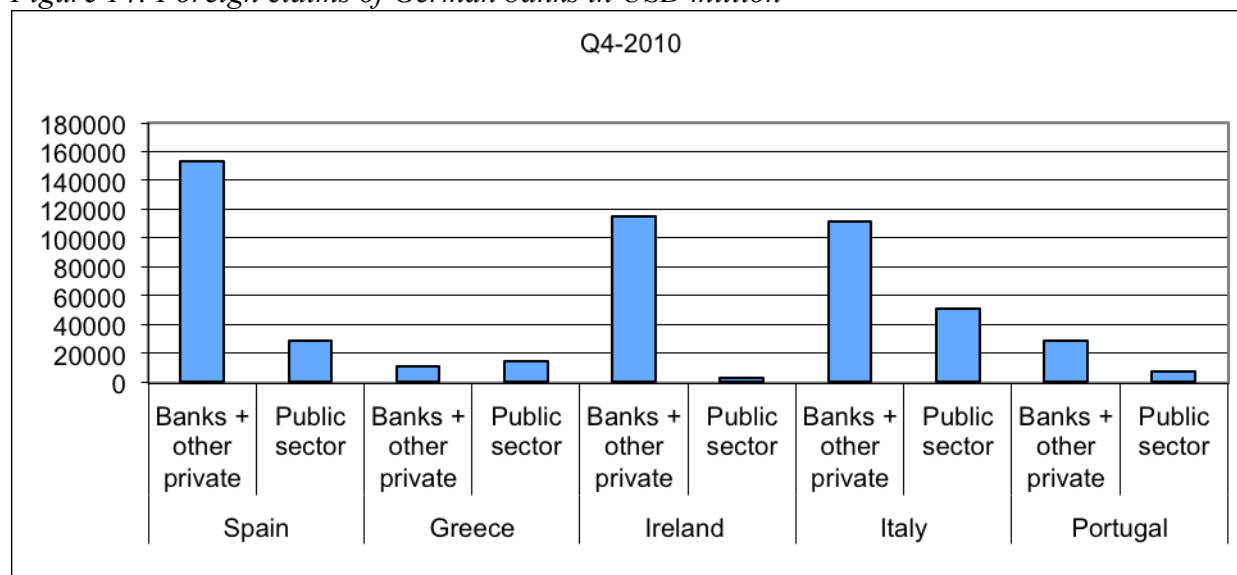
Data: Bank for International Settlements

Figure 14 shows how for Q4-2010 (the first quarter with available data), the funds went into government bonds (in the case of Greece, Portugal and Italy) and bank bonds or other private sectors (Spain, Ireland, Portugal). The financial exposure to Euroland countries was higher than the corresponding levels of trade integration. Germany was more integrated into the EMU financially, than through the real economy, which made it vulnerable to debt problems in the EMU (Bibow, 2012). A financing structure (of CA deficit) biased towards banks intermediation to that extent[22], left the peripherals being exposed to the unwinding of capital inflows, e.g. in a financial crisis (Merler and Pisani-Ferry, 2012).

Nevertheless, the EMU peripherals borrowed heavily abroad and consequently their (cumulative) CAs turned from being roughly balanced in '94 to a deficit of 10 per cent in 2008[23]. The cheap credits financed government debt (Greece) or borrowing by the financial sector, which in turn fostered credit driven real estate price bubbles (Spain and Ireland). In Italy and Portugal they financed both. This fostered a boom in consumption and (construction) investment. The illusionary prosperity[24] further increased inflation. The higher inflation let their real exchange rate (REER) increase in line with the Unit Labour Costs (ULC) and made the peripheral countries loose competitiveness. This crowded out manufacturing and exports and led to an unsustainable growth of the non-trade sector (Chen, Milesi-Feretti and Tressel, 2012). Figure 15 shows the boom in domestic demand during the 2000s, displaying the most dramatic increase in Ireland, Spain and Greece.

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[22] The contribution of foreign direct investment has been very small.

[23] For Greece, Portugal, Italy and Spain (Jaumotte/ Sodriwiboon, 2010).

[24] Illusionary because, as mentioned before, it was not matched by improvements in productivity or business environment, thus it was not sustainable (See also Lin and Treichel (2012)).

Figure 15: Domestic demand (2000=100%)
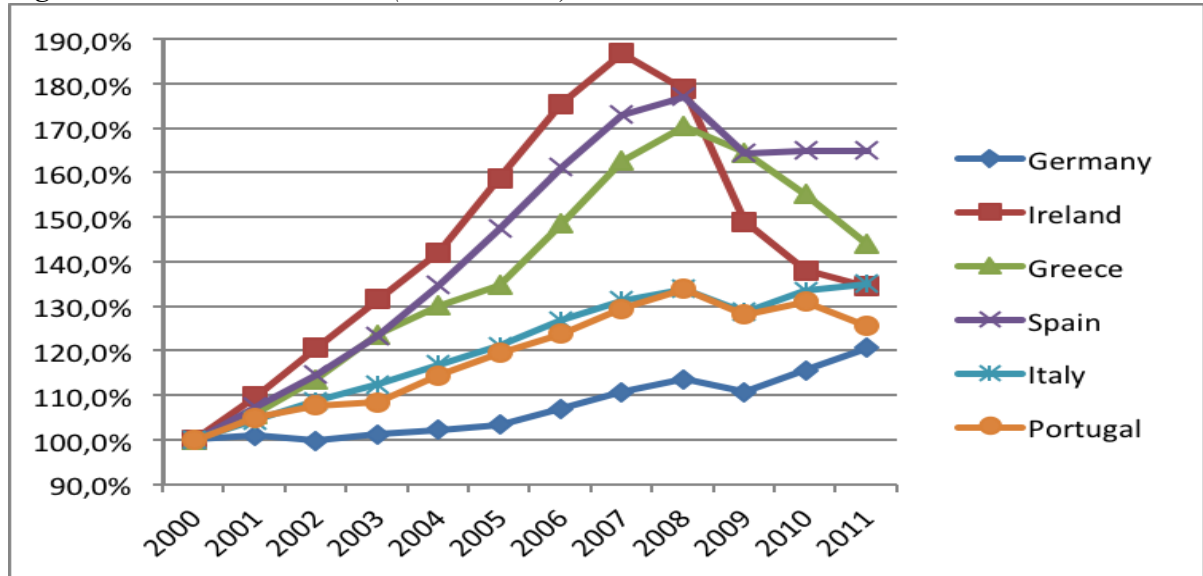
Source: Eurostat

Figure 16 shows the deterioration in unit labour costs (ULC). All peripheral countries followed the same upward trend until the financial crisis. Ireland experienced the highest increase, but managed to readjust its labour costs quickly after the crisis. Unsurprisingly, Figure 1 has shown us that the Irish economy managed to return to a positive CA at about the same time.

When in 2009 the newly elected Greek government had to admit that the deficit figures of the preceding years had been understated and Greece was running deficits persistently over 3 per cent markets stopped ignoring the default risks and confidence in peripheral EMU economies was damped.

Figure 16: Unit Labour Costs, 2000=100%
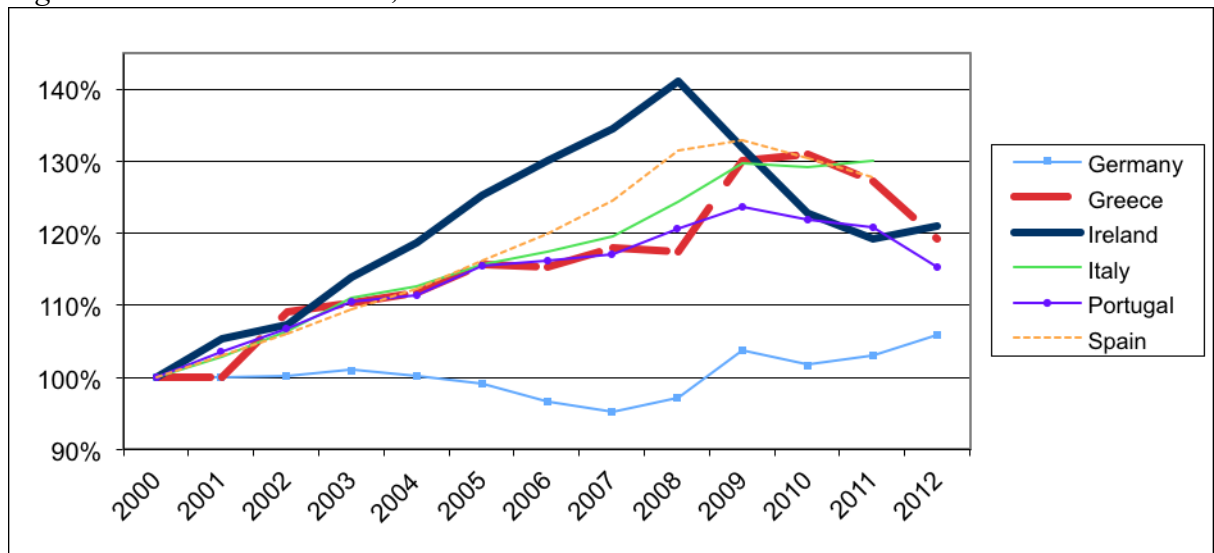
Source: OECD.Stat

Investors realised that growth by domestic demand, financed abroad was unsustainable (Giavazzi and Spaventa, 2010). The markets charged a higher risk premium, which put additional pressure on the refinancing of these countries. The

governments were confronted with twin imbalances: Regaining competitiveness and correcting the public debt (Benito, 2012).

To deal with the twin imbalances described above, reforms were implemented on the peripherals, aiming at the first of the two equilibria mentioned in section 3. The peripherals are supposed to implement structural reforms to regain competitiveness, whilst the provision of public loans through the EFSF, the ESM and the euro-system are smoothing that process[25]. The idea is that the improved competitiveness will boost exports and close the CAs, whilst the regained investor's confidence will finance the remaining CAs and close the Target2 balances. We will begin by describing the current status quo, aiming at the first equilibrium and which problems might occur.

a) Equilibrium 1: Regaining competitiveness and investor's confidence

In section 2 and 3 we discussed the emergence of CA imbalances and how the euro crisis reversed capital flows from an over financing of the bilateral CAs to an underfinancing. Since the outbreak of the euro crisis the peripherals face severe problems to attract sufficient private funds to finance their CA deficit. They also can't use their central bank to purchase government bonds in an unlimited amount, thus the financial crisis forced them to improve their CAs.

The usual way to rebalance the CA would be a currency depreciation which would immediately reduce the (external) value of a country's demand. This would narrow the CA deficit and improve the country's competitiveness directly which would help to regain shares on the world's export markets via that manipulated exchange rate (Dettmann, Moebert and Weistroffer, 2012). This is not possible for a country in a currency union.

Consequently, prices and wages must decline to rebalance the economy (internal devaluation)[26]. The increased competitiveness would facilitate the countries' exports, and reduce the prices of domestic goods relative to foreign goods and eventually replace them. As a result a country might improve its trade balance significantly in the short run. In the longer run, competitiveness is important to attract (direct) investments and thus expand the industrial base. The process of internal devaluation seems to be a more painful process than an external devaluation, and it has the natural side-effect that the internal devaluation will lower the nominal GDP and make the debt to GDP ratio look less favourable in the short run[27].

There is some evidence for inflexible labour markets in the peripheral EMU countries[28] that do not allow wages to decline to the extent that would be necessary. For these reasons, the process of an internal devaluation would have to be a gradual one.

To maintain a functioning economy during that process, the use of fiscal policies, transfer payments and a mobile labour force would be necessary (Essl and Stiglbauer, 2011). Since there is hardly any scope left for fiscal policies in a country already facing a debt problem, some kind of adjustment through the labour markets would

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[25] ESFS stands for European Financial Stability Facility and ESM stands for European Stability Mechanism.

[26] The adjustment process of the Baltic States in 2008/ 2009 provides a recent example (see Lindner, 2011).

[27] Having said that, an external devaluation could make the debt to GDP ratio even worse, if debt is denominated in a foreign currency and the currency devalues beyond the necessary level (overshooting).

[28] Dettmann, Moebert and Weistroffer (2012) name the OECD indicator "strictness of employment protection" to show there is some resistance to rebalancing that prevented lower wages but also led to higher unemployment.

bring some relief. A transfer mechanism would further ease the transition until the economies have regained competitiveness.

Given that the mobility of labour seems to be limited within the whole EU and there is no agreement on a transfer union yet, internal devaluation through the wage and price channel will have to be accompanied by some kind of public loans. This happens since 2010 through the European Financial Stability Facility (EFSF) and its predecessor for Greece, Portugal and Ireland. But these public loans could not make up for the whole difference between the CA deficits and the lack of capital inflows in the peripherals. Since the CA has to be matched by a sufficient capital inflow and the core EMU countries stopped to play their role as an intermediary, some other source of financing must have been at work.

As we mentioned above, there is no official agreement on a transfer union in the EMU yet[29], but the EMU membership allows countries almost unlimited access to euro funds. These funds help to finance a country's CA and thus form some kind of indirect transfer mechanism. The (net) capital flows of that mechanism are reflected in the Target2 balances. This means, even if investors lose confidence, the system will not come to a halt.

The idea of that unlimited provision of liquidity is to smooth the rebalancing process in the peripherals, but the danger is that external investors feel more comfortable in this situation, which allows them to maintain the system of separating an EMU countries' FA from its CA for their bilateral trade with single EMU countries, and thus have no incentive to invest in the peripherals directly. It is like a system in a single currency world that would allow investors to trade with any country, no matter how indebted it is, and as soon as the transaction is completed, the proceeds would turn into some other, harder currency. They might prefer the current situation, which allows them to make business with the whole EMU, whilst risk is pooled in the core EMU countries.

In that case, the provision of liquidity through the euro-system will become a permanent phenomenon, rather than a way to smooth the transition period. The role of the intermediary was taken by the ECB instead of Germany and France. The next section will show how that ultimately puts Germany into the same situation as before, because the euro-system liquidity works as a kind of loan from the surplus to the deficit countries.

Even if unlimited liquidity for the peripherals means that they could use this liquidity to repay external investor's loans[30], investors might still prefer to hold claims against the core EMU countries, as long as there is a chance of a (sudden) break-up of the euro.

We have shown that despite all efforts that were made to regain investors' confidence, the external investors might just prefer a situation that we called the second equilibrium. We will show how the liquidity provision through the euro-system works and if that mechanism might be considered benign, not only for the external investors, but also for the deficit countries.

b) Equilibrium 2: Permanent euro-system lending through Target2

The idea of the restructuring of the peripheral economies implies that investors´ confidence into the peripherals eventually returns. If it doesn´t, we might end up in

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[29] Neglecting the transfers already established in the EU, e.g. agricultural subsidies.

[30] In September 2012, the ECB made it also clear that they would buy sufficient bonds of peripheral states to maintain the EMU as whole. This led to a decrease in the Target2 balances. If this is just due to liquidity circulation within multinational banks or a permanent effect is not clear at this moment.

what we called the second equilibrium. In that case, the provision of public loans via the Target2 system, that was meant to accompany the transition period to equilibrium 1, will turn into a permanent phenomenon. To understand the underlying problems, it is important to understand how the Target2 system works.

The Trans-European Automated Real-Time Gross settlement Express Transfer (Target2) is the euro-system's operational tool through which national central banks (NCBs) provide payment and settlement services for transactions within the EMU. These transactions are not limited a priori. If a country systematically settles more outward payments than inward payments, its central bank has a deficit position. The country is a net borrower from the euro-system, whilst others are net lenders (Merler and Pisani-Ferry, 2012).

Figure 17 shows the diverging trend of the Target2 balances since the beginning of the global financial crisis in 2007, which accelerated after 2009, when the euro crisis began. One can clearly see the increasing balances of the northern European countries (Germany being the biggest contributor) and the deteriorating balances of the peripheral EMU countries (Italy and Spain contributing the most).

But what caused these imbalances, are they really a result of Germany and France stopping their intermediary role? As Cecioni and Ferrero (2012) stated, an increase in the Target2 liabilities of a country can have three reasons. It can derive from the CA, it can represent a flight of private capital or a deposit run by residents. Comparing figure 17 with figure 1 shows that the widening of the Target2 balances happened at a time when CA imbalances were already shrinking. Whilst before the crisis, there was a CA deficit for all countries but Italy (where the CA was roughly balanced), the CAs improved substantially after the outbreak of the global financial crisis in 2007. Thus, there is hardly any evidence that the CA imbalances are the main driver behind the Target2 imbalances[31].

Figure 17: Net Balance with the euro-system in bn. EUR/ Target2
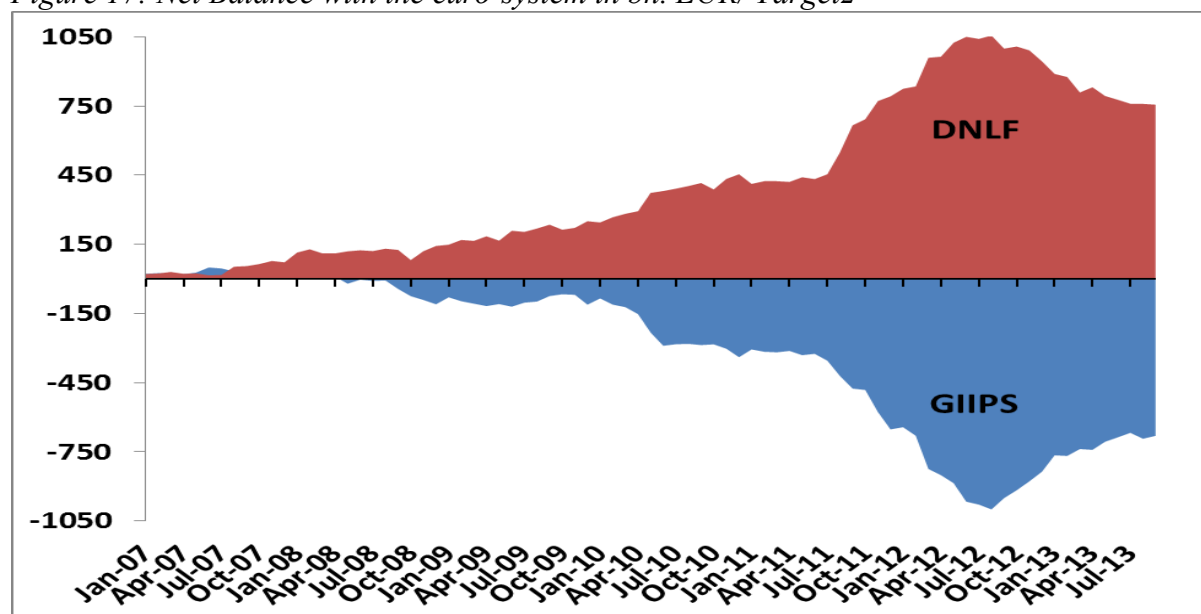
DNLF = Germany, Netherlands, Luxembourg, Finland
GIIPS = Greece, Italy, Ireland, Portugal, Spain
Data: Euro Crisis Monitor, Osnabrück University

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[31] In fact, Merler and Pisani-Ferry (2012) have shown that before 2008 the CA imbalances in the EMU have been financed by private capital inflows.

Since bank runs do not seem to be a major problem yet, we will not consider them either (even though there is some evidence for a deposit run in Greece[32]). That leaves us with the flight of private capital. As already stated in section 3, rising Target2 balances mainly reflect a ceasing of investments from Germany and France, whose banks refused to roll over their investments in the peripherals and repatriated their funds. Private capital flows to Portugal, Spain and Italy deteriorated rapidly since 2009 whilst private capital outflows shrank only slowly, due to a flight of private capital from the peripherals to the core. Thus, we face a combination of external factors (extra-EMU countries prefer to use core countries as an intermediary) and internal factors (banks in the core countries stop their intermediary role and repatriate funds; flight of private capital from peripherals to the core) that explain the surging Target2 balances.

Figure 18 shows what the graphs in figure 9 would look like if adjusted for central bank lending. According to Germany's liability for ECB claims, we attributed 1/3 of the Target liabilities of each central bank to the bilateral FA with Germany. We took the difference of each country's CA and FA, including the Target loans. Since we took the negative of all values, positive figures represent an FA (including Target loans) that exceeds the CA deficit. The figure shows that the system that seemed to have come to a halt in the years of the crisis is still going on. German bank loans were just replaced by central bank loans. Whilst in Ireland, Greece and Portugal, the European transfer mechanism seemed to have stopped capital flight; values have been skyrocketing for Italy and Spain.

Figure 18: Bilateral CA plus FA for Germany and the EMU peripherals in mio. EUR (incl. Target2 loans, negative values)
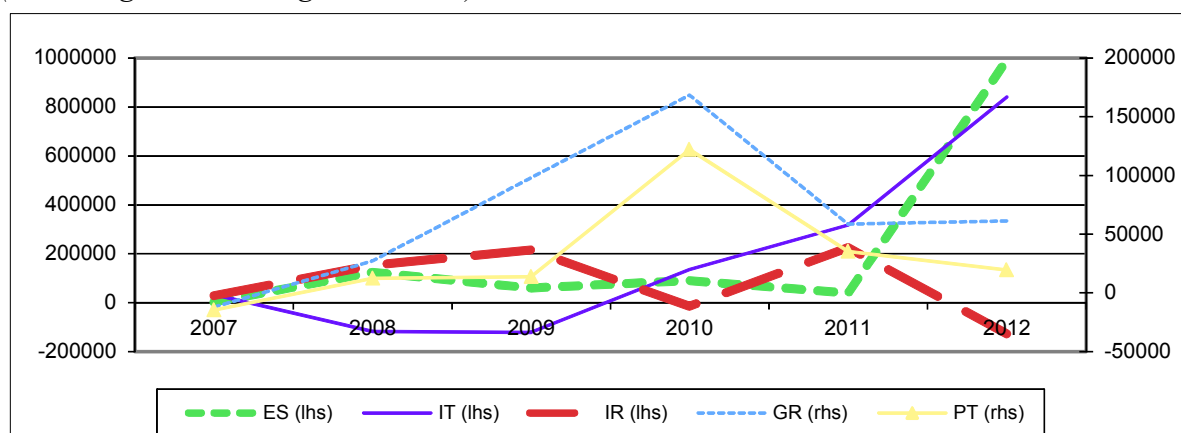
Data: Deutsche Bundesbank and Euro Crisis Monitor (Osnabrück University)

As we predicted in section 3, the Target2 provisions of liquidity just replaced private foreign investments. When e.g. German banks stopped redirecting capital flows into the peripherals and were cutting back their exposure to the peripherals, these loans were replaced by euro-system transfers and the Bundesbank Target2 surplus rose[33].

In our example, bonds are practically repaid via the euro-system, which just shifts the debt from the foreign (private) bond holders' balance sheet to foreign CB's balance sheet. If we noted in section 3 that Germany does not demand a considerable risk

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[32] See Whittaker (2011) for a more detailed analysis of the possible impact of deposit runs in the peripherals.

[33] The build-up of the German Target2 position equals the accumulation of gold reserves in a fixed exchange rates regime such as Bretton-Woods (Bibow, 2012).

premium for its intermediary role, it is worth noting that in this situation, the risk premium could even be negative. Germany (and the other surplus countries) would pay a higher interest rate on their debt, than they would receive for their CB credits to the deficit countries[34].

Figure 19: Net Balance with the euro-system in mio. EUR/ Target 2, separate countries
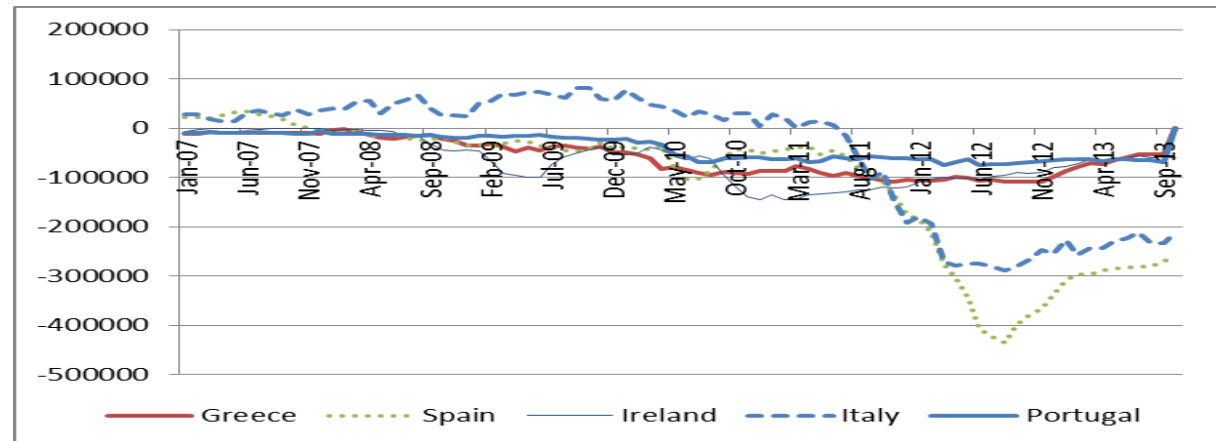
Source: Euro Crisis Monitor, Osnabrück University

Apart from the provision of liquidity through Target2, the reversal of private capital inflows did not lead to a Balance-of-Payments crisis because the private capital outflows were compensated by two additional forms of public support: The Troika[35] assistance programs and the ECB purchases of sovereign bonds. When the debtor country receives Troika funds, then those funds replace the euro-system loans and the Target2 balance decreases temporarily. Figure 19 shows the Target2 balances for the peripherals separately. One can see e.g. the little upward dent in the curve of Ireland, when the first tranche of payments was settled in early 2011, and the same for Portugal in June 2011. The debt of the peripheral countries does not decrease; it just changes its owner. The set-up of these rescue packages through the ESFS and its successor ESM, helped to calm down the situation a bit for the countries that were subject to it (namely Portugal, Greece and Ireland). In Italy and Spain on the contrary, the countries that did not receive support from the ESFS yet, the acceleration of Target2 deficits was just about to begin (see figure 19). The issuance of the ECB's longer-term refinancing operation (*LTRO*) in December 2011 and February 2012 went in favour of this development, when Italian and Spanish banks draw big amounts of money from the ECB and placed them in (mainly) German banks. The improvement in the Target2 balances of Spain and Italy since late 2012 might just be a reversal of that (temporary) development.

Following Deutsch Bank Research (2012), figures 20 and 21 display the overall capital account vs. the "private" capital account[36] of Spain, Portugal and Italy. The graphs show how for Spain and Italy, their central banks had to transform a negative capital account into a positive one in 2011 (from -7.3 per cent of GDP to +3.3 (Spain)

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[34] Sinn (2012) describes in detail how Target2 balances are the same as a loan from or to other EMU countries.

[35] Troika stands for the committee led by the European Commission with the International Monetary Fund and the European Central Bank. The Troika organised loans to the Greek, Irish and Portuguese governments.

[36] By "private" capital account we mean the CA, net of central bank lending.
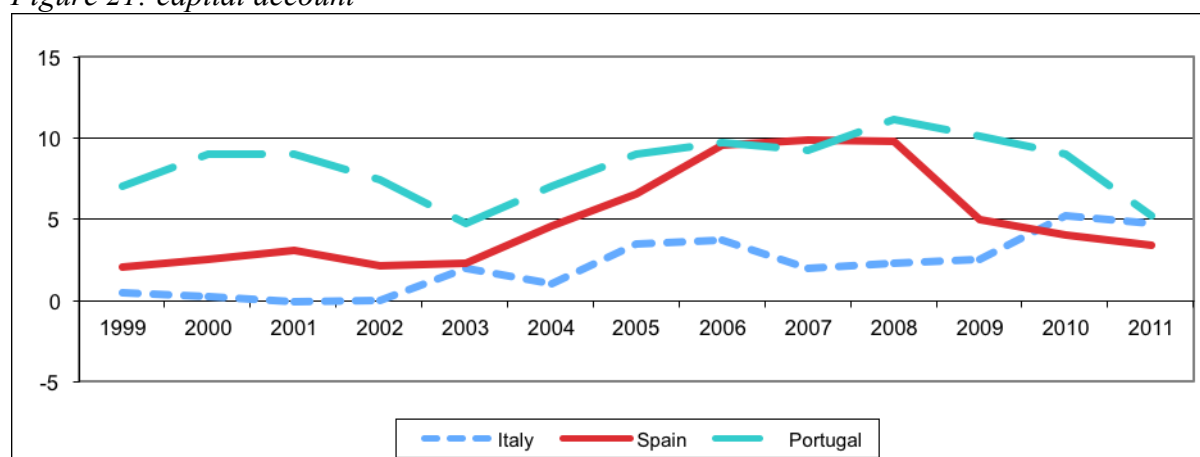
and from -8.1 to +4.7 per cent (Italy)). For Portugal we can see how the situation calmed down, after Portugal became subject to the ESFS in April 2011.

Figure 20: "Private" capital account (without central bank lending)
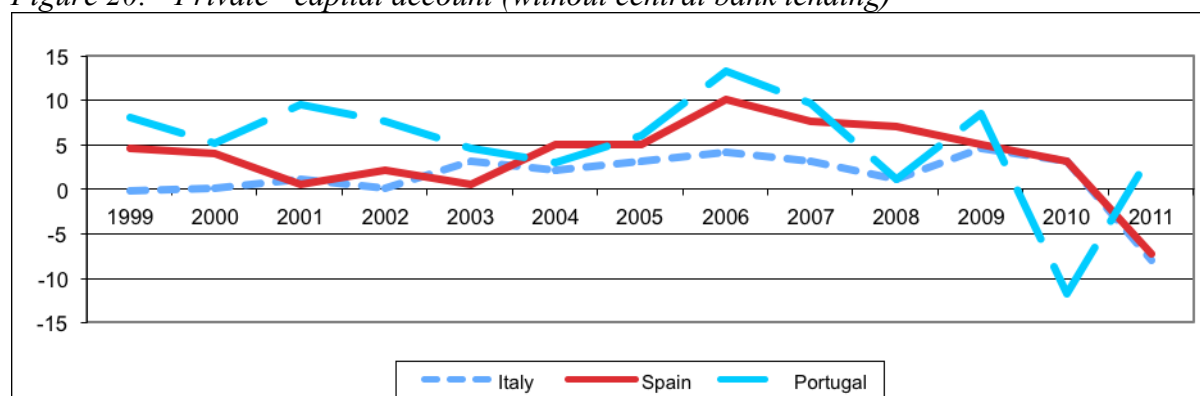
Source: DB Research

Figure 21: capital account

Source: DB Research

On the one hand this system mitigated the adjustment process of the CA and FA, but on the other hand it facilitated the withdrawal of private investors. It might be exactly this mitigation that will leave the EMU stuck in the second equilibrium. The external trade partners can keep on exporting to the peripherals, without having to invest there, whilst the peripherals do not have to reduce their imports to a level that corresponds to their import of private capital. Since the "normal" capital inflows from Germany and France ceased, Target2 liquidity allows the peripherals to run persistent CA deficits without depleting the net foreign assets. For Greece we observe a similar picture (not displayed). Greece and Portugal financed almost their entire CA with Target credits from 2008 to 2010 (EEAG, 2013). This works almost similar to the US, who can finance their imports through the money press, because they issue the world reserve currency. The euro membership puts the peripherals in a position where they can finance the net import of their goods via the money press too (Sinn, 2012). Otherwise their currency would lose its value quickly (similar to the mechanism described in section 3).

What we see up to this point is in line with our predictions in section 3. Once a currency union is in a situation where risk is pooled in few countries, those countries have no means to stop this system. If their private investors try to reduce their

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exposure to deficit countries, the exposure will be transferred to their countries´ public sector. How could a system like this evolve and why was there no way to stop it?

After the collapse of the EMU interbank market, the ECB applied the fixed-rate full allotment procedure. This procedure let a fatal pact between the EMU banks and governments arise. Even if the Troika would cease its payments to troubled countries, their governments could just borrow from their commercial banks, which would borrow from their central banks, which in turn could borrow from the ECB. Consequently a potential end of the Troika lending would not form a binding constraint for any government in the EMU[37]. The government could just replace it by euro-system lending and even save on interest payments, having only to pay the ECB base borrowing rate instead of the higher Troika rate[38]. Even if the ECB would refuse to accept peripheral government bonds as collateral for new credits, they could just extent their Emergency Liquidity Assistance (ELA), which is not subject to collateral[39]. The only way to stop this would be to exclude a debtor country from the euro-system. This theoretical option would further enhance capital flight from that respective country, so that the euro-system had to provide even more liquidity before the final exclusion of that country. That additional liquidity would be lost for the other EMU countries if that country eventually exits the EMU and defaults on its Target2 liabilities. Hence, the ECB is the lender of last resort for all EMU countries, if it likes it or not, unless there is a political agreement to actually kick a country out of the euro (Whittaker, 2011). There is no way to rebalance the Balance-of-Payments of the EMU countries internally to a match of bilateral CAs and FAs, as long as there is no rebalancing with external trade partners. The EMU is in a situation where external investors as well as the peripherals might prefer the status quo.

Could the phenomenon of euro-system lending be considered a benign one? The allocation of capital in a scenario like this is far from efficient and hinders the adjustment process. Nevertheless, this equilibrium offers a variety of risks and chances. If private Investors are not willing to finance banks and government budgets anymore, the central banks step in. The injection of liquidity has protected the peripheral countries from the full negative impact of a sudden stop[40]. On the one hand, this helps to avoid non-performing loans or the bankruptcy of banks and

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[37] It is also interesting to look at the bank notes issued from the single EMU nations. Technically any EMU member country could just keep on printing bank notes if the ECB refuses to provide any more liquidity. An amount that exceeds the internal allocation for that country forms a liability within the euro-system and thus must be added to the Target2 balance to get a precise picture of the intra EMU balances. In the case of Portugal and Spain this forms a moderate asset that has to be netted with their Target2 deficit, whilst in case of the other peripherals it represents an additional liability. Interesting enough, Germany would have to reduce its Target2 claims by EUR 192bn for September 2012 (according to Bundesbank data). Possible reasons for the overproportional amount of banks notes issued in Germany might be that migrant workers in Germany have carried these bank notes to their countries of origin, where they are used as a parallel currency or that German tourists carry these notes abroad.

[38] The first tranches of EFSF loans to Ireland and Portugal had an effective interest rate of about 5 per cent to 6 per cent, whilst the ECB base borrowing rate was only 0.75 per cent at the time (currently 0.25 per cent).

[39] The ELA has already been used extensively in Ireland and Greece, according to Merler and Pisani-Ferry (2012).

[40] Restricting the euro-system liquidity flows would not solve the euro crisis, but limit the banks' ability to lend to their government, in troubled countries. A government with a debt problem in turn, can't support its banks with liquidity, the two problems are intertwined. Any attempt to stop this would have to contain a mechanism to stop governments and banks from default and protect member countries from speculative attacks (Merler and Pisani-Ferry, 2012).

governments. On the other hand, central bank liquidity just replaces existing credits. It will keep the net indebtedness constant, thus there cannot be a new (fiscal or credit driven) stimulus for these economies. Another problem is that the unlimited provision of liquidity hinders a sufficient adjustment of asset prices.

Figure 22: REER, price deflated GDP, 2000=100
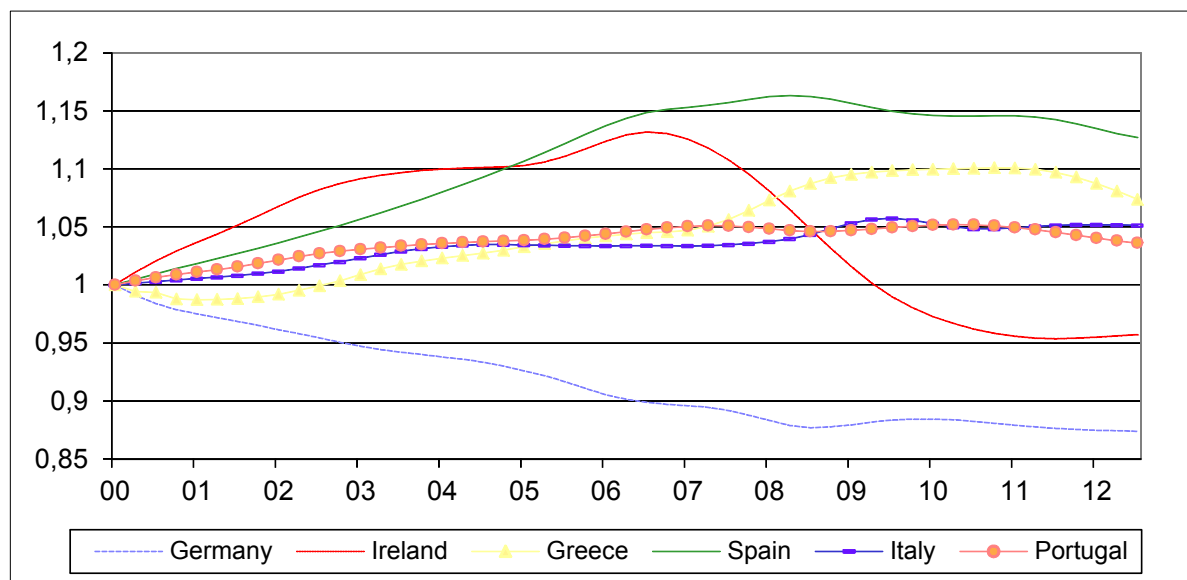
Data: Eurostat

The difference between figure 22 and figure 16 illustrates this point. Apart from Ireland, no country seems to have made a notable progress in competitiveness, based on price deflated GDP, whilst the unit labour costs in figure 16 showed a slightly brighter picture. The reason is that in a crisis, the least productive workers are set free first, so unit labour costs decrease. This is a purely statistical effect, which has no implications for an improved productivity (see also Sinn, 2012). For an internal devaluation, which the reforms aim at, a lowering of the price levels would be needed. Apart from Ireland, this has not happened in any of the peripherals. Greece and Spain had even rising price levels until very recently[41]. There is strong evidence that the provision of public loans and liquidity has deferred the adjustment process. Sinn (2012) e.g. states that public loans and euro-system liquidity deferred the structural improvements of the competitiveness in the peripherals (except Ireland) by at least five years.

We will demonstrate this again at the example of Spain, because it has been one of the major destinations of capital flows (if one includes the Target loans). A country that experienced an asset price bubble like Spain has to undergo some asset price adjustment process. As section 3 has shown, the Spanish real estate bubble was mainly fuelled by German and French Banks. We have seen above, that the outbreak of the crisis let these capital flows cease. Without the euro-system replacing these flows, the adjustment process would be more painful for Spain. The nominal value of the stock of assets would shrink substantially and the wealth of Spanish households would decrease in line. A ceasing of the Target2 loans to Spanish banks on the

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[41] Sinn (2012) states that Greece and Portugal would have to reduce their price levels to 60-70 per cent of their 2007 levels to regain competitiveness. Spain would have to reduce to 80 per cent and Italy to 85-90 per cent.

contrary would raise interest rates, households would default on their loans; banks would eventually default too and have to be bailed out by either the Spanish government or the ESM. After the end of that process, the economy would find itself on a lower level of (asset) prices and wages and eventually start growing again. As Sinn (2013) stated, the financing costs for the Spanish banks are still too low at the moment. This leads to a non-optimal allocation of capital. The necessary adjustment of credit lending is deferred which also defers a possible adjustment of the Spanish economy. In the current situation, Spain is stuck in a triangle of over indebted banks, households and government. The austerity of the government and households depresses growth. Unless the situation adjusts, GDP growth will remain poor.

Since the private capital that flees from the peripherals is likely to be invested in the core EMU countries (safe haven), the price level in the core countries might rise and help to rebalance the price levels in the EMU internally. But, since it is easier to politically control inflation, and Germany has shown in the past that it is willing and capable of doing so, an over proportional share of the adjustment process will be imposed on the deficit countries. The question if their societies are willing to accept that, will decide in which equilibrium the EMU will be stuck in the mid-run.

5. Conclusion

In the present paper we analysed the widening of the intra-EMU imbalances. We addressed the questions if the capital flows inside the EMU were sustainable and what external and internal factors contributed to them and why the Balance-of-Payments should matter at all in a monetary union. Our results were that the EMU has been hit by an external trade shock which worked in favour of some countries' CA, but challenged other EMU countries' CAs. The external shock was amplified by the particular structure of the EMU since the peripheral countries did not receive direct capital inflows for their challenged CAs, but their trade partners preferred to use the particular structure of the EMU to invest via German and French banks as intermediaries. This risk pooling in the core EMU countries left them heavily exposed to the peripherals. When the two consecutive crises that hit the EMU led to a repatriating of funds, the euro-system had to step in and provide the peripherals with the necessary funds to finance their CA deficits. This way of financing is benign for the peripherals and external investors, but defers necessary structural adjustments and works as a self-enforcing process which pools the risks and liabilities in the core EMU countries. It will depend on the political pressure to implement necessary adjustments to regain investors' confidence in the peripheral EMU countries, otherwise the procedure of deficit financing via Target2 will become a permanent phenomenon. An increase in domestic demand of the surplus countries might provide additional help. Otherwise, diverging Target2 balances will remain in the long run.

V Concluding remarks

The purpose of this thesis was to provide a coherent explanation of the global financial crisis and the deficiencies in the world monetary system. We began our study by displaying the distortions that came with the widening of current accounts around the globe and how they created the conditions that made the financial meltdown 2007-2010 possible. We went on and mathematically described how a world with monetary asymmetry further enhances these conditions. Finally we could show how similar problems appeared on a regional scale with the introduction of the euro in the EMU.

We explained how Global Imbalances contributed a major part to the financial crisis. The usual adjustment channels did not work because of the special role of the USD (US) and the special composition of the Euro (EU). In both regions, deficit countries could indebt themselves almost for free. The USD allowed the US to postpone a painful tightening of aggregate demand, whilst the euro did the same for the EMU deficit countries. In the long-run, a multipolar world of several regional currencies (Renminbi, USD, EUR) might emerge or other means, such as special drawing rights (SDRs), will play a more important role.

Nevertheless, for a more balanced growth path in the world economy, the role of the US-Dollar will have to be rethought. At the time of finalizing this thesis, the world still struggles with the distortions that came with the globalisation. The understanding of this topic is still incomplete, therefore future research will be necessary.

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