

Global Imbalances and the Financial Crisis

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Summary

The thesis starts with an overview of the crisis. Expressions as prime- and subprime lending are being explained. The third chapter is the part of the thesis which tries to catch the macro perspective. The U.S. current account deficit and the inflow of capital to the U.S. are important topics here. It is also a discussion part which presents different views about the driving forces behind the global imbalances. Chapter 4 goes more into details about the developments in the financial system and the U.S. housing market. Much place is being devoted to the presentation of the securitization process and its consequences. Chapter 5 presents my views about what should be the most important lessons from the Financial Crisis.

Foreword

In this thesis I have tried to present my understanding of how the Financial Crisis should be understood and what we should learn from it. Much time has been devoted to reading papers of well known economists where they present their view. I have noted that they often tend to disagree with each other. The thesis is based upon the views that make most sense for me. The system that evolved around the issuing of subprime mortgage loans was extremely complex. I can therefore see why many will think that my presentation is too simplistic. The aim of my presentation is just to give the reader an overview of how the features of the financial system together with the global imbalances must be seen as determinants for the Financial Crisis. I am also sure that much more could have been written about what we should learn from the crisis.

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1. Introduction

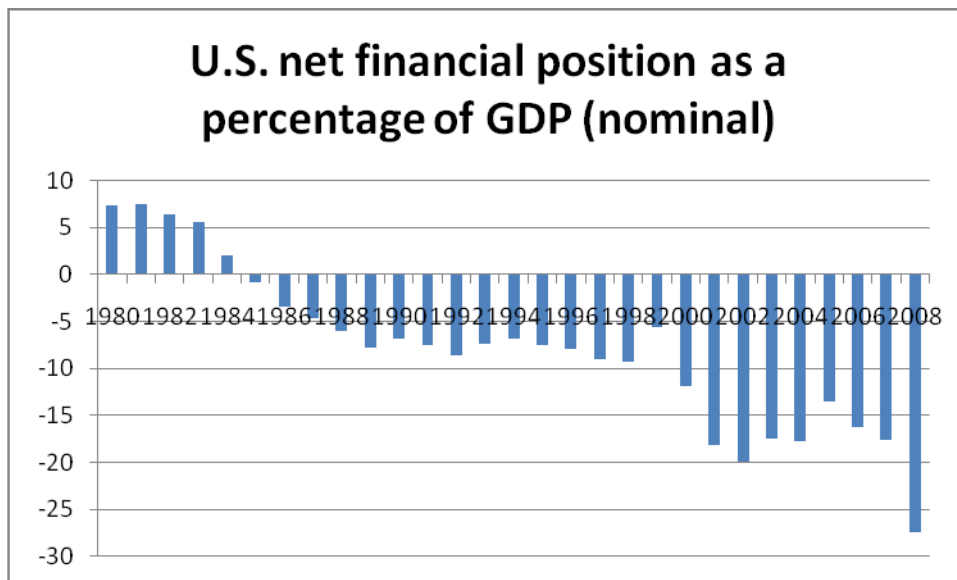
This thesis takes the perspective that the Financial Crisis must be seen as a consequence of the global imbalances that have evolved the last decade. The thesis gives an overview of the global imbalances and investigates the linkage to the Financial Crisis. Further the thesis investigates the features of the financial system that made it possible for the crisis to happen.

The term “global imbalances” will notably refer to the large current account deficits the U.S. has run the last ten years. The “current account” is a country’s net income from the world outside for a given period of time. The term will be more closely defined later in the thesis. A country that runs a yearly current account deficit lives beyond its means, and will experience a deterioration of its net financial position with the rest of the world.

A country’s net financial position is the difference between domestic ownership of foreign assets and domestic assets owned by foreigners. The term “assets” refers to economic resources and can be everything from physical property to bank accounts, stocks and bonds. If the current account deficits exceed the economic growth rate, debt to foreigners will start to increase as a percentage of the “gross domestic product” or the “GDP”. This term is measure of a country’s yearly production of goods and services.

The graph on the next page clearly shows the deterioration of the U.S. net financial position since 1980, especially from 2000 and onwards.

Figure 1



Source: <http://www.federalreserve.gov/releases/z1/Current/>, table L.107 and

<http://www.bea.gov/international/index.htm>,

The U.S. economy makes up about 20 percent of the world economy. The dollar is still, and probably will for many years to come, be the world's most important currency. When the U.S. is running a current account deficit that is seen as too high, it is therefore also seen as a problem for the whole world economy. When the U.S. economy is unbalanced, the world economy is unbalanced. The graph is thus a good indicator for the global imbalances that have evolved the last decade. Many researchers warned about the deficits before the crisis.

"Any sober policymaker or financial market analyst ought to regard the US current account deficit as a sword of Damocles hanging over the global economy"

Maurice Obstfeld and Kenneth Rogoff (2005)¹

¹ http://www.cid.harvard.edu/cidpublications/darkmatter_051130.pdf, page 1

Global imbalances are often seen as a result of the economic relationship that has evolved between the U.S. and China the last ten years. A relationship where China stands for the production and the U.S. stands for the consumption. China is the biggest financier of the U.S. current account deficit. The thesis therefore takes an extra interest in the relationship between these two countries.

The mirror image of a current account deficit is a capital inflow of equal magnitude. Thus it has until now clearly been a willingness by foreigners to finance the U.S. current account deficits. It has been believed that a continuing accumulation of debt to foreigners eventually would lead to a loss of confidence in U.S. assets. This would then lead to a crisis for the U.S. economy as foreign capital would be withdrawn, the value dollar would decline and interest rates would rise to attract necessary capital from abroad. This “rebalancing” of the U.S economy has still not happened. Instead another kind of crisis came.

From 2003 and onwards the origination of “subprime mortgage loans” increased heavily. This term refers to a mortgage loan given to a borrower with low credit worthiness. The expansion of credit to this segment was accompanied by an increase in securities backed by these loans. It has been common practice in the U.S. to use mortgages as collateral for the issuing of financial instruments, or securities. The payments of principal and interests are directed to the investors in these instruments. This process is commonly referred to as “securitization”.

The date when the Financial Crisis started is often set to 15th of September 2008. This date the investment bank Lehman Brothers filed for bankruptcy protection. The bank, like many other financial institutions, had made substantial investments in the American subprime mortgage loan market. House prices had for many years had an upward sloping trend. Securities related to this market thus seemed to be attractive. In the middle of 2006 prices began to flatten out and eventually began to decline. This caused a rise in the delinquency

rate among subprime borrowers. Of reasons that will be investigated this inflicted losses on financial institutions all over the world. Nervousness by these institutions by making new investments led the world into a recession that many sees as the worst since the Great Depression in the 1930`s.

Did the increase in originating of subprime mortgage loans cause the house price appreciation? Research has found that areas with mostly subprime borrowers, between 2002 and 2005, experienced a higher growth in home prices than areas with mainly prime borrowers, despite that the latter areas experienced a higher income growth (Mian and Sufi, 2008). This thesis is critical to this view. The house price appreciation will be seen as a result of several factors. Still it is the increase in subprime home mortgage loans and the way the financial sector handled the securities based upon these loans that the thesis sees as the ultimate cause to the Financial Crisis. The house price appreciation hid the fragility of the system that emerged around the issuing of subprime mortgage loans. The term “the financial sector” will in the thesis be used about financial institutions located both in and outside the U.S.

Now the financial sector has by many researchers been found guilty in causing the Financial Crisis. Even if the failures of the financial sector must be seen in the light of the capital inflow to the U.S., the thesis shares the view that the financial sector must take a large part of the blame. The last part of the thesis will therefore focus on the worst shortcomings in the financial sector before the crisis.

2. The Subprime Crisis

This chapter takes a look on some of the aspects of the crisis that began to emerge in 2007.

2.1 Prime and Subprime Lending

A home mortgage loan is a loan secured by a home and the real estate the home is built on. A “subprime home mortgage loan” is a mortgage loan given to a borrower with a poor credit history. The thesis will only focus on home mortgage loans. Further in the thesis it is therefore the terms “mortgage loans” and “subprime mortgage loans” that mostly will be used. In the U.S. the so called FICO score is often used to measure the quality of the credit history. This score has a range going from 300 to 850. 60 percent of all borrowers have a score between 650 and 799. Mostly a borrower with a score below 620 is seen as a subprime borrower. A high debt to income and loan to value level is also often used measures to identify a subprime borrower. Due to the higher risk these borrowers represent, subprime mortgage loans carry a higher interest rate than prime mortgage loans. This subprime mark up has historically been in the area between two and four percent (Mian and Sufi, 2008)²

² Page 1, section 1.

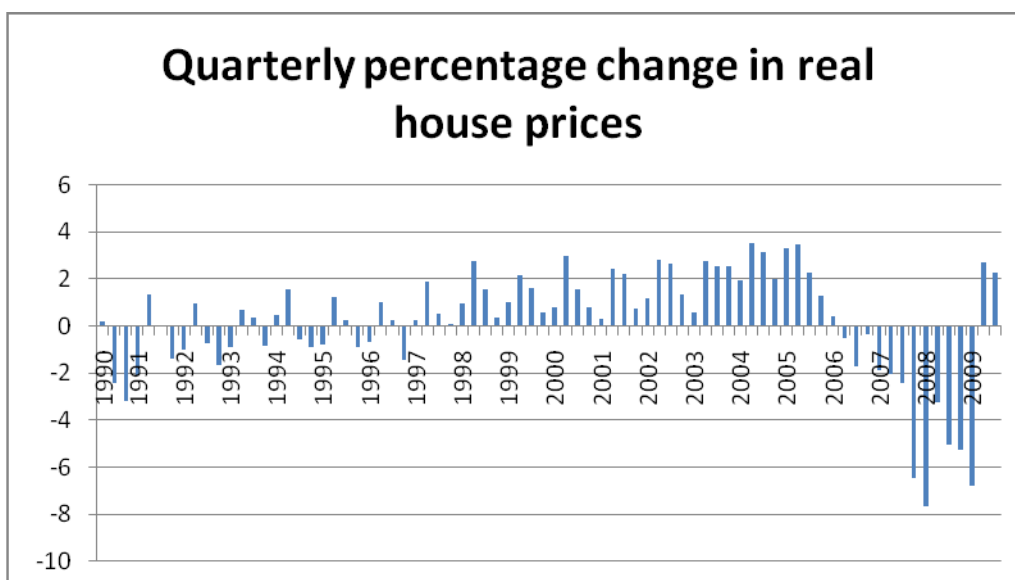
A prime mortgage loan can be seen as the opposite of a subprime mortgage loan. They are given to customers with a good credit history and with good prospects of paying the loan back. About two thirds of all outstanding residential mortgage loans fall in under this category. Most of them carry a fixed rate. Normally a prime borrower has a FICO score above 700.

A term that also will be mentioned in this text is the so called Alt-A mortgage loans. This is mortgage loans given to borrowers with a better FICO score then the subprime borrowers, but who have some kind of other risk attached to them. This can for example be a lack of proper documentation or a high loan to value ratio. In figure 3 the Alt-A mortgage loans have been put together with the prime mortgage loans.

2.2 The Development of the Crisis

The graph below shows the inflation adjusted change in house prices since 1990. The real house prices from year to year are based upon the median priced house. In the summer of 2006 house prices began to flatten out.

Figure 2



Source: <http://mysite.verizon.net/vzeqrguz/housingbubble/>

The increase in subprime lending in the period 2002 to 2005 was more than double as high as that of prime lending. In 2005 about 20% of all mortgage loans that were originated were rated subprime (Bethel, 2008)³. The size of the subprime mortgage loan market must not be exaggerated. The second quarter of 2008 the total value of outstanding mortgage loans in the U.S. was estimated to be \$11.3 trillion. The total value of securitized mortgage

³ Page 7.

debt at this point has been estimated to \$6,8 trillion (Demyanyk and Hasan, 2009)⁴. In December 2007 the value of outstanding subprime mortgage loans was estimated to be \$1.3 trillion⁵. The total value of securitized subprime mortgage loans in the period 2000 to the end of 2007 has been estimated to be \$1.8 trillion (Demyanyk, Van Hemert, 2009)⁶. This tells us that the subprime market compared to the overall mortgage loan market actually is relatively small.

As seen in the graph the price decline was in the beginning not that dramatic. The result was still that many homeowners found themselves in a situation where their homes were worth less than their total debt. For subprime borrowers that were dependent upon a further price increase to service their debt, the only solution now seemed to be to deliver back the key to the bank. When you do this in the U.S. you have actually freed yourself from all obligations. A mortgage loan follows the property and not the individual.

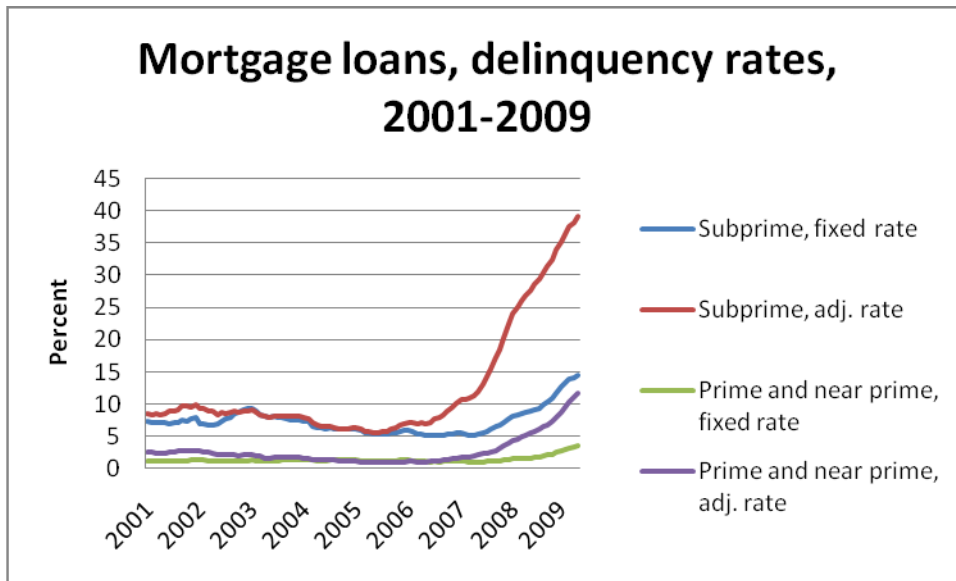
About half of the outstanding subprime mortgage loans have an adjustable rate. Often these loans have a low fixed “teaser rate” the first two or three years. From figure 3 we see that it was especially among the loans with an adjustable rate that the delinquency rate increased sharply during 2007. The assumption among these borrowers was that housing prices would continue to rise so that they would be able to refinance before the interest rate reset to an unaffordable level.

⁴ Page 4.

⁵ www.Bloomberg.com

⁶ Slide 2

Figure 3



Source :

http://www.federalreserve.gov/monetarypolicy/mpr_20090721_part2_accessible.htm#fig5

Figure 5.

The delinquency rate is here defined as the percentage of loans where either the interest rate or the principal have not been paid in 90 days, or the loans which already have reached the foreclosure stage. For all subprime borrowers the probability of default has since 2006 been three times as high as it has been for a prime borrower. In the graph above “near prime” refers to Alt-A mortgage loans.

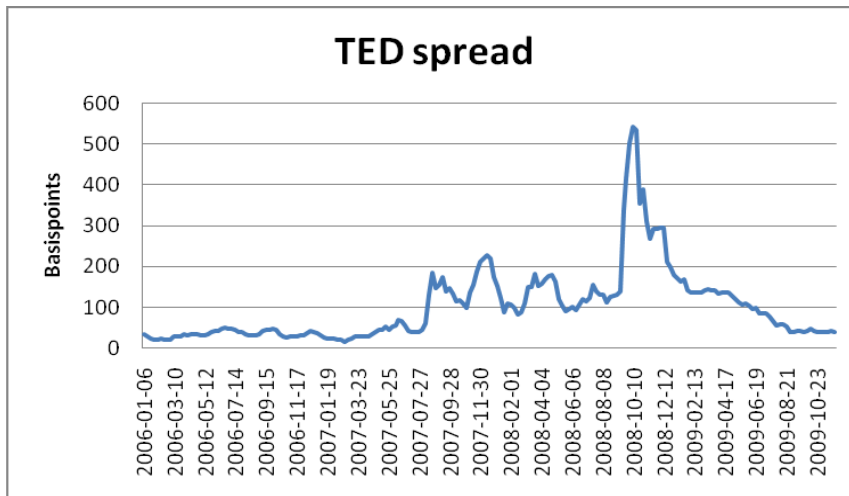
Individuals and financial institutions all over the world had for years invested heavily in securities backed by subprime mortgage loans. In this thesis the term “subprime securities” will often be used to refer to securities that represent claims on the cash flows from subprime mortgage loans. As delinquency rates increased investors became aware of that these securities were not as much worth as they once had believed they were. Since these securities were valued at marked-to-market on the balance sheet, managers had to write down their value as their market value declined.

In February 2007 the world largest bank, HSBC, reported a loss on \$10.5 billion dollars on securities related to the American subprime market⁷. In September that same year another British bank, Northern Rock, actually experienced a bank run due to losses on investments in the American subprime market. In the last months of 2007 and in the beginning of 2008 big financial institutions as Merrill Lynch, Citigroup, UBS AG, Bear Stearns and Morgan Stanley began reporting write downs on securities related to subprime mortgage loans. In March 2008 Bear Stearns were forced by U.S. officials to merge with JP Morgan Chase. Many financial institutions had borrowed heavily to invest in these securities. To keep the equity positive it was therefore necessary to sell off securities as write downs continued.

This created a further downward pressure on prices, triggering new rounds of sell offs. September 7th the Government sponsored enterprises Freddie Mac and Fannie Mae were placed under government conservatorship. The happening that maybe in the future will be seen as the start of the Financial Crisis came 15th of September. On this date Lehman Brothers filed for bankruptcy. The debt used to finance investments subprime mortgage loan related securities were often short term debt taken up in the money market. As investors began to withdraw capital from money market mutual funds it became more difficult to roll over the short term debt. The money market is the global market for short term borrowing and lending. Money market mutual funds are investment companies that invest in this market to provide money market rates of return to investors. The spread between the interest rate on the three-month Treasury bill and the three-month LIBOR, the TED spread, is often being used as an indicator for how easy liquidity flows in this market. The three-month Treasury is seen as a risk free asset. LIBOR stands for London Interbank Offered Rate and is the rate at which London banks borrow unsecured funds from each other. Financial instruments issued all over the world use LIBOR rates as a reference rate. LIBOR reflects the risk one bank perceives in lending to another bank. The graph below shows that in September 2008 the TED spread rose to over 500 basispoints.

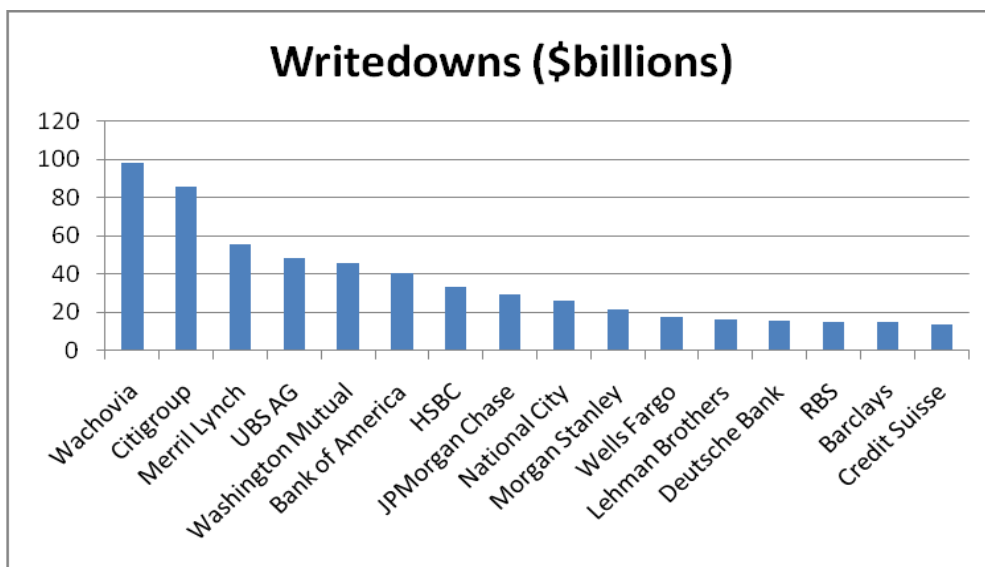
⁷ BBC News, Timeline: sub-prime losses

Figure 4



Source: <http://www.federalreserve.gov/datadownload/Build.aspx?rel=H15>

Figure 5



Source: <http://www.soa.org/files/pdf/2009-chicago-erm-darcy.pdf> , slide 3.

The graph above shows which financial institutions that have done the largest writedowns on subprime securities. The numbers the graph is based upon were published in February 2009. The dominating role of U.S. based banks is clearly seen. The European institutions

above are UBS AG, HSBC, Deutsche Bank, RBS, Barclays and Credit Suisse. Except from these all the others are American.

3. Global Imbalances

This part of the thesis gives an overview of the features of the global economy that have contributed to the Financial Crisis.

3.1 The Balance of Payments Equation

The “balance of payments” equation tracks all the economic transactions a country has with other countries for a given period of time. In the thesis the following way of writing the balance of payments equation will be applied:

$$\text{Current Account} = \text{Capital Account}$$

The following paragraphs give an explanation of these two accounts.

Current Account= Balance of trade + Net factor income from abroad + Unilateral transfers from abroad.

The term “Balance of trade” refers to exports of goods and services minus imports of goods and services. The term “Net factor income from abroad” refers to of income derived from all kinds of domestic owned assets abroad minus payments on foreign owned domestic assets. Income can here refer to interest receipts, returns from equity investments, returns from foreign direct investments (FDIs) and remittances from individuals working abroad. “Unilateral transfers from abroad” refers to gifts and aid.

Any deficit on the current account has to be neutralized by capital inflows from abroad. A country that one year has a current account deficit will in this year experience an increase in foreign owned domestic assets compared to domestic owned foreign assets. Its net financial position will thus deteriorate.

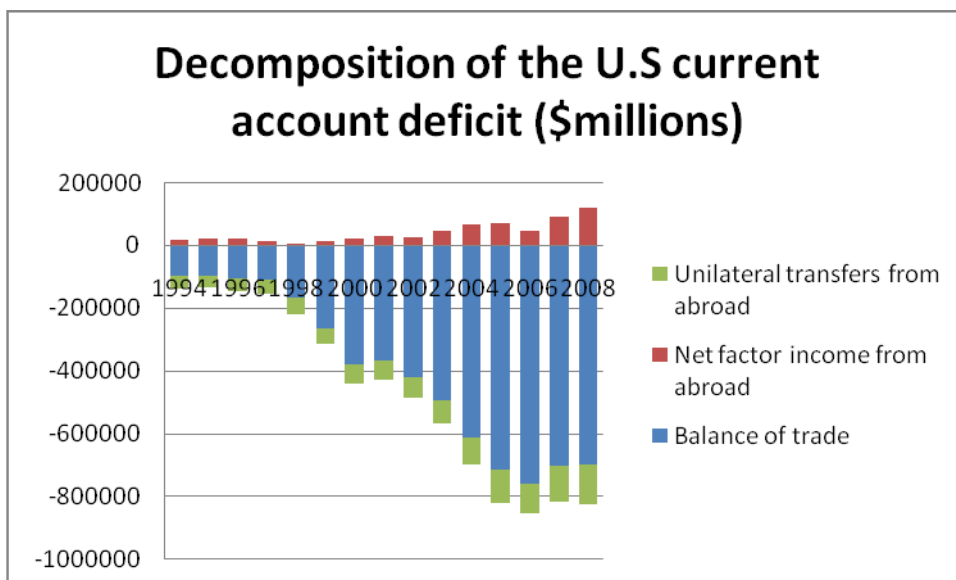
Capital Account = Change in foreign ownership of domestic assets - Change in domestic ownership of foreign assets

It is also possible to see the current account in terms of national savings and investments. By definition total saving in the world has to equalize total investment in the world. Since most countries are more or less part of an integrated world economy this does not have to be the case for each national economy in each measured period. A country with a total amount of national savings that exceed the total amount of profitable investment opportunities, can lend the residual to a country where profitable investment opportunities exceed the total amount of national savings available. The amount of profitable investment opportunities reflect the economy`s capacity to grow. The net inflow of capital to a country must equalize the difference between national investments and national savings. This means that the difference between a country`s total investments and savings must equalize its current account.

3.2 The U.S. Current Account Deficit

As seen in the graph below it is the yearly negative balance of trade that makes up most of the U.S. current account deficits. Surprisingly the U.S. has for every year a positive net factor income from abroad. This will be commented upon later in the thesis.

Figure 6



Source:

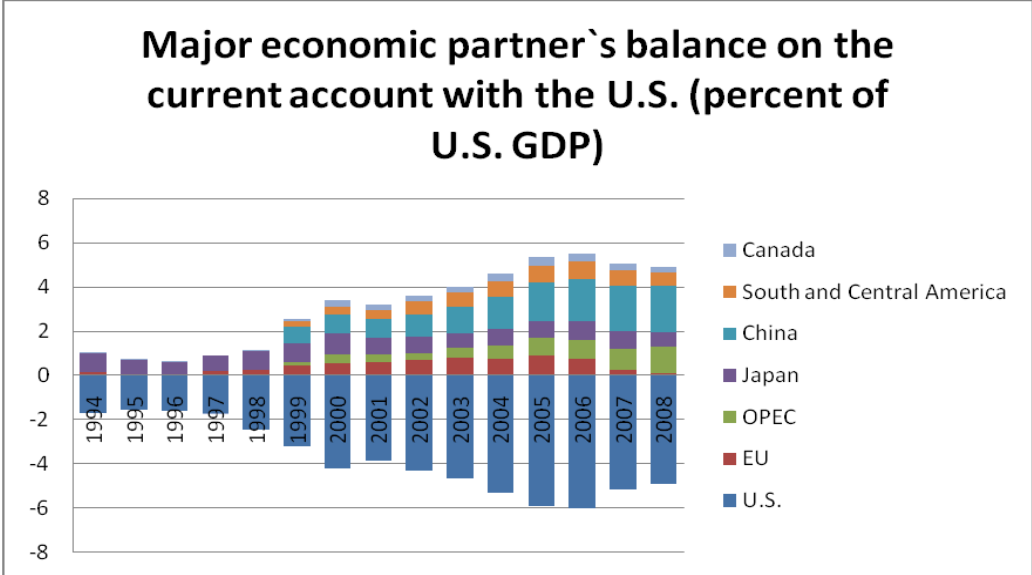
http://www.bea.gov/international/bp_web/simple.cfm?anon=71&table_id=1&area_id=3

A large share of the U.S. trade deficit is made up of imports of petroleum related products. Examples of these products are crude oil, natural gas, and fuel oil. In 2008 the value of petroleum related products was \$453 billion. The value of U.S. exports of these products was only \$67 billion. This means \$386 billion in deficit in this product class. Another big contributor to the trade deficit is the import of consumer goods. Consumer goods are everything from footwear, televisions and household goods to gems and jewellery. The

value of U.S. imports of consumer goods in 2008 was \$485 billion, while the value of its exports of these goods was \$161 billion. The deficit was thus \$324 billion. The third large contribution to the trade deficit in 2008 was a deficit of \$113 billion in the trade with cars, trucks and auto parts. When it comes to services the U.S. is a net exporter. The surplus in 2008 was \$144 billion. The major contributors to this surplus were the export of intellectual property and financial services⁸.

Between 2002 and 2006 the price of oil nearly quadrupled. Because of the large share imports of oil makes up of total imports, this had serious consequences for the U.S. trade deficit. It has been estimated that 50 percent of the deterioration of the trade deficit in this period came as a result of this price increase (Cavallo, 2006). Already from the end of the 1990`s the concerns about the deficits increased (Jill A. Holman, 2008).

Figure 7



Source: Bureau of Economic Analysis

⁸ The data are from table 1 and table 2b in U.S. International Transactions Accounts Data, Bureau of Economic Analysis.

http://www.bea.gov/international/bp_web/list.cfm?anon=71

Figure 7 shows the total yearly U.S. current account deficits, and some countries that are running a current account surplus with the U.S. The Bureau of Economic Analysis (BEA) is having data back to 1994 for Japan, Canada and the EU. The data for China only goes back to 1999. OPEC is a group of twelve oil producing countries located in South America, Africa, and in the Middle East. With 33.3 percent of the world's oil production in April 2009, OPEC is the most important participant in this market⁹.

Venezuela and Ecuador are members of both OPEC and South and Central America. In the graph the numbers for these two countries are thus counted twice. In 2008 Venezuela stood for nearly 40 percent of South and Central America's current account surplus with the U.S. It is notably China, Japan, and OPEC members that are running large current account surpluses with the U.S. OPEC's current account surplus with the U.S. has since the year 2000 increased dramatically. High oil prices the recent years must be seen as the reason for this.

The most noteworthy about the graph above is the rise of the Chinese current account surplus with the U.S. The economic relationship that has evolved between the U.S. and China the last decade is marked by a high saving rate in China and American overconsumption. Each year the industrialised eastern part of China attracts people from the rural western part of the country. An export led growth has by Chinese authorities been seen as the best way to create new jobs to all those who are seeking a better life.

⁹ Wikipedia

The U.S. and China accounts for 25 percents of the world`s population, and above one third of its GDP. It is therefore not so strange that many researchers see this relationship as the most dominant feature of the world economy (Ferguson and Schularick 2009). The relationship has been given the name “Chimerica”.

Japan`s current account surplus with the U.S. has the last 15 years been relatively stable. In 1989 Japan experienced a sharp drop in prices on real estates and stocks. This marked the beginning of a period with slow economic growth and deflation. Now researchers claim that the nineties and the first decade of this century have been two lost decades for the Japanese economy. The country has however continued to maintain its position as a large exporter of goods.

3.3 The Inflow of Capital to the U.S.

Every dollar that goes out of the U.S. has to come back in some way. If the entire capital outflow from the U.S. had been directed back in the form of purchases of American goods and services the U.S. current account deficit would have been eliminated. Most of the capital has instead come back in the form of purchases of U.S. assets. It is this purchasing of U.S. assets by foreigners that is meant with capital inflow from abroad. Between 2002 and 2006 gross capital flows in to the U.S. totalled \$6.2 trillion dollars. In 2006 alone \$1.9 trillion dollars flowed in to the U.S. (Forbes 2008)¹⁰. It has been estimated that a continuation of the deficits in the recent years will lead to that foreigners in the future will own about half of the capital stock in the U.S. (Eichengreen, 2006). If this will be a reality depends upon foreigner`s willingness to continue to finance the deficits, and Americans willingness to let this happen. Probably the U.S. will find this situation uncomfortable. The term “foreigners” refers to all individuals, firms, institutions and governments not residing in the U.S. The term “private capital inflow” refers to investments done by individual investors, banks, and other private institutions. The term “official capital inflow” refers to capital invested by foreign governments and central banks. In statistics the distinction between official and private capital inflow is not always easy to draw. It has been estimated that in 2004 60 percent of the U.S. current account deficit was funded by foreign official inflow. By 2006 the share was 55 percent (Ferguson and Schularick, 2007)¹¹.

Figure 8 shows the total yearly increase or decrease in foreigner`s ownership of U.S. financial assets. Because of the complexity of financial assets, the assets have been divided in to three broad simplified groups. The first group “Equity+FDI”, consists of assets like corporate equities, mutual fund shares, and foreign direct investments. Some of the most

¹⁰ Second part page 2.

¹¹ First part page 229

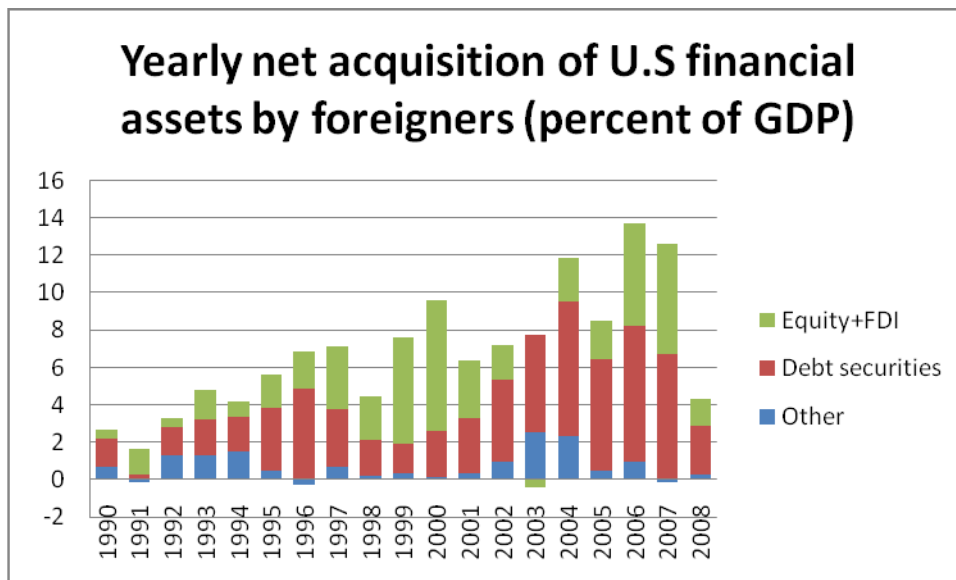
important asset classes making up the second group, “Debt securities”, are Treasury securities (Treasuries), agency-and GSE backed securities, and corporate bonds. Treasury securities are debt instruments issued by the U.S. government to finance the budget deficit. The term includes all the four types of this asset. Treasury bills, Treasury notes, Treasury bonds, and Treasury Inflation Protected Securities. About half of the U.S. Treasuries are owned by U.S. government trust funds. The other half is privately owned. Of this privately owned share foreigners own half of the outstanding value. However most of this share is foreign official holdings. The term “agency- and GSE-backed securities” refers to a broad class of securities. Agency backed securities are securities issued by U.S. federal agencies other than the Treasury. The term “GSE” stands for government sponsored enterprise. These enterprises are financial institutions set up to provide credit to specific groups or areas of the economy. Since they are sponsored by the government, this thesis will not see them as part of the private sector. The most known GSEs are the federal Home Loan banks, Federal National Mortgage Association (Fannie Mae), Federal Home Loan Mortgage Corporation (Freddie Mac), Federal Agricultural Mortgage Corporation, and Farmers Home Administration Pools. Corporate bonds are debt obligations of U.S. financial and nonfinancial corporations. Some of the assets in the column termed “other” can also be seen as debt but not necessarily debt securities, for example U.S. time deposits.

The columns do not necessarily equal the current account deficit. In 2006 the current account deficit was about 6 percent of the GDP, while in the same year the U.S imported capital on a magnitude of almost 14 percent of GDP. This is because The U.S. this year exported capital equal to almost 8 percent of its GDP.

Foreign direct investments in the U.S. and other foreign purchases of U.S. equity have tended to be offset by similar investments done by U.S. abroad. Foreign purchases of U.S. debt securities however exceed U.S. purchases of debt securities abroad. The U.S. current account deficit has therefore largely been financed through debt securities (Setser and Roubini 2007). From the end of 2000 to the end of 2007 total foreign holdings of U.S. debt securities increased from \$3 trillion to about \$ 7,4 trillion. The Financial Crisis has clearly

had an impact on foreign accumulation of U.S. debt securities. From mid 2008 to the end of third quarter of 2009 foreign holdings only increased from \$7,6 trillion to \$7,7 trillion¹².

Figure 8



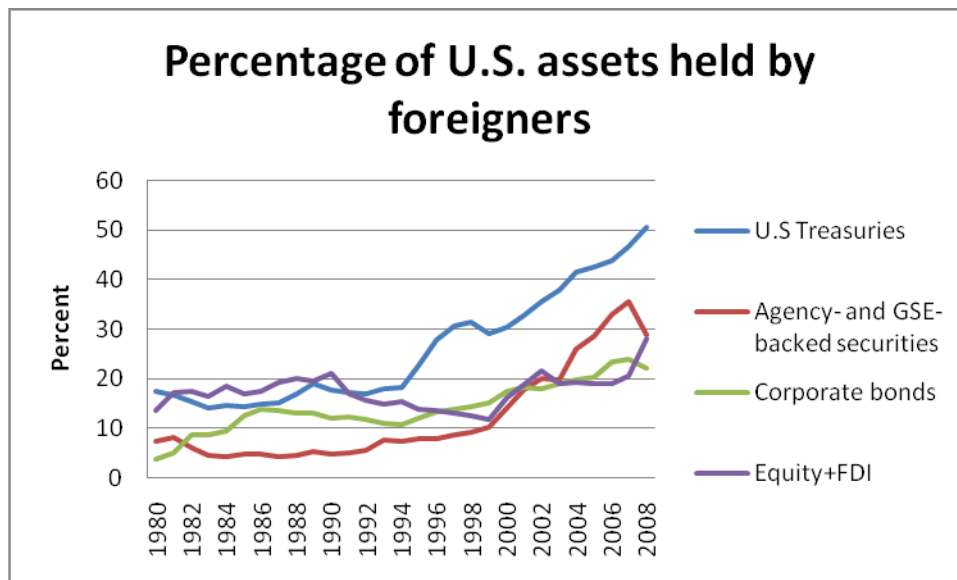
Source: Bureau of Economic Analysis <http://www.bea.gov/national/#gdp> and

Federal Reserve: <http://www.federalreserve.gov/datadownload/Choose.aspx?rel=Z.1>, table F.107

In the graph below debt securities have been divided up in U.S. Treasuries, agency-and GSE-backed securities and corporate bonds. The graph shows the percentage of these asset's outstanding value that is held by foreigners. The foreign direct investments have been added with foreign ownership of equities, and then partitioned with the total value of outstanding U.S. equities. This share has been kept on a fairly constant level the last twenty years. Foreigner's share of corporate bonds have also only increased modestly.

¹² Federal Reserve Board, table L.107

Figure 9



Source: Federal Reserve:

<http://www.federalreserve.gov/datadownload/Choose.aspx?rel=Z.1>

Table: L.209, L.210, L.212, L.213, and L.107.

The most strikingly about the graph are foreign holdings of U.S. Treasuries and agency-and GSE-backed securities. Inflow of capital from China has been seen as a reason for this increase. In September 2008 China surpassed Japan as the biggest holder of U.S. Treasuries. In November 2009 foreigners held U.S. Treasuries worth \$3,6 trillion. China's holdings at this time was \$789,6 billion, or about 22 percent of total foreign holdings. At this point in time 67 percent of foreign holdings of Treasuries were official¹³. China however does not allow private individuals to invest abroad. A substantial part of the capital inflow to the U.S. from China must therefore be termed official. In June 2008 Chinas' total holdings of U.S. securities was set to \$1,2 trillion dollars, or 11,7 percent of total foreign holdings¹⁴. This was five times the absolute level in 2003. While another large holder of U.S. securities, the

¹³ The United States Treasury, <http://www.treas.gov/tic/mfh.txt>

¹⁴ Page 4 in the article to and Labonte.

UK, holds most of its share in corporate bonds and equities, China has mainly invested in Treasuries and agency-and GSE-backed securities (Morrison and Labonte, 2009). In June 2008 the share was 43,3 and 43,7 percent¹⁵.

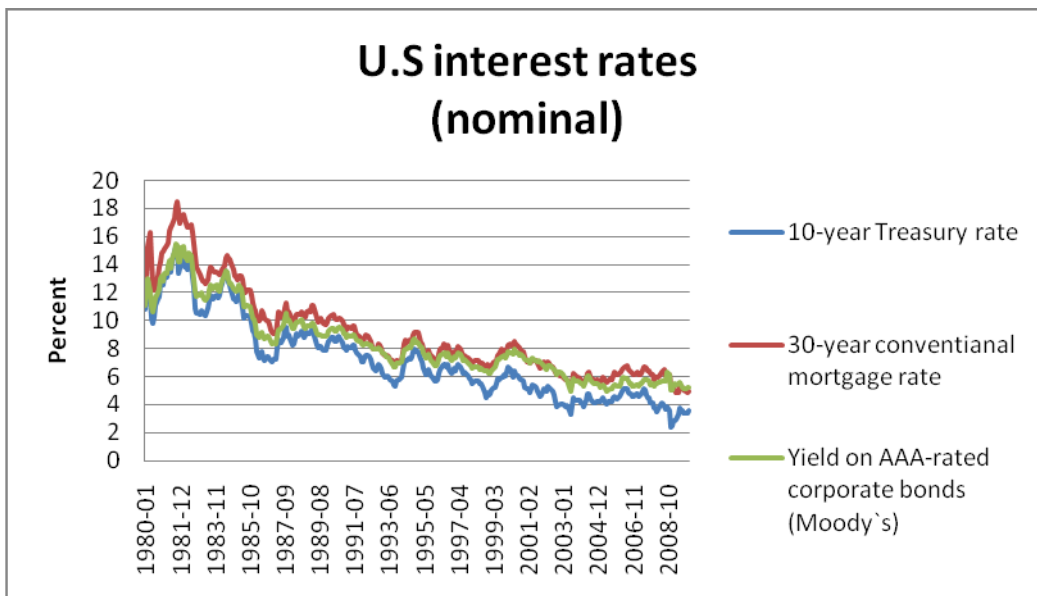
As the graph on the next page shows, long term nominal interest rates have had a declining trend since the beginning of the 1980s. The inflation rate in the same period has been fairly stable. This indicates that also the long term real interest rates have had a declining trend the last thirty years. The most important price in the U.S. capital market is the interest rate on 10-year Treasuries. This interest rate is seen as the risk free benchmark for long term investments. 10-year Treasuries are traded heavily in the secondary market. A high demand for a security will press down the yield this security gives to investors. It has been argued that the declining rate on the 10-year Treasury has been a result of loose monetary policy of the Federal Reserve. In the first years of the last decade Alan Greenspan kept the federal funds rate on a very low level. In the middle of 2004 the rate reached 1 percent. From then on Alan Greenspan began to raise it. After one year the rate was up to 3 percent. This however seemed to have no impact. The 10-year Treasury rate continued to decline. Alan Greenspan called this a ``conundrum``. The federal funds rate is however only one of several factors that affects the demand for 10-year Treasuries. The other most important ones are assumed to be interest volatility, expected long run inflation and the structural budget deficit (Francis E. Warnock, Veronica Cacdac Warnock, 2006).

Most often the yield curve will have a decreasing upward slope. The longer investors lend their capital away, the higher yields they demand. During the spring 2006 the yield curve became inverted. An inverted yield curve means that short term interest rates are higher than long term interest rates. This is often being seen as a prediction for a coming recession.

¹⁵ Page 5 in the article to Morrison and Labonte.

It was for a long time believed that international flows of capital did not have any effect on interest rates in the U.S. An investigation done in 2006 proves this assumption to be wrong. At this point it was estimated that foreign official purchases of U.S. government bonds the last year led to that the rate on 10-year Treasury securities was 90 basis points lower than what it would have been with only domestic purchases (Francis E. Warnock, Veronica Caccac Warnock, 2006). In addition also foreign private individuals and institutions are purchasing U.S. Treasuries. The same paper also finds that the yield on AAA-rated corporate bonds and the 30-year fixed conventional mortgage rate is being influenced on the same magnitude of foreign official purchases. The conventional mortgage rate is the name used by Federal Reserve and is the same as the interest rate on a prime mortgage loan. According to these findings an important part of the reason for the declining interest rates must be attributed to the inflow of capital from abroad.

Figure 10

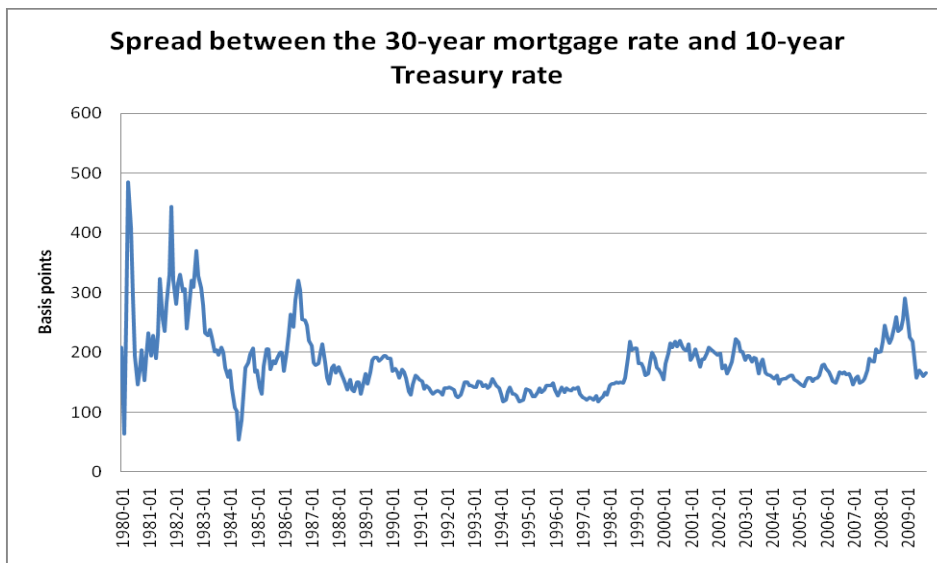


Source: Federal Reserve:

<http://www.federalreserve.gov/datadownload/Build.aspx?rel=H15>

The graph below shows the difference between the rate on a 30-year fixed conventional mortgage loan and the 10-year treasury rate. We see that for the last 20 years the spread has been relatively constant. This indicates that investors see securities backed by these mortgage loans and 10-year Treasuries as substitutes. When the 10-year Treasury rate declines the fixed 30-year mortgage loan rate also declines.

Figure 11



Source: Federal Reserve: <http://www.federalreserve.gov/releases/h15/data.htm>

3.4 Controversies about the Driving Forces behind the Global Imbalances

A country that runs a current account deficit for a long time will normally experience an increased pressure for adjustment. This means an upward pressure on domestic interest rates, a downward pressure on the exchange rate, and slower economic growth. The U.S. does not fit into this story.

The U.S. has been allowed to finance its current account deficits with cheap credit from abroad. From 2000 to 2007 the U.S. in average experienced a yearly real GDP growth on 3.2 percent¹⁶. For a mature economy this is seen as a very high growth rate. The U.S. trade deficit is a manifestation of an overvalued dollar, at least in terms of trade. As already mentioned the Financial Crisis was a completely other kind of crisis than the one which many feared. The crisis that came originated in the U.S. and was thus not a consequence of the rest of the world losing faith in the U.S. economy. Still it can be argued that the recent crisis can be the beginning of a more balanced world economy. In the first quarter of 2009 the U.S. current account deficit was “only” 2.88 percent of GDP (Schmukler and Serven, 2009). This indicates that the crisis has had an impact on the magnitude on the global imbalances. The interest rate on Treasuries and corporate bonds however, has been kept on a low level. The dollar also remains relatively strong against other currencies. During the crisis the dollar even appreciated against many currencies. The limited impacts of the crisis must be seen as a result of that it affected the whole world. Any serious adjustment of the imbalances has still yet to come (Schmukler and Serven, 2009).

¹⁶ www.indexmundi.com

It is no straight forward answers to what the main causes for the global imbalances are. This section takes some of the perspectives up to discussion.

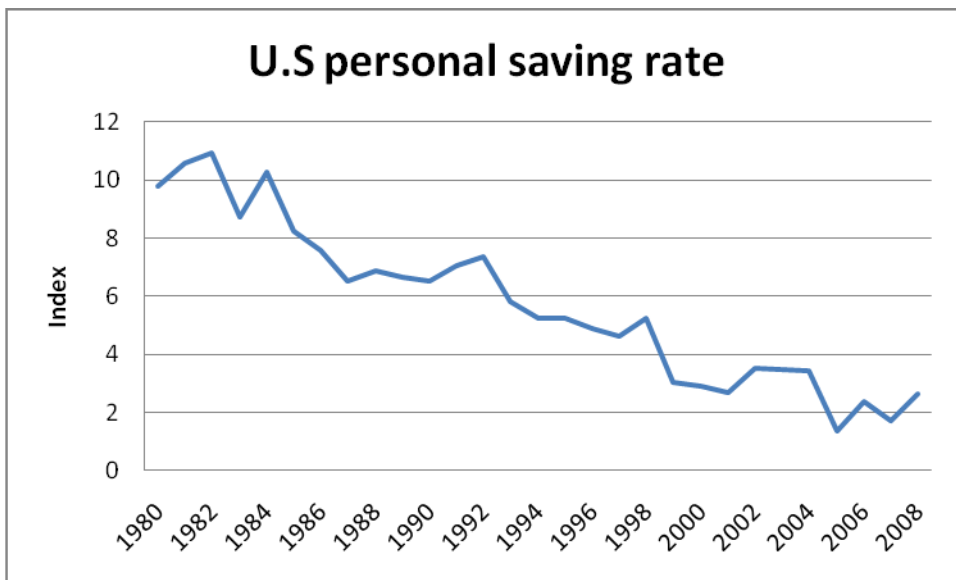
It has been argued that China intervenes in the currency market to keep its own currency undervalued, mostly in respect to dollar (Roubini, 2006). The reason for this intervention is to promote an export lead growth. According to this view Chinese policy is the source of the U.S. current account deficit. Research has however questioned this view. It has been argued that if Chinese authorities let its currency float so the current account surplus were eliminated, and all of this elimination came as a result of less export to the U.S., the U.S. current account would just improve with 10 percent (Cooper, 2005).

Those who argue that the U.S. current account deficit is a result of domestic developments often points to the yearly U.S. budget deficit. The term “the twin deficits” refers to the budget deficit and the current account deficit. It has been argued that since 2001 the U.S. current account deficit has reflected the U.S. budget deficit (Roubini and Setser, 2004). The fiscal deficit is still mostly not seen as an important reason for the current account deficit. The U.S. ran a budget surplus in the late 1990s while the current account deficit continued to increase. Germany is constantly running a deficit on its budget while it is running a surplus on its current account. Researchers seem to disagree about how strong the linkage between a budget deficit and a current account deficit really is (Ferguson, 2005).

Another domestic feature that many will see as a determinant for the current account deficit is that U.S. citizens save a very small amount of their income. A widely used measure for the savings done by private individuals is called the personal saving rate. This rate is calculated in National Income and Products Accounts, an analysis done by Department of Commerce in the Bureau of Economic Analysis. Disposable income is calculated by taking personal income minus personal current taxes. Disposable income minus personal outlays is the personal saving. The personal saving rate is the percentage personal savings makes

up of the disposable income. The declining trend in the personal saving rate since 1980 is very clear. After the crisis the rate has increased a little bit.

Figure 12



Source: Bureau of Economic Analysis:

<http://www.bea.gov/National/nipaweb/TableView.asp?SelectedTable=58&Freq=Qtr&FirstYear=2007&LastYear=2009>

This low personal saving rate is a result of that U.S. citizens increasingly have chosen to consume rather than to do the savings necessary for the U.S. economy's ability to grow. A low saving rate in the U.S. is however just one part of the global imbalances. Americans have been allowed to keep their saving rate on such a low level because people elsewhere in the world have been willing to do the saving for them.

Ben Bernanke wrote in March 2005 an article where he used the term "the global saving glut". This theory sees the U.S. current account deficits as a result of developments outside the U.S. Worldwide, he claims, there is a higher willingness to save than to invest. In this

situation, it is not so strange that the long term interest rates in the U.S. for many years have fallen. The U.S. capital market is a part of the world capital market, and in a capital market interest rates reflects the collective desire to save and invest. The U.S. current account deficit is according to this perspective a natural consequence of foreigners desire to place their excess savings in the U.S. financial market. It is the capital account that drives the current account and not the other way around. Research has shown that there is a worldwide shortage for liquid financial assets (Caballero, Farhi and Gourinchas, 2008), and that capital inflow to the U.S. is a result of foreigners search for safety (Caballero and Krishnamurthy, 2009). This is in accordance with Ben Bernanke`s theory. The emerging markets which are running such large current account surpluses with the U.S. do not have the institutional capability to produce the safe assets they want to invest their excess savings in (Caballero, 2010). It is especially many Asian countries that have a high propensity to save. Many governments in Asian countries took wisdom from the Asian Crisis. In the booming years before the crisis emerging countries in Asia were dependent upon capital from abroad. Some events made foreign investors nervous and a massive outflow of capital began. This made the crisis much worse than it really had to be. After the crisis governments in the region began to build up reserves of foreign capital, to protect their economies with in the case of future crisis. Also China began to follow this policy even though the country was not that hard hit by the Asian Crisis. These reserves have been used to buy American securities with.

A high household savings rate is often being seen as the source for large savings in many East Asian countries. When it comes to China, some researchers have taken a different view. Two industry sectors in China, manufacturing and mining have the last years experienced large profits. These profits have come both from the domestic market and international markets. It has been argued that these large corporate profits have given rise to a large corporate saving rate. Many of the Chinese companies are state owned so these savings have made the Chinese central bank able to build up massive foreign reserves. The Chinese household savings rate has actually fallen the last years (Ferguson and Schularick, 2007).

Another source of large savings are oil producing countries. High oil prices the recent years have made countries in the Middle East, and other countries such as Venezuela, Nigeria and Russia to large accumulators of foreign exchange.

A question here becomes why foreign investors see the U.S. as such a desirable place to invest? The U.S. is a mature economy. Due to their higher capacity to grow one would believe that most investors would find investments in developing countries more desirable. What we saw above is maybe an important part of the answer to this question. The U.S. financial sector's ability to produce financial assets makes the country an attractive place to invest. Other researchers also argues that an important determinant for the direction of international capital flows is the development of country's financial markets (Forbes, 2008). The U.S. financial sector is seen as highly developed, liquid and efficient. These attributes however also counts for many European financial markets. So why do not Europe absorb as much foreign capital as the U.S.? Research has found that in the years before the Financial crisis many investors meant that the U.S. economy had a bigger ability to grow than the European one (Dooley, Folkerts-Landau, Garber, 2005). The U.S. has thus been seen as a more desirable place to direct surplus savings. A contradiction to this view is that the U.S. net financial position has not deteriorated in the same speed as the current account deficit. The capital that flows out from the U.S. is mostly in the form of FDIs and purchases of foreign equities. The U.S. has experienced a much higher increase in value of these investments than foreigners have done on similar investments in the U.S. From the end of 2002 to the end of 2007 the value of foreign holdings of corporate equities in the U.S. increased from \$1,2 trillion to \$2,8 trillion. The value of foreign corporate equities held by the U.S. increased from \$1,3 trillion to \$5,2 trillion. A surplus for the U.S. against the rest of the world at about \$2,8 trillion. These numbers take into account both the increased value of existing assets and the value of new purchases. This surplus and the surplus on other U.S. investments abroad is a result of that the U.S. experiences a higher value appreciation on it's assets, and explain why the U.S. net financial position did not deteriorate between 2002 and 2007 (Setser and Roubini 2007). This is clearly seen in figure 1. The large negative increase in U.S.' net financial position in 2008 must partly be seen as a result of that U.S. citizens during the Financial Crisis began selling off their foreign assets.

Another contradiction to the favourable growth perspective contradiction to this view is that a very large portion of the capital inflow has been directed towards debt instruments, or said another way, fixed income instruments. (Balakrishnan, Bayoumi, Tulin, 2007).

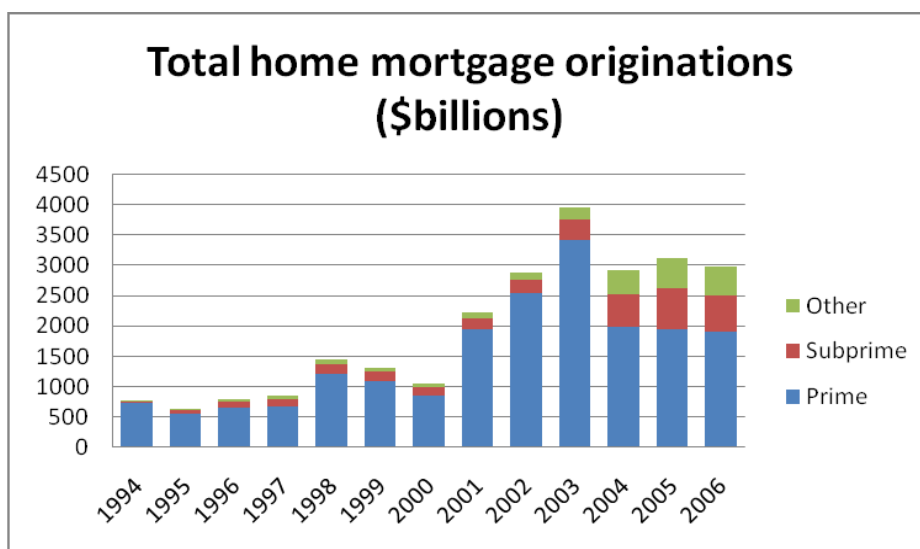
Some researchers question the whole way a country's current account is being measured. As seen in figure 1 the U.S has accumulated debt to foreigners. Yet we see in figure 6 that the U.S. net factor income is positive in every year. The U.S. earns a return on its net financial position as if it was a creditor. Changes in a country's net financial position is tracked by the capital account which equals the current account. When it seems like it has not been any deteriorating of the U.S net financial position it can be inferred that there is no such thing as an U.S. current account deficit. The global economy is thus not imbalanced, or at least it is imbalanced in a different way than we today believe. Official reported current account deficits must be seen as a result of measuring errors. These measuring errors happens because official statistics do not take into account U.S. exports of "dark matter" (Hausmann and Sturzenegger, 2005). This export is based upon U.S. owned assets that cannot be properly measured but clearly have to be there since they generate income. Brand names, knowhow, liquidity services and insurance are taken as examples of these invisible exports. These exports are not being paid for immediately, but rather generate a yearly return that shows up in the net factor income account. Thus the U.S exports more goods and services than what are reported. This theory offers an explanation of why foreigners are so willing to finance the official U.S. current account deficit. The capital inflow is just a natural outcome of a balanced U.S. economy.

This thesis takes the official statistics into account. Much of what will be seen in the thesis is in accordance with the "global saving glut" theory. Any exact answer to why foreigners see it in their self interest to continue to direct so much of their excess saving to the U.S. cannot be given.

4. The Financial Sector and the American Housing Market

The graph below shows that the origination of loans increased heavily up to 2003. From then on the yearly origination is kept on a very high level compared to the period up to 2000. It is worth noting that it was notably the origination of prime mortgage loans that stood for the increase up to 2003. It is seen in figure 9 that it was from 2000 and onwards that foreigners increased their holdings of agency- and GSE- backed securities. Many of these securities are backed by prime mortgage loans. The 30-year conventional mortgage rate, as seen in figure 10, has had a declining trend since the beginning of 2000. As we saw above research has found that foreign capital inflow contributed to this decline. It can then be argued that foreign capital inflow, by making it more affordable to get a loan, also contributed to the house price appreciation. Many researchers support this view (Bernanke, 2005) and (Caballero, Farhi and Gourinchas, 2008).

Figure 13



Source: GH Bank Housing Journal, <http://www.ghb.co.th/en/Journal/Vol2/04.pdf>

Research has however also found that prior to 2004, fluctuations in house prices were actually driven by fundamental factors (Coleman, Locour, Vandell, 2008). Fundamental factors are here city size, population growth, employment and per capita income. According to this investigation it was first from the beginning of 2004 that the house price appreciation started to get the characteristic of a bubble. A bubble occurs when increased monetary liquidity drives the price of an asset above its fundamental value. This thesis takes the view that this bubble was the result of foreign capital inflow into securities related to all kind of American home mortgage loans. As seen in the graph it was from 2004 that the origination of subprime mortgage loans increased heavily. The thesis takes the view that the origination of subprime mortgage loans was only a part of the cause for the house price appreciation.

This chapter gives an overview of the securitization process, and investigates developments in the American housing market in the years before the crisis.

4.1 The U.S. Agency and the Government Sponsored Enterprises

In this thesis the interesting GSEs are Freddie Mac and Fannie Mae. The interesting agency is Ginnie Mae. This is because these entities are involved in the securitization of American home mortgage loans. Freddie Mac, Fannie Mae and Ginnie Mae were established to provide a secondary market for mortgage loans. The first of them, Fannie Mae was set up already in 1938 to do this. Its mission was to buy loans from smaller banks so these banks could issue more loans. By selling a loan the originator has freed itself from the risk of default. The government hoped that this arrangement would bring lenders and borrowers together and thereby make it easier for people to get a mortgage loan and then own their own home. Homeownership was believed to be good for society. To expand the secondary market Freddie Mac was set up in 1968. In 1970 Ginnie Mae was set up. In 1970 Ginnie Mae began issuing Mortgage backed securities, or MBS`. Investors could buy these securities and then get a claim on a part of the cash flow derived from the entity`s pool of mortgage loans. The investors would have the property of the homeowners as collateral. Freddie Mac and Fannie Mae also soon began issuing MBS`.

This paragraph gives an example on how a pool of mortgage loans can be turned into MBS`. Let say that we have a pool consisting of 1000 loans, each worth \$100000. Each loan has a 30-year maturity and has an interest rate on 6.5 percent. The value of this pool is \$100 million. This pool can be divided up into 10000 MBS`, each being sold for \$10000. Each of these MBS` can for example give an interest rate, or a coupon rate, on 6 percent. The difference between the interest rate borrowers pay and the coupon rate investors get, are proceeds to the issuer. All MBS` issues from this pool have the same claim on the payments from the pool. The credit rating of the MBS` depends on the risk characteristic of the borrowers.

The MBS` issued by the agency- and GSEs is seen as very safe and carries an AAA-rating. The reason for this is that they are supposed to only buy prime mortgage loans. In this thesis these securities will be termed “agency-and GSE MBS`”. This thesis sticks to Standards and Poor`s credit rating. AAA-rating is the rating given to the debt to the most reliable borrowers. AAA-, AA-, A- and BBB-rated debt is called Investment Grade debt. BB-, B-, CCC-, CC-, C-, CI-, R-, SD- and D-rated debt is called Non-Investment Grade debt. D-rated debt is debt that most probably never will be paid back. It is also possible for debt to be “not rated”, or NR. Ginnie Mae, as a government agency is different from the two other enterprises in that it is fully owned by the U.S government. The securities issued by this entity are therefore guaranteed by the government. In reality this also counts for the three GSEs. For Freddie Mac and Fannie Mae this was tested in the autumn of 2008. The two institutions had to be bailed out by the U.S. government.

It is here important to remember that securities issued by these pools of mortgage loans are not the only type of securities issued by U.S. agencies and GSEs. They also, if not only, issues ordinary bonds. The term “agency-and GSE-backed securities” is thus a much wider term than “agency-and GSE MBS`”.

The primary mission to Ginnie Mae and the GSEs is to give rather standardized prime mortgage loans to the middle class. Mortgage loans that the agency-and GSEs do not want are often being referred to as “non-conforming”. Both Alt-A loans and subprime loans fall in under this category. A development that took off after 1997 was that Freddie Mac and Fannie Mae began to purchase mortgage loan related securities from private institutions. In 2005 22 percent of the mortgage portfolio to Freddie Mac and Fannie Mae consisted of private label mortgage securities (Petersen, 2009)¹⁷. A high portion of these securities were backed by Alt-A- and subprime mortgage loans. During this period the two GSEs continued with their primary mission, to buy mortgage loans directly from those institutions that had

¹⁷ Page 163, part 2,

issued them. In March 2007 Freddie Mac and Fannie Mae held \$370 billion worth of private label MBS`. \$170 billion of these were subprime MBS` (De Michelis, 2009)¹⁸. As a result of the U.S government`s policy to increase homeownership, the equity ratio for Freddie Mac and Fannie Mae were extremely low. When foreclosures began to rise among subprime borrowers, it didn`t take long before this equity was gone.

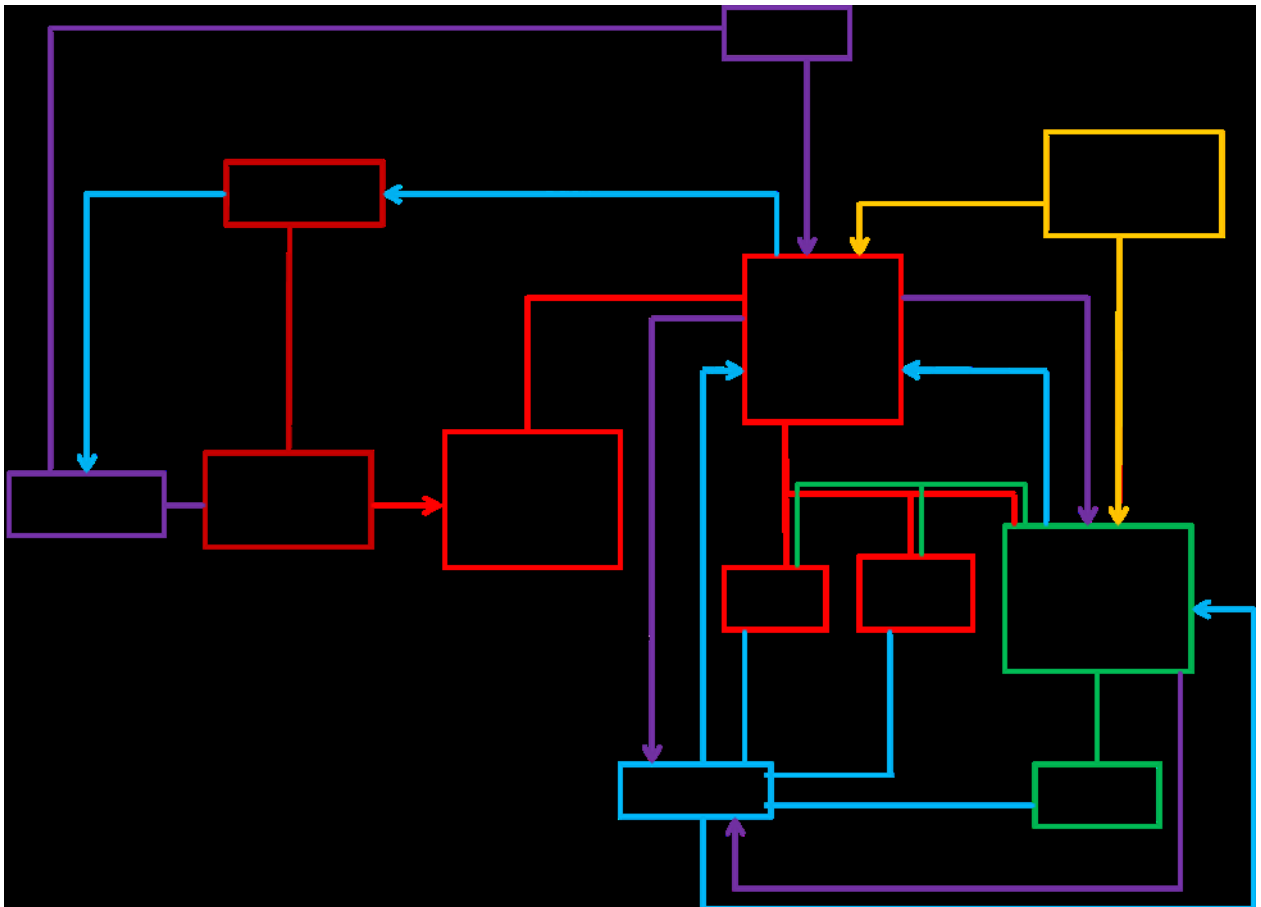
The next section takes a closer look on the subprime mortgage loan securitization process.

¹⁸ Page 10, first part.

4.2 The Subprime Mortgage Loan Securitization Process

The private financial sector specialised in the market for subprime mortgage loans. This section investigates more closely the complex system of securitization private financial institutions developed to make money on subprime borrowers.

Figure 14



The diagram is a highly simplified presentation of the complex system that the private financial sector developed. A borrower takes up a subprime mortgage loan of an originator. This can be an institution that has specialized in the originating of subprime mortgage loans, or it can be the borrower's local bank. The mortgage loan is being pooled together with other subprime mortgage loans. Often this pool could also consist of some prime mortgage loans. The pool is then being sold to a "Special purpose vehicle" or a "SPV". A SPV is a legally independent entity sponsored by a financial institution. This institution is entitled to provide a back up credit line to the SPV if that should be necessary. The SPV uses the loans as a basis to issue securities to investors. The SPV earns money by making a difference between the interest rate it gets and the interest rate the investors demand. The borrowers only have to deal with the "Servicer", an entity put up to administrate the cash flow from the borrower to the SPV. The investors are also free from the risk of bankruptcy among the originators. The securitization process described so far is very similar to the one described above.

To earn money on a pool of subprime mortgage loans the private sector developed the process of "tranching". This term refers to the process where the cash flow from the pool is directed to investors through securities issued from different tranches. Which tranche the investors choose to invest in depends on their risk preferences. In a typical deal the SPV issues securities from three tranches, senior, mezzanine or junior, and non-investment grade. These three tranches make up the funding structure of the deal. The securities making up the senior tranche is AAA-rated. These securities typically make up nearly 80 percent of the securities in the deal. The mezzanine tranche typically consists of securities with AA -, A - and BBB -rating. The securities in the last tranche, often called the equity tranche, typically have a BB-rating or are not rated at all. The owners of securities from the senior tranche are the first ones to get paid, but also receive the lowest interest rate. The owners of securities from the equity tranche are the last ones to get paid but receive the highest interest rate. The point of this trenching is to create AAA-rated securities to the risk adverse investors and more risky securities to investors looking for high yields. The investors stream of capital is most of all dependent upon which tranche the securities belongs to, and only indirectly dependent upon the quality of the mortgage loans making

up the underlying pool. What makes it possible to issue AAA-rated securities from an underlying pool of subprime mortgages is that if defaults increase and payments from the pool of mortgage loans get smaller, the first ones to take losses are the owners of securities from the mezzanine and equity tranche. Those who have invested in securities from the senior tranche are protected from initial losses¹⁹. The issuance of AAA-rated securities is dependent upon the willingness of some investors to buy the most risky securities. It is a goal to issue as much AAA-rated securities as possible. It is the issuance of these securities that provide the capital structure with the cheapest funding. It seemed to be difficult to find investors willing to invest in the most risky securities to a reasonable price. It was here the issuance of “Collateral Debt Obligations”, or “CDOs”, had a mission.

The CDO was invented in the beginning of the 1980s. As a result of steadily growing house prices and a high demand for financial products, the market for CDOs related to mortgage loans began to increase in the beginning of the 2000s. The issuance of CDOs takes the process of securitization one step further. Special Purpose Vehicles set up to issue CDOs buy MBS, pool them, and again issues securities in different tranches. The funding structure is usually a little different than the funding structure of a subprime MBS funding structure. Typical it is four tranches. The first one is called Class A and has an AAA-rating. The second is called Class B and has an A-rating. The third one is called Class C and has a BBB-rating. The fourth is called Class D and has a BB-rating. Nearly 80 percent of the capital structure can be in Class A. 8 percents of the capital structure is called the equity and is unrated. Residual cash flow end up here²⁰. In this thesis the term “securities related to the home market” refers to both MBS and CDOs. If the underlying asset is subprime mortgage loans, CDOs also fall under the term “subprime securities”.

¹⁹ Information about the funding structure to privately issued MBS is found in the article to De Michelis 2009.

²⁰ Information about the funding structure to CDOs, is found in the article to Mason and Rosner, 2007.

The issuance of CDOs added liquidity to the mezzanine tranche of a MBS funding structure (Mason, Rosner, 2007). Research shows that the emergence of the CDOs was associated with a significant tightening of the spread between the interest rate on subprime mortgage loans and the 10-year Treasury yield (Deng, Gabriel, Sanders, 2009). This indicates that the demand was for safe low yielding AAA securities, and not for more risky high yielding securities. The CDOs that were considered too risky by the market were actually repacked again into CDOs², securities with CDOs as collateral. Also in these securities a great majority got AAA-rating by rating agencies. The private financial sector made the process of securitization to an iterative process. Based upon what written above the creation of CDOs, CDOs², CDOs³ must be seen as a process with the purpose to make AAA-rated securities out of pools of underlying assets with an average rating below the AAA-level. This of course also manifested itself in what kind of collateral many CDOs ultimately were built upon. In March 2007 it was estimated that over 70 percent of asset backed CDOs had subprime loans as the underlying asset²¹. As long as housing prices kept on rising, borrowers were able to pay, and investors got their interest payments.

In the middle of figure 14 is the “Structured Investment vehicle”, or the “SIV”. This term will in this thesis be used about off-balance sheet vehicles set up by financial institutions with the purpose to take advantage of the spread between long term interest rates and short term interest rates. It is seen in the figure that the SIV has ownership links to long term assets, such as MBS` and CDOs. The SIV funds these purchases by issuing short term debt; “ABCP” or “asset backed commercial paper”, in the money market. The money market is a global market for short term lending and borrowing. Short term here means one year or shorter. The interest charged in the money market for short term funding is often very close to the LIBOR. A special feature of SIVs is therefore that they contain a maturity mismatch. Before the crisis the value of assets held in a SIV could range from \$1 billion to \$30 billion²². Like a SPV, a SIV is a legally independent entity with a back up credit line to a

²¹ Reuters

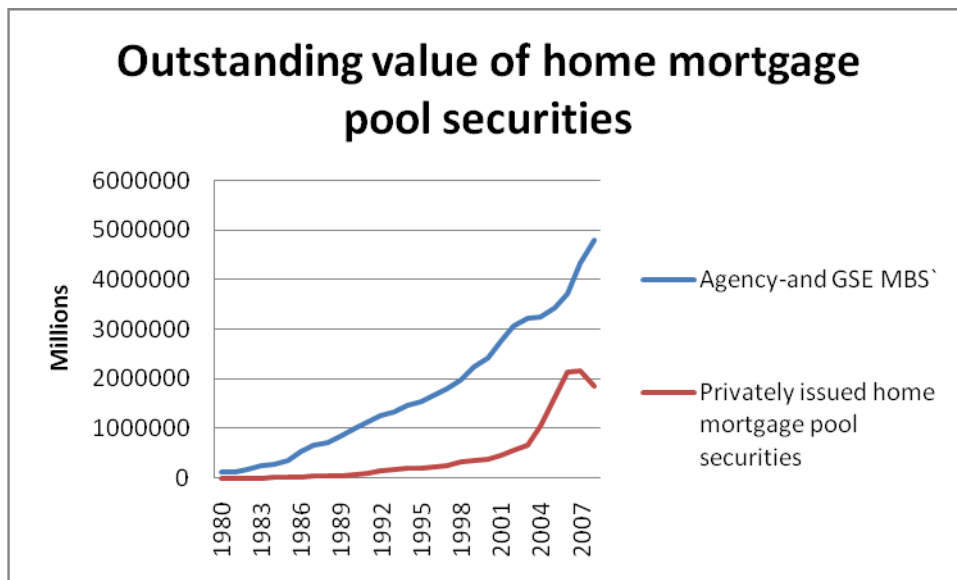
²² Wikipedia

supposedly solid financial institution. This is necessary so the ABCPs the SIV issues can attract a high short term rating. The maturity mismatch represents a risk for investors. The durability of these asset backed commercial papers can be from some days to some months. This means that pretty often these vehicles have to roll over their debt. The term “asset backed commercial paper” is used since the issued debt is backed by assets such as MBS` and CDOs. Before the crisis when the money market was highly liquid this system performed well. SIVs also engage in the issuing of medium term notes. SIVs that only issues commercial paper are called SIV- Lites.

Both commercial banks, investment banks and other financial intermediaries set up SIVs to buy large quantities of subprime securities. By setting up a SIV it was possible to circumvent regulations. Many SIVs therefore had an extremely low equity ratio. By providing a credit guarantee, the capital requirement for assets held on SIVs could be over 90 percent lower than if the same assets had been held on the balance sheet (Acharya and Schnabl, 2009). By setting up a SIV financial institutions could earn an extra profit on their equity. It has been estimated that in January 2007 the value of outstanding asset backed commercial paper was about \$1,2 trillion (Kacperzyc and Schnabl, 2009). This number however includes commercial paper backed by many kinds of assets. Because of a lack of reporting it is difficult to find data about the growth of the SIVs in the market for subprime securities. It is however being argued that from 2005 and onwards the SIVs contributed substantially to the increase in mortgage loan finance, especially in the subprime sector (Beitel, 2008). The decreasing 10-year Treasury rate can be seen as a part of the reason for this. When the yield curve in the spring of 2006 became inverted, investors were no longer automatic rewarded for funding long term debt with short term debt. Investments in securities related to subprime mortgage loans thus seemed attractive as it gave investors in asset backed commercial paper the spreads they wanted. A professor with the name Paul Mitzen has claimed that 49 percent of all securities related to subprime mortgage loans were held

by SIVs²³. It was the SIVs that were the reason for the big losses financial institutions had to take during the crisis.

Figure 15



Source: Federal Reserve,

<http://www.federalreserve.gov/datadownload/Choose.aspx?rel=Z.1>

The graph above clearly shows the rise of the private financial sector's involvement in the securitization of home mortgage loans. Claims that different entities have on each other are here netted out. This means that issuing CDOs out of a pool of MBS do not add to the value of outstanding securities. The graph shows that the value of mortgage loans backing privately issued securities in 2007 was about 2 trillion. The value of outstanding subprime mortgage loans at this point was \$1.3 trillion. The private sector did not only concentrate

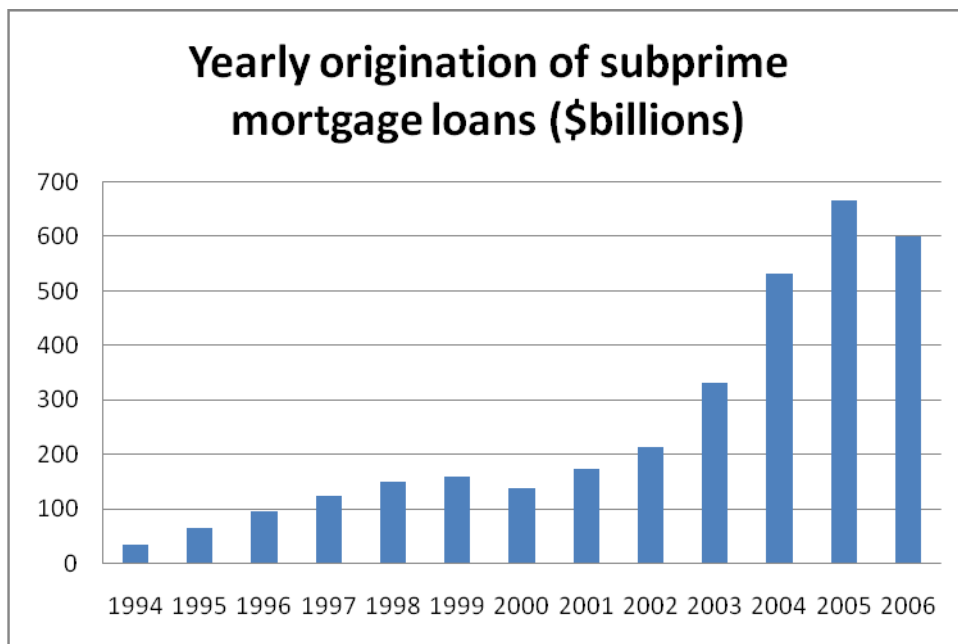
²³ doc88, slide 31

on the subprime market but also engaged itself heavily in the securitization of Alt-A mortgage loans.

4.3 Impacts of Securitization of Subprime Mortgage Loans

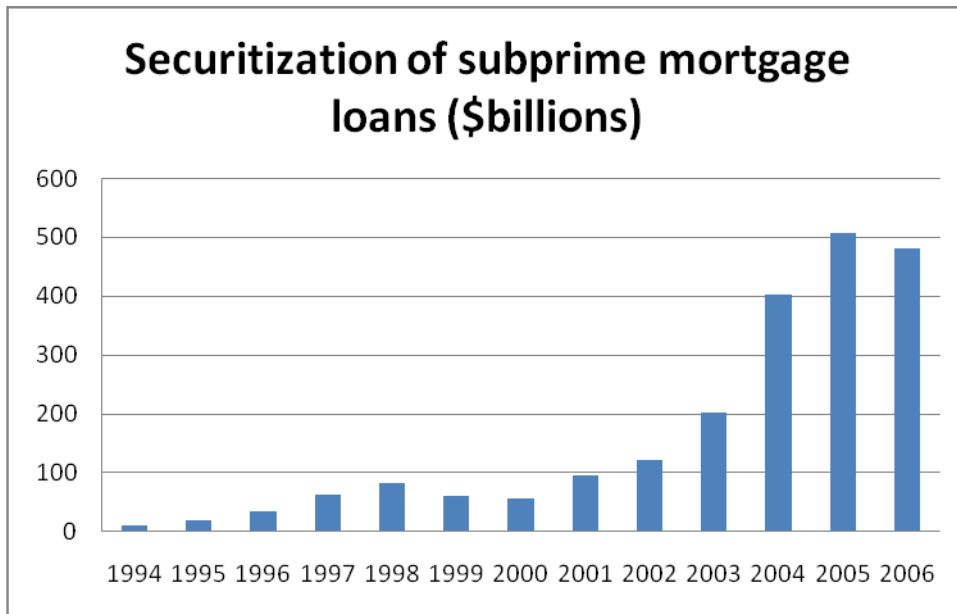
The two graphs below show that it developed a close relationship between the value of issued subprime mortgage loans and the value of securities ultimately backed by these loans. This supports the theory that securitization of subprime mortgage loans was associated with easing credit standards (Dell’Araccia, Igan, Laeven, 2008).

Figure 16



Source: GH Bank Housing Journal, <http://www.ghb.co.th/en/Journal/Vol2/04.pdf> Page 7.

Figure 17



Source: Source: GH Bank Housing Journal, <http://www.ghb.co.th/en/Journal/Vol2/04.pdf>

Page 7.

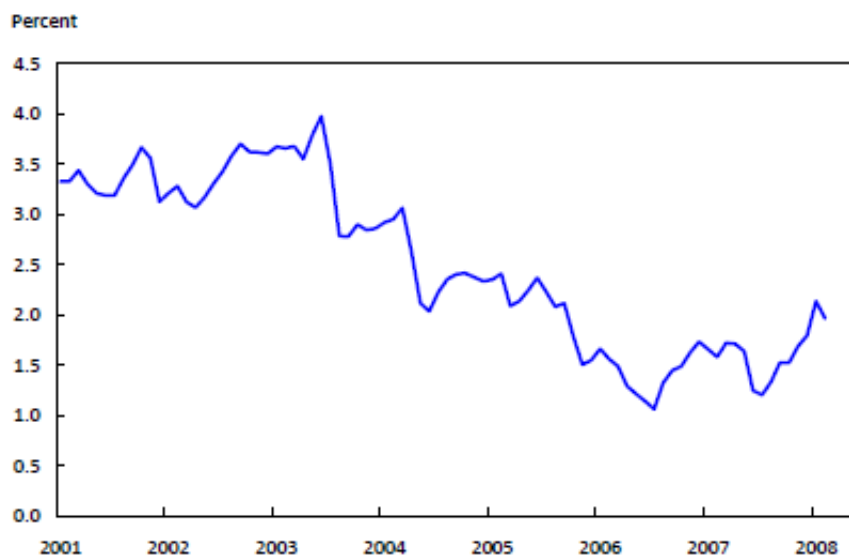
If figure 16 and 17 is compared with figure 15 it is seen that the increasing rate of issuing and securitization of subprime mortgage loans coincides with the period when the private market increased its involvement in the home mortgage market. Unfortunately the graphs above end in 2006. Not so surprisingly the market for subprime securities decreased heavily in the autumn of 2007.

The spread between the interest on a subprime mortgage loan and a prime mortgage loan represents the compensation demanded for doing an investment considered to be more risky. The interest rate on subprime mortgage loans can vary some among the various subprime lenders. An internet based agency, Loanperformance.com, has since 1998 taken a sample of 30 of these lenders and calculated an average interest rate. The graph on the next page is based upon these data, and shows the spread between the interest rate on fixed subprime- and prime- mortgage loans with a 30-year maturity. From 1998 to 2003 the

spread was rather constant (Laderman, 2008). This indicates that the subprime market at this stage had become a part of the broader capital market. From 2003 and onwards the spread narrows considerably. This narrowing coincides with the period when the securitization of subprime mortgage loans really took off. This indicates that the increase in the issuing of subprime mortgage loans was a result of increased demand for subprime securities. The lowering of the interest rate was thus necessary to make the supply of capital to fit the demand for loans. It must here be remembered that the interest rate on subprime mortgage loans declined even more than the graph below indicates. As we have seen the interest rate on prime mortgage loans had until the beginning of 2008 a relatively constant mark up to the declining 10-year Treasury rate.

Figure 18

Subprime-prime spread on fixed mortgage loans



Source: <http://business.clemson.edu/Economic/seminars/papers/Subprime.pdf>

4.4 Foreign Demand for Subprime Securities

Where did so this demand come from? Is it evidences that indicates that capital inflow to the U.S. in the period 2003 to 2007, were biased toward securities related to the subprime market?

To get an impression of the amount of foreign investments that ultimately have ended up in American mortgage loans the term “foreign net exposure” is useful. The iterative process of securitization highly overstates the reported value investors have invested in the primary asset, in our case, the mortgages. When a bank buys a pool of MBS` and uses these securities as collateral to issue CDOs to investors, the gross exposure to the primary asset are being doubled. In practice the bank that has issued the CDOs has no longer any exposure to the primary asset. MBS` and CDOs can also be bought by SIVs and used as collateral for the issuing of asset backed commercial paper. The term “net foreign exposure” nets out U.S holdings of mortgage loan related securities issued by foreign entities as well as foreign entities claims on each other. In some cases the foreign entities mixed securities related to the American mortgage loan market with their own domestic securities, something that can overstate the reported net foreign exposure to American mortgage loans. This effect is however assumed to be small, and is therefore not taken into account here. In a paper issued by the Federal Reserve it is estimated that in June 2007 foreign net exposure to private labelled securities related to the U.S. non-conforming mortgage market was \$650 billion (Beltran et al., 2008)²⁴. This number however also includes securities related to commercial real estates. About half of the outstanding private-label home mortgage loan securities were in 2007 backed by subprime mortgage loans²⁵. That means a foreign net exposure to subprime mortgage loans at about \$325

²⁴ The data are from the article of Beltran, Pounder and Thomas, 2008. Page 20, line 5, table 1.

²⁵ Same article as above, page 21, point 6 in notes to table 1

billion. In 2007 securities backed by commercial mortgage loans made up about 20 percent of the privately issued securities related to mortgage loans, while securities related to home mortgage loans made up about 74 percent²⁶. If foreigners not were biased towards any kind of securities this means that at the end of 2007 foreigners had about \$240 billion worth of net exposure to subprime home mortgage loans. In December 2007 the value of outstanding subprime home mortgage loans has been estimated to \$1.3 trillion. The value of outstanding subprime securities is not known. From figure 16 and 17 it is seen that in 2006 the share of originated subprime mortgage loans that was securitized reached 80 percent. The historical average is a little bit lower, about 60 percent²⁷. If this historical average is used to estimate the value of outstanding subprime securities in December 2007 we end up with the number 780 billion. This again indicates that the share of these securities owned by foreigners was about 30 percent.

Since this estimate is based upon some pretty loose preconditions it must not be taken too serious. There are however some indications on that this number not is so very far from the truth. Two researchers Adrian Blundell-Wignall and Paul Atkinson has estimated that about one third of subprime related securities were sold to foreign investors (Blundell-Wignall and Atkinson, 2008)²⁸. In February 2006 Goldman Sachs claimed that foreigners recently have been standing for 40 percent of the demand for AAA-rated securities made out of subprime mortgages²⁹. What “recently” means is not being told. These findings indicate that foreigners have contributed significantly to the pre-crisis demand for subprime securities.

²⁶ Federal Reserve Board, table L.126

²⁷ www.eimgroup.com, page 6

²⁸ Page 64

²⁹ Goldman Sachs, slide 15

An important feature of the crisis was that so many European financial institutions were heavily exposed to U.S. subprime securities. Especially between 2003 and 2007 European financial institutions set up SIVs and invested heavily in AAA-rated tranches of pools with subprime mortgage loans as the underlying asset. From 2003 to the first quarter of 2007 U.S. assets owned by European financial institutions grew from around \$4 trillion to above \$8 trillion (Obstfeld, 2009). These purchases were funded by the issuing of asset backed commercial paper in the U.S. money market. In December 2008 the U.S. stood for \$664 billion write downs done by financial institutions due to the financial turmoil. Europe stood for \$271 billion. East Asia however only stood for \$30 billion (Sayuri, 2009)³⁰. It is an interesting feature that the countries with the largest current account surpluses with the U.S. had such a limited exposure to U.S. subprime securities. The reason for the heavy European exposure must be seen as a result of the increased cross boarder banking activities from 2000 and onwards (Sayuri, 2009). These activities are dominated by financial institutions located in the U.S. U.K. Germany, France and Switzerland and are not dependent upon a U.S. current account deficit. Based upon this it is not sure that foreign purchases of securities related to subprime mortgage loans should be seen as a direct consequence of global imbalances.

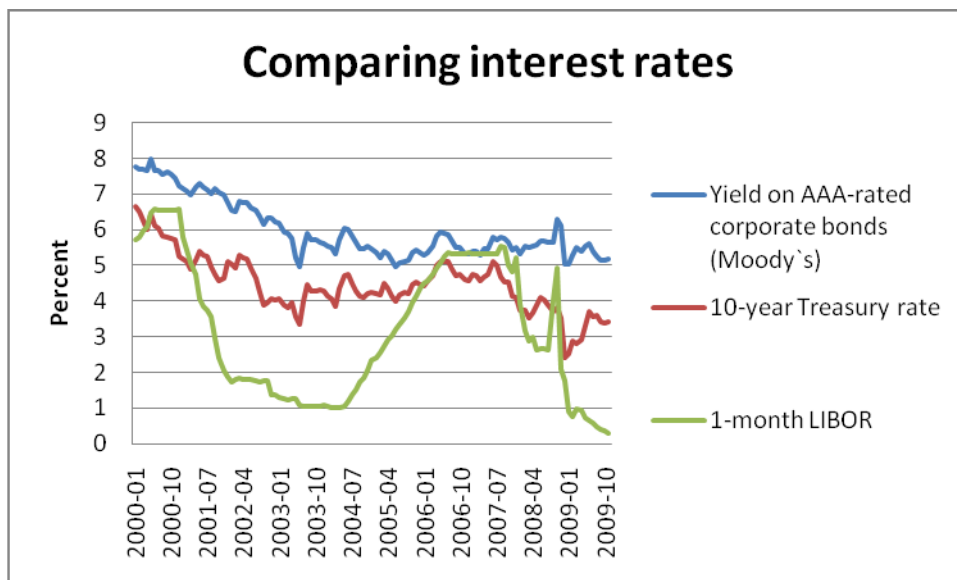
³⁰ Page 22, third part

4.5 Returns on Investments in the Subprime Mortgage Loan Market

This section takes a look on the yields investors could expect to get on their investments in subprime securities.

In the graph below we see the declining rate on 10-year Treasuries and AAA-rated corporate bonds. We see that until the end of 2007 the yield on AAA-rated corporate bonds follows the rate on 10-year Treasuries rather closely. The 1-month LIBOR is shown since the return on many subprime securities is a fixed spread to this rate.

Figure 19



Source: Federal Reserve,

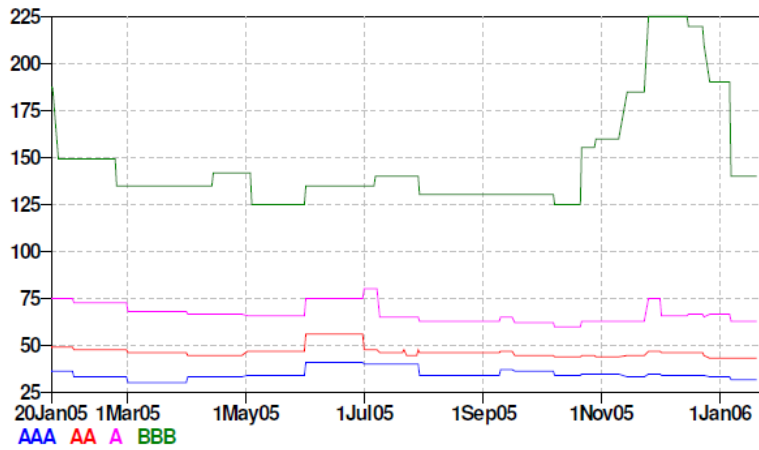
<http://www.federalreserve.gov/datadownload/Build.aspx?rel=H15>

The following paragraph takes a look on a real subprime MBS funding structure (Aschraft, Schuermann, 2008). The pool of subprime mortgages was securitized by New Century in June 2006. The value of the pool is \$881,5 million. Nearly 80 percent of this value is being issued as AAA-rated securities. Actually the AAA-rated tranche, or the senior tranches, again consists of five different tranches. The only difference between them that is seen as relevant here is that the safest tranches, the super safe tranche, has a coupon rate set to only 0,07 percent above the 1-month LIBOR. The most unsafe AAA-rated tranche has a coupon rate set to 0,24 percent above LIBOR. The mezzanine tranche, going from AA-rated to BB-rated securities, is also divided up into several smaller tranches. The BBB-rated tranche gives a coupon rate 1 percent above LIBOR while the BB rated tranche gives a coupon rate 2,5 percent above LIBOR. It is seen that at the point these securities were issued, even the safest subprime MBS` gave an interest rate higher than the 10-year Treasury yield. It was however only the lower rated securities that gives a return significantly higher than the corporate bonds. As noted earlier there are indications that tell us that it was not these higher risk securities most investors first of all were interested in.

It is difficult to find data on how these spreads have varied from year to year. A graph published by Goldman Sachs gives us an indication on that at least the highest rated securities` spread above 1-month LIBOR until the beginning of 2006, were kept on a rather constant level. Unfortunately the graph only goes back to January 2005.

Figure 20

Spreads on subprime MBS's



Source: Goldman Sachs,

<http://web.mit.edu/joshuali/Public/JObs2/GS%20Subprime%20Primer.pdf>, slide 14

Figure 21

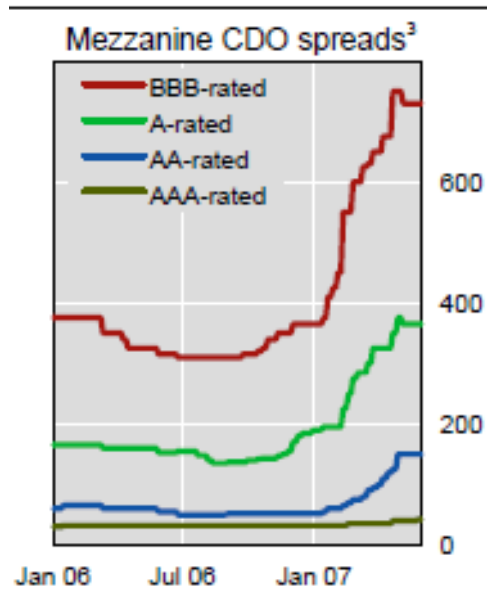
Source: BIS Quarterly Review, June 2007, http://www.bis.org/publ/qtrpdf/r_qt0706.pdf, page 10

Figure 21 shows the development of the spreads above 1-month LIBOR on CDOs issued out of the mezzanine tranche of a MBS-funding structure. As noted earlier also the majority of a CDO funding structure consists of AAA rated securities. The figure above shows that these AAA-rated CDOs, as the AAA-rated MBS, carry a very low interest rate.

We have seen in this chapter that capital inflow to the overall housing sector created an appreciation of house prices. It seems like that the aim of the securitization of subprime mortgage loans was to fulfil a demand for safe securities. Securities that had too low rating were securitized again. Investors clearly accepted the low yields the AAA-rated securities gave. The fact that it outside the U.S. mostly were European financial institutions that had to take big losses due to the financial turmoil, give us reason to doubt that this demand for safe assets was a result of global imbalances. It is still an interesting feature of the crisis that it seems like that much of the foreign capital did not flow into subprime securities of speculative reasons.

5. Lessons From the Financial Crisis

International flows of capital are something that cannot and should not be curtailed. As noted earlier in the thesis cross boarder flows of capital are ultimately dependent upon different people`s propensity to save and the opportunities for domestic investments. Much of the saving around the world is clearly done by governments and official institutions. This must be seen as policies in accordance to the wishes of their populations. Some researchers argue that the Financial Crisis proves that large imbalances between countries should not be neglected. When a country`s current account deficit or surplus reach a certain limit the government should react by implementing macroeconomic and structural policies that affect saving and investment (Blanchard 2009). This can be a difficult task for the authorities. Caballero argues that the demand for a safe store of value will be with us for the years to come, so the resulting global imbalances is therefore more structural in nature than what is often being implied (Caballero, 2009).

It must also be remembered that if some more of the capital inflow to the U.S. had been put into productive use, in infrastructure, green investments, education, and so on, many people would have taken a different view on global imbalances. What really happened was that a little too much of the capital inflow to the U.S. was used to fuel a rise in house prices. When house prices began to decline financial institutions both in the U.S. and in Europe found themselves in a situation where they had to be rescued by the taxpayers. This thesis therefore takes the perspective that lessons from the Financial Crisis first of all should be found in the routines and business methods of the financial sector in the years before the crisis.

5.1 Origination of Mortgage Loans

An important feature of the mortgage loan market before the crisis was the “originate and distribute” system. This term refers to the selling of mortgage loans in a secondary market. The system creates a typical agent principal system. When the issuer of a mortgage loan does not have to hold the loan on its balance sheet, the incentive to properly screen the borrower is diluted. This is also the case for the third party buying the loan since it probably neither is going to hold the loan on its balance sheet. A practice that facilitated the “originate and distribute” system was automated underwriting. In the late 1990`s automated underwriting became more common. Underwriting is the name on the process where a financial institution screens a customer to see if it can provide the customer with the financial service in question. Important information is personal income and credit history. In automated underwriting this process is done by a computer. A result of this is that the screening can be done much faster. It has been argued that private institutions have misused automated underwriting to engage in predatory lending (Mason and Rosner, 2007). Under traditional mortgage lending it was a rule that total debt load should not be more than 36 percent of gross monthly income (Mason and Rosner, 2007)³¹. In the run up to the crisis lenders gave mortgage loans to people where this limit was greatly exceeded. Many have thus been left dependent upon new mortgage loans to service older loans. To take up a new mortgage loan they were again dependent upon a house price appreciation so they could use the positive equity as collateral. Why did borrowers take up mortgage loans they knew they would only manage to service given a further home price appreciation? Of course it can be claimed that many people before the crisis, believed that home prices could only rise. Maybe more important is the American “walk away” system. This system clearly makes people less afraid for taking up a personally risky mortgage loan. The worst thing that can happen is that he or she loses the house. When the key to the

³¹ Page 10, part 2.

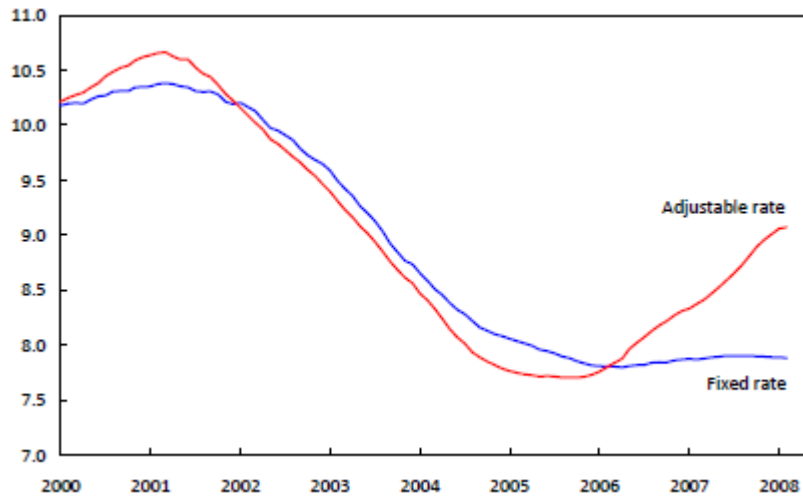
house is delivered back the individual can start all over again. This practice should have put an increased responsibility upon mortgage loan issuers.

What is profitable for one individual or institution is not necessary profitable for the whole system. The term "system" here refers to the network of individuals and institutions that somehow is involved in financial transactions. If a transaction adds to the instability of the system this "cost" should be taken into account in the decision making. This is of course difficult to put into practice. One solution could be that the originator of mortgage loans must hold some of the securities resulting from these loans, on their balance sheets. The originators will then have an incentive to screen each borrower more carefully.

As mentioned in the beginning of this thesis most subprime mortgage loans were ARMs issued with a low teaser rate. The teaser rate could be as low as 1 and 2 percent. The rest of the maturity the interest rate would float, normally with a fixed spread above the 6-month LIBOR. The graph on the next page shows how the interest rate on the ARMs increased as LIBOR increased. The much higher delinquency rates among the subprime ARMs indicates that many borrowers didn't properly understand the future economic burden these mortgage loans represented for them. A floating rate can be both good and bad for borrowers and is an offer that should be available. The practice of issuing mortgage loans with a teaser rate however clearly contains a speculative element. If a person cannot handle the real debt burden today, why is it then reasonable to assume that he or she will be able to bear it two or three years into the future? It is worth noting here that Freddie Mac and Fannie Mae do not accept floating rate loans.

Figure 22

Average interest rates on subprime mortgage loans



Source: <http://business.clemson.edu/Economic/seminars/papers/Subprime.pdf> , page 5

5.2 Securitization

The process of securitization is often being claimed to be a main cause for the crisis. It has been argued that the complexity of the securitization process made rating firms and investors not to fully assess the riskiness of the underlying pool of assets (De Michelis, 2009). When already the initial pool of mortgage loans is difficult to value, the value of the CDOs is even more difficult to estimate.

An investigation finds that the AAA-rating given to subprime MBS was not unreasonable (Hull, White, 2009). The investors in the AAA-rated tranche were protected by the investors in the mezzanine tranche who also got a higher interest rate as compensation. The misevaluation started when new AAA-rated securities were created out of the mezzanine tranche. Rating agencies such as Standard and Poor's and Moody's used the models they use to evaluate the riskiness of corporate bonds to also evaluate the riskiness of CDOs. This was a fatal error. The reason for this is that the probability of loss distribution to each tranche in a MBS capital structure is different from the probability of loss distribution to bonds with an equivalent rating. As written about in the previous chapter a SPV could for example buy a lot of BBB-rated MBS from different MBS capital structures, pool them, and then issue AAA-rated CDOs. A perfect correlation between the tranches means that the AAA-rated CDOs have the same probability of becoming worthless as the underlying BBB-rated tranches. Based upon this, the only rating assigned to the CDOs that can be justified, is a BBB-rating. Hull and White have calculated that the performance of mezzanine tranches from different MBS capital structures actually had a very high correlation. In which degree the rating agencies took this correlation factor into consideration, can be questioned.

The practice of making high rated securities backed by low rated securities related to the home market should be taken into consideration. If the process of securitization was only allowed to happen once the creation of opaque securities would have been halted.

Originators would also have got access to less capital to lend out. This would probably have raised the credit worthiness of the borrowers on the margin.

5.3 Structured investment vehicles

It was believed that the process of securitization had made the American financial system better able to bear an increase in default rates. The risk of defaults had been diversified among so many investors that each investor almost could look away from it. Further even the issuing of subprime mortgage loans at the top made up 20 percent of all mortgage loans issued, this market was a relatively small one. Thus many believed that a rise in defaults among subprime borrowers would easily be absorbed by the financial system. Had these securities really been spread properly among investors this would maybe also have been the case. When default rates began to increase in 2007 it became clear it was not. The huge amount of subprime securities collected up in Structured investment vehicles was the financial sector's little surprise to the world.

An important feature of modern finance is the marked-to-market system of accounting. This means that security's value on the balance sheet depends upon its market value. This has much to say for the size of the balance sheet when the manager of it has a leverage target.

Leverage = assets/equity,

A rise in the value of the assets will automatically lead to a decreased leverage. To hold the target the manager will take up more debt so the necessary amount of assets can be bought. A decline in the value of assets will lead to the opposite. The manager will sell off assets to pay down the necessary amount of debt. Since other managers will do the same initial price movements will be exacerbated.

Research has shown that there is a clear tendency among investment banks that leverage is procyclical (Adrian and Shin, 2008). In times when the value of assets increase managers tends to increase leverage. When asset prices decrease the opposite happens. This will of course further amplify the price movements.

The deleveraging process described in the second part of the thesis was a result of the mechanism described here. As the value of MBSs and CDOs deteriorated, it became clear for sponsors of the SIVs that they could not regard the SIVs as completely independent entities. To protect their reputation, and maybe also to avoid lawsuits financial institutions took the SIVs they had sponsored back on to their own official balance sheets. Financial institutions all over the world engaged in the U.S. subprime market in this highly leveraged fashion. So much of the risk attached to the subprime related securities were not well diversified among thousands of investors but were rather unnecessarily concentrated (Blanchard, 2009), and, because of high leverage, exacerbated in the hands of some relatively few institutions which the smooth working of the world economy depends on.

The maturity mismatch between the debt and the securities held in SIVs made the financial institutions even more vulnerable for sudden price fluctuations. The failure of banks like Northern Rock, Bear sterns and Lehman Brothers were not caused directly by the high default rates among the subprime borrowers. It was caused by their inability to roll over their short term debt they needed to fund their longer term investments in subprime securities. As investors in asset backed commercial paper became nervous about the subprime market they became more reluctant to provide the SIVs with their needed short term funding. Many SIVs also held securities ultimately backed by prime mortgage loans. Because of nervous investors it also became difficult to refinance these securities. From August 2007 to August 2008 the value of outstanding asset backed commercial paper fell from \$1,18 trillion to \$789 billion (Kacperzyc and Schnabl, 2009). A 33,1 percent fall. An initial fall in value caused by increased delinquencies among subprime borrowers was thus greatly exacerbated because SIVs had to sell securities to fire sale prices to pay their short

term debt. Based upon the predicted capital stream from many of these securities, many of them probably were worth more than they were sold for.

It now seems very clear that financial institutions should have unloaded more of the risk. This is of course easy to say now. When house prices were on a rising path they had no incentives for doing so. A bank that had been more risk averse than the competitors, would have been punished by the stockholders. Herd mentality is an important phenomenon in financial markets. By doing the same as everyone else an institution can act in its own self interest. Its actions however are not necessary in accordance with the self interest of the system as a whole. An institution can contribute to systemic risk. As written about above the marked-to-market system of asset valuation, pro-cyclical leverage and maturity mismatch clearly contributed to financial instability when house prices began to decline.

It is the actions that contribute to systemic risk regulations of the financial sector should address. The marked-to-market system has probably come to stay. Suggested measures of an institution's contribution to systemic risk is leverage, maturity mismatch, interconnectedness with other institutions and credit expansion (Brunnermeier, 2009). These variables can be used as the basis for countercyclical regulation. Countercyclical regulation is regulation that is most constraining when markets are booming, and more relaxed in downturns. The challenge is of course to identify an irrational rise in asset prices from a rise in prices based on fundamentals. Going into details of what this countercyclical regulation should imply is out of reach for this thesis.

6. Concluding Remarks

According to most views the U.S. economy has during the last decade evolved to become severely unbalanced. The large current account deficits are the manifestation of a population that consumes far more than it produces. The rest of the world's willingness to finance this overconsumption has led some researchers to conclude that the unbalanced U.S. economy is a result of developments outside the U.S. It has been argued that it in the world as a whole is a bigger willingness to save than to invest. The U.S. financial markets have looked attractive for individuals, institutions and governments looking for a safe place to invest their surplus savings. This theory provides an explanation on why capital inflows have continued despite the declining long term U.S. interest rates.

The linkage between global imbalances and the Financial Crisis must be found in the effect capital inflow have had on the overall issuing of debt in the U.S. Increased availability of credit to homeowners, or people wishing to become homeowners, induced a steadily rise in home prices. This rise in housing prices facilitated the making of complex securities backed by home mortgage loans. These securities further increased the available credit in the U.S. housing market. Marginal borrowers, or subprime borrowers, could now easily get a loan. Many of these marginal borrowers could only honour their commitments by taking up a new loan based upon the positive equity created by the price appreciation. Foreigners provided the capital for a boom in housing prices, but it was the financial sector that misused this situation to issue securities that were dependent upon this price rise. This also hit back on the financial sector. A large portion of the securities related to subprime mortgage loans were held on SIVs. When house prices stopped rising and the fragility of the system revealed itself, investors stopped buying the ABCPs the SIVs issued. In this situation many large financial institutions in the U.S. and in Europe found themselves stuck with all

the bad cards. The most important lesson from the Financial Crisis must be found in the way the financial sector engaged in the market for subprime securities. The concentration of risk, high leverage and maturity mismatch must be seen as the main reasons for why a crisis in a relatively small market could become a worldwide financial crisis.

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