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1. Introduction

“Exchange rates are no longer an arcane interest confined to a handful of economic specialists and traders. They are ubiquitous, to the point where it almost seems that whatever the subject under discussion – the outlook for the domestic or world economy, stock markets, industrial competitiveness at the level of the firm or the industry, even the outcome of the next election – the answer almost invariably turn out to revolve around the exchange rate.”¹

Exchange rates and their fluctuations have played a major role in our lives and are continually important. This paper will focus on exchange rate fluctuations, their causes and consequences and the ability to estimate such. I will describe major events in the foreign exchange market and the essential theory supporting those.

Chapter 1 will focus on the general explanation of exchange rates and will give an overview of its history.

Followed by the clarification of different exchange rate regimes and the reasoning of why one country would choose a fixed versus a flexible exchange rate and vice versa. As all nations face different economical and political circumstances they will accordingly choose a regime, which fits best. It will be pointed out how economies use historic events in the foreign exchange market as an indicator of exchange rate movements.

The foreign exchange market will be described in Chapter 4 clarifying the instruments used in the market and pointing out its enormous size. The next part serves as an explanation of exchange rates movements, where different approaches and their outcomes will be shown. These approaches are dependent on different determinants and time horizons, as some can determine short-term movements and some long-term movements of exchange rates.

One major problem has always been to forecast fluctuations in the exchange rate. This problem is faced in Chapter 6 where the ability of monetary fundamentals forecasting exchange rate fluctuation is assessed.

As for nations, they have to decide on how keep or get stable economies and have to make decisions how to use monetary policy to ensure purchasing power and stable prices. This paper will go into more detail explaining the occupation of the Federal Reserve Bank and

¹ Copeland (2005, p.2)

the European Central Bank, focusing on one main task of whether or not to intervene in the foreign exchange market.

Chapter 10 will use a practical example of explaining exchange rate dynamics using the Euro and the U.S. dollar relation and then continues to focus on the question if the Euro will rival the U.S. dollar as the main reserve currency.

Finally, the paper will end with serving a conclusion.

2. History of the currency exchange system

Tracing back to the introduction of coinage by the ancient Egyptians, foreign exchange trading can be seen as a very old profession. A more relevant stage in history was the so-called gold standard between 1816 and 1933 where all major trading nations were unified to one currency system. The plan was to make trading easier and less pricy to gain a stable economy. The pound sterling, which was tied to gold and then referred to as 123.27 grains of gold became the leading reserve currency.²

However when World War I was happening in 1914 Britain along with other European countries fell out of the system, the U.S. dollar replaced the pound sterling. Nonetheless, two decades after that the U.S. dollar came off the gold standard again, following the huge international depression of 1929. This was the end of the gold standard. The system was now instable and exchange rates where unpredictably moving. International trade was collapsing and innumerable investors lost their money. People didn't trust banks anymore, which led them to withdraw their money, which then caused a lot of banks to go bankrupt. The depression caused distrust in the market, which led the Congress to a new Act to reinforce confidence. In 1933 the Securities Act was built and the following year the Securities Exchange Act pursued. The reasons for these acts were to force companies to tell the truth about their businesses, about the risk of investing and the securities they were selling. Secondly they made traders and dealers treat their investors with honesty and put their interest first.³ After years of instability, the Bretton Woods System was introduced in 1944. This was a fixed exchange rate system to even out fluctuation and boost trade, where the U.S. dollar was the new reserve currency fixed to gold. However in 1973 capital

² See Archer (2005, p.12)

³ See Archer (2005, p.14)

accounts in the US had a big deficit causing a lack in gold reserves and therefore the angst that the U.S. wouldn't be able to sustain convertibility. So after three decades of a fixed exchange rate regime, a system of flexible exchange rate was introduced and holds until today. Since then the volume of transactions in the market has augmented substantially and the system was working well. It was until the Euro was commenced in 2002 and one currency for twelve nations in Europe was formed.⁴ After being introduced to a flexible system of exchange rate with the major currencies like U.S. dollar, the British pound or the Japanese Yen dominating the market, the Euro proofed to be an instantaneous success and is now the second most traded currency in the market.

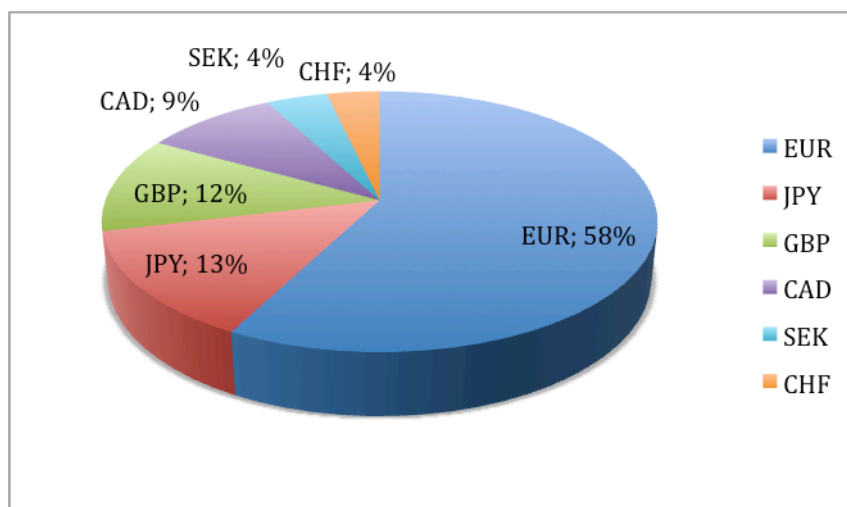
Table 1: U.S. Dollar Index

<i>Currency</i>	<i>Weight %</i>
Euro EUR	57.6
Japanese Yen JPY	13.6
British Pound GBP	11.9
Canadian Dollar CAD	9.1
Swedish Krona SEK	4.2
Swiss France CHF	3.6

Source: Archer, (2005, p.22)

⁴ Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

Figure 1: U.S. Dollar Index



Source: The U.S. Dollar Index (2008), 06.05.09

Figure 1 illustrates a measurement of the U.S. dollar, a geometrically averaged calculation, and gives a nice overview of what is happening in the global foreign exchange market. The U.S. Federal Reserve formed it in 1973, following the Bretton Woods agreement. It is used to show the U.S. dollar's general performance relative to a group of six foreign currencies, stating that if the Dollar Index is drifting lower, another major currency of this Index will be trading higher.⁵

3. Nominal exchange rates, Real exchange rates

Generally when talking about exchange rates, they are always referred to as being bilateral, meaning that they are between two currencies.

There are two ways in which nominal exchange rates can be expressed. Both are correct and there is no specific rule on which definition to use. The first goes as follows: nominal exchange rates can be defined as the price of the domestic currency in terms of the foreign currency. While the other definition is the other way around where the nominal exchange rate is the price of the foreign currency in terms of the domestic currency.⁶ Or, „as home

⁵ See Intercontinental Exchange (2009, p.2), 18.04.09

⁶ See Blanchard (2006, pp.378-379)

currency price of a unit of foreign exchange rate“, as it is generally used in exchange rate literature.⁷

To clarify this statement an example of Euro and U.S. dollar can be used, where the Euro is the domestic currency and the U.S. dollar is the foreign currency. In this case the nominal exchange rate would be the price of a Euro in terms of U.S. dollars, using indirect quotation, which means that the domestic currency is expressed in terms of the foreign currency.

Two types of nominal exchange rates can be differentiated; the spot and the forward exchange rate. Whereas the spot exchange rate stands for the rate at which foreign exchange can be sold or bought instantly and the forward (also called future) exchange rate is the rate at which foreign exchange can be sold or bought at some point in the future.⁸

A rise in the price of the domestic currency implies an increase in exchange rate and is called an appreciation of the domestic currency in terms of the foreign currency. However, a decrease in the exchange rate indicates a decline in the price of a domestic currency in terms of the foreign currency.

If somebody from Italy is planning on visiting the USA, he will be interested in how many U.S. dollars he will get in exchange for Euros, the nominal exchange rate. However, he will also want to know how much a good in the USA will cost relative to a good in Italy, hence he wants to know the real exchange rate.⁹

The real exchange rate is gained by adjusting relative prices to the nominal exchange rate. Simply put, the real exchange rate is the price of domestic goods in terms of foreign goods. Yet, it is not possible to do so by just using one price of one good, instead a price index is used for all goods produced domestically and for all goods produced abroad. This is called the GDP deflator, a way of measuring the price level of goods produced in an economy.¹⁰ The real exchange rate can be expressed as follows:

$$\varepsilon = EP / P^*$$

⁷ See MacDonald (2007, p.2)

⁸ See MacDonald (2007, p.2)

⁹ See Blanchard (2006, p.380)

¹⁰ See Blanchard (2006, p.37)

Where E stands for the exchange rate, P for the price of the domestic good and P^* for the price of the foreign good. Using an example, the price of European goods in Euros P is multiplied by the exchange rate E , which is the price of European goods in terms of U.S. dollars, EP . P^* stands for the price of American goods in U.S. dollars and finally ε gives us the real exchange rate and consequently the price of European goods in terms of U.S. dollars. Real exchange rates move over time, there can be an increase in the relative price of domestic goods in terms of foreign goods, or a decrease. The exchange rates can therefore increase, which is then called a real appreciation or decrease, called real depreciation. As a result a 15% increase in the exchange rate of Europe and the USA would suggest that European goods are 15% more expensive in relation to American goods.¹¹

Within the world economy changes in the nominal and the real exchange rates were among the most significant ones in the 1980's. The U.S. dollar experienced large fluctuation in the first half of the decade where it appreciated by 40% compared to other major currencies, although in the second half it depreciated that much overturning the appreciation.¹²

4. Exchange rate systems

4.1. Fixed exchange rates

Countries with a fixed exchange rate keep their currency fixed in terms of a foreign currency. So the value of one currency matches the value of another currency. Usually countries do so to stabilize their currencies compared to another. The term peg is also used when talking about fixed exchange rates, as one country pegs to another in terms of increasing and supporting trade between them. Most countries peg their currency against the U.S. dollar. However, a fixed exchange rate does not mean that they never actually change. They do, just not as much as flexible exchange rates, which change on a daily basis. The terms used when fixed exchange rates increase or decrease differ from the expression used

¹¹ See Blanchard (2006, p.381)

¹² See Manzur (1993, p.123)

with nominal or real exchange rate. An increase of exchange rates under a fixed exchange rate system is called revaluation and a decrease is called devaluation.¹³

Countries fix the value of their currency relative to a foreign country to gain price stability. Nevertheless, this particular monetary approach is not necessarily right for every country. Before making this choice a country's background needs to be reflected.

*„Fixing the value of the domestic currency relative to that of a low-inflation country is one approach central banks have used to pursue price stability“.*¹⁴ Fixing an exchange rate can consequently lower inflation, though, there are several weaknesses which should be considered first. Those countries might admit the failure of their monetary policy and might be unable to react to various domestic economic shocks.

*„On balance, it seems that a fixed exchange rate approach to price stability makes most sense when the country adopting it has an economy closely tied to the country or countries it is pegging to and is thus subject to similar international shocks in any case.“*¹⁵

Countries using a fixed exchange rate regime are, for example, the Danish krone¹⁶, which is pegged to the Euro, the Belize dollar¹⁷ or the Omani rial¹⁸, which are both pegged to the U.S. dollar. To keep a fixed exchange rate, governments buy or sell their own currency in order to keep the desired rate.

Fixed exchange rate regimes cannot just be made bilateral, between two countries, but between a group of countries. An example of such a group is the European Monetary System (EMS), which was founded in 1987. The plan was to support trade within Europe and bring an end to the incisive competitiveness, by introducing a “fixed but adjustable” system.¹⁹ It was agreed upon members that they would keep their exchange rate in comparison with the others at a similar level and changes could only be made with the agreement of the other countries. After the crisis in 1992, some members dropped out of the EMS and it was hard to keep adjustment recurrent. This was the time when some countries

¹³ See Blanchard (2006, pp. 430-431)

¹⁴ See McDonough (1996), 20.04.09

¹⁵ See McDonough (1996), 20.04.09

¹⁶ See Danmarks Nationalbank (1999), 20.02.09

¹⁷ See Central Bank of Belize (2003), 20.02.09

¹⁸ See Central Bank of Oman (2003), 20.02.09

¹⁹ See Giavazzi, Micossi, Miller (1989, p.1)

decided to adopt the Euro, a common currency, where the adaptation from domestic currencies to the Euro started in 1999.²⁰

4.1.1. Bretton Woods System

After World War II the Bretton Woods System was established. It was a system of fixed, yet adjustable, exchange rates. It was in July 1944 where 44 nations met to discuss and build a new exchange rate and an international monetary system. All members had to have a fixed parity agreement in terms of the U.S. dollar, where the exchange rate could move within a 1% margin. At the Bretton Woods Conference, the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD) were founded and up until today play an important role in world economy. The IMF controls and supervises the international financial system through following macroeconomic policies of its members with focusing on the balance of payments and exchange rates. After World War II countries needed support to rebuilt stable economies. The IBRD was formed to do so, by financing those nations.

4.2. Flexible exchange rates, 1971 – 1994

In 1971 there was an unexpected end to the Bretton Woods period, as president Nixon had decided to defer the convertibility between the U.S. dollar and gold. At this point people started to acknowledge Friedman's proposition of flexible exchange rates, which stated that only if the economic environment was unstable then the exchange rate would be unbalanced too.²¹ Suddenly a flexible exchange rate system was preferred.

A system with flexible exchange rates would mean that the rates would freely adjust to any values, which are needed to equate supply and demand for its currency.²² Additionally there is no government intervention in the foreign exchange market, which results in countries not having to hold reserves.

²⁰ See Blanchard, (2006, p.432)

²¹ See Hairault, Sopraseuth (2004, p.182-183)

²² See McCallum (1996, pp.86-87)

A country under a flexible exchange rate regime is a type where the exchange rate is floating; consequently the currency of a country fluctuates suitably to the foreign exchange market. Nonetheless, there are several advantages and disadvantages of using a flexible system, which need to be considered before applying one.

4.3. Exchange rate regimes

As already mentioned it is very difficult to decide on one particular regime. Yet, it is not as simple as to say one can either apply a flexible or a fixed exchange rate system. Typically there is a severe difference made between fixed and floating exchange rate, usually referred to as corner solutions, however there are various stages in between. The categorization usually applied is the IMF classification, using the “Annual Report on Exchange Rate Arrangement and Exchange Restrictions”, which defines four categories, the fixed, the limited flexibility, the managed floating and the independently floating, and asks members to characterize their exchange rate relation themselves.²³ However, Levy-Yeyati and Sturzenegger (2000) claim that the so-called *de jure* classification used by the IMF gives a somewhat incorrect picture.

The IMF empirical literature is based on the regime that countries declare to have, however, as many claim to be running a flexible rate in theory and do interventions pervasively, hence do not differ from countries using explicit fixed exchange rates.

Levy-Yeyati and Sturzenegger (2000) have developed a new categorization called the *de facto* classification, in order to detain the genuine policies and learn more about the chosen exchange rate regimes and their influence on economic variables, using a more statistical approach. The *de facto* classification wants to describe which regime is actually used rather than what countries say they use. Those three new categorizations go as followed: changes in the nominal exchange rate, the volatility of these changes, and the volatility of international reserves.²⁴ Whereby flexible exchange rate regimes are related to extensive volatility in nominal rates with more or less stable reserves and fixed regimes enjoy small volatility in the nominal exchange rate with high volatility of reserves.

²³ See MacDonald, (2007, p.28)

²⁴ See Levy-Yeyati, Sturzenegger (2000, pp.1-4)

As expected, there were significant differences between the IMF classification and the *de facto* classification by Levy-Yeyati and Sturzenegger (2000). The IMF explored that since the Bretton Woods period up until 1999 there has been a static decline in countries using fixed exchange rate regimes. However, using the LYS classification this regime seems to have been relatively constant after the Bretton Woods shock. Secondly, according to Levy-Yeyati and Sturzenegger (2000) there was evidence against the hollowing-out hypothesis, which declares that regimes like crawling pegs and managed floats, also referred to as the intermediate regimes, have been uncommon; instead have actually been quite stable over the last two decades. The hollowing-out hypothesis, expressed by Eichengreen in 1994, describes that in a world of a large degree of international capital mobility and financial markets, intermediate exchange rate regimes seem to be less attractive than flexible regimes or hard pegs as they are vulnerable to capital flows. Consequently the hypothesis states that countries should move towards using flexible regimes or hard pegs.²⁵

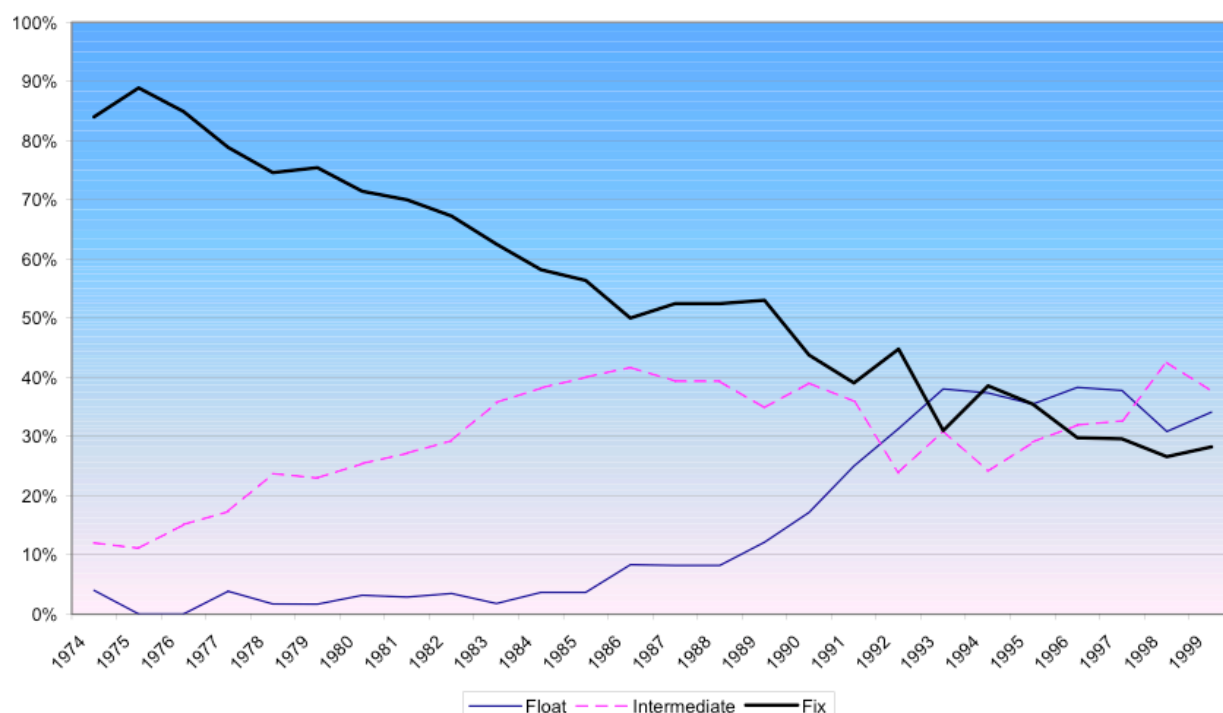
Additionally, using the IMF classification, countries claiming of using a flexible exchange rate regime repeatedly intervene to keep stable exchange rates. Conclusively, Levy-Yeyati and Sturzenegger came to the sense that countries, which claim of using a fixed exchange rate regime, are actually applying a more flexible one.

In 1999 the IMF has finally changed from the *de jure* classification to using the *de facto* classification.²⁶

²⁵ See Severov (2006, p.120)

²⁶ See Rogoff (2004, p.5)

Figure 2: Distribution of Exchange Rate Regimes IMF Classification (1974-1999) Non-Industrials



Source: Levy-Yeyati, E., Sturzenegger F. (2000, p. 31)

In 1999 twelve states of the European Union gave up their own currency to adopt the Euro, a common currency for all member states. In January 2002 all old bank notes were withdrawn and Euro coins and bank notes started to circulate. Today there are 16 countries using the common currency.²⁷ Several countries moving from their domestic currency to form one common currency, the Euro, can be seen as an extreme form of fixed exchange rates, as between each member pair of currency it is fixed at a one to one value.²⁸

When the future member states decided on the Euro they also decided to use a flexible exchange rate system. Even though the Euro is floating relative to foreign currencies, all member states are fixed forever to the Euro in addition to giving up their independent monetary policies to the European Central Bank. This was an obvious decision at this time, as the exchange rate is not an instrument of economic policy. Meaning that the financial

²⁷ Belgium, Germany, Finland, France, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Austria, Portugal, Slovakia, Slovenia, Spain and Cyprus.

²⁸ See Blanchard (2006, p.432)

market determines external value of a currency. Using a flexible exchange rate regime, the Euro was following a lot of industrial countries and emerging markets that are also still applying a flexible exchange rate regime. The United States, Japan, the UK or Australia and Switzerland are using a flexible regime, as all of these countries are following their domestic objectives and not ones of a foreign country, which is only achievable with a flexible exchange rate regime. If a currency is pegged to another its monetary policy will be determined by the country whose currency it is pegged to rather than its own. Thus an independent monetary policy cannot hold at the same time as a fixed exchange rate regime. Nevertheless, if a country or a basket of countries decide to use a flexible exchange rate it is not said that there isn't an exchange rate policy used, as central banks do tend to intervene to avoid excessive changes.²⁹

After Mundell's theory of an optimal currency area a merging of currencies into a common currency would increase economic efficiency. Since the introduction of the Euro trade between European countries has increased solidly. However, when comparing Europe to the United States, the degree of labour market flexibility is still relatively low. Workers tend to move much more in the U.S. compared to countries within Europe where this is still quite unusual.³⁰

As shown in table 2 member states that have adopted the Euro have experienced an immense decrease in unemployment, 16 million jobs were acquired since the introduction of the Euro. Comparing this to the United States, which experienced a decline in employment over the same period of time even though it is more mature economy with good demographics. However, there has been weak productivity growth in the Euro Zone. Although the labour market has improved, relative to the United States productivity has gone down enormously. Nonetheless, productivity would have been even worse without the launch of a single currency as it has given companies a bigger change to trade.³¹

²⁹ See Smaghi (2007, p.1-5)

³⁰ See Mulhearn, Vane (2008, p.71)

³¹ See European Commission (2008, p.9)

Table 2: Growth and employment (average annual changes in %)

	1989-1998	1999-2008
Euro area		
Real GDP	2.2	2.1
Real GDP per capita	1.9	1.6
GDP per capita level (index, US=100)	73	72
Employment	0.6	1.3
Labour productivity	1.6	0.8
United States		
Real GDP	3.0	2.6
Real GDP per capita	1.8	1.6
Employment	1.5	1.0
Labour productivity	1.5	1.6

Source: European Commission (2008, p.9)

4.4. Fixed versus flexible exchange rates

„The choice of exchange rate policy is probably their single most important macroeconomic policy decision.“³²

It is very complex for a country to decide whether to use a fixed or a flexible exchange rate system. Would it be better to let the foreign exchange market determine the exchange rate or is it more efficient to intervene. Additionally, when deciding on which exchange rate regime to apply, governments need to consider the volatility of the exchange rates, which are lower when using a fixed regime and higher when adopting a flexible exchange rate regime. So it is clear that if a country pursues a policy with low volatility it would fix exchange rate.³³

³² Cooper (1999, p.1)

³³ See Gärtner (1993, p.267)

Looking at a fixed exchange rate regime firstly and its advantages and disadvantages compared to a flexible system, there is one main benefit, which is to avert countries going after their own, and self-governed monetary policy, additionally to quite a high credibility as Magendzo (2003) noted. Furthermore, if a country is pegged to another country with a tough anti-inflationary status it might find it easier to fight inflation and strengthen credibility.³⁴ Due to speculations an exchange rate can get quite askew, causing misalignments, however that can be removed when fixing the exchange rate as investment and trade get more attractive. So fixing an exchange rate can mean enhancing trade.

Nevertheless, there can be downsides to it as well. Fischer (2001) speaks the following, *“each of the major international capital market-related crises since 1994 ... has in some way involved a fixed or pegged exchange rate regime. At the same time, countries that did not have pegged rates ... avoided crises of the type that afflicted emerging market countries with pegged rates.”*³⁵ Disregard those factors another advantage of having fixed exchange rates is that they can be less volatile.

Comparing fixed to flexible exchange rates one benefit of flexible ones is the stability because it is less affected by attacks speculative nature. Additionally a country can function on its own, using an independent monetary policy, without having to put up many trade barriers or quotas.³⁶

After the collapse of the Bretton Woods system most countries with major exchange rates have been flexible and weren't pegged to any foreign currencies. On the other hand, the minor currencies seem to have pegged to the major currencies.³⁷

The International Monetary Fund (IMF) stated in 1997 that there was a significant decline in the number of countries using a fixed exchange rate system relative to those using a flexible exchange rate system. Countries, which pegged fell significantly between 1976 and 1996, whereas countries using flexible exchange rate rose from 11 to 52.³⁸ Nevertheless as the following graphs show, countries using a fixed exchange rate regime were still relatively high.

³⁴ See MacDonald (2007, pp.30-33)

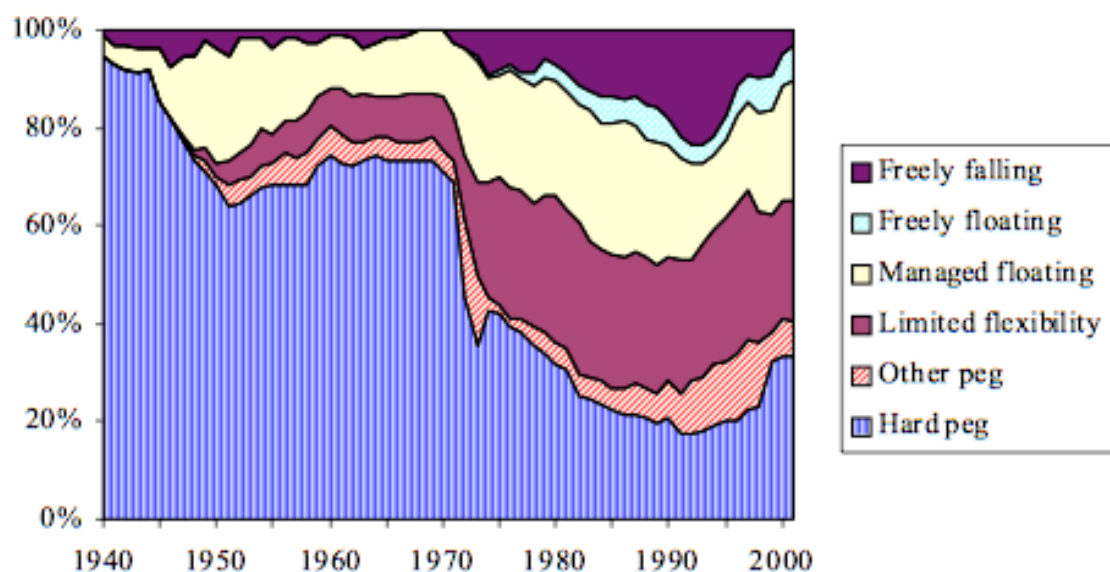
³⁵ Fischer (2001, p.3)

³⁶ See MacDonald (2007, p.30)

³⁷ See Sarno, Taylor, Frankel (2002 p.177)

³⁸ See Levy-Yeyati, Sturzenegger (2000, p.2)

Figure 3: Natural Classification Regime Distribution, 1940-2001 (in % of annual observation)



Source: Rogoff (2004, p.14)

4.4.1. Mundell-Fleming Model

With its origin in the IS-LM model, which processes the relation between interest rates and output, and considering an open economy, the Mundell-Fleming model shows the relation between output and the nominal exchange rate. Founded in the 1960's and named after the two economists Robert Mundell and Marcus Fleming, who independently developed it.

The model supposes static expectations and is somewhat the origin of many exchange rate models.³⁹ It assumes that a country using a fixed exchange rate regime cannot simultaneously hold a self-governing monetary policy and free capital mobility. The model describes an economy and its reaction to changes of conditions in the goods or money market.

³⁹ See Sarno, Taylor, Frankel (2002, p.99)

5. The foreign exchange market

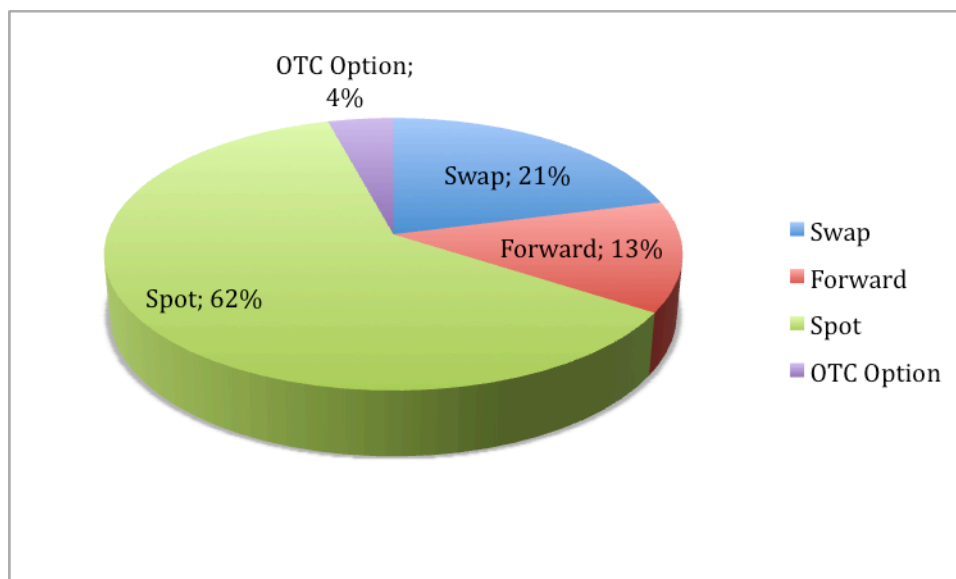
The FOREX is the biggest financial market in the world with a \$ 2 trillion volume on a daily basis. Through the possibility of accessing it over just a computer and therefore operating over an electronic network, individuals, banks and corporations can make use of it on a 24-hour basis.⁴⁰ The Bank of International Settlements recorded a turnover record in 2007 of \$ 3.2 trillion, which was collected of their 48 central bank participants. Whereby foreign exchange trading has increased between 2004 and 2007 by 70%. This is due to a couple of reasons, one being the easy access to the market. Another factor is the rising significance of the market as an asset class. The main cause of the huge turnover in the foreign exchange market is due to spot transactions, swaps and outright forwards, which make more than 90%.⁴¹

A 24-hour trading day starts in Asia continues to Europe and lets the US follow. Traders want to buy or sell when the market is on its peak and there are the maximum amount of buyers and sellers, so there will be periods with high and low activity on the market. The foreign exchange market will reach its highest when it is morning in New York and afternoon in London. This results in an ever-moving market, where traders have to count with fast changes in the foreign exchange market even when they are not sitting in the office. Those changes can be caused by any decisions or conditions in any country around the world. The only limitations apply to those countries using a fixed exchange rate regime and are being stopped from trading freely.

⁴⁰ See Archer (2005, p.3)

⁴¹ See International Financial Services London (2007, p.1), 27.04.09

Figure 4: Average Daily Volume Composition by Instrument Type, October 2008
Total = \$762 billion



Source: Foreign Exchange Committee (2009, p.2), 06.05.09

The U.S. dollar is the mostly traded currency with an involvement of 87% of all transactions worldwide.⁴² The daily average volume of over-the-counter instruments was \$762 billion, which is a rise of 8.7% since October 2007. Nevertheless, the main amount of foreign exchange trading takes place in London.⁴³

Any currency pair consisting of whether the United States (USD), Great Britain (GBP), Europe (EUR), Switzerland (CHF) or Japan (JPY) is called a major.⁴⁴ Currency pairs consisting of one of those and another currency are minors and if a currency pair does not include one of these currencies they are referred to as exotics, which are less liquid and not as much traded as majors or minors. Risk exposure can be quite high when trading exotics but so can profit be, however it is more difficult to carry them through.

Currency prices are determined by various factors like the constantly changing environment following an economic or political condition. In addition to inflation, interest rates, trade or political stability, which perhaps have the bigger impact on currency prices.⁴⁵

⁴² See Sarno, Taylor, Frankel (2002, p.271)

⁴³ See Federal Reserve Bank New York (1998, p.15), 06.05.09

⁴⁴ See Bickford, Archer (2007, p.170)

⁴⁵ See Archer (2005, p.5)

5.1. Spot

On the spot market transactions are made with the current price and delivered within two business days. It is therefore an immediate exchange of two currencies, also called a currency pair, where one currency is bought and another is sold. It is outright, which means that the transaction of one currency for another is straightforward or on the spot.

Each currency has two prices, the buying and the selling price. The bid price is the amount of terms currency a trader is willing to pay for one unit of the base currency and the ask price is the amount of terms currency a trader is charging for a unit of the base currency. The bid price is always lower than the ask price and the difference is the so-called spread. The base currency is the currency the price is always measured upon, as every foreign exchange transaction involves two currencies. The base currency is always mentioned first, so using the currency pair Euro- U.S. dollar; the base currency would be the Euro.⁴⁶

5.2. Options

An option is an instrument, which can be used on the market to speculate or hedge; therefore it can be used to gain profit or to minimize the exposure of risk of another businesses position. Option contracts are standardized in terms of the amount of the underlying currency, the expiration date and the exercise price. Taking out an option means to have the right of buying or selling a currency at a specific date in the future, however still using the price of the date the contract has been entered into. For example if a trader is positioned short on EUR/USD he would take the opposite position in options.⁴⁷ A trader can either put or call, put means to have the right to sell a position to someone, while call is the right to buy. Nevertheless, they are not obligated to do so; they simply have the right to execute their position. If a trader does exercise his position, the price at which the underlying currency is bought, is called strike price. The positive side to options is that it cannot be lost more than the price of the option. However the time value of an option has to be paid for.

⁴⁶ See Federal Reserve Bank New York (1998, pp.31-35), 06.05.09

⁴⁷ See Archer (2005, p.209)

5.3. Forwards

In a forward transaction the exchange does not happen immediately. There is a foreign exchange contract with an agreed upon exchange rate, which is used even if it is not the same anymore.⁴⁸ A forward contract is usually based on the interest rate differential between two currencies and lasts about 3 months. So, the forward rate is the rate which is agreed currently and which can be sold or bought for delivery at one specific point in the future. The forward rate is hence the function of the spot and the interest rate differential between two currencies.

Nowadays more and more non-deliverable forwards are used in the market, which is quite comparable to outright forwards but no physical transfer of the currency is needed.

Generally, forward contracts are done in combination with another contract to limit a company's risk and exposure but they can also be used to cover future expenditure, for speculation or hedging. Those contracts can be referred to as swaps, where an instantaneous purchase and sale of a similar quantity of a currency is taking place at a forward exchange rate, which creates an exchange and a re-exchange.

5.4. Futures

In the future market transactions are not made straight away, though at some specific time in the future. When a contract is entered there is no actual buying or selling. A buyer and a seller consent on a contract with a delivery date with an agreed price; those contracts are standardized including a maturity date. The span is usually a few months. Basically the foreign exchange rate can be sold or bought on the agreed delivery date with the rate negotiated earlier. Or futures can be sold or bought on an exchange before the delivery date has arrived, enabling the individual holding the contract not to take delivery of the underlying asset.⁴⁹

The difference between forwards and futures is that forwards are over the counter contracts, which means they are not traded on an exchange and the length might be days, months or years. Forward contracts can easily be customized to meet specific wishes of a customer.

⁴⁸ See Archer (2005, p.269)

⁴⁹ See MacDonald (2007, p.2)

Futures are traded on the stock exchange and are not as flexible and there are only a few volumes of currencies available, which are delivered on specified days.⁵⁰ These contracts contain standardized amounts, maturity dates and underlie trading rules, which means it is easy to transact business, as only the price and the number of contracts need to be discussed. Futures contracts are often used for speculation and hedging reasons.

5.5. The participants

The Bank for International Settlements counts about 200 dealer institutions.⁵¹ There are official participants in the foreign exchange market like governments and there are private sellers and buyers like fund managers, hedge funds, corporations and investment or commercial banks, which build the majority. Those participant are the determinants of the market, those are the ones influencing the market. However, one party alone cannot cause a long-term movement in this market, as it is too large and has too many contestants.

The largest players of the foreign exchange market are banks, whereby 100-200 are the market-making ones globally. Interbank trading counts 60%-80% of foreign exchange trade, whereas brokers account for about 15%-30% and private customers only sum up around 5% of trade.⁵²

Central Banks also act in the foreign exchange market to influence their currencies. They control money supply and follow certain strategies, however those ones vary from nation to nation. Some banks may use a strategy to control interest rates or inflation; however what it comes down to is that a nation will always try to stabilize the market. This is when a nation will decide on which regime to use and which they believe fulfils their needs. Since the Bretton Woods System in the 1970's a nation is free to choose an exchange rate regime within the rules of the IMF.⁵³

⁵⁰ See McCallum (1996, p.19)

⁵¹ See Federal Reserve Bank New York (1998, p.18), 06.05.09

⁵² See MacDonald (2007, p.3)

⁵³ See Federal Reserve Bank New York (1998, p.26), 06.05.09

Conclusively, it is investors trading speculation or profit, which make most of the daily volume in the foreign exchange market and secondarily the government and companies, which buy and sell products and services in a foreign country.⁵⁴

6. Various approaches to explaining exchange rate movements

6.1. The flexible-price monetary model

Being one of the earliest approaches to determine exchange rates, the Monetary Approach, also called the flexible-price monetary model emerged in 1970's when the Bretton Woods System was coming to an end. This approach, *“starts from the definition of the exchange rate as the relative price of two monies and attempts to model that relative price in terms of the relative supply of and demand for those monies.”*⁵⁵

This model assumes real interest rates to be exogenous in the long run as a result of the perfect capital mobility assumption in addition to absolute purchasing power parity, which means that between two currencies prices will be equalized through their exchange rate. So the exchange rate between two countries can be extracted as:

$$s_t = p_t - p_t^*$$

Where s_t stands for the nominal bilateral exchange rate or the domestic price of the foreign currency, p_t for the domestic price and p_t^* for the foreign price. This then assumes that exchange rates are the relative price of two monies.

As an example, if Mexican goods get cheaper than U.S. goods, both Mexicans and people from the U.S. will be buying more from Mexico and less goods in the United States. This will then lead to an augmentation in relative demand for Mexican goods and make the peso appreciate compared to the dollar and hence balance out the dollar denominated prices of

⁵⁴ See Archer (2005, pp.4-5)

⁵⁵ Sarno, Neely (2002, p.51)

Mexican and U.S. goods.⁵⁶ Hence exchange rates can be strongly linked to money supply as slow money supply growth leads to an appreciation of a currency's value.

Thus assuming that the interest rate semi-elasticities and the income elasticity of the money demand are similar in the foreign and the domestic country the fundamental equation of the monetary model is as follows:

$$s_t = (m_t - m_t^*) - (\kappa y_t - \kappa^* y_t^*) + (\lambda i_t - \lambda^* i_t^*)$$

Where s_t is the nominal bilateral exchange rate, m_t stands for the money supply, y_t is the income and i_t is the interest rate. The variables κ and y signify positive exchange rate constants ($\kappa = \kappa^*$ and $\lambda = \lambda^*$) and t expresses a specific point in time.

Assuming foreign variables are held constant, a depreciation of the domestic currency in terms of foreign currency is caused by a rise in domestic money supply in relation to the foreign money stock and therefore an increase in the exchange rate s_t .⁵⁷

The monetary model and its approach are quite simple. However there are a number of assumptions that have to be made to gain such simplicity. There are six markets in an open economy: labour, goods, foreign exchange, money, domestic bonds and foreign bonds. However the flexible price monetary model does only have equilibrium condition in one market, the money market. Assuming perfect substitutability of foreign and domestic assets, both markets turn into one market. Additionally, an equilibrium goods market is gained through perfectly flexible prices and exchange rates can adjust without restraint to balance demand and supply in the foreign exchange market and supposing equilibrium in the labour market; in three of the five remaining markets will exist equilibrium.

Nevertheless, after high instability of exchange rates in the 1970's, another model was developed, namely the sticky-price monetary model.

⁵⁶ See Sarno, Neely (2002, p.51)

⁵⁷ See Sarno, Taylor, Frankel (2002, p.108)

6.2. The sticky-price monetary model

With its roots in Dornbusch's model in 1976 where he noted that assumptions, where prices are perfectly flexible even in the short run, are unrealistic; he came up with a suggestion that purchasing power parity would hold in the long run. Extracting from there the sticky-price monetary model developed. In the model it is supposed that there are "jump variables", namely interest rates and exchange rates, which balances the stickiness in other variables. Additionally there is short-term overshooting of real and nominal exchange rates above the long-run equilibrium level. The term "overshooting" describes that long-run trends and short-run fluctuations of an exchange rate are connected to each other. So when an exchange rate acts disproportionately to an unexpected change of interest rates and moves away from its real value it is called overshooting and is also compatible with the interest rate parity, which will be explained later.

So, if prices of goods are sticky in the short run, a cut in the nominal domestic supply of money will cause a fall in real money supply and a resulting climb in interest rates in order to clear the money market. This will consequently cause an appreciation of the nominal exchange rate and a capital inflow. Even though now if investors experience a foreign exchange loss as the profits of their investments are used to pay back liabilities in foreign currency, as a result of them pushing the value of the domestic currency up. As long as the interest rate difference exceeds the expected foreign exchange loss, investors will still be willing to borrow abroad and purchase domestic assets. Looking at the three different stages of short-, medium-, and long-run, equilibrium can be realized in the short-run if the expected rate of reduction is the same as the differential of interest rate, that said, this suggests that the domestic currency has appreciated further than its long-run purchasing power parity equilibrium. As money supply declines and therefore domestic prices begin to fall in the medium run, this results in a rise in real money supply and interest rates will then start to fall. The outcome is that the exchange rate will gradually devalue towards long-run purchasing power parity. On the whole, the increase in interest rates encourage an exchange rate appreciation, which is then followed by a slow depreciation as price adjust until purchasing power parity can be pleased in the long-run. This describes that a country's currency with higher interest rates is likely to depreciate.

Nonetheless, assuming prices are sticky or flexible, the sticky-price monetary model and the flexible-price monetary model both suggest exactly the same equations for exchange rates:

$$s_t = (m_t - m_t^*) - (\kappa y_t - \kappa^* y_t^*) + (\lambda i_t - \lambda^* i_t^*)$$

6.3. The purchasing power parity approach

The PPP theory talks about the exchange rate between two currencies and its equilibrium if the purchasing power is identical in both of them. It suggests an inverse relationship between the value of currencies and the product prices. So in the long run it is assumed that exchange rates will alter to balance the relative purchasing power of currencies.

The basis of the PPP approach is the law of one price, which states that a product in a perfectly competitive market has the same price as in each country if expressed in the same currency. Hence the price of a product calculated in the domestic currency is the same as the price of the foreign currency times the current spot exchange rate.

The law of one price does only talk about one product, while the absolute PPP talks about a whole bundle of goods. In this market it is assumed that the bundle of goods have an equalized price in different countries when expressed in the same currency.⁵⁹

Compared to the absolute PPP, which focuses on a price level, the relative PPP concentrates on changes in the exchange rate and prices. It assumes that relatively to a change in the ratio of two country's price level the exchange rate will change. In the long run this assumption can be used to forecast exchange rate trends. The inflation rate plays a big role and countries with higher inflation rates are likely to depreciate more compared to countries with a lower inflation rate, which tend to appreciate.⁶⁰

Yet, there are a few problems emerging using the PPP approach. The hypothesis that all goods are tradable and identical, that there aren't any transportation costs or tariffs and

⁵⁸ See Sarno, Taylor, Frankel (2002, pp.104-107)

⁵⁹ See Ralph (2005, p.7)

⁶⁰ See Federal Reserve Bank New York (1998, p.107), 06.05.09

information gaps and that exchange rates only depend on changes of inflation rates, seem somewhat unrealistic. Exchange rate changes occur over time not just as a result of an inflation rate movement but other reasons as technology improvements or growth in productivity. In the long run the relative PPP approach can be very helpful in predicting exchange rate trends or providing information about how to reach its equilibrium. Nevertheless, in the short run it does not seem to be supportive in forecasting exchange rate movements.⁶¹

6.4. The interest rate parity approach

In comparison to the purchasing power parity approach, the interest rate parity can give an insight to short-term exchange rate fluctuations. Basically, an interest rate differential can affect the exchange rate of two currencies. The interest rate parity holds the relation of spot and forward exchange rates; the interest rates in two countries and can be seen as follows:

$$f_t = s_0 (1 + r)^t / (1 + \rho)^t$$

The relationship between the spot and forward exchange rate can be verified through the relation of risk-free interest rates in two countries. Whereas f_t is the forward exchange rate, s_0 the spot exchange rate and ρ is the foreign interest rate and r is the domestic interest rate level. Short-term interest rates tend to follow changes in key interest rates, which are set by the reserve banks. So when there is a slowdown in a country's economy, central banks will use expansionary monetary policy and decrease prime interest rates to stimulate the economy.⁶²

⁶¹ See Federal Reserve Bank New York (1998, p.108), 06.05.09

⁶² See Ralph (2005, pp.6-11)

6.4.1. Covered interest rate parity

Covered interest rate parity deals with the relation between spot and forward exchange rates and interest rates. It declares that the forward premium equals the domestic and foreign interest rate differential. It is the rate held in different currencies and covered against potential currency changes. So the return will be the same when investing in the domestic currency and the same amount in a foreign currency, the investment is hence protected.

6.4.2. Uncovered interest rate parity

The uncovered interest rate parity just holds if market participants are risk-neutral.⁶³ This means that investors do not care about the risk when deciding on which bonds to hold but about the highest expected rate of return. It also assumes that there is no such thing as transactions cost and it completely ignores risk. So if the risk-neutral condition holds, then the gain of the expected foreign exchange of holding one currency compared to another currency must make up for the interest rate differential caused by holding funds in this currency rather than the other one.⁶⁴

6.5. The balance of payments approach

The macroeconomic balance approach is a very traditional one to analyze exchange rate movements. The key point is the state of the balance of payments equilibrium and hence the equilibrium exchange rate. The basis of this approach suggests that a rise in the price of foreign exchange causes a rise in the relative price of a country's imports relative to its

⁶³ See Gärtner (1993, p.11)

⁶⁴ See Sarno, Taylor, Frankel (2002, p.5)

exports, in addition to an augmentation of net inflow of foreign exchange caused by net outflow.⁶⁵

So the balance approach is fundamentally trying to achieve internal and external equilibrium. Basically economies are achieving their supply potential and their targeted capital account position, hence meeting internal and external balance. The balance of payments approach classifies the exchange rate, which is constant with medium-term macroeconomic equilibrium, as its equilibrium exchange rate. In the medium-run an equilibrium exchange rate can be achieved for any current account balance, therefore it is called flow equilibrium.

The balance of payments approach can be divided into two parts, internal and external, where equilibrium is met when internal and external balance is achieved. Whereas internal balance is realized when output is positioned to trend output and external balance is achieved if the underlying current account has matched the value of the target capital account. Hence domestic and foreign countries are in internal equilibrium.⁶⁶

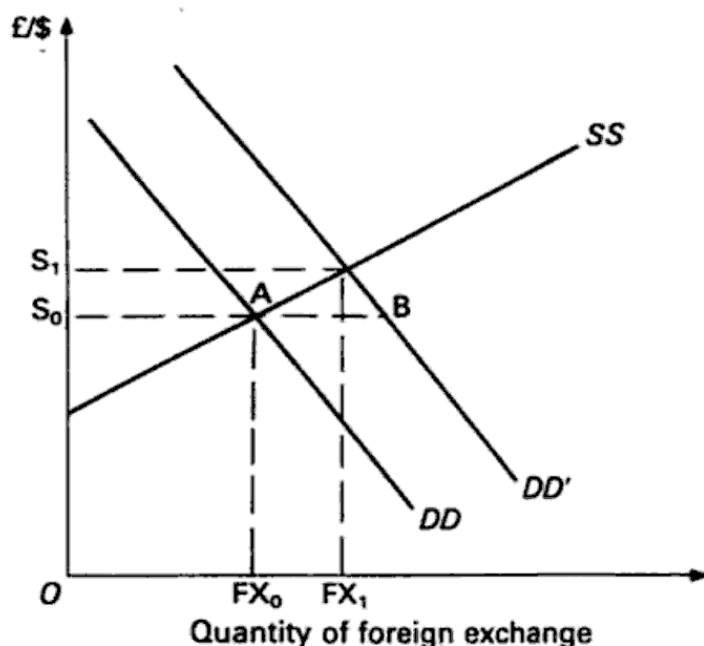
For the determination of the exchange rate the so-called Marshallian scissors of supply and demand can be applied where the balance of payments approach uses the exchange rate as a price. The transactions documented in the balance of payments illustrate the supply and demand of a country's currency. The following graph shows how exchange rates can be determined through demand and supply for imports and exports.⁶⁷

⁶⁵ See Bilson, Marson (1984, p.21)

⁶⁶ See Dvornak, Kohler, Menzies (2003, p.2)

⁶⁷ See MacDonald (2007, pp.8-9)

Figure 5: The Simple Balance of Payments, or Flow Model, of the Determination of the Exchange Rate



Source: MacDonald (2002, p.26)

In this graph the underlying DD shows the demand of imports of goods and services in the U.S. as the domestic country and using the United Kingdom as the foreign country. The demand curve for foreign exchange is downward sloping, which states that at a lower price more foreign exchange will be demanded. It reacts upon the usual factors as on the import supply side the producers' factor prices play a role and on the import demand side the income and tastes of consumers are considered.

S_0 determines the exchange rate where supply and demand intersect and FX_0 is the foreign exchange quantity at its equilibrium. An augmentation in income of U.S. households or a change in tastes result in a rise in the demand for dollars and would hence shift the demand curve to DD' . Point A is the original equilibrium along with excess demand for the pound.⁶⁸

Nevertheless, there are some limitations to the balance of payments approach like the absence of the explanation of the dynamics of adjustment to the balance exchange rate. In

⁶⁸ See MacDonald (2007, pp.8-9)

this approach the exchange rate is simply the relative price, which eases the alteration of the underlying current account to the target capital account.⁶⁹

6.6. The microstructure approach

Up until now only macroeconomic approaches have been considered, however there are other ways to find out how the price of foreign exchange is set. As macroeconomic fundamentals are better determinants in a long-term view, a microeconomic approach looks at unexplained macroeconomic fundamentals, which seem to affect exchange rates. The microstructure approach focuses on price formation, the behaviour of market agents, information flows or the heterogeneity of market participants. It assumes that not all relevant information of exchange rates are publicly known, contrasting the conventional macroeconomic view that considers all information is publicly known. Additionally this approach assumes that participants in the foreign exchange market are heterogeneous rather than homogenous which is supposed by macroeconomic-based approaches. This suggestion considers that different market expectations by agents affect prices and that expectations are not homogeneous. The different views are assumed to be caused by dissimilar beliefs, information, wealth or preferences.⁷⁰ An additional factor that affects prices in the foreign exchange market is trading mechanisms, which are diverse. For that reason order flow plays an important role using this assumption as it is fundamental information, which is not known by the public. Based on the dispersed information flow rather than the public information approach it looks at market participants and their expectations of future fundamentals.⁷¹

7. Assessing the ability of monetary fundamentals forecasting exchange rates

⁶⁹ See Dvornak, Kohler, Menzies (2003, p.8)

⁷⁰ See MacDonald (2007, p.393-341)

⁷¹ See Lyons (2001, pp.1-3)

There have been a lot of reasons to doubt that monetary fundamentals can efficiently forecast exchange rate movements. One main unanswered uncertainty has been the missing of forecasting changes in exchange rates. The monetary model is very simple in its use, which makes it highly attractive, however the downsides of this simplicity is that many assumptions have to be made. It focuses on only one of the six macroeconomic markets and only puts the money market in an equilibrium condition, leaving the others out. As Meese and Rogoff noted in 1983 the monetary models have not been able to forecast exchange rates better than a no-change forecast. Thus, it was able to predict in a long-term phase of about 3-4 years, but this wasn't given too much attention, as there was no insight of short-term predictability. The reason for this unpredictability might lay in the different expectations on future exchange rate fluctuations, as Frankel stated in 1996. Purchasing power parity and uncovered interest rate parity have not worked well of explaining variations in exchange rates. The uncovered interest rate parity was unable of explaining movements in floating exchange rate times, as was the purchasing power parity, which was distinct by high volatility of exchange rates in the 1970's. So it seems there is little evidence of monetary models explaining volatility in exchange rates.⁷²

8. The role of central banks

8.1. The Federal Reserve System

In 1913 the United States Congress formed the Fed, an arrangement that was supposed to acquire more trust in the banking system. The Fed was formed to build and sustain a stable economy with a working banking system through a low unemployment level, moderate and stable interest rates and price stability. It is said to be the banker's bank as it overviews all banking activities in the United States. The Fed is organized in three sections, the Federal Reserve District, the Federal Open Market Committee (FOMC) and the Board of Governors.

The Federal Reserve District consists of banks in various big cities around the United States, which operate as a supervision of banking activities in those districts. Acting as the operating arm of the central bank, the reserve banks gain their income through services

⁷² See Sarno, Neely (2002, pp.51-71)

provided to banks, interest earned on government securities, income from foreign currency held and interest on loans to depository institutions.⁷³

The 12 members of the FOMC are divided into seven governors and five Federal Reserve District Bank presidents. This branch has a more political view and makes the most important decisions about monetary policies, as deciding on interest rates.

The President of the United States appoints the seven members of the Board of Governors for a 14-year period. The Board includes a chairman and a vice-chairman and the Senate must agree upon all members.

The following graph illustrates the drastic increase in reserves worldwide. Since 1995 the size was tripled from USD 1.2 trillion to more than USD 4.0 trillion in 2005. Nevertheless the most drastic rise was experienced between 2002 and 2005 where reserves have almost doubled. The Asian economies now play a big role as they account for 64% of the world foreign reserves in 2005 and therefore obtain eight spaces out of ten among the largest reserve holders. Then again, foreign reserve management differs entirely around the globe.⁷⁴

⁷³ See Archer (2005, p.13)

⁷⁴ See International Relations Committee Task Force (2006, pp.9-11)

Figure 6: Foreign exchange reserves of countries with the largest holdings: 1995-2005

(net of gold, SDR and reserve positions at the IMF; end-of-period holdings; USD billions)														
Reserve-accumulating countries (with ranking)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005 ¹⁾	% of GDP	CC ²⁾	Regime (de jure) ³⁾
1. Japan	172.4	207.3	207.9	203.2	277.7	347.2	387.7	451.4	652.8	824.3	823.1	17.7	N	IF
2. China	73.6	105.0	139.9	145.0	154.7	165.6	212.2	286.4	403.2	609.9	769.0	37.0	Y	MF
3. Taiwan	90.3	88.0	83.5	90.3	106.2	106.7	122.2	161.7	206.6	241.7	253.7	78.2	N	IF
4. Korea	–	29.4	8.9	48.5	74.1	96.2	102.8	121.4	155.3	199.1	205.9	29.1	N	IF
6. Russia	14.4	11.3	12.9	7.8	8.4	24.3	32.5	44.0	73.2	120.6	155.7	20.7	Y	MF
7. India	–	–	23.9	26.8	31.5	36.8	44.9	65.7	95.2	124.7	136.9	18.9	Y	MF
8. Hong Kong	55.4	63.8	92.8	89.6	96.3	107.6	111.2	111.9	118.4	123.6	122.0	75.1	N	CB
9. Singapore	68.8	77.0	71.4	75.0	77.2	80.4	75.8	82.3	96.3	112.8	115.5	104.4	N	MF
10. Malaysia	22.9	25.1	20.0	24.7	29.7	28.6	29.6	33.3	43.5	58.2	75.8	55.5	Y	MF
11. Mexico	15.7	16.7	26.7	29.5	30.7	36.2	40.0	45.8	55.7	61.0	68.6	15.0	N	IF
12. Brazil	51.8	60.1	52.2	44.5	36.3	33.0	35.9	37.8	47.1	54.0	54.8	8.8	N	IF
13. Algeria	2.0	4.2	8.0	6.8	4.4	11.9	18.0	23.1	32.9	39.4	51.7	52.9	Y	MF
14. Thailand	–	–	–	24.7	33.6	32.5	33.2	38.1	42.1	49.1	48.3	29.7	N	MF
15. Norway	21.1	25.2	22.0	17.3	22.5	26.7	22.2	30.7	35.9	42.7	42.7	17.1	N	IF
16. Turkey	–	–	–	–	–	19.6	19.9	26.4	32.3	35.1	41.7	11.8	N	IF
19. Denmark	10.2	13.4	18.2	13.7	21.1	14.5	16.1	25.9	36.0	38.2	34.4	15.8	N	FP
20. Australia	11.3	13.9	16.1	13.4	19.5	16.8	16.4	18.6	29.9	33.9	33.4	6.1	N	IF
Other (non-accumulating) reserve holders (with ranking)														
5. Euro area	277.4	306.8	312.5	284.4	228	218.6	208	215.8	188	179	173.2			
17. US	49.1	38.3	30.9	36.0	32.2	31.2	29.4	33.1	39.2	42.4	38.7			
18. UK	39.2	37.1	28.8	27.3	30.1	39.3	32.0	32.8	35.1	39.5	38.6			

Sources: IMF and CEIC Data Company database.
1) Latest available 2005 data (mostly to August 2005).
2) Capital controls: Y = Yes; N = No.
3) IF: Independent floating; MF: managed floating; FP: fixed peg; CB: currency board.

Source: International Relations Committee Task Force (2006, p.11)

8.1.1. The Fed applying monetary policy

The Fed wants to increase or decrease interest rates, to do so there are three tools that affect interest rates; reserve requirements, lending to banks and open-market operations.

The Fed decides on how many reserves a bank must hold relative to checkable deposits, which in most cases is more than a bank would choose to hold. When the Fed makes a decision on whether to increase or decrease the amount on reserves a bank must hold it affects interest rates. An increase of reserve requirements leads to a rise in the demand for central bank money, hence the equilibrium interest rate augments. A decrease of reserve requirements would therefore lead to a decline in interest rates.⁷⁵

⁷⁵ See Blanchard (2006, p.547)

When the Fed lends to banks it can be compared to buying bonds where money is created and hence money supply of the central bank is increased. The Fed decides under the discount policy on which conditions the money is lend and how much they lend. Nowadays this instrument is not used as much anymore. The Fed usually encourages banks not to borrow money from them.⁷⁶

The third instrument used by the Fed to affect interest rates is open-market operations, where bonds are bought and sold in the bonds market. This is a very popular mechanism as it is an easy way of influencing money supply of the central bank and hence manipulate interest rates.⁷⁷

8.2. The European Central Bank

The European Central Bank (ECB) is the central bank for the single currency, the Euro, in Europe. The ECB has similar tasks as the Fed, making sure of purchasing power and stable prices. Their task is to decide on monetary policies, set guidelines, intervene in the foreign exchange market and set definitions on which policies to use in the Eurosystem. The Eurosystem is the term used to define those 16 countries, which have already adopted the Euro and the ECB.

The European System of Central Banks (ESCB) consists of all 27 members of the EU, also called the national central banks (NCB). So, even the countries which have not yet adopted the Euro are member of the ESCB, this means that they still have their own national currency and follow their independent monetary policy. However, they still follow the principals of monetary policies used by the ESCB.⁷⁸

Similar to the Fed, the ECB uses three instruments to set monetary policy and achieve their task of price stability. The first and main instrument used is open-market operations, where interest rates are manoeuvred and the money market is managed. The ECB sets the minimum reserves requirements, which banks have to hold, which is supposed to assure interest rate stability. Thirdly, the ECB provides standing facilities, which place boundaries for overnight interest rates and offer overnight liquidity.⁷⁹

⁷⁶ See Blanchard (2006, p.547)

⁷⁷ See Blanchard (2006, p.547)

⁷⁸ See European Central Bank (2009, p.1), 20.06.09

⁷⁹ See European Central Bank (2009, p.7), 20.06.09

8.3. Foreign exchange intervention

The Fed is the consultant of the United States Treasury in terms of intervening in the foreign exchange market. So the Treasury is responsible for setting exchange rate policies and the Federal Reserve Bank of New York executes foreign exchange interventions. However, in recent years that kind of intervention has become less, even though there is some evidence that intervention, when used selectively can be effective. As Fatum and Hutchison reported in 2003 after looking at daily data of the Bank of Japan, the German Bundesbank, the Federal Reserve and the European Central Bank, intervention can be successful when concentrating on short-run objectives and when used selectively. They state that exchange rate management is an effective form of influencing exchange rate movements as long as its policy is persistent and used in terms of specific objectives in cooperation with other central banks. Even though they were not able to define why intervention actually helps in stabilizing prices, they could still say that their findings were consistent with other common literature, stating that interventions could indicate future monetary policy. Nevertheless, this empirical evidence of Fatum and Hutchison only supports short-run effectiveness of intervention and can therefore not be seen as a management tool for a longer period.⁸⁰

The reason for interventions is to foster a stable exchange rate, to dampen volatility and to deal with rapid movements, which are riotous to market conditions. So when the price of the U.S. dollar needs to be supported against another currency the Federal Bank of New York will buy dollars and sell the other currency. However, as mentioned earlier, the foreign exchange market is too big for one single party to influence it, therefore an intervention will not cause an immediate shift in supply or demand. Though, it will influence investors' behaviour.⁸¹ Another reason for intervening in the foreign exchange market is explained through the "wrong-rate" argument, *"under a floating exchange rate system, an inefficient foreign exchange market may tend to generate the wrong rate (which implies ex ante abnormal returns) rather than the "correct rate" (the exchange rate which fully reflects the economic fundamentals) which would arise if agents in the foreign exchange market used all available relevant information."*⁸²

⁸⁰ See FRBSF Economic Research Department (2003, p.2-4)

⁸¹ See Federal Reserve Bank of New York (2007), 20.06.09

⁸² Sarno, Taylor, Frankel (2002, p.210)

There are some issues concerning official exchange rate intervention that are addressed by Sarno and Taylor (2002). The first one is the decision between secret or public intervention. Usually interventions are not announced in the public and hence have been partly kept secret. For this reason it makes it hard to become aware of the level of intervention operations. There have been three statements made by Dominguez and Frankel (1993), which approve of interventions made in secrecy. These are as follows; the first argument is that the central bank wants to minimize the affect of unsolicited operations concerning interventions as these might not be judged properly by the central bank and might therefore be made by an external institute, like the Treasury Department in the United States. The second case is established on the fact of volatility in the foreign exchange market and the perceived risk. This means that if a central bank would announce an intention of intervening publicly, in a market of high volatility its announcement would be risky and not believed in by many investors. The third statement says that a central bank might just want to regulate its foreign exchange portfolio in order to have sufficient reserves. In this case a publicly announced statement would be confusing for the market and its investors, as they might perceive that the central bank wants to shift the exchange rate in a particular direction.⁸³

Another issue concerning official interventions is the question whether to use an international coordination of interventions or to just focus on independent domestic interventions. When using the international approach, central banks work together and intervene concurrently in the market agreeing to back up the same currency. Additionally the spill-over effects of macroeconomic policies should be considered when using an interdependent approach that exploit interdependencies between countries within the coordinated intervention, as empirical evidence has been shown by Kenen (1995) that coordinated intervention may indeed be more successful than independent operations. Another model constructed by Flandreau (1996) declares that coordinated official intervention in the foreign exchange market has many gains. Stating that when changes occur in one exchange rate, it does influence other exchange rates. So shocks of fundamentals also have an effect on involved exchange rates. In relation to an individual intervention it seems that coordinated intervention contain large gains and hence seem to be an effective approach.⁸⁴

⁸³ See Sarno, Taylor, Frankel (2002, pp.216-217)

⁸⁴ See Sarno, Taylor, Frankel (2002, pp.217-219)

Friedman (1953) stated that if an official intervention does not include profit as an outcome it is not effective. So if a central bank intervenes and hence stabilises the exchange rate it should automatically gain a profit at the cost of speculators. Therefore, he says, the effectiveness of official intervention should not be deliberated but the profitability instead, even though these measures are limited as it is hard to calculate these profits or losses in this certain context. So the bottom line of Friedman's theory is that central banks do earn profit in the long run through intervention operations. However, the negative aspect is that central banks might even acquire profits of an intervention even if it doesn't have an effect on exchange rates. In this case it cannot be argued that these profits imply that interventions have a stabilising consequence on exchange rates. Another related theory is that there is a significant relation between central banks making official interventions and trading-rule profits. Interventions made by the central bank can be related to the profitability of trading returns. In times when the central bank does many interventions in the foreign exchange market there is very low predictability of exchange rate movements.⁸⁵

An additional difficulty in measuring the effectiveness of official intervention is the limitation of data of exchange rate. Some studies have just used the reserve changes as an indicator of intervention flows. However, this is not sufficient as reserves can change for various reasons. In terms of being sufficient in representing relevant data on the short- and long-term effects of interventions at least daily data should be collected. Furthermore there are various countries that do not make data available on interventions, which make it very hard to gather international information. The United States, Germany and Japan are the only ones out of the G7 countries that do show their data.

8.3.1. Sterilized intervention

Sterilized intervention is a method used by the central bank by intervening in the foreign exchange market. The government sells or purchases domestic assets in the domestic market to offset the reserve injection, hence limiting the domestic currency amount available to the foreign exchange market. However, sterilized intervention can cause conflicts between the several targets of a central bank. Usually central banks want to keep or achieve price stability and maintain proper interest rates, GDP growth and a low unemployment rate, those foreign exchange interventions can often intervene with each of these goals. An example of a common problem when intervening is the outcome when wanting to raise

⁸⁵ See Sarno, Taylor, Frankel (2002, pp.219-220)

interest rates in order to slow down economic growth to avoid a resurrection of inflation. The intervention in the foreign exchange market to lower the domestic currency value would hence cause a decrease in interest rates and a rise in the money supply, which is not the goal of the central bank. This can be a reason why central banks chose to sterilize intervention in order to change exchange rates when at the same time money supply and interest rates are unaltered.⁸⁶ Nevertheless, this target is hard to achieve in practice and generally sterilized interventions seem to be ineffective as the impact on exchange rates is small and highly unpredictable. It does not straightforwardly influence fundamental economic determinants of exchange rates, however sometimes it seems to affect market expectations of fundamentals. Additionally to this problem Humpage found in 2000 that a sterilized intervention could not change the direction of an exchange rate movement, consequently it is unable to cause a depreciating currency to appreciate.⁸⁷ Even so, short-term affects can be achieved over a short period, as considerable intervention will thus cause an immediate affect on the exchange rates over some days. Moreover can an intervention lead to an alteration in investor's expectations about the market.

9. Exchange rate dynamics between the Euro and the U.S. dollar

The key interest rates set by the central banks are the origin of short-term interest rates in contrast to long-term interest rates, which are derived by the market. When the Central Bank of the U.S. or the ECB make changes they will affect their exchange rates in the short run. Usually those exchange rates tend to follow the economic cycle, hence when a country experiences a slowdown in the economy, the central bank will use expansionary monetary policy, as prime interest rates tend to decrease. When the economy is recuperating again, central banks will lower interest rates vice versa to escape rising inflation.⁸⁸

⁸⁶ See Suranovic (2005, Chapter 70-4) 13.08.09

⁸⁷ See Humpage, Craig (2000, pp.1-5)

⁸⁸ See Ralph (2005, p.10)

The ECB reacted to an almost 2% prime interest rate increase of the Fed made between 1999 and 2000, by keeping them steady up until the beginning of 2000 and then increasing them by 2%. This can be seen in the appendix (figure 7 and figure 8), which show the relation between the Euro and the U.S. dollar. The Fed made a sudden drop in 2001 when reducing interest rate from 6% to 2%, whilst the ECB made a smaller decrease to 3.25% in November 2001 and again in December 2002. The Fed came down to an interest rate of 1% in 2003 and slowly started to increase in mid 2004 until it reached 5.25% in 2006. Meanwhile the ECB declined its rate to 2% and kept it there until the end of 2005. After this period the ECB started to increase interest rates by small steps until it again reached 4% in July 2007. For the time being the Fed held higher interest rates with a more or less steady rate of 5.25% in mid 2007.

The financial crisis has hit the United States strongly and since August 2007 interest rates have plunged down by 5%. Even though the Fed has tried to secure a fast recovery through numerous measures, the fast rise in money supply made it very difficult. With an interest rate of now 1%, overnight lending between banks is almost zero.

The European Central Bank has been recognized of being slower in realizing monetary policy measures to support their economy. However, the ECB have become quite active in recent years. Since reaching 4% in 2007, the financial crisis has brought interest rates down to 1% like in the U.S. money market rates are in the Euro Zone than anywhere else with a deposit rate of 0.25% and their main refinancing rate continues to be higher than the ones in the United States.

The following table shows the comparison between the average interest rates differentials between 2000-2008. When comparing these facts to the exchange rate of the Euro against the U.S. dollar (see also the appendix, figure 9) it presents findings consistent with assumptions made in this paper.⁸⁹

⁸⁹ See Ralph (2005, p.10)

Table 3: Average interest and exchange rates of the Euro Zone and the United States

	2000	2001	2002	2003	2004	2005	2006	2007	2008
EZ	3.94	4.21	3.21	2.25	2	2.02	2.69	3.81	3.83
(in %)									
USA	6.19	3.73	1.67	1.10	1.29	3.10	4.94	5.00	1.88
(in%)									
Exchange rate	0.92	0.90	0.95	1.13	1.24	1.24	1.26	1.37	1.47

Based on: Global Economic Research (10.08.09) and Federal Reserve (23.09.09)

Accordingly to the change of interest rate, the exchange rate also alters in favour of the country with the higher interest rate. As it can be seen in figure 9 (appendix) when the Fed announced an increase in interest rate from 3.75% in October 2005 to 4% while the ECB kept its rate constant at 2%, there was an immediate reaction and the Euro depreciated from EUR 1 = USD 1.20 to EUR 1 = USD 1.17. This shows the short-term reaction when interest rates are changed by the central bank. Hence short-term fluctuations can be explained by interest rate differentials.

Interest rates do not just influence a country's exchange rate but are also used to influence the price level and to position the target inflation rate of an economy. Authorities use prime interest rates as an instrument of monetary policy to affect long-term trends. High interest rates indicate low inflation rates in the long run as it means that there will be a reduced speed in the rise of prices for goods and services.

When the interest rate of one country is higher than the other, the currency of the other country tends to depreciate. Comparing table 3 and figure 9 in the appendix it shows that when the United States had higher average interest rates in the years 2000 and 2005 the Euro depreciated against the U.S. dollar. The same happened vice versa when the level of interest rates were higher in the Euro Zone in 2002 the Euro appreciated against the U.S. dollar.⁹⁰

⁹⁰ See Ralph (2005, p.10)

The following graph shows the average inflation rates of the Euro Zone and the United States between 2000 and 2008. There is a correlation between relative inflation rates and the exchange rate trends in the long run. This can be clarified by comparing figure 9 with figure 10 and 11 in the appendix. Generally a relatively high inflation rate leads to currency devaluation in the long run.

Table 4: Average inflation and exchange rates of the Euro Zone and the United States

	2000	2001	2002	2003	2004	2005	2006	2007	2008
EZ	2.10	2.33	2.41	2.10	2.23	2.19	2.18	2.13	3.28
(in %)									
USA	3.38	2.82	1.58	2.28	2.68	3.38	3.23	2.87	3.85
(in %)									
Exchange rate	0.92	0.90	0.95	1.13	1.24	1.24	1.26	1.37	1.47

Based on: Global Economic Research (10.08.09) and Federal Reserve (23.09.09)

When the Euro was introduced in 1999 investors were still sceptic about the currency and kept holding mostly U.S. dollars, which caused a drop of 25 cents for the Euro against the U.S. dollar. Nevertheless, by the year 2000 the Euro started to appreciate against the U.S. dollar and rose by 50 cent within a period of 4 years in 2000 and 2004. There are various factors, which have influenced this shift; the rising inflation rate of the United States is one of them. In addition to negative expectations of the future market performance in the U.S. investors started to relocate their assets in safer currency environments like the Euro Zone, hence the Euro appreciated against the U.S. dollar. By the end of 2004 when the exchange rate has peaked EUR 1 = USD 1.40 the Euro started to depreciate again, which can be explained by again using economic fundamentals. There was a change in interest rate differentials and the United States was expected to have lower inflation rates than in Europe. By that point the United States was able to reconquer investors' confidence in their

currency, GDP growth rates were expected to be higher and the U.S. dollar started to appreciate again.⁹¹

Even though the volatility of the U.S. dollar was high between 2002 and 2004 it did not replace it as the main reserve currency in the world. Brenner (2006) argues that the Euro will never overtake the U.S. dollar as the main reserve currency. He states that only if a drastic incident happens that the Euro has a change of displacing the U.S. dollar. One of these events would be that the Fed mismanages the U.S. dollar completely or the ECB decides to target the price of gold to manage the Euro. According to Brenner (2006) the Euro is an experiment as it is not backed by gold or supported by a solid and strong government. The Euro cannot become the world's main reserve currency unless it adopts a persistent trade deficit to enable surplus member states to progress their Euro reserves. The Euro Zone would need a new and strong government to set new regulations and policies to build a reform necessary to achieve being the main reserve currency, which seems highly unlikely. So the only way for the Euro to become a serious competitor for the United States is that the Fed critically mismanages monetary affairs.

The government needs to pursue a direction of achieving and keeping stable money and consequently develop an open capital market. Brenner (2006) also says that if a country does not have an open capital market it will lose talented people and investors to countries with more open capital markets as, *"when capital markets are open, venture capital firms, commercial and investment banks, leveraged-buyout firms, and asset management firms price the risk and bet on entrepreneurs and managers, holding them accountable. When capital markets are closed, governments, families, and criminals make the key decisions about the allocation of capital."*⁹² When the U.S. government does not manage monetary policy appropriately it will cause the U.S. dollar to weaken, which can cause a postponement in finding a solution for a stable reserve currency and consequently cause inflation and unemployment.⁹³

So it has been argued that the Euro will not displace the U.S. dollar as the main reserve currency. Nevertheless the United States has to watch out and be careful not to mismanage monetary policy, as the Euro is still a relatively strong competitor. The statement that the

⁹¹ See Ralph (2005, p.11-13)

⁹² Brenner (2006, p.331)

⁹³ See Brenner (2006, pp.317-332)

Euro is unlikely to put the U.S. dollar out of place is mainly based on the assumption that Europe simply faces boundaries in terms of offering security relationships across its borders. Furthermore it seems that the economic gains of using the Euro are not overwhelming. So even though the Euro Zone as a monetary union has been doing quite well, the real economy's performance has not shown such a convincing performance. The recent boom in Europe was not due to a rise in productivity growth, as Posen (2008) argues. He even suggests that this growth in productivity came from an augmented input of low-skilled labour and could evoke a descending trend in growth. This signifies that the relative parity in economic size of the United States and the Euro Zone at this moment is improbable to remain, which will affect the role of the Euro. The United States has demographics on its side like birth rates and immigrations, which allows the United States to have a decrease in productivity growth but still keep a gap between the Euro Zone and itself. The relative size of a country's economy is important when determining the currency status and the United States will add in size relative to the Euro Zone even if it gets smaller relative to China. As Posen (2008) puts it, “ ... *we at least should not assume that saying “not yet” for the euro – or the yuan – means “no worries” for the dollar.*”⁹⁴

There are other views on how the U.S. dollar will develop as the main reserve currency. Some economists argue that the Euro will challenge the U.S. dollar as the international currency. Once before has a currency knocked the leading reserve currency from its throne. After World War II the U.S. dollar has pushed the pound sterling away, even though in 1899 the United Kingdom had more than double foreign exchange holdings than its closest competitor the mark and the franc and the U.S. dollar wasn't even close to rival. In 1940 foreign-owned liquid sterling assets were still substantially more than the U.S. dollar. However, by 1945 as the United Kingdom was borrowing a lot from the United States as a result of the war, the situation has reversed and the U.S. dollar had ascended. Nonetheless, the war was just *the icing of the cake*, as economic fundamentals seem to be the real reason why the sterling pound has been overtaken by the U.S. dollar. Starting in the late 19th century the U.S. economy has been surpassing the British economy in many ways. The size of the U.S. economy has been growing and by 1915 U.S. exports have overtaken the British, in addition to becoming net creditor instead of net debtor, whilst the United Kingdom was moving the other way.

⁹⁴ Posen (2008, pp.94-96)

If the United States can indeed not hold its position as the country with the leading international currency it will face huge setbacks. As Chinn and Frankel (2008) put it, “*we would lose the exorbitant privilege of playing banker to the world, accepting short-term deposits at low interest rates in return for long-term investments at high average rates of return.*”⁹⁵ This can cause serious difficulties for the United States as this, in addition to other bad political developments; can result in losing political and economic hegemony. What happened to the pound a few decades ago could just as well happen to the U.S. dollar, nevertheless if the Euro were to overtake the U.S. dollar then this would not happen before the year 2015.⁹⁶

Europe would then face many advantages like the ease to carry out international operations without having high exchange rate risks. The European economy would be less vulnerable to changes in the exchange rate as imports and exports are Euro-denominated. Another considerable advantage would be seignorage and its gains like low interest loans. Additionally the demand for Euros would rise as a result of international trade growth and as the demand for the Euro increases the currency would appreciate.⁹⁷

Nevertheless, when becoming the main reserve currency Europe would face many challenges and difficulties as well. As for example a rise in the demand for Euros can also oblige the Euro Zone to keep a substantial external deficit to satisfy the external demand for Euros. The Euro Zone would hence run a looser monetary policy, which would cause many conflicts within Europe, as already some members are worried about the Euros performance.⁹⁸ Thus some may suggest that becoming the main reserve currency by overtaking the United States might not be such a good idea as it not only brings advantages but many challenges.

⁹⁵ Chinn, Frankel (2008, p.69)

⁹⁶ See Chinn, Frankel (2008, pp.49-69)

⁹⁷ See Tilford (2007), 23.09.09

⁹⁸ See Tilford (2007), 23.09.09

10. Conclusion

To determine exchange rate behaviour is very hard, even when looking at past events it is difficult to determine the causes of exchange rate movements. With the help of various approaches exchange rates can be determined in theory, however the reality often looks very different, as has been experienced many times in the last decades. A crisis like this one does not make this easier as unexpected and sharp movements occur. Since this financial crisis there have been sharp movements in the global exchange rate. As for example the U.S. dollar was believed to depreciate as a process of adjustment since the financial crisis has began. However, especially since the summer of 2008, there has been an appreciation of the U.S. dollar against nearly all currencies, emerging markets and advanced economies.

As the financial crisis is still going and will for the next few years, it is hard to determine what will happen to the global exchange rate. One question remains whether these unforeseen and quick currency movements, which were experienced in the last two years are of temporary nature or if they could happen again. Nevertheless, it seems to be important to have stable current account positions to be able to deal with capital flow setbacks and keep strong foreign exchange reserves.⁹⁹

The main goal of each country and of the International Monetary Fund is to gain and keep economic stability. Bonpasse (2008) states that what the world needs is to return to a simple trade system and to get to this stage the world needs a single global currency. He argues that one currency would be the solution of the major problems the foreign exchange is facing and cannot seem to be solved. One constant problem is, as discussed in this paper, how to foresee changes in the exchange rate over time and secondly, how to precisely and consistently determine the value of one currency compared to another. A global economy should have a global currency says Volcker¹⁰⁰ as in this case big and small countries would be able to play a similar part in the global economy.

“If some spaceship captain came down from outer space and looked at the way international monetary relations are conducted, I am sure she would be very surprised ...But it would strike her as very strange to find the complete disorganization of currency markets, the recurrent currency and debt crisis, and wonder why more than one currency

⁹⁹ See Fratzscher (2009, pp.5-23)

¹⁰⁰ Paul Volcker, Chairman of the Federal Reserve (1979-1987)

was needed to conduct international trade and payments in a world that aspired to a high degree of free trade.”¹⁰¹

¹⁰¹ Mundell (2005, pp.465-466)

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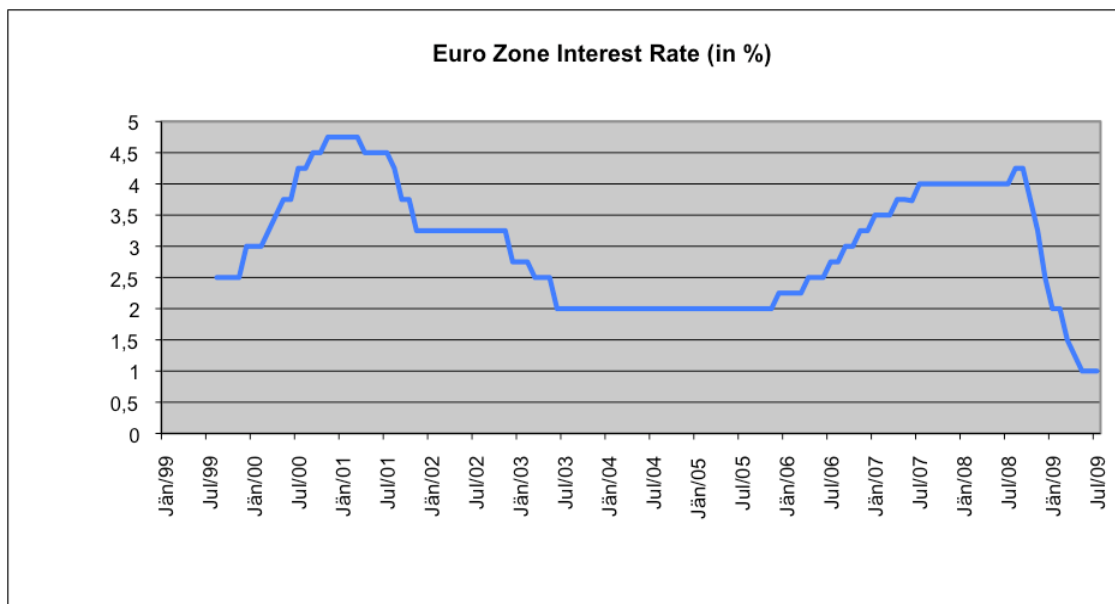
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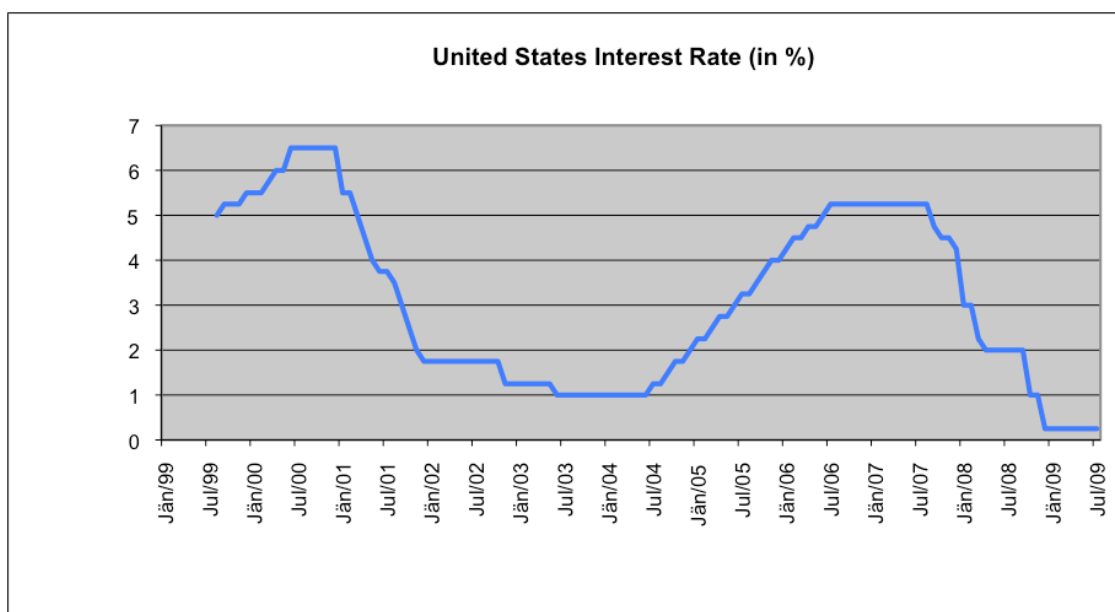
APPENDIX I

Figure 7: Euro Zone Interest Rate



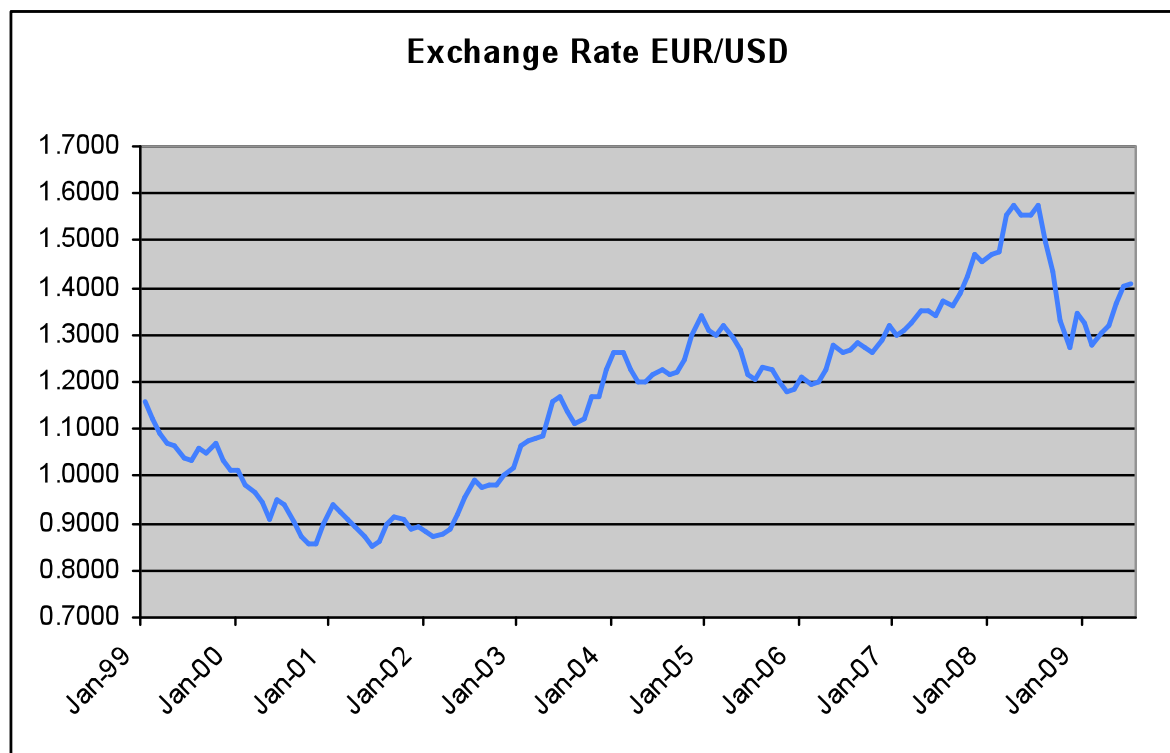
Source: Global Economic Research (10.08.09)

Figure 8: United States Interest Rate



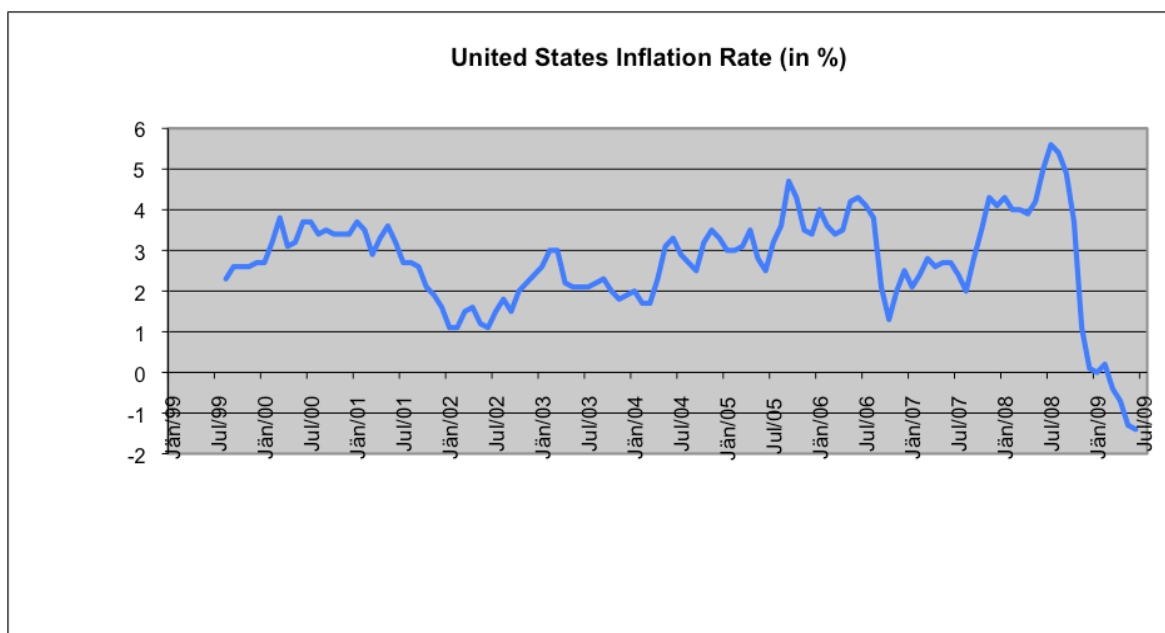
Source: Global Economic Research (10.08.09)

Figure 9: Exchange Rate USD/EUR



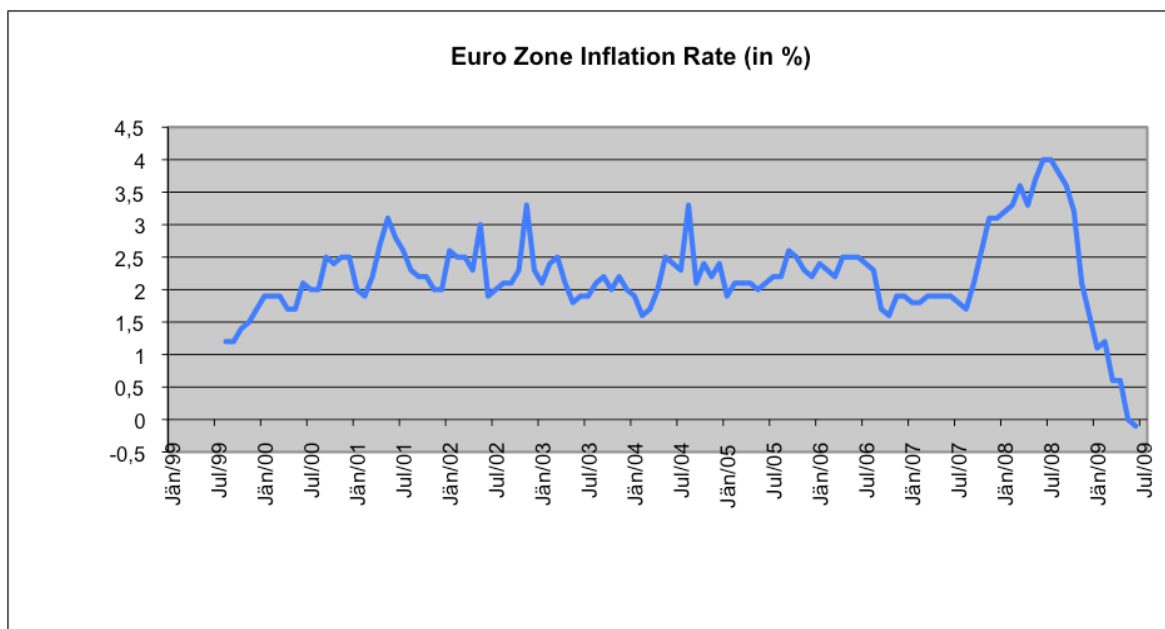
Source: European Central Bank (2009), 10.08.09

Figure 10: United States Inflation Rate (in%)



Source: Global Economic Research (10.08.09)

Figure 11: Euro Zone Inflation Rate (in%)



Source: Global Economic Research (10.08.09)

ABSTRACT

This paper presents an overview of the role of exchange rate in a global economy, as they have played a major role in our lives and are continuingly important. It looks at exchange rate movements, their causes and how they affect an economy. The main issue of this paper is to show how changes in the exchange rate can be determined and predicted. This will be clarified by looking at various theoretical approaches in addition to looking at historical events and their consequences. The Euro and U.S. dollar relation will function as a practical example of the dynamics of exchange rates by explaining their correlation followed by an estimation of their future development.

ZUSAMMENFASSUNG

Die Arbeit zeigt einen Überblick über die Rolle des Wechselkurses in einer globalen Ökonomie. Bewegungen und Änderungen des Wechselkurses, und wie diese die Wirtschaft beeinflussen, werden in dieser Arbeit besprochen. Ein genauerer Fokus wird darauf geworfen wie Bewegungen der Wechselkurse bestimmt und vorhergesehen werden können. Dabei werden theoretische Aspekte, historische Ereignisse und deren Konsequenzen berücksichtigt. Die Beziehung des Euro und U.S. dollar wird näher dargestellt und unterstützt theoretische Modelle angeführt in dieser Arbeit.

Lebenslauf

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Sep 07	KNIGHT FRANK, global property consultancy Internship in the commercial tenant representation department <ul style="list-style-type: none"> • Provide an overview of the strategic and transactional advice to businesses • Understanding the development of property strategy and commercial property transactions 	London
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