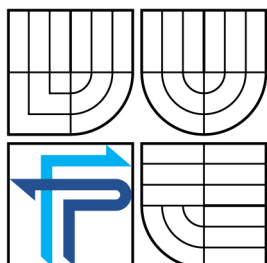# VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ
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FAKULTA PODNIKATELSKÁ
ÚSTAV EKONOMIKY

FACULTY OF BUSINESS AND MANAGEMENT
INSTITUT OF ECONOMICS

MANAGEMENT OF THE PAYMENT ABILITY OF THE COMPANY IN CONNECTION WITH THE RISKS OF FOREIGN EXCHANGE RATES
ŘÍZENÍ PLATEBNÍ SCHOPNOSTI PODNIKU V KONTEXTU EXISTENCE KURZOVÉHO RIZIKA

DIPLOMOVÁ PRÁCE
MASTER´S THESIS

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MASTER'S THESIS ASSIGNMENT

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Pursuant to Act. No. 111/1998 Coll., on Higher Education Institutions, and in accordance with the Rules for Studies and Examinations of the Brno University of Technology an Dean's Directive on Realization of Bachelor and Master Degree Programs, the director of the Institute of is submitting you a master's thesis of the following title:

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In the Czech language:

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Instruction:

Introduction
Problem definition and objectives of the work
Literature review
Analysis of the problem and current situation
Custom solution, contribution of the proposed solution
Conclusion
Bibliography
Appendixes

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Brno, 05.09.2011

Anotace

Diplomová práce se zabývá faktory ovlivňující společnosti, které podnikají na globálním trhu a jsou vystaveny rizikům, která přinášejí výkyvy ve směnných kurech. Zabývá se také prozkoumáním motod analýzy vývoje směnných kurzů a metod ochrany proti těmto rizikům.

Annotation

The aim of this Thesis is to explore factors that influence companies which conduct business on global markets in conjunction with the risks coming from foreign currency exchange rate changes. The aim is also to review methods of analysis of exchange rate development and methods that can be used for hedging against foreign exchange exposure.

Klíčová slova

Kurzové riziko, Fundamentální analýza, Technická analýza, Metody zajištění, Reflexivita, Riziko

Keywords

Exchange rate exposure, Fundamental analyses, Technical analyses, Methods of hedging exposure, Reflexivity, Risk

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Čestné prohlášení

Prohlašuji, že předložená bakalářská práce je zpracovaná samostatně na základě uvedené literatury a pod vedením vedoucího práce. Prohlašuji, že citace použitých pramenů je úplná, a že jsem v práci neporušil autorská práva (ve smyslu zákona č. 121/2000 Sb. o právu autorském a o právech souvisejících s právem autorským).

V Brně, dne 31. srpna 2011

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Table of Contents

1. Purpose and methods of the thesis

The aim of this Thesis is to explore factors that influence companies which conduct business on global markets in conjunction with the risks coming from foreign currency exchange rate changes. The aim is also to review methods of analysis and products that can be used for hedging against foreign exchange exposure.

In the theoretical part of the thesis are described both fundamental and technical methods of analysis. The concept of reflexivity in currency markets is mentioned as well to point out that analyses may help the analyst understand the tendencies or directions in which the exchange rate may develop but firm should hedge even if the analyst is certain of the future development.

Though for the practical part only fundamental methods are selected because the nature of business of the company involves mainly projects that span over time periods longer than month. The selected analyses are based on comparison through combination of GDP and PPP, Effective Exchange Rate, analyse of Balance of Payments or Trade Balance. The analyse of the Big Mac Index is examined as well. This set of methods was selected with the accessibility for cost of time and internet fees in mind.

The thesis examines main global currencies namely American Dollar - $, European Euro - € and Japanese Yen - ¥ (these currencies are usually traded in the following pairs USD/JPY, EUR/USD and EUR/JPY).Then select the suitable tactic for hedging risks connected to trading goods and services in markets where these currencies are used.

2. Theoretical Basis

Companies which are conducting business internationally are exposed to the risk of changes in exchange rates. The literature uses terms Risk and Exposure in this context interchangeably although the term Exposure really refers to the quantification of the Risk that the value of firm's asset and liabilities as well as expected cash flow or profits changes as a result of differences between home and foreign currency.

Depending on the exposure this risk might be managed and hedged so that its threats for the firm may be lowered but unfortunately it can not be removed [16].

2.1 Foreign Exchange Participants

Participants of Foreign Exchange (FOREX) may trade currencies 24 hours a day 5 days in a week.

The companies and individuals who need foreign currencies for business or travel usually exchange the currency through Commercial, Investment or Merchant Banks. The banks who actively participate in FOREX and provide liquidity to market are Credit Suisse, Bank of America, Goldman Sachs and Morgan Stanley.

The FOREX Brokers bring together banks, buyers and sellers together and receive commissions.

Investment funds and hedge funds participate on FOREX as well either explicitly through speculations on trends in market or implicitly because when they invest internationally into for example bonds, stocks or derivatives they usually need foreign currency to realize their trades.

Central Banks trade currencies because they are responsible for the monetary policy of the currency. The main central banks who intervene in FOREX and implement their monetary policies are The Federal Reserves (Fed) which is central bank of United States of America. The Bank of Canada (BOC) is central bank of Canada it sets the Canadian monetary policy. European Central Bank (ECB) is responsible for monetary policy of states under European Monetary Union. The Bank of England (BOE) is the central bank of United Kingdom of Great Britain. The Swiss National Bank (SNB) it the central bank of Switzerland and it is independent in setting monetary policy. The Bank of Japan (BOJ) is responsible for monetary policy in Japan however the Japanese Ministry of Finance (MOF) inspects the monetary policy of all other countries therefore it is considered as the main monetary maker of the Japanese market. Both Japanese and Swiss intervene in the market to assert their monetary policy. Because both Japanese and Swiss economy is strongly dependant on export they prefer weaker home currency [9].

2.2 Methods of Quotation

A foreign exchange rate is the price of one currency denominated in another currency or in a set of currencies (currency basket). It connects internal economy of the country with external surroundings and mediate influence of external economic relations to home economic processes. The exchange rate is influenced by behaviour and expectations of participants as well as by fundamental factors like balance of payments, inflationary and interest differentials, money supply or GDP growth.

When quoting currency pairs the first currency is called the base currency and the second one is referred to as counter or quote currency.

The Spot price or Spot rate is a price which is quoted for immediate settlement. Spot settlement is usually one ore two business days from the trade date.

The spot rate might be quoted as a Direct quote which represents number of units of home currency needed to buy foreign currency. For example the quote 80.380 USD/JPY says that 1 US Dollar can be exchanged for 80.38 Japanese Yen.

The spot rate can also be quoted as indirect quote which represents number of units of foreign currency needed to buy home currency. For example the quote 1.4633 EUR/USD says that 1.4633 US Dollars can be exchanged for 1 Euro.

FOREX dealers quote two prices for each currency pair. Bid price is smaller and it is a rate at which dealer or bank buys currency from customer. The Ask (or Offer) price is always higher, it is price at which dealer or bank sells currency to client. FOREX prices are generally quoted to four decimal places (with a few exceptions where the rates are high for example Japanese Yen is quoted to 3 decimal places). The last place in the quote is called "PIP" or Basis Point. It is minimum by which the rate can change.

The difference between Bid price and Ask price is called Spread. Spread is also the only margin for market makers which must cover both costs and profits. The spread differ depending on volatility and turn-over of the currency pair.

2.3 Foreign Exchange Exposure

The exposure to Foreign Exchange risk is in practice broken in to three categories:

- Transaction Exposure,
- Economic Exposure,
- Translation Exposure.

2.3.1 Transaction Exposure

The Transaction exposure is the simplest to understand and quantify. It refers to sensitivity of future transactions (payments or settlements) in foreign currency denominated in home currency for past, present and future exchange rates. [6]

In case of some assets and liabilities it is possible to anticipate that aside of spot rate effect there could be price forming effect present as well. The price forming effect may increase or decrease the FOREX exposure to the automatic market hedge. One of the examples could be bonds indexed to market interest rate or indexed to security for selected price index.

On the other hand an example of an asset with high FOREX exposure might be foreign bonds with fixed rate that are not held to maturity. In case of depreciation of home currency central bank would increase interest rates which might be followed by decrease of bond market prices which adds up to negative recalculating effect of spot rate depreciation [6].

2.3.2 Economic Exposure

Economic exposure represents sensitivity of the present value of firm's future cash flows to movements of the foreign currency. This type of exposure emerge at the time when the company signs contract for export of goods or services with fixed price. Economic exposure influence both assets, liabilities and cash flow of firm both from the home and foreign markets, because the movement in FOREX effects all companies. For example if the exporter sell goods in it's home currency the transaction exposure does not emerge, but changes in FOREX rates will have effect on the costs for the foreign consumer therefore the exporter (vendor) faces economic exposure [16]. For a wider example if the company realizes it's business in the home currency only than it is not effected by the transaction exposure at all but when the competition which imports

substitutes to the firm's product and the FOREX move in favour of the competition then the competitive position of firm changes due to economic exposure even though the company realizes business in home currency only.

2.3.3   Translation Exposure

Translation exposure which is also called accounting exposure represents sensitivity of consolidated financial statements of firms that operates in more than one country and more than one currency to changes of historically accounted records to FOREX changes.

This exposure arises when there is a requirement to translate the accounts to home currency. It is relevant to both assets and liabilities accounted in the foreign currency and depending on the used accounting method changes in FOREX rate may influence both Profit and Loss account and Balance Sheet [16].

Depending on the chosen method and overall contribution of subsidiaries to firm's profits this exposure may influence the reported earnings but there is no real cash effect with exception of rate of dividend payed at the end of the year.

3. Foreign Exchange Analysis

Foreign exchange rates connect economy of the country with the surrounding economies and at the same time mediate influence of economic relations to domestic economic processes. The foreign exchange rates are influencing financial management of state and its institutions, firms and consumers as well. The importance of foreign exchange rates rises as the economy opens to the world. Therefore the foreign exchange rate of domestic currency become along with interest rate most important economic price. The rate influence both Macroeconomic and Microeconomic values. It influences price of both inputs and outputs. The FOREX rate is also important factor in national balance of payments.

The firm which conduct its business internationally or multinational is influenced by the FOREX and depending on its partners and amount of exported or imported products it should observe changes in FOREX rates. In order to forecast and eventually hedge against changes in FOREX rates the firm's financial department should analyse the FOREX market. For forecasting the changes in FOREX rates firm may use theory of FOREX rates for instance theory of purchasing power parity, theory of interest rate parity or monetary approach that comes from economic theory and form basics of fundamental analysis. And combine it with technical analysis which is based on thought that the prognosis of the change in FOREX rate can be made by analysing historical development. Another point of view describes FOREX market as a suspect of the participant's bias and examines how reflexive forces can move the FOREX rates around the equilibrium through boom and bust cycles [6, 17].

3.1 Fundamental Analysis

Fundamental analysis is performed through several approaches which may be grouped by the different time periods when they were developed to traditional or present.

3.1.1 Traditional approaches to Fundamental analysis

Purchasing power parity (PPP) is a measure of long-term equilibrium exchange rates based on relative price levels of two countries. Theory of PPP states that the price of goods is in a long term are same in each country and therefore exchange rates change to restore purchasing power parity. During 80's there a lot of the capital was released in conjunction with the forming of EMU and EC. Similar development was present in other parts as well. With increasing amount of capital the PPP in present lose potential to explain why does FOREX rates changes the way they are. Although the development of PPP still important information for financial analysis and prediction of the FOREX rate development for these reasons:

1. In a long-term FOREX rates develop in tendency which may be defined by development of PPP and modern theories of FOREX rate developments are taking into account prices of goods as well.

2. The real exchange rate is based on the purchasing parity power and are used as indicators of appreciation or depreciation of the currency. The change in real exchange rates may indicate change in competitive power of the country on the international market. The central banks then may use this indication when deciding on the intervention in FOREX.

The **absolute** version of PPP is based on the law of one price which states that the identical good should have the same price in different countries. According to this theory prices of goods are relatively fixed and the return to equilibrium between domestic ($P_{D,\,t}$) and foreign ($P_{F,\,t}$) price levels proceeds by change in FOREX rate (SR_t) not by change in price levels. So the functional relation is implied as follows:

$$SR_t = f\left(\frac{P_{D,t}}{P_{F,t}}\right)$$

This statement is bounded by a set of assumptions that can not by met in current economy. The statement assumes free market with unlimited competition where movement of goods is not limited by any way. It also implies assumption that there is no transac-

tion cost, no taxation nor customs duty etc. The absolute version of PPP infer the FOREX rate as ratio of price levels statically as follows:

$$SR_{PPP} = \frac{\sum_{i=1}^{n} P_{D,i} \cdot Q_i}{\sum_{i=1}^{n} P_{F,i} \cdot Q_i}$$

Where SR_{PPP} - exchange rate inferred from PPP (expressed as amount of domestic currency units for one unit of foreign currency),

$\sum_{i=1}^{n} P_{D,i} \cdot Q_i$ - collection of goods Q_i expressed in domestic price $P_{D,I}$,

$\sum_{i=1}^{n} P_{D,i} \cdot Q_i$ - collection of goods Q_i expressed in domestic price $P_{F,I}$.

The application of absolute PPP may introduce different results based on the consumption baskets used in the calculation even with the different prices used. The ration between market exchange rate (SR) and rate based on PPP (SR_{PPP}) is called ERDI (Exchange Rate Deviation Index) which express de facto margin of other factors influence that determine the exchange rate:

$$ERDI = \frac{SR}{SR_{PPP}}$$

Probably the most famous ERDI is called the Big Mac Index. This index started to be publicised by The Economist in cooperation with the Mc Donald's corporation form 1986 and popularized the PPP. This index is useful because it reflects the set of costs conjuncted with production of one Big Mac which is standardised product and it's price must include cost of various parts of economy, such as life stock production, transport, marketing, management or facility maintenance. Big Mac also can not be kept fresh for a long time once it is finished so it is hard to use it for price arbitrage.

The **relative** version of PPP (known also as comparative) express the dynamic view on exchange rate. It does not use the price basket but perceptual change of prices in selected period, expressed as price indexes. It states that the new Equilibrium is adjusted to the inflationary differential. It means that the relative change in balance of exchange rate correspond to the change in inflation rate in different countries:

$$SR_{E,t} = SR_{E,t-n} \cdot \frac{1 + P_{D(t-n,t)}}{1 + P_{F(t-n,t)}}$$

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where $SR_{E,t-n}$ - balanced exchange rate in previous period *t-n*,

   $SR_{E,t}$ - balanced exchange rate in period *n*,

   $P_{D(t-n,t)}$ - rate of inflation in domestic country for period from *t-n* to *t*,

   $P_{D(t-n,t)}$ - rate of inflation in foreign country for period from *t-n* to *t*.

Domestic government may use different tools to improve competitive power of domestic goods in both domestic and foreign markets. These tools may improve export and affect exchange rates and improve balance of national accounts in a long run but by using these tools changes the nominal exchange rate which may no longer be naturally formed. The following table shows influence of these factors [6].

Factor	Demand for Currency	Supply of Currency	Market exchange rate	Purchasing power parity
Import duties	Decrease	Slight decrease	Appreciation	Depreciation
Import quotas	Decrease		Appreciation	Depreciation
For export tools		Increase	Appreciation	Depreciation

Table 1: Infulence of fiscal tools on market exchange rate and calculation using PPP
Source: Durčáková and Mendel, 2010, p.89

Parity of interest rate and interest rate differential

After the fall of Brettonwood's system that released exchange rates floating and after liberalization of capital movement in nineteen-seventies. The appreciation and depreciation of currencies started to gain momentum. For instance between 1980 and 1985 the american dollar gained 30% against Japanese yen and even 76% against German mark even though the rate of inflation was greater in USA than in Japan or Germany.

The parity of interest rates is similarly to purchasing parity power based on thesis that if there is a free movement of capital then investors will pursue to have the same gainings from their assets denominated in any currency. Similarly cost of borrowed capital should be same in different countries.

The parity of interest rate exist in two basic forms. As **uncovered** interest rate parity and **covered** interest rate parity[6].

The uncovered interest rate parity

The uncovered interest rate parity is called uncovered because in its calculation the expected future spot rate is simply not closed on the market (using futures or other derivatives) therefore it is uncovered.

For uncovered interest rate parity is investors decision process influenced by two factors:

1. difference between domestic interest rate (IR_D) and foreign interest rate (IR_F),
2. difference between expected spot rate in time of maturity (SR^e) and current spot rate (SR).

The market is in equilibrium based on uncovered interest rate parity if the following equation is true:

$$SR \cdot (1 + IR_D) = (1 + IR_F) \cdot SR^e$$

Prerequisite of the uncovered interest rate parity states that the expected change in exchange rate should approximately correspond to the interest rate differential. In that case the market is in balance or "two way" so there is no need for investors to prefer one or the other investment. The uncovered interest rate parity equation with assumption of lower foreign interest rate, "$(1+IR_F) \rightarrow 1$" may be arranged the following way:

$$\frac{SR^e - SR}{SR} = \frac{(1 = IR_D) - (1 = IR_F)}{1 = IR_F}$$

$$sr^e = \frac{SR^e - SR}{SR} = IR_D - IR_F$$

where sr^e – expected relative change in spot rate.

The uncovered interest rate parity is prerequisite of balance in exchange market for analyst. Similarly to the law of one price it does not concretely indicate how does the market return to equilibrium. One can also question whether interest rates adapt faster than exchange rates. The theory of interest rate parity expect that the exchange rates adapt faster therefore we may modify the uncovered interest rate parity into the functional relation:

$$SR_t = f \left[E_t(SR_{t+n}) \cdot \frac{1 + IR_{F(t, t+n)}}{1 + IR_{D(t, t+n)}} \right]$$

The spot rate in time $t(SR_t)$ depends on the expected value of the spot rate for time $t=n[E_t(SR_{t+n})]$ and also on domestic ($IR_{D(t,t+n)}$) and foreign ($IR_{F(t,t+n)}$) interest rate.

According to this relation the increase in domestic interest rate lead to appreciation of domestic currency and increase in foreign interest rate lead to depreciation of domestic currency. This is caused by the movement of capital which is induced by the change in interest rates [6].

The theory of interest rate parity in its original version assumes that the domestic and foreign assets are perfect substitutes and therefore doesn't include risk premium.

Fisher international effect and its relation to uncovered interest rate parity

The development of nominal interest rate should not be the only criteria when deciding where the investor should put the assets. The real gains should be taken to account so the calculation of real interest rate should include also effect of inflation. The term real interest rate is connected to so called Fisher effect. According to Fisher the nominal interest rate (IR) is a combination of the real interest rate (RIR) and the expected rate of inflation [E(p)]:

$$IR_{t,t+n} = RIR_{t,t+n} + E_t(p_{t,t+n})$$

If the real interest rates are stable then changes in nominal interest rates are connected to expected rate of inflation.

The international application of this approach is known as International Fisher Effect. The base of this approach states that the nominal interest rate differential of two countries is given by sum of differential of real interest rates and differential of inflation expectations.

$$IR_{D(t,t+n)} - IR_{F(t,t+n)} = [RIR_{D(t,t+n)} + E_t(p_{D(t,t+n)})] - [RIR_{F(t,t+n)} + E_t(p_{F(t,t+n)})] =$$
$$= (RIR_{D(t,t+n)} - RIR_{F(t,t+n)}) + [E_t(p_{D(t,t+n)}) - E_t(p_{F(t,t+n)})]$$

According to Fisher's statement the real interest rate in long-term is stable and same in all countries ($RIR_D = RIR_F$). The fluctuation of nominal interest rates is therefore given by changes in the inflation expectations. The application of Fisher effect to two countries implies that interest rate differential express different expectation for inflation on different countries:

$$IR_{D(t,t+n)} - IR_{F(t,t+n)} = E_t(p_{D(t,t+n)}) - E_t(p_{F(t,t+n)})$$

That is very important for the theory of determination of exchange rates. If the relative version of interest rate parity would be applied to expected values then

$$E_t\left(sr_{t,t+n}\right) = E_t\left(p_{D(t,t+n)}\right) - E_t\left(p_{F(t,t+n)}\right)$$

Expected relative change in spot rate is determined by the differential of expected inflation. If at the same time it is true that according to Fisher effect applied for two countries is interest rate differential given by differential of expected inflation rate then it is also true that

$$E_t\left(sr_{t,t+n}\right) = IR_{D(t,t+n)} - IR_{F(t,t+n)}$$

The synthesis of relative version of purchasing power parity and Fisher effect creates International Fisher Effect [6].

Covered interest rate parity

When the firm takes into account some method for heading against the exposure to exchange rate risk through some form of term contract (for instance forward contract) then the firm would work with covered interest rate parity. The firm must decide in which currency it should hold its asset and there will come two factor into the decision process:

1. difference between domestic (IR_D) and foreign (IR_F) interest rate,
2. difference between forward exchange rate (FR) and current spot rate.

The requirement of the equation for covered interest rate parity states that the relative difference between forward exchange rate and spot rate should approximately correspond to the interest rate differential. In the direct quotation is the relative difference between forward exchange rate and spot rate is called discount (term premium), it is marked with the symbol " f ". The relation between discount and interest rate can be inferred the following way with the assumption of the low foreign interest rate $(1 + IR_F) \rightarrow 1$:

$$SR \cdot \left(1 + IR_D\right) = \left(1 + IR_F\right) \cdot FR$$

$$\frac{FR - SR}{SR} = \frac{\left(1 + IR_D\right) - \left(1 + IR_F\right)}{1 + IR_F}$$

$$f = \frac{FR - SR}{SR} = IR_D - IR_F$$

The connection between expected spot rate, expected inflation differential and interest differential is now extended with the discount. This may show the connected model of the international finances.

The equilibrium in the model arises when the interest differential correspond with both:

- Discount
- Difference between expected inflation rates
- Expected relative change in spot rate

This model presumes that there is a free movement of capital and goods but also exchange rates [6]. Use of this model in exchange rate systems with restrictions for exchange rate float is limited. Although theory assumes that event in the systems with restrictions the system of international finance will tend to equilibrium in a long-term.

3.1.2   The main theories of the present fundamental analysis

The currency, economic and political conditions in which the exchange rates are formed develop through the time as well as the theory of exchange rates. For example in nineteen-seventies when central banks of developed countries started to focus on targeting money supply (aggregates M1, M2 etc.) the new monetary models emerged to help forecast changes in exchange rates in conjunction with the rate of growth of money aggregates [6]. Changes in currency and economic conditions gave an impulse for forming new theories which are focused on:

*   forming overall supply and demand for foreign currency on FOREX they found significant both flow of goods and capital,
*   differentiating and at the same time combine static and flow perspectives,
*   differentiating long-term (balanced) and short-term (imbalanced) periods for determination of the exchange rates,
*   respect expectation as an important aspect for determination of the exchange rates,
*   observing influence of fiscal and monetary policy,
*   emphasizing real changes in exchange rate not merely nominal changes.

3.1.2.1   Approach based on balance of payments and effect of international indebtedness

The approach represented by the theory of balanced payments is based on thesis that the exchange rate depends on the turn-over of the goods and services between countries but also on the development of balance of payments which a part from exchange of goods and services includes movement of capital and debt as well. The change in exchange rate is according to theory of balance of payments function of balance of payments accounts which express the relation between supply and demand for currency on FOREX:

$$sr = f\left(BOP\right)$$

If the balance of payments account of the country is active then demand for currency of that country rises in FOREX so the exchange rate appreciates. On the other hand if the

balance of payments account is passive then the country increases its demand for foreign currencies and the exchange rate of this country depreciates.

Analysts are usually focusing on analysis of the current account balance. If the balance of current account is in deficit then they focus on how is this deficit financed (by inflow of straight investments, inflow of debt or decrease of foreign currency reserves).

The theory of balance of payments is typical flow perspective because it takes into account flow of goods, services and capital and its effect on supply and demand for currency. This approach sometimes tend to bear distorted information on the future development of exchange rates. The reason for this distortion is that even with relatively high deficit of balance of payment accounts does not have to lead to depreciation of currency when the foreign debt is relatively low. Therefor the analyst who uses balance of payments must confront this flow approach with static approach. That means observe the static information on the balance of payments accounts and analyse whether international subject will willing to credit the country with deficit on balance of payments account.

For practical point of view it is necessary to focus on economic indicators where market subjects react sensitively on negative development of these indicators [6].

From flow indicators it is namely ratio of BOP in GDP which should not be lower than -7%. From static indicators it is ratio of gross foreign debt in GDP be more than 40%. Although these values are theoretically questionable their psychological importance is significant.

3.1.2.2 Monetary approach to exchange rates and the new view on the influence of interest rates and real national income

In nineteen-seventies with the accession of monetarism new monetary models arose. Central banks started to specify their monetary targets in a form of money aggregate rates of growth. For this reason the central bankers and exchange rate analysts started to take interest in the effect that higher or lower rate of growth of money supply may have on the exchange rates. The most basic monetary model for long-term with flexible prices is based on two prerequisites:

1. The development of the price levels in different countries reflects development of the money supply (M^S) transactional demand for money L(Y) and speculative

demand for money L(IR) in these countries. From the equation of exchange the real money supply must be equal to the real money demand:

$$\frac{M^S}{P} = L(Y, IR)$$

It is true that the transactional demand for money grows with the growth of real GDP (Y) and the speculative demand for money decline with the growth of interest rate (IR). People and firms demand more money if there is a greater supply of the goods and services on the market. People and firms demand less money if the interest rates grows because the market price of bonds and securities is falling and people prefer them over holding the money. For the following expression of the monetary approach to exchange rate is important to understand that the price level is given by the ratio of money supply and money demand:

$$P = \frac{M^S}{L(Y, IR)}$$

2. The ratio of price levels P in two countries (For example Japan and USA) is according to absolute version of purchasing power parity closely related to exchange rate of those two countries:

$$SR = \frac{P_{JPN}}{P_{USA}}$$

After installing price levels into the equation for absolute version of purchasing power parity we get:

$$SR = \frac{M^S_{JPN}}{M^S_{USA}} = \frac{L_{USA}(Y_{USA}, IR_{USA})}{L_{JPN}(Y_{JPN}, IR_{JPN})}$$

The following conclusions might be made regarding monetary approach to determining exchange rate of Japanese yen:

1. The yen depreciates when the supply of money grows faster in Japan than in USA, ceteris paribus. The excess of money supply will be seeking the import of goods, services and financial assets in USA.

2. The yen depreciates when the real GDP of Japan grows faster than real GDP of USA, ceteris paribus. The faster growth of transactional demand for money in Japan and generation of excess of demand for money over supply of money in

Japan will lead to decrease of import from USA and eventually to increase of export to USA.

3. The growth of interest rates in Japan with unchanged interest rates in USA will lead to depreciation of yen. Because the growth of interest rates will lead to decrease in speculative demand for yen and also to excess of money supply over money demand in Japan.

On monetary model which belongs to static models (money as a asset kind are statical value) can be documented the difference between statical and flow models. When assessing influence of interest rates and national income on exchange rate the flow models like BOP implies following:

- Growth of domestic interest rates lead to increase of foreign capital inflow which increases supply of foreign currency and that lead to appreciation of domestic currency.

- Growth of domestic national income lead to increase of domestic import which increases demand for foreign currency and that leads to depreciation of domestic currency.

On the other hand static monetary approach implies following:

- Growth of domestic interest rates lead to decrease of speculative demand for money which increases import of foreign assets and that leads to depreciation of domestic currency.

- Growth of domestic national income lead to increase of transactional demand for money which decreases import of foreign assets and that leads to appreciation of domestic currency.

The approach which better describes the real processes depends on which transmissive channel is stronger

Role of expectations, long-term and short-term determinants of exchange rate

The role of expectations is part of the theory of effective markets which is works with the model based on assets market. Determining exchange rates based on theory of effective markets and theory of asset market constructed Mussa [15]. He consider the spot rate as the reflection of the best market evaluation of what will feasibly happened with the exchange rate in the future. Basis of this approach to determining exchange rate

is that the currencies are considered as specific assets which enables purchase of financial or real assets in the concrete country.

This approach conjunct two hypothesis:

1. The fist states that the spot rate reflects the interest of subject in to holding assets that were produced or emitted in discrete countries and are denominated in the corresponding national currency. The preference of some assets over others then depends on the earning capacity of the asset in future.

2. The second states that what is expected is becoming reality from the inception of that expectation. The current values of the spot rates therefore reflects future expectations of the spot rate development.These expectations might be formed on the basis of public or nonpublic information.

The current spot rate SR_t depends on comparison of the expected earning capacity of domestic assets $E_t(R_{D,\,t+n})$ and expected earning capacity of foreign assets $E_t(R_{F,\,t+n})$:

$$SR_t = f\left[E_t\left(SR_{t+n}\right)\cdot\frac{1+E_t\left(R_{F,t+n}\right)}{1+E_t\left(R_{D,t+n}\right)}\right]$$

The theory of effective markets is evolving thoughts of uncovered interest rate parity where are know interest rates for different options of asset maturity. In many cases traditional approach over the uncovered interest rate parity can not explain changes in exchange rates if the yield curves are know and are the same. Theory of effective markets evolves the view by expected yield rate for unlimited number of financial and real assets (Stocks, real estate, art, raw materials etc.). The appreciation may be therefore caused be the expectation on the market that for example prices of real estate will rise or that prices of some specific group of Stocks will rise.

The theory of effective markets takes into consideration three basic forms of market effectivity – weak form of effectivity, medium strength of effectivity and strong effectivity.

The weak form of effectivity does not expect any rational market expectations because spot rates includes only information that can be obtained by technical analyses. The market subjects are able to systematically process only information that are carried by time series about historical development of the spot rates. Where there is weak form of effectivity in the market there fundamental analysis may contribute to extraordinary profits. The technical analysis can not bring extraordinary profits if other market

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subjects are systematically processing the data from the market. In the case that market subjects would stop using technical analysis the market would become ineffective and the technical analysis on the single participant level would become effective.

The medium strength form of effectivity expect full rationality of market expectations because spot rates reflect information that could be obtained from both technical analysis and fundamental analysis. The market subject are able to process all available public information through technical and fundamental analysis. In this form of market effectivity neither the technical nor fundamental analysis can bring extraordinary profits [6].

The strong form of market effectivity expect that spot rates reflect even non-public information. This form of effectivity would indicate "leak" of non-public information (for example from central bank). It could be internal information about change in interest rates, change in inflation target or interventional strategy of central bank.

Short-term and long-term determinants of exchange rates

The model of asset market uses F. S. Mishkin [14] as well. First he analyses factors that influence behaviour of exchange rate in long term. It is mostly price of custom duty, productivity of labour, product innovations and consumer preferences. Influence of these factors is summed up in the following table.

Factor	Change in exchange rate
Increase in domestic price levels	Depreciation
Imposition of import duty	Appreciation
Preference of foreign consumption	Depreciation
Increase in labour productivity	Appreciation
Lagging in product innovation	Depreciation

Table 2: Long-term determinants of exchange rate change, Source: Durčáková and Mendel, 2010, p. 119

Dominant short-term determinants of exchange rates behaviour are according to F. S. Mishkin are holding of domestic financial assets in connection to holding of financial assets of other country. Resulted holding of financial assets in one or other currency is given by their respective supply and demand.

Mishkin investigated the real interest rates across countries in the nineteen-eighties and found about the american supply and demand of money this.

He considered the supply of dollar financial assets to be more or less stable with close connection to the assets of US economy and found that it changes in time very slowly.

The main factors that influence short-term demand for domestic assets to domestic and foreign investors are interest differential, exchange rate at the time and expected future exchange rate.

Factors that influence the movement of demand curve of domestic assets are summed up in the following table.

Factor	Change in demand
Increase in domestic interest rate	Increase
Increase in foreign interest rate	Decrease
Expected increase of prices of domestic bonds	Increase
Expected increase of prices of foreign bonds	Decrease
Expected appreciation of domestic currency	Increase

Table 3: Factors which influence movement of demand curve of domestic assets, Source: Durčáková and Mendel, 2010, p. 119

On the basis of the factors that influence demand for financial assets which he regard as main moving force that influence changes in exchange rates and long-term factors that influence supply of assets (including money) he concludes that changes of balanced exchange rates can be invoked by:

- changes of interest rates where he differentiates:

   - change of nominal interest rate which is invoked by the change of real interest rate which has effect in direction of appreciation of currency,

   - change of nominal interest rate which is invoked by change of the expected inflation which has effect in direction of depreciation of currency;

- change in rate of growth of money supply where faster growth has effect in direction of depreciation of domestic currency by higher rate of inflation in

comparison of domestic and foreign economy or by decrease in domestic interest rate.

His approach is synthetic. Prices and from them deduced purchasing power parity he perceive as one (but not only one) of the determinants for long-term. He analyses also determinants that influence exchange rate in short-term and he emphasises influence of the expectation of investors as important element for determination of exchange rate on short-term.

3.2   Technical Analysis

The technical analyses has been popularized since nineteen-seventies. In contrast to fundamental analyses it does not analyse the influence of macroeconomic variables to movements of exchange rates. Instead it aim to infer the movement of exchange rate by studying its historical development. Some technical analysts even believe that fundamental analysis is not necessary for them because the historical development of the exchange rate includes information about the underlaying fundamental factors.

From the point of view of fundamental analysts the technical analyses is not based on economic theory therefore it is not thought of as "scientific" economic method.

Technical analysts work with chart representation of historical development of exchange rate where by analysing various patterns they estimate the future development of exchange rate. Or they may use combination mathematical and statistical methods to where they decide for example on the relation between development of exchange rate and moving averages.

To defend the technical analyses it should be said that for its inception and development contributed fundamental analysis by its unreliability and some times theoretical ambiguity. Fundamental analyses is also oriented more on long-term or mid-term and let the market participant in some sort of uncertainty for short-term.

Technical analyses provide some sort of support point for the short-term decision for participants.

The imperfection of fundamental prognosis are based in at least three reasons:

- Usually the prognosis of exchange rate development is done by using some other macroeconomic variables (interest, inflation, balance of payments, real GDP growth, money supply, balance of national budget). Success of most of fundamental prognosis is conditioned by fulfilment of prognosis of exogenous variables development.
- Influence of many macroeconomic variables development on development of exchange rate might be ambiguous. Growth of one explaining variable might theoretically lead to both appreciation and depreciation (for instance different conclusions of monetary approach and earlier inceptions of influence of interest, real growth and growth of prices to exchange rates). It is questionable which transitive channel is stronger.

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- Parameters of exchange rate sensitivity to macroeconomic variables are unstable from various and not every time known beforehand. Frequent structural changes in transitive economies (for example change in amount and structure of direct investment, change in indebtedness of households, change in structure of assets of firms and households, change in tax system or change in system of retirement) lead to change in various economic parameters.

On the other hand, technical analyses have limited use for mid-term and long-term. Therefore portfolio managers who need to diversify risk are using fundamental analyses .

3.2.1 Basic concepts of technical analysis

The most basic form of technical analyses is based on purely analysing chart graphically which is some times called chartism. Analyst is basically looking for patterns that either support trend of previous development or indicates the change in trend (for example head and shoulders, double hill, table, reverted table).

The more advanced form of technical analyses is based on mathematical and statistical methods. Although the methods used are scientific it does not promote technical analysis to scientific method.

As a connection between classical graphical method and more advanced mathematical and statistical methods are special bar charts that carry information about open, close, highest and lowest position of the set period.
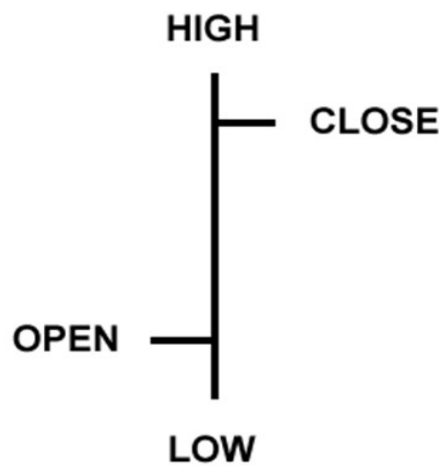
Illustration 1: Bar Chart legend, Source: www.babypips.com
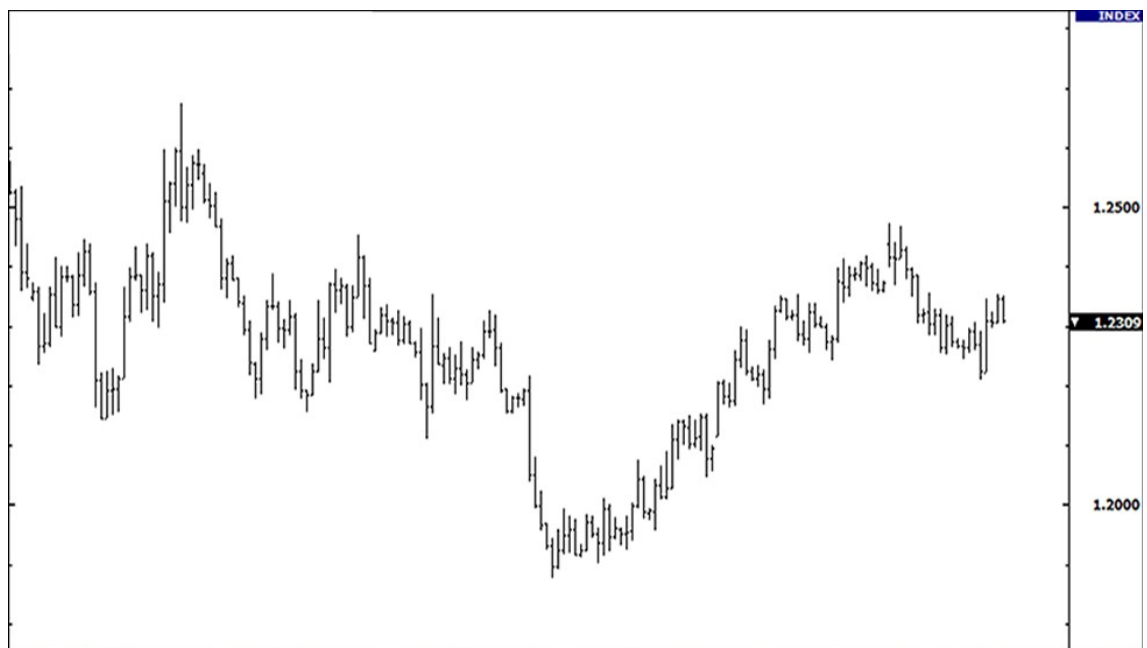

Illustration 2: Bar chart, Source: www.babypips.com

In the trading software analyst may also use similar version of this chart called Japanese candlesticks.
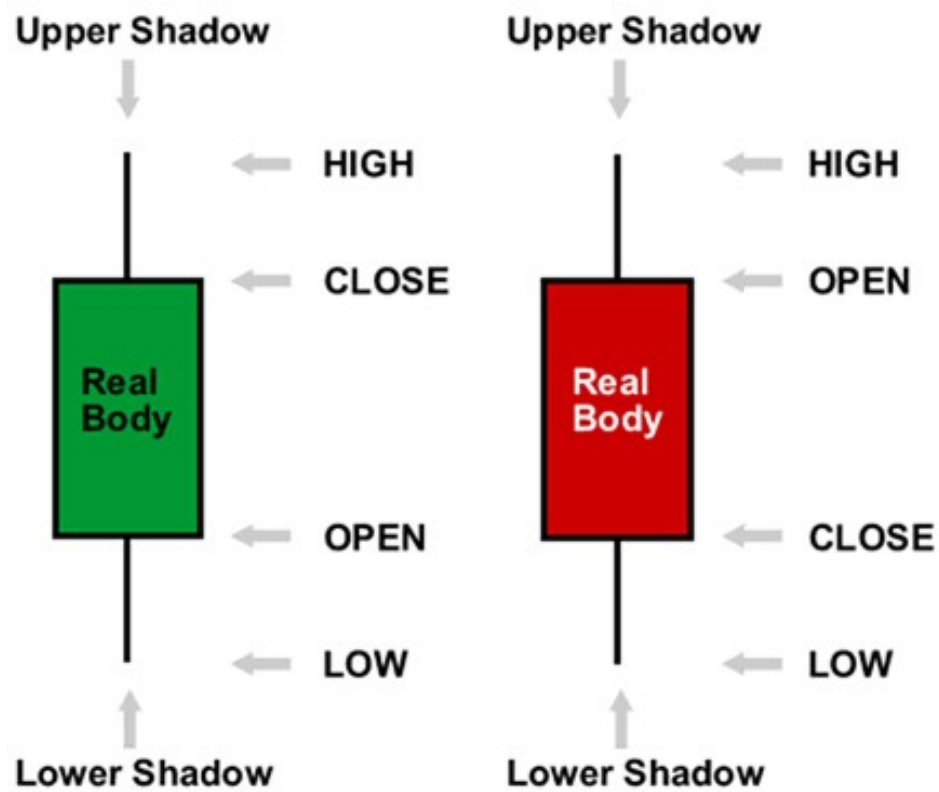
Illustration 3: Japanese Candlestics Chart Legend, Source: www.babypips.com

Illustration 4: Japanese Candlestics chart, Source: www.babypips.com

These charts provide possibility to construct even basic trend lines. Meaning of the word "trend" is in the context of technical analysis a bit different than in context of fundamental analysis. Instead of examining change in prices over the term of years in context of technical analysis the changes in movements are examined on the matter of weeks, days and even shorter periods. The growing trend which is also called **bullish trend** arises when the lowest values of observed period are growing. The opposite trend is called **bearish trend**. The crossing of trend line in following observed period may indicate change in trend. But it may just indicate extension of oscillation as well. Each previous movement of exchange rate may have two opposite explanation which is the primary issue of any type of technical analysis. Technical analyses identify one other trend aside from bearish and bullish trends. This trend is called side trend and it identify periods where exchange rate stays fairly same. So with slight oscillations exchange rate stays for some time at the bottom or at the top [6].

The trend analyses is usually combined with analyses of volume, which may indicate whether the the market is strong or weak. Even from supply and demand analyses it is known that market is not defined just by price but by volume of trade as well. On the basis of volume of trade the analyst may consider how liquid the market is and how much does opening the position (for example with greater amount of currency) may influence the price. For this purpose there is an indicator of daily amount buy and sells which is actually called "Volume". Technical analyst speaks about strong market if the appreciation is in conjunction with the growth in volume of trade. Also about weak market when the depreciation is in conjunction with decline in volume of trade. The supply and demand analysis implies that (with normal incline of supply and demand curve) for strong market must growth of exchange rate (appreciation of currency) be invoked by growth of demand for currency (not by decline in supply of currency). On the other hand the decline in exchange rate (depreciation of currency) must be invoked by decline in demand (not by crease of currency supply) [6].

3.2.2 Technical analysis based on mathematical and statistical methods
The mathematical and statistical methods are used mainly to give the trader impulse to either sell or buy and buy opening short or long position to speculate on future movement of the exchange rate. The optimal time arises when the function is at the spot

of local minimum or local maximum at lowest or highest point of the curve that represent's historical data about exchange rate development. These spots are hard to identify in the real time so usually the point of method is to wait for a while to confirm the last minimum or maximum. One of the methods used for such identification is setting up of filter.

The **filter** set for example to 3% gives order to open the long position when the spot rate is 3% over the previous minimal value of the exchange rate. At the same time the filter will give the order to open short position when the spot rate is at 3% under the last maximal exchange rate. Setting the filter closer to zero may open positions that will not eventually confirm them self but setting too high filter may on the other hand give signal to open the position too late and consequently miss opportunities to make a profit. On the currency pairs with higher spread the too coarse filter may even cause losses [6].

Moving averages are also popular tools of technical analyses that gives signals for opening speculative positions. Statistics provide a set of different sorts of moving averages. In the simple moving arithmetical average (SR_{SMA}) each controlled variable has the same weight:

$$SR_{SMA} = \frac{SR_t + SR_{t-1} + SR_{t-2} + ... + SR_{t-n}}{n+1}$$

In exponential (weighted) moving average (SR_{EMA}) the weights are decreasing with raising delay of controlled variables:

$$SR_{EMA} = SR_t \cdot \lambda^0 + SR_{t-1} \cdot \lambda^1 + SR_{t-2} \cdot \lambda^2 + ... + SR_{t-n} \cdot \lambda^n$$

where $0 < \lambda < 1$.

Exponential moving average gives more weight to the controlled variables that are closer to present. The use of exponential moving average is therefor more logical. Because the influence of older exchange rate should probably be lower than of the newer ones. The exponential moving averages are usually combined in the chart. For example short-term exponential moving averages (usually 5 to 10 days) with longer term exponential average (usually 15 to 20 days). The most common is combination of 5 day with 20 day exponential moving average. If the short-term exponential moving average crosses the long-term moving average from bottom up then it is signal for

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opening long position because the base currency depreciates. Theoretically it is possible to use the curve of spot rate development in combination with long-term exponential moving average but with the risk that the higher oscillation in spot rate will give the false signals [6].

Bollinger bands devised by J. Bollinger at the beginning of nineteen-eighties and publicised in the book Bollinger on Bollinger Bands [4] is another popular tool of technical analyses. The mathematical and statistical base of Bollinger Bands is also moving average of the spot rate development which should capture the main trend adjusted for short-term and random influences. Observation of moving average is appended by calculation of historic volatility of spot rate based on standard deviation. The values of standard deviation help mark out ranges of oscillation abound the moving average and expected volatility of the exchange rate. The higher range of oscillation is given by value of moving average plus set multiplication of standard deviation value. The lower range of oscillation is given by value of moving average minus set multiplication of standard deviation value. If the real movement of the base is close to the lower range of oscillation than it could be expected that the base is near its appreciation maximum and that the counter currency will get technical support from the market. At this point the appreciation of counter currency is expected and therefore the counter currency may be bought. Questionable is whether it is wise to by right from the point where technical support is expected or whether to wait for trend to confirm it self.

Illustration 5: Bollinger Bands, Source: babypips.com

The exchange rate may also move under the Bollinger Bond and the change in trend may be signalized by moving through the Bond from bottom up [6].

3.3   Theory of Reflexivity and the Currency Market

George Soros introduces concept of reflexivity in his book The Alchemy of Finance [17] where he argues that when analysing the financial markets the analyst should take into account that there are thinking participants of which introduces a some degree of uncertainty based in the biases coming from the fact the each participant can not be fully informed of the situation on the market and by acting in the course of the bias the participant starts to be one of the variables that influence the situation in the market it self.

Soros describes the concept of reflexivity simply. *"In situation that have thinking participants, there is two-way interaction between the participants' thinking and the situation in which they participate. On the one hand, participants seek to understand the reality; on the other, they seek to bring about the desired outcome. The two functions work in opposite directions: in the cognitive function the reality is give; in the participating function, the participants' understanding is the constant. The two functions can interfere with each other by rendering what is supposed to be given, contingent. He call the interference between the two functions "reflexivity". He envisions the reflexivity as a feedback loop between the participants' understanding and the situation in which they participate, and he content that the concept of reflexivity is crucial to understanding situations that have thinking participants. Reflexivity renders the participants' understanding imperfect and ensures that their actions will have unintended consequences."* [1]

The traditionally the currency market is viewed as that it has tendency to restore equilibrium. An overvalued exchange rate encourages imports and discourages exports until. Similarly, an improvement in competitive position is reflected in an appreciating exchange rate that reduces the trade surplus so that equilibrium is again reestablished. Speculation cannot disrupt the trend toward equilibrium because if speculators anticipate the future correctly then they accelerate the trend and if they misjudge it then they will be penalized by the underlying trend that may be delayed but will inexorably assert itself.

Though experience since floating exchange rates were introduced in 1973 has disproved this view. Instead of fundamentals determining exchange rates, exchange rates have

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1   [17]The Alchemy of Finance page 2

found a way of influencing the fundamentals. For example, a strong exchange rate discourages inflation: wages remain stable and the price of imports falls. When exports have a large import component, a country can remain competitive almost indefinitely in spite of a steady appreciation of its currency, as Germany demonstrated in the 1970s.

The fact is that the relationship between the domestic inflation rate and the international exchange rate is not unidirectional but circular. Changes in one may precede changes in the other, but it does not make sense to describe one as the cause and the other as the effect because they mutually reinforce each other. It is more appropriate to speak of a vicious circle in which the currency depreciates and inflation accelerates or of a benign circle where the opposite happens.

Vicious and benign circles are a far cry from equilibrium. Nevertheless, they could produce a state of affairs akin to equilibrium if the reflexive, mutually self-reinforcing relationship could be sustained indefinitely. But that is not the case. The self-reinforcing process tends to become more vulnerable the longer it lasts and eventually it is bound to reverse itself, setting in motion a self-reinforcing process in the opposite direction. A complete cycle is characterized by wide fluctuations not only in the exchange rate but also in interest rates, inflation, and/or the level of economic activity.

The participants' bias introduces an element of instability into the system. If the system had an innate tendency toward equilibrium the participants' bias could not disrupt it; at worst, it could introduce some random, short-term fluctuations. But when the causal connections are reflexive, the participants' bias may engender, sustain, or destroy a vicious or benign circle. Moreover, the prevailing bias takes on a life of its own as one of the constituent parts in a circular relationship. It finds expression in speculative capital movements that may serve as a counterweight to an imbalance in trade, allowing a trade surplus or deficit to exceed, both in size and in duration, the level that could have been sustained in its absence. When that happens speculation becomes a destabilizing influence.

International capital movements tend to follow a self-reinforcing/self-defeating pattern similar to the one we identified in the stock market. But the model we used for stock price movements cannot be applied to currency markets without substantial modifications. In the stock market we focused on the reflexive relationship between two variables: stock prices and a single underlying trend. We were trying to build the simplest

possible model and we were willing to simplify a much more complex reality to serve our purpose. In the currency market we cannot get by with two variables; even the simplest model will need seven or eight. We have selected four rates and four quantities, namely:

e nominal exchange rate (number of foreign currency units for one domestic currency unit; ↑ e = strengthening)

i nominal interest rate

p domestic versus foreign price level (↑ p = increase in domestic prices faster than in foreign prices and vice versa)

v level of economic activity

N non-speculative capital flow - ↑ = increased outflow, ↓ = increased inflow

S speculative capital flow   - ↑ = increased outflow, ↓ = increased inflow

T trade balance   - ↑ = surplus, ↓ = deficit

B government budget   - ↑ = surplus, ↓ = deficit

Our task is to establish how these variables relate to each other. We shall not attempt to explore all the relationships but only those that are necessary to build simple models. In other words, we are not aiming at a general theory, only at a partial explanation of currency movements. Our focus is the exchange rate and we bring in the other variables only when we need them. We shall not quantify any of the variables but only indicate direction (↑ , ↓) or order of magnitude (>,<).

Before we start, two general observations can be made. One is that relationships tend to be circular; that is, variables can serve as both cause and effect in relation to other variables. We shall denote the causal connection by a horizontal arrow (→). The other point is that the relationship of the variables need not be internally consistent; it is the inconsistencies that make that entire situation move in a certain direction, creating vicious or benign circles. Equilibrium would require internal consistency; historical change does not. Describing historical change in terms of vicious and benign circles is, of course, merely a figure of speech. A circular movement between component parts when the entire system is in motion could also be described as a spiral. Moreover, what is benign and what is vicious are in the eye of the beholder.

Exchange rates are determined by the demand and supply of currencies. For present purposes, we can group the various factors that constitute demand and supply under

three headings: trade, non-speculative capital transactions, and speculative capital transactions. This gives us the simplest model of a freely floating exchange rate system:

$$(\downarrow T + \uparrow N + \uparrow S) \rightarrow \downarrow e$$

In other words, the sum of the currency transactions under the three headings determines the direction of the exchange rate.

Our primary interest is in investigating the role that the participants' bias plays in exchange rate movements. To facilitate the investigation, we shall assume that the bias finds expression only in speculative capital transactions (S), while trade (T) and non-speculative capital flows (N) are independent of expectations: they constitute the "fundamentals." In reality, the "fundamentals" are also influenced by the participants' expectations about the future course of "exchange rates. Trade figures are notoriously distorted by leads and lags in payment, not to mention the effect of expectations on the inventory policy of exporters and importers. As far as capital movements are concerned, perhaps the only transaction that is totally independent of expectations is the payment of interest on accumulated debt; the reinvestment of interest receipts already qualifies as a speculative transaction. The repatriation of bank debt from less developed countries is probably best described as non-speculative, although speculative considerations come into play if and when the assets are redeployed. What about direct investment? If managements were interested only in the total rate of return, it ought to be classified as speculative, but often there are overriding industrial considerations. It can be seen that there are many gradations between speculative and non-speculative transactions; but we do not do any great violence to reality by putting them into these two broad categories.

We shall focus on speculative capital transactions because that is where the participants' bias finds expression. Speculative capital moves in search of the highest total return. Total return has three elements: the interest rate differential, the exchange rate differential, and the capital appreciation in local currency. Since the third element varies from case to case we can propose the following general rule: speculative capital is attracted by rising exchange rates and rising interest rates.

$$\uparrow(e + i) \rightarrow \downarrow S$$

Of the two, exchange rates are by far the more important. It does not take much of a decline in the currency to render the total return negative. By the same, token, when an

appreciating currency also offers an interest rate advantage, the total return exceeds anything that a ¡holder of financial assets could expect in the normal course of events.

That is not to say that interest rate differentials are unimportant; but much of their importance lies in their effect on exchange rates and that depends on the participants' perceptions. There are times when relative interest rates seem to be a major influence; at other times they are totally disregarded. For instance, from 1982 to 1986 capital was attracted to the currency with the highest interest rate, namely, the dollar, but in the late 1970s Switzerland could not arrest the influx of capital even by imposing negative interest rates. Moreover, perceptions about the importance of interest rates are often wrong. For instance, until November 1984 the strength of the dollar was widely attributed to high interest rates in the United Spates. When interest rates declined without the dollar weakening this view was discredited and the dollar went through the roof.

Expectations about exchange rates play the same role in currency markets as expectations about stock prices do in the stock market: they constitute the paramount consideration for those who are motivated by the total rate of return. In the stock market that covers practically all investors, in currency markets all speculative transactions.

In the stock market we used a model that focused on stock prices and disregarded dividend income. No great distortion was involved because in the kind of boom/bust sequences we were considering stock price movements far outweigh dividend income. Similar conditions prevail in currency markets: expectations about future exchange rates constitute the main motivation in speculative capital transactions.

The major difference between the stock market and the currency market seems to be the role played by the fundamentals. We have seen that the "fundamentals" were rather nebulous even in the case of stocks but at least we had no reason to doubt that stock prices were somehow connected to the fundamentals. In the case of currencies the trade balance is clearly the most important fundamental factor, yet the dollar strengthened between 1982 and 1985 while the trade balance of the United States was deteriorating. It would seem that the fundamentals are even less relevant in determining price trends than in the stock market. We do not need to look far afield for an explanation: it is to be found in the relative importance of speculative capital movements.

As we have seen, speculative capital is motivated primarily by expectations about future exchange rates. To the extent that exchange rates are dominated by speculative capital

transfers, they are purely reflexive: expectations relate to expectations and the prevailing bias can validate itself almost indefinitely. The situation is highly unstable: if the opposite bias prevailed, it could also validate itself. The greater the relative importance of speculation, the more unstable the system becomes: the total rate of return can flip-flop with every change in the prevailing bias.

In our discussion of the stock market we identified certain sequences such as the conglomerate boom where the prevailing bias formed an important part of the underlying trend, but we concluded that such pure examples of reflexivity are exceptional. By contrast, in a system of freely fluctuating exchange rates reflexivity constitutes the rule. Of course, there is no such thing as a purely reflexive situation. Speculation is only one of the factors that determine exchange rates and the other factors must also be taken into account in formulating one's expectations. Thus, expectations cannot be totally capricious: they must be rooted in something other than themselves. How a prevailing bias becomes established and, even more important, how it is reversed are the most important questions confronting us.

There are no universally valid answers. Reflexive processes tend to follow a certain pattern. In the early stages, the trend has to be self-reinforcing, otherwise the process aborts. As the trend extends, it becomes increasingly vulnerable because the fundamentals such as trade and interest payments move against the trend, in accordance with the precepts of classical analysis, and the trend becomes increasingly dependent on the prevailing bias. Eventually a turning point is reached and, in a full-fledged sequence, a self-reinforcing process starts operating in the opposite direction.

Within this general pattern each sequence is unique. It is the characteristic feature of a reflexive process that neither the participants' perceptions nor the situation to which they relate remain unaffected by it. It follows that no sequence can repeat itself. Not even the variables that interact in a circular fashion need be the same; certainly they will not carry the same weight on different occasions.

We have had two major reflexive moves in the dollar since the breakdown of the Bretton Woods system and at least that many in sterling. It it instructive to compare the two big moves in the dollar because the interaction between the trade balance and capital movements was radically different in the two instances.

In the late 1970s the dollar got progressively weaker, especially against the continental currencies, while in the 1980s it got progressively stronger. We shall call the first move Carter's vicious circle and the second Reagan's benign circle. We can build simple models to show how different the two trends were.

In the case of Germany in the late 1970s, the German mark was strong (↑e). Speculative purchases played a major role in making it stronger (↓ S) and sustaining the benign circle. Germany started with a trade surplus and the strength of the currency helped to keep the price level down. Since exports had a large import content the real exchange rate, as opposed to the nominal, remained more or less stable (↕ep) and the effect on the trade balance was negligible (↕T). With the speculative inflow predominating (↓S > ↕T), the benign circle was self-reinforcing:

$$\uparrow e \rightarrow \downarrow p \rightarrow \updownarrow(ep) \rightarrow (\downarrow S > \updownarrow T) \rightarrow \uparrow$$

The fact that the rate of currency appreciation exceeded the interest rate differential made it very profitable to hold German marks, so that the speculative inflow was both self-reinforcing and self-validating.

What was a benign circle for Germany was a vicious circle for the United States. As the exchange rate depreciated, inflation accelerated. Despite rising nominal interest rates, real rates remained very low, if not negative. Various measures were tried to compensate for the outflow of capital, of which the issue of so-called Carter bonds denominated in German marks and Swiss francs was the most dramatic, but nothing seemed to work until the Federal Reserve embraced a strict monetarist policy. Then came the election of Ronald Reagan to the presidency and the dollar embarked on a sustained rise.

During Reagan's benign circle the strong dollar caused a sharp deterioration in the trade balance of the United States. In contrast to Germany in the late 1970s, the United States did not have a trade surplus to start with. Moreover, the appreciation in the currency was not matched by inflation rate differentials. The inflation rate declined in the United States but it remained low in other countries as well. As a consequence, the United States developed an unprecedented trade deficit as well as an unprecedented interest rate differential in favour of the dollar. It was extremely attractive to hold dollars as long as the dollar remained firm, and the dollar remained firm as long as the deficit on current account was fully matched by a surplus on capital account. In our notation:

$$(\uparrow e + \uparrow i) \rightarrow (\downarrow S > \downarrow T) \rightarrow \uparrow e \rightarrow (\downarrow S > \downarrow T)$$

The models are obviously oversimplified. We shall explore Reagan's benign circle in greater depth later. The point we are trying to make here is that different sequences have totally different structures. In the case of Germany in the late 1970s the appreciation of the currency was sustained by the inflation rate differential and the balance of trade was largely unaffected. Reagan's benign circle was sustained by a differential in interest rates rather than inflation rates and there was an ever-growing trade deficit which was matched by an ever-growing inflow of capital. While in the first case it was possible to claim some kind of equilibrium, in the second case the disequilibrium was palpable. The inflow of capital depended on a strong dollar and a strong dollar depended on an ever-rising inflow of capital which carried with it ever-rising interest and repayment obligations ($\downarrow N$). It was obvious that the benign circle could not be sustained indefinitely. Yet, while it lasted, any currency speculator who dared to fight the trend had to pay dearly for it. Speculation did not serve to reestablish equilibrium. On the contrary, it reinforced the trend and thereby increased the disequilibrium, which would eventually have to be corrected.

Although each self-reinforcing circle is unique, we can make some universally valid generalizations about freely fluctuating exchange rates. First, the relative importance of speculative transactions tends to increase during the lifetime of a self-reinforcing trend. Second, the prevailing bias is a trend-following one and the longer the trend persists, the stronger the bias becomes. The third is simply that once a trend is established it tends to persist and to run its full course; when the turn finally comes, it tends to set into motion a self-reinforcing process in the opposite direction. In other words, currencies tend to move in large waves, with each move lasting several years.

These three tendencies are mutually self-validating. It is the growth in speculative capital flows moving in a trend-following fashion that makes the trend so persistent; it is the persistence of the trend that makes a trend-following bias so rewarding; and it is the rewards reaped by speculation that attract increasing amounts of capital.

The longer a benign circle lasts, the more attractive it is to hold financial assets in the appreciating currency and the more important the exchange rate becomes in calculating total return. "Those who are inclined to fight the trend are progressively eliminated and in the end only trend followers survive as active participants. As speculation gains

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in importance, other factors lose their influence. There is nothing to guide speculators but the market itself, and the market is dominated by trend followers. These considerations explain how the dollar could continue to appreciate in the face of an ever-rising trade deficit. Eventually, a crossover point would have been reached, even without the intervention of the authorities, when the inflow of speculative funds could not keep pace with the trade deficit and with rising interest obligations, and the trend would have been reversed. Since the predominating bias is trend following, speculative capital would then have started moving in the opposite direction. If and when that happened, the reversal could easily have accelerated into a free fall. For one thing, speculation and "fundamental" flows would then have worked in the same direction. Even more important, when a change in trend is recognized, the volume of speculative transactions is likely to undergo a dramatic, not to say catastrophic, increase. While a trend persists, speculative flows are incremental; but a reversal involves not only the current flow but also the accumulated stock of speculative capital. The longer the trend has persisted, the larger the accumulation. There are, of course, mitigating circumstances. One is that market participants are likely to recognize a change in trend only gradually. The other is that the authorities are bound to be aware of the danger and do something to prevent a crash. How the drama actually unfolded will be the subject of a later chapter. Here we are trying to establish a general proposition.

Taking the three generalizations together, it can be asserted that speculation is progressively destabilizing. The destabilizing effect arises not because the speculative capital flows must be eventually reversed but exactly because they need not be reversed until much later. If they had to be reversed in short order, capital transactions would provide a welcome cushion for making the adjustment process less painful. If they need not be reversed, the participants get to depend on them so that eventually when the turn comes the adjustment becomes that much more painful.

It is quite likely that the generalization about the progressive accumulation of hot money holds true not only within a cycle but also from one cycle to another, although the history of fluctuating exchange rates is too short to provide reliable evidence. It has certainly been true so far—the size of speculative capital movements was far greater in Reagan's benign circle than it was during Carter's vicious circle. Empirical studies of

the 1930s also showed a cumulative growth in "hot money" movements,1 although cir-cumstances were somewhat different because currencies were not freely floating.

We can see why hot money should continue to accumulate as long as real interest rates are high and the return on physical investments low: keeping capital in liquid form in an appreciating currency is more rewarding than investing it in physical assets. What is needed to give the generalization universal validity is an argument that would show that fluctuating exchange rates are associated with high returns on financial assets and low returns on physical investments. Let me try. We have seen that hot money can earn exceptional returns if it gets the trend right; since it sets the trend, that is likely to be the case. Physical assets represent the opposite side of the coin: they cannot move to take advantage of the trend. The tradable goods sector is bound to suffer when a currency appreciates. Of course, a depreciating currency brings windfall profits to exporters, but having been hurt before, exporters are loath to invest on the basis of a temporary advantage: they prefer to hold their profits in financial assets, contributing to the growth of hot money. The process can be most clearly observed in the United Kingdom, where exporters refused to expand when sterling fell below $1.10 in 1985, despite record profits. How right they were! Sterling rose above $1.50 by April 1986. Thus, both an appreciating currency and a depreciating currency discourage physical invest-ment and foster the accumulation of "hot money."

We can attempt yet another tentative generalization. When a long-term trend loses its momentum, short-term volatility tends to rise. It is easy to see why that should be so: the trend-following crowd is disoriented. The generalization is tentative because it is based on inadequate evidence. It certainly was true when the dollar reversed its trend in 1985.

If these generalizations are indeed valid, the eventual demise of a system of freely fluc-tuating exchange rates is inevitable. Fluctuations become so wild that either the system has to be modified by some kind of government intervention or it is bound to break down. Currency markets thus provide the best support for my contention that financial markets are inherently unstable. There is no built-in tendency toward equilibrium: to the extent that we need stability we must introduce it by deliberate policy measures.

These conclusions may not strike the reader as particularly revolutionary at the present time, but they certainly contradicted the prevailing wisdom at the time they were written

in April/May 1985. There was widespread malaise about the instability of exchange rates, but belief in the magic of the market was still running strong, and the famous Plaza agreement in September 1985 came as something of a shock to market participants. Even today, there is no theoretical underpinning for the contention that a freely floating exchange rate system is cumulatively destabilizing. That is what I hope to have provided here."[2]

Although George Soros himself states that the theory of reflexivity in currency markets is not yet complete and not based on the economic theory. It may help identify the transitive channel that could be dominant while helping describe the events as they unfold.

Reflecting on the theory of expectations from the theory of effective markets mentioned in the part about fundamental analyses it may be assumed that both fundamental and technical analyses play some role on the participants bias about the expected development of the exchange rate because the participants utilises both analyses when forming their expectation on which they hedge or speculate.

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2 [17] The alchemy of Finance page 74 - 84

3.4   Hedging Currency Exposure

The firm has several options how to hedge against the currency exposure. The decision on what course of action will be chosen should depend on the expectations of management regarding future development of exchange rates, and from the management's risk (aversion, inclination to, neutrality). And from the firm's negotiation position regarding its business partners and financial institutions. The firm then choose one of three approaches. Either it will undergo the risk and do nothing, or it will try to reduce or avoid the risk.

The first option is rational when the amounts of transaction in the currency in question os little or when the cost of securing the future changes in exchange rate is higher than loses from possible change of exchange rate.

The risk might be reduced by several options. Usually the risk is shared with the other subject, by securing operations on the market, by transferring risk to other subject or by diversification. I some cases the management may even evaluate the transaction or decision for so risky that they will decide not to take the opportunity in such conditions and by that decision they avoid the risk altogether.

Although the attitude of management to risk is one of the component that determine the tolerance for risk the core business and ability to absorb negative consequences connected to taking the risk must be taken to account as well. For example financial institutions will incline more to taking the risk because it is their line of business while non-financial firms will incline to reducing the risk. Though some production firms may take the risk connected with currency exposure when they will try to increase their profits [16].

The methods and tools for management of the currency exposure may be distinguished to internal which are part of common decision making of a firm. And external that involve additional contracts in the financial market.

3.4.1 Internal Methods of Hedging Currency Exposure

The internal or natural tools for securing currency exposure concentrate on the firms activities and operations which they try to amend in order to reduce the exposure without the need to create additional contracts [16].

Currency diversification

The firm that records claims in different currencies may lower the currency exposure by diversification of currency portfolio. The assumption for this method is that exposure of each new claim or pledge is the same or lower and that the value of correlation coefficient between the exchange rate of claim or pledge and the at least one exchange rate from the current portfolio is lower than one [16]. Or that the higher influence of the currency exposure of the new claim or pledge is compensated by the lower value of correlation coefficient in that relation.

Strategic decisions

The currency exposure might be as well reduced by taking the strategic decisions for international business relations [16]. These decisions may involve:

- selection of the suitable economic relations (for example by replacing export expansion with foreign direct investment. Or by replacing import with domestic production);
- choice of the currencies for expression of the value of assets and liabilities in order for exchange rate movements to influence it positively;
- choice of business partners in order to influence the structure of assets and liabilities positively (for example by preferring vendors from countries where the revenues are realized);
- systematical innovations and reaching for greater price of exports in order to hedge against domestic currency appreciation;
- change in the currency structure of debt (for example for exporting firm to hold credit in the currency of its sales).

Whatever strategic decision will be chosen should be primarily in line of the core business and for creating value for the firm owner not just in order to reduce currency exposure.

Transfer of risk to business partners

The option to transfer the risk to business partners (vendors and clients/customers) always depend on the negotiation position of the firm and structure of the market where it compete [16]. The firm in position of the price maker has always better position than price taker. In ideal case the firm should be able to change the price policy in reaction to expected development of exchange rate (when the domestic currency as expected to appreciate to be able to increase the price of products and services sold in foreign currency).

Monetary clauses is the ex ante solution for exchange rate exposure that define the conditions of contract when and how can be the price changed in regard of development of the exchange rate in time from the taking the order to time of payment.

Important instrument is also choice of the **invoicing currency** where the exporter may avoid the currency exposure by invoicing in domestic currency or by purchasing from the vendors in the currency of its export operations [16].

The more aggressive technique of transferring risk to business partners is called **lagging and leading**. In accordance to expected development of the exchange rate the firm optimize its payments and collections. When the firm expect that the domestic currency will appreciate try to lag payments of its pledges and lead collection of its claims. This technique require very good negotiation position of the firm.

Netting and matching of payables and receivables

The company may reduce the exposure to currency where the subsidiary or its business partner process payables and receivables by reducing amounts of exchanged currencies by three forms of netting.

1. Unilateral netting is the simplest and it involves the company and its subsidiaries. The company aggregates the cash flow between subsidiaries and identify those that can be netted. By this netting the cash flows it reduces volume of foreign exchange cash flow and reduces risk from exchange rates.

2. Bilateral netting. When two companies located in different countries transact a great deal of business with each other, then they can track the payables owed to

each other, net out the balances at the end of each month, and one party pays the other the net remaining balance.

3. Multilateral centralized netting. When there are multiple parties wishing to net transactions, it becomes too complex to manage with a spreadsheet. Instead, the common approach is to net transactions through a centralized exchange.

Matching may be used for one or more firms but the centralized exchange must be involved as well [16]. By this approach payables and receivables are paired in regard of the amount and date of maturity.

3.4.2 External Methods of Hedging Currency Exposure

External methods of hedging currency exposure involve contracts with third party institutions and as such may introduce additional costs. The external method should be used only in case that all economically acceptable forms of natural hedging were exhausted. In case of external methods are instead transferring the exposure to banks and financial institution using special financial instruments that are derived from the primary underlying assets. Classical currency derivatives are currency forwards, currency futures, currency options and currency swaps [16].

The forward trades are accomplished out of stock exchange. The typical representative of trades is forward rate agreement (FRA).

The future contracts are fully standardized and can be quoted on terminal or option stock exchanges. The futures and forward trades have to be fulfilled by both parties.

The swap trades represent the settlement deals with future exchange of currency payments. It is possible to combine the above mentioned trades and create further derivatives. For example options on contracts of futures, options on swaps and forward swaps. The so called insert derivatives have been used in recent time. The insert derivation is a part of composition of financial instrument.

The option contracts are the trades, when the buyer obtains the right to buy or sell certain asset. He can make a decision, whether the trade will be realized or not. The seller of option has to wait, which decision the buyer makes. The seller is awarded the call premium for this uncertainty [5].

There are two types of options that are distinguished according to the moment of their application:

1. European options, where the moment to apply the options is set up for fixed day,
2. American options, where the owner of options can apply his option during given time period [5].

4. Company characteristics

The operates on the localization market and its headquarters is based in Belgium. The Localization market involves companies from all over the world so the beholder might say that competition is global because the company may find competitor with fairly similar service on each continent. Though the main concentration of localization big localization firms is in North America and Europe. Fair competition comes from South America and Asia as well [13]. And the analyses of the market indicates that even if the 10 biggest competitors would merge their monopolistic power would not be very threatening to other competition [3]. Because of the characteristics of the market customers hold quite a good bargaining power because they have a lot of companies to choose from. Therefore the bigger customers usually choose currency of their payments. Vendors usually consist either of the other localization companies or freelancers who provide translation services. The currency that is chosen for paying off the vendor or freelancer for their services usually depend on the firm that takes the order. It is cause by the tendencies to push costs to minimum where freelancers has a competitive advantage on smaller translation project so where it is possible projects are divided into pieces that are small enough for freelancer and small enough not to create too much management costs for the localization company.

The rivalry between companies is quite moderate because they have to compete for customers but the nature of the business allows that the competitor may become vendor of the company where on bigger contracts localization company usually outsource part of the workload which it can not find capacity for. Therefor some degree of co-operation between companies in localization market is quite natural.

 The threat of new entrant is not very high. Not because the initial costs would be too hight (group of freelancers may start the company for very low cost). But because the market is fairly new and enjoys growth *"As of 2010, Common Sense Advisory calculates that the language services market is growing at an annual rate of 13.15%."* [13]

5. Analyses of current situation

The company has the highest costs in EUR but the biggest customers pay in EUR, USD and JPY therefore it must analyse the FOREX in order to decide which hedging strategy it should apply depending on the development of exchange rates. The company operations are based in the Eurozone and may decide to pay the vendors in EUR. But because some customers are used to pay in USD and some other in JPY as well the company is exposed to the economic risk coming from the exposure to USD and JPY. Therefore the company should analyse development of the both EUR, USD and JPY.

The spot rate of the currency pairs in the FOREX oscillated during previous 12 month in the following bands:

- EUR/USD – between 1.5 and 1.2 with bullish trend at the end of year 2010 which turned to bullish for two months than back and forth but bullish trend prevailed.
- EUR/JPY – between 127 and 105 with prevailing bearish trend.
- USD/JPY – between 95 and 75 with prevailing bearish trend.

5.1 Currency analyses through combination of GDP and PPP

The countries and economic areas where the Euro, US Dollar and Yen are domestic currencies belong to developed economies.

The Euro belong to Eurozone countries which consist of seventeen countries of European union that adopted Euro as a common currency. The population of members states of Eurozone accounts roughly to 330 million citizens. For the monetary policy of the Euro zone is responsible European Central bank which has as one of the main goal to target inflation of the eurozone at annual rate of 2% measured by the Harmonised Index of Customer Prices and to maintain stability of the currency [7]. There is no common fiscal policy but some cooperation takes place through Euro group (the meeting of eurozone financial ministers).

The US Dollar is a domestic currency of United Stated of America. The population of United states accounts to roughly 312 million citizens. For the monetary policy is responsible Federal Reserve System (informally known as Fed). The Fed does not have particular goal for inflation rate as ECB but it's main aim is to maintain price stability and keep inflation low. For the fiscal policy is responsible the US Government [8].

Japanese Yen is the domestic currency of Japan which has population of around 128 million citizens. Bank of Japan is responsible for the monetary policy of Yen. BOJ does not have target for inflation, similarly to Fed. Instead the objectives of the bank are *"to issue banknotes and to carry out currency and monetary control"* and *"to ensure smooth settlement of funds among banks and other financial institutions, thereby contributing to the maintenance of stability of the financial system."* according to Bank of Japan Act [2].

The comparison of GDP development from IMF [10] which includes projection of the trend for these areas shows that the United states and Eurozone produce greater output than Japan in whole numbers. The projection of GDP also indicates that the economic growth in each country should continue.
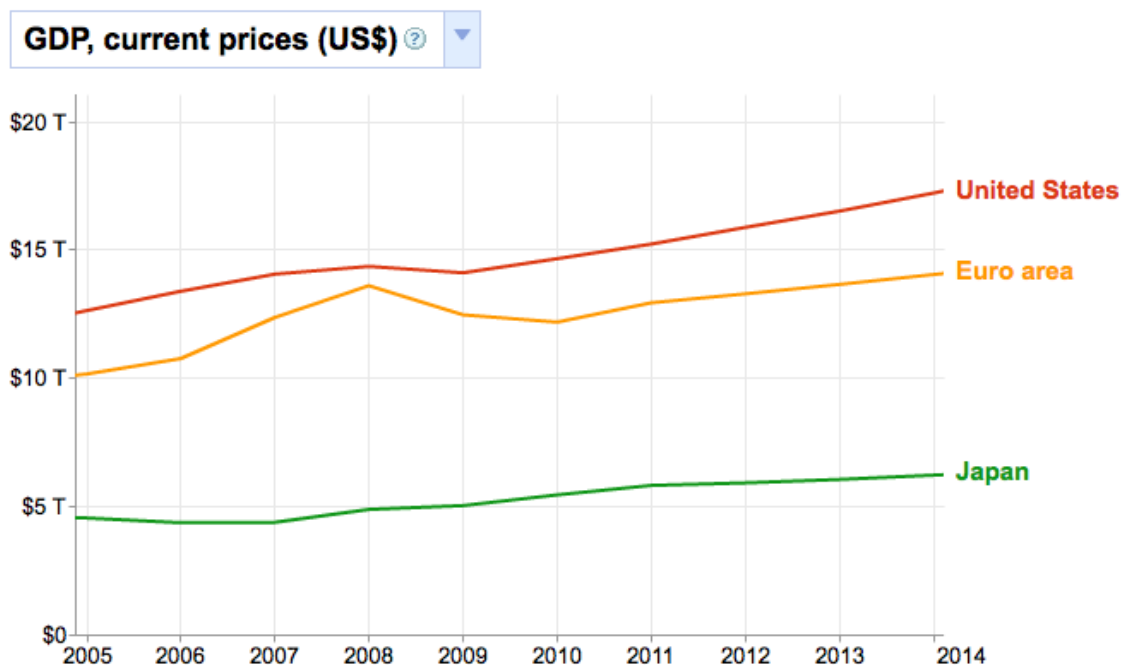

Illustration 6: Current prices GDP of United States, Eurozone and Japan in current prices, Source: IMF World Economic outlook, processed by Google public data explorer

But when the comparison of GDP is based on Purchasing Parity Power it shows that the performance of the Eurozone and United States is closer to Japan. Or if the theory of purchasing power parity is correct by stating that in the long-term prices are same in all countries and the exchange rate acts as the mechanism that help markets to return to

equilibrium then it implies that US Dollar is overvalued and should depreciate to balance the nominal prices to the real level in long-term.
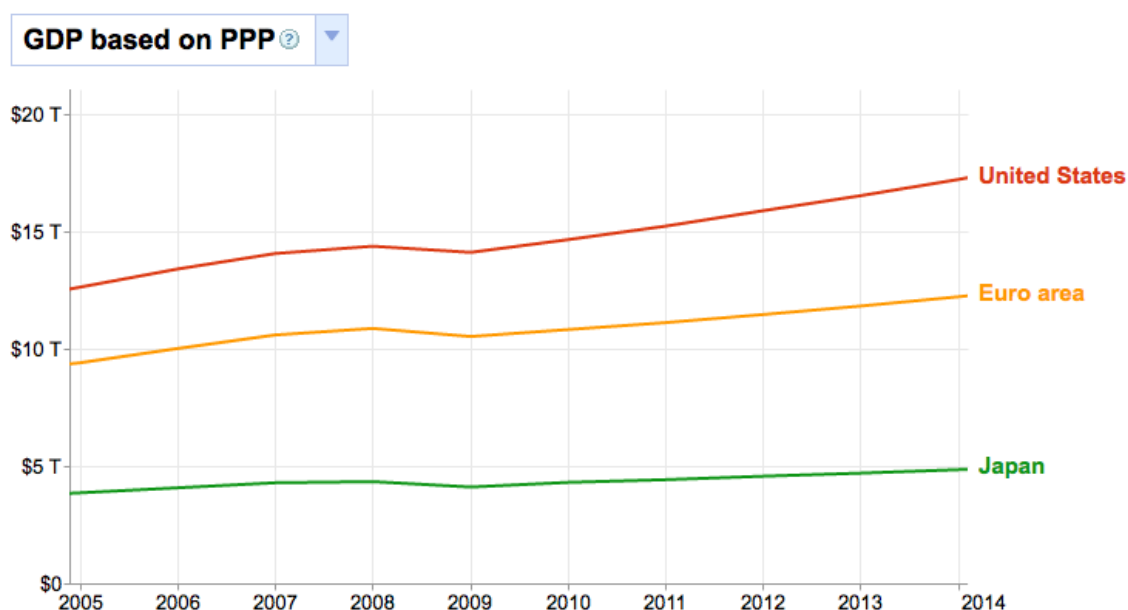

Illustration 7: GDP based on PPP of United States, Eurozone and Japan, Source: IMF World Economic outlook, processed by Google public data explorer

The comparison of the GDP development per capita based on the current prices and GDP development per capita based on the current prices based on PPP indicates that the value of Japanese Yen is undervalued so the analysts may expect that Yen will continue appreciating its value against the dollar or that the dollar will depreciate against Yen. But both statements infer expectation that Yen's value should rise against Dollar.
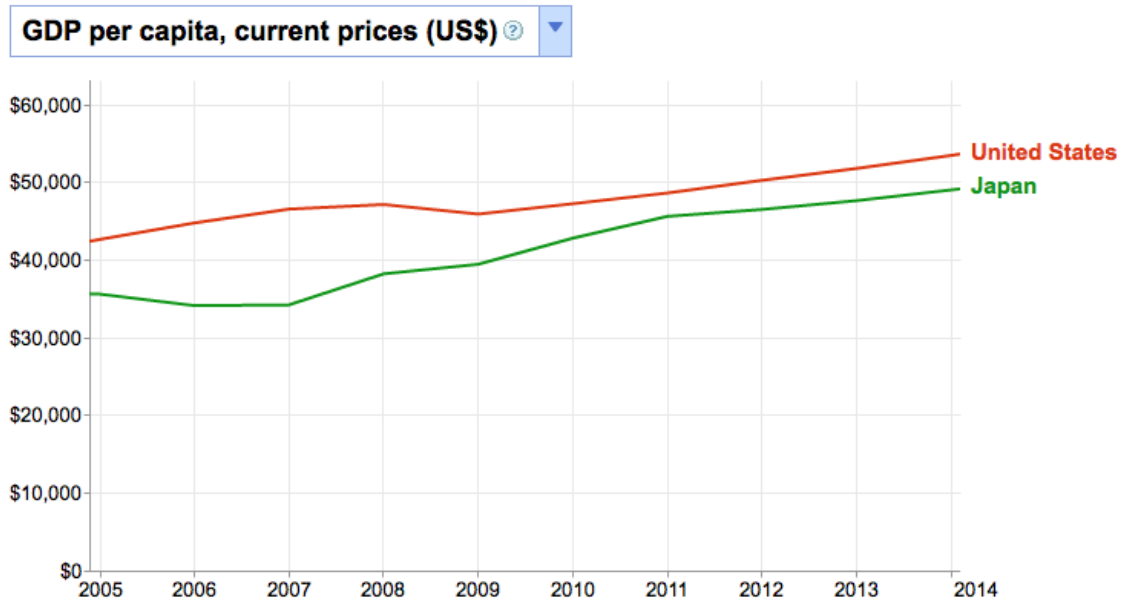
Illustration 8: GDP based in current prices per capita of United States, Eurozone and Japan in current prices, Source: IMF World Economic outlook, processed by Google public data explorer
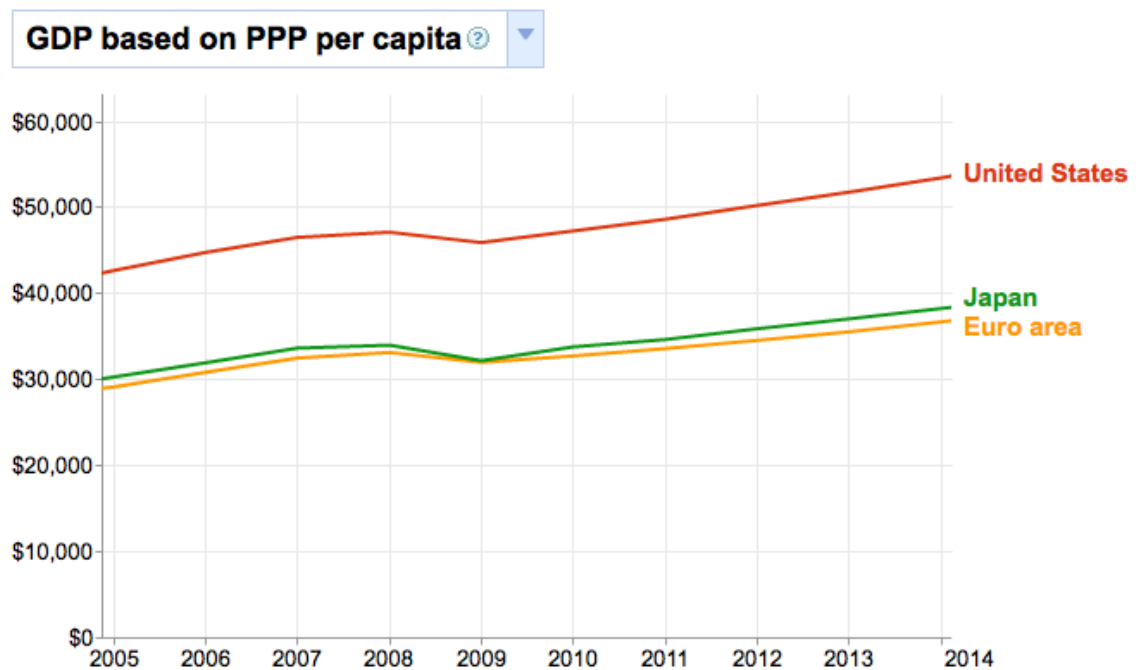

Illustration 9: GDP based on PPP per capita of United States, Eurozone and Japan in current prices, Source: IMF World Economic outlook, processed by Google public data explorer

5.2 Comparison based on the Big Mac Index

Although the comparisons based on the GDP per capita and PPP indicates that the Yen is undervalued against the Dollar. When comparing the prices in each country based on the index popularized by the Economist. Then the result is quiet different. As already mentioned the in its nature contains comparison of both the final product served to the customer but costs that contribute to its production, shipment to restaurants and cost of management. The big mac index from July 2011 publicised by The Economist [19] indicates that the exchange rate between the Dollar and Yen almost at the equilibrium because the price of The Big Mac is in both countries same. It also shows that the price of Euro is overvalued against the Dollar because the price of the Big Mac is higher in Euro zone. The index adjusted to GDP per capita shows even more overvaluation of Euro and slight overvaluation of Yen.

The hamburger standard

Country	Big Mac prices in local currency	Big Mac prices in dollars*	Implied PPP† of the dollar	Actual dollar exchange rate July 25th	Under(-)/over(+) valuation against the dollar, % raw index	Under(-)/over(+) valuation against the dollar, % adjusted for GDP per person
United States‡	$4.07	4.07	–	–	–	–
Argentina	Peso 20.0	4.84	4.92	4.13	19	101
Australia	A$4.56	4.94	1.12	0.92	22	12
Brazil	Real 9.50	6.16	2.34	1.54	52	149
Britain	£2.39	3.89	1.70§	1.63§	-4	9
Canada	C$4.73	5.00	1.16	0.95	23	24
Chile	Peso 1,850	4.00	455	463	-2	58
China	Yuan 14.7	2.27	3.60	6.45	-44	3
Colombia	Peso 8,400	4.74	2,066	1,771	17	108
Czech Republic	Koruna 69.3	4.07	17.1	17.0	nil	45
Denmark	DK 28.5	5.48	7.01	5.20	35	23
Egypt	Pound 14.1	2.36	3.47	5.96	-42	11
Euro area**	€3.44	4.93	1.18††	1.43††	21	36
Hong Kong	HK$15.1	1.94	3.71	7.79	-52	-43
Hungary	Forint 760	4.04	187	188	-1	57
India§§	Rupee 84.0	1.89	20.7	44.4	-53	-8
Indonesia	Rupiah 22,534	2.64	5,543	8,523	-35	24
Israel	Shekel 15.9	4.67	3.91	3.40	15	43
Japan	¥320	4.08	78.7	78.4	nil	5
Malaysia	Ringgit 7.20	2.42	1.77	2.97	-40	2
Mexico	Peso 32.0	2.74	7.87	11.7	-33	13
New Zealand	NZ$5.10	4.41	1.25	1.16	9	29
Norway	Kroner 45.0	8.31	11.1	5.41	104	46
Pakistan	Rupee 205	2.38	50.5	86.3	-42	16
Peru	Sol 10.0	3.65	2.46	2.74	-10	63
Philippines	Peso 118	2.78	29.0	42.4	-32	33
Poland	Zloty 8.63	3.09	2.12	2.80	-24	21
Russia	Rouble 75.0	2.70	18.5	27.8	-34	10
Saudi Arabia	Riyal 10.0	2.67	2.46	3.75	-34	-3
Singapore	S$4.41	3.65	1.08	1.21	-10	-6
South Africa	Rand 19.45	2.87	4.78	6.77	-29	24
South Korea	Won 3,700	3.50	910	1,056	-14	21
Sweden	SKr 48.4	7.64	11.9	6.34	88	85
Switzerland	SFr 6.50	8.06	1.60	0.81	98	63
Taiwan	NT$75.0	2.60	18.5	28.8	-36	-7
Thailand	Baht 70.0	2.35	17.2	29.8	-42	6
Turkey	Lira 6.50	3.77	1.60	1.72	-7	53

*At current exchange rates †Purchasing-power parity; local price divided by price in United States ‡Average of Atlanta, Chicago, New York and San Francisco §Dollars per pound **Weighted average of prices in euro area ††Dollars per euro §§Maharaja Mac

Illustration 10: The Big Mac Index: July 2011, source: www.bigmacindex.org

5.3 Comparison of effective exchange rates

The currencies in the question have a few similarities and some differences as well. For instance both currencies are emitted by Central bank which influences monetary policies for the particularly currency but only USD and JPY may count on united fiscal policy that act in favour desired development of its exchange rate. EUR at the moment lack centralised fiscal policy because that would require member states of Eurozone to reduce their sovereignty by further integrating state budgets under one common Eurozone budget. Instead the EUR is at the moment somehow destabilised by fiscal deficit of Portugal, Italy, Greece and Spain [18].

In current development there were a few significant historical events that may influence development of exchange rates. During years 2008 and 2009 financial crises contributed to slight fall of USD and with some delay to EUR as well. But on the other hand JPY during that time started to appreciate and appreciated against both USD and EUR. This trend is apparent even in the nominal effective exchange rate published by the Bank for International settlements [1] charted in the following illustration.
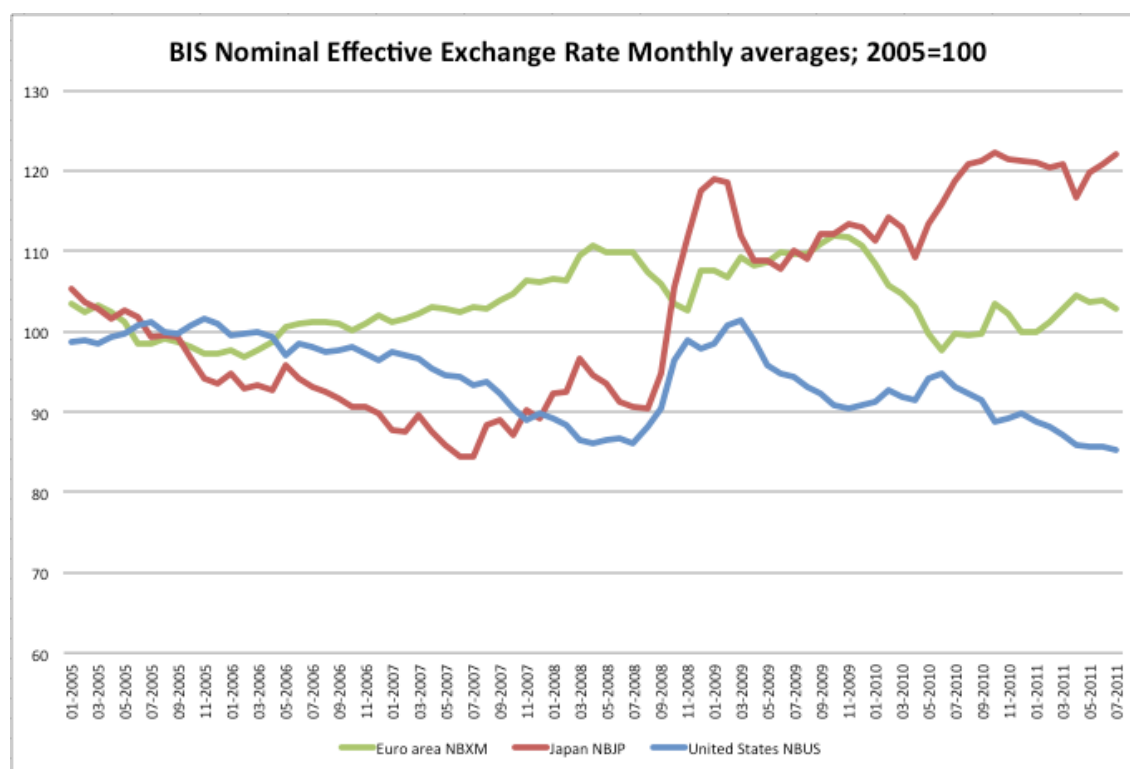

Illustration 11: BIS Nominal Effective Echange Rate, Source: Own processing based on data form BIS (2011)

The nominal effective exchange rate indicates the Yen is overvalued against both Dollar and Euro but the trend lines does imply even more divergence in the upcoming development of the exchange rates between Yen and the other two (further appreciation of the Yen).

The Real Effective Exchange rate which is adjusted to the development of interest rates shows that the prices of Yen and Euro should be closer to each other than to Dollar but even in this chart of the Real Effective Exchange Rate published by Bank for International Settlements [1] Yen diverge in its appreciation from both Euro and Dollar.
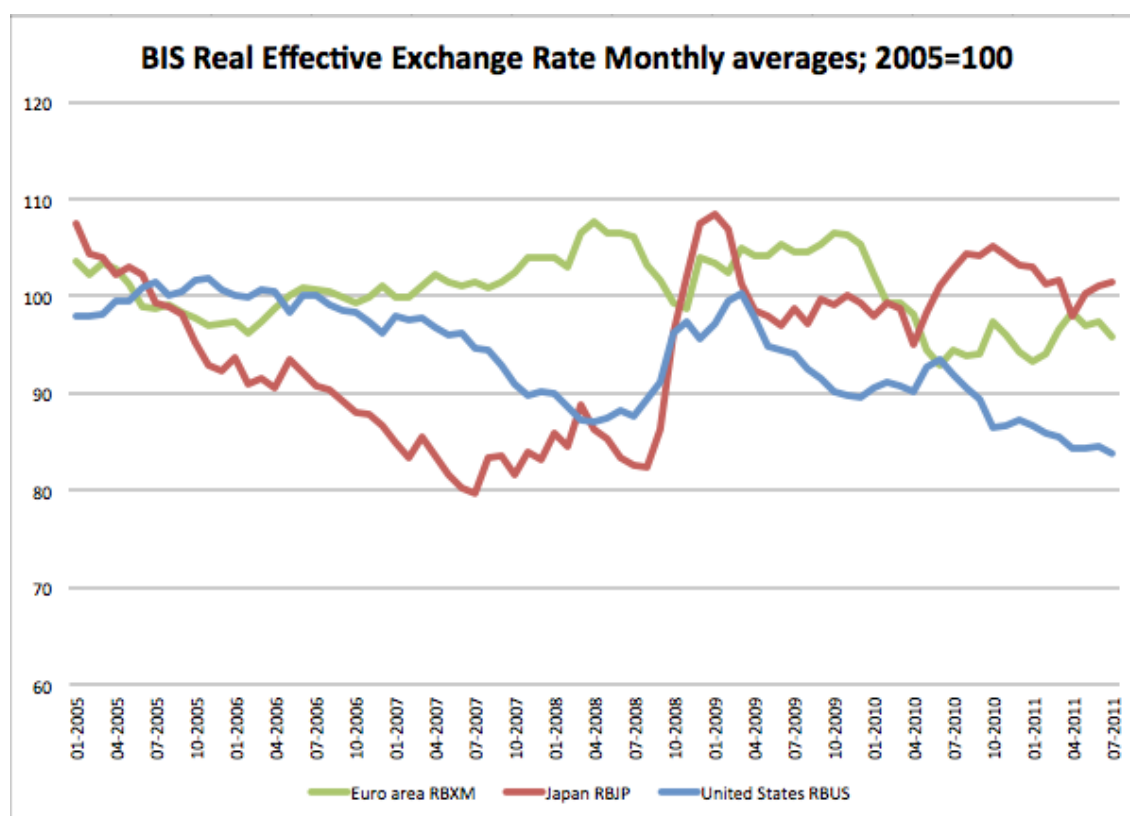

Illustration 12: BIS Real Effective Echange Rate, Source: Own processing based on data form BIS (2011)
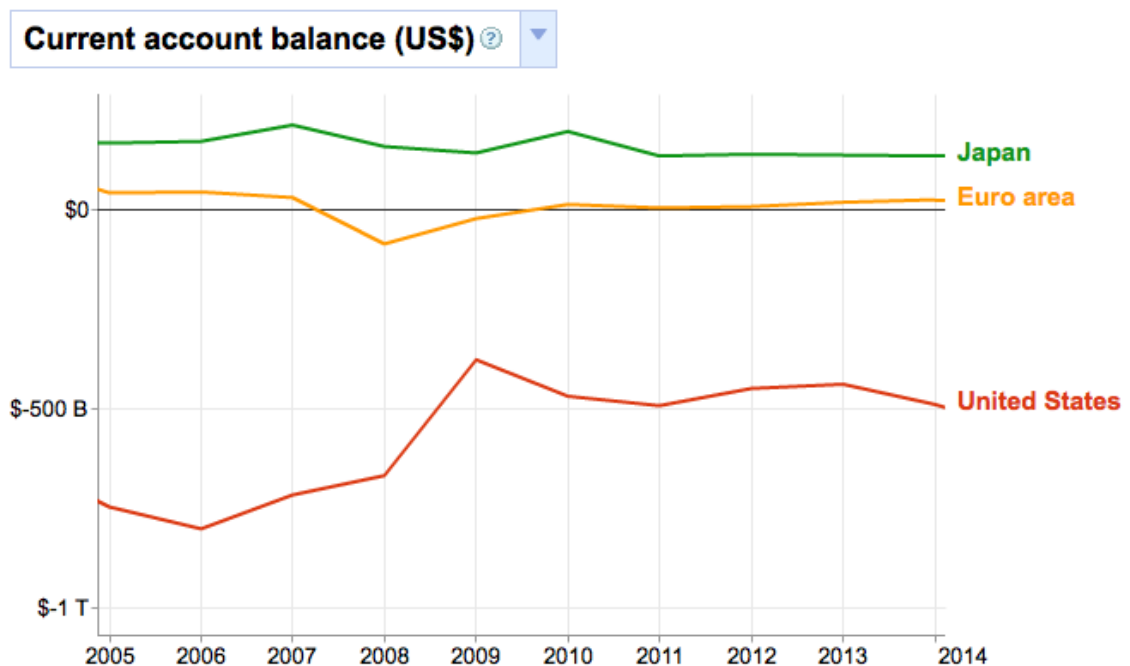
5.4 Balance of Payments comparison

Illustration 13: BOP Current balance of United States, Eurozone and Japan in current prices, Source: data from IMF World Economic outlook, processed by Google public data explorer

One of the fundamentals that connects domestic economy to foreign countries whch should influence the exchange rate is the Balance of Payments and its structure. The projection of the BOP Current account balance based on the data from International Monetary Fund [10] shows the surplus of both Japan and Eurozone which should influence the exchange rates in favour of Yen and Euro or at least not out of favour.

The projection of current balance account of the BOP as a percentage of GDP in the following chart bears similar information.
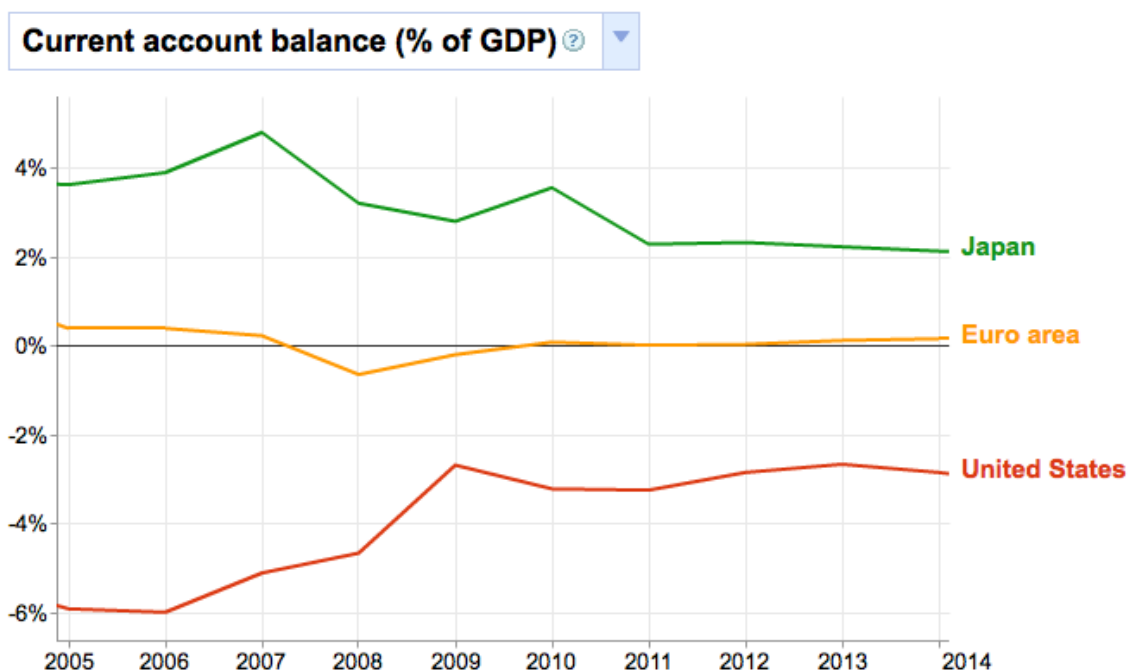
Illustration 14: BOP Current balance as % of GDP of United States, Eurozone and Japan in current prices, Source: data from IMF World Economic outlook, processed by Google public data explorer

The information about the trade balance from International Trade Administration of U.S. Department of Commerce [11] indicates that part of the US BOP deficit is quite a big deficit of trade balance between the US and the rest of the world which may push the Dollar to further depreciation. Although the China is the biggest exporter to US it is also great force that holds the Dollar from great depreciation through its managed float of its national currency. Japan seems to be one of the other great exporter to US but Japanese Yen floats free and therefore may influence the dollar if it appreciates.
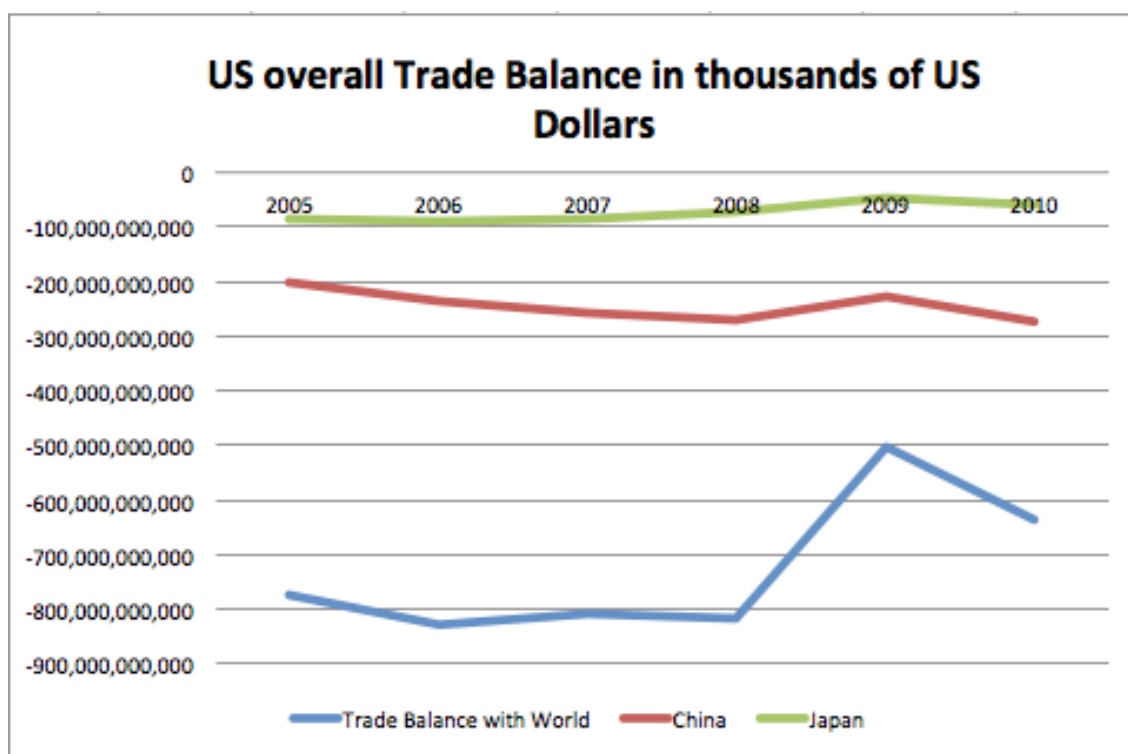
US overall Trade Balance in thousands of US Dollars

Illustration 15: U.S. Trade balance, Source: Own processing based on data from International Trade Administration

Though the influence of trade between Japan and USA has more import component to Japan as can be seen in the chart of data from the Japanese Ministry of Finance [12] But Japanese trade surplus has its component in the Euro zone as well which imply when taking into account the Japanese surplus in BOP current account that Yen may appreciate but probably more between Dollar and Yen than between Euro and Yen.
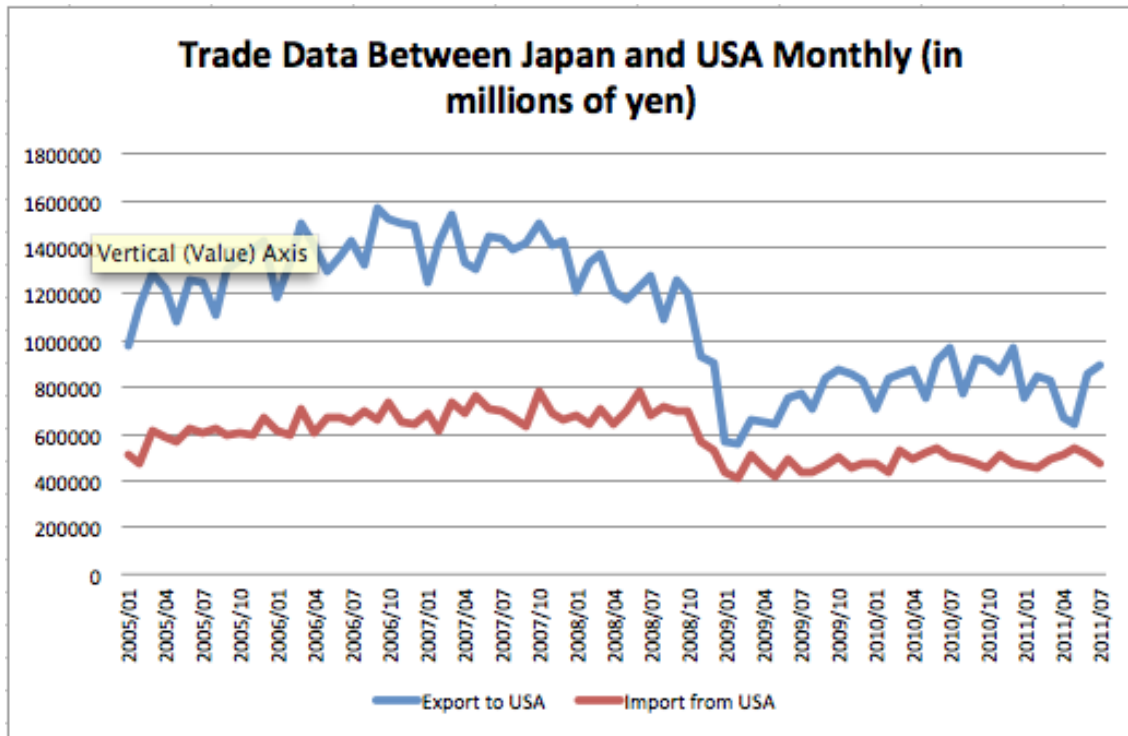
Illustration 16: Trade between Japan and US, Source: Own processing of data from Japanese Ministry of Finance
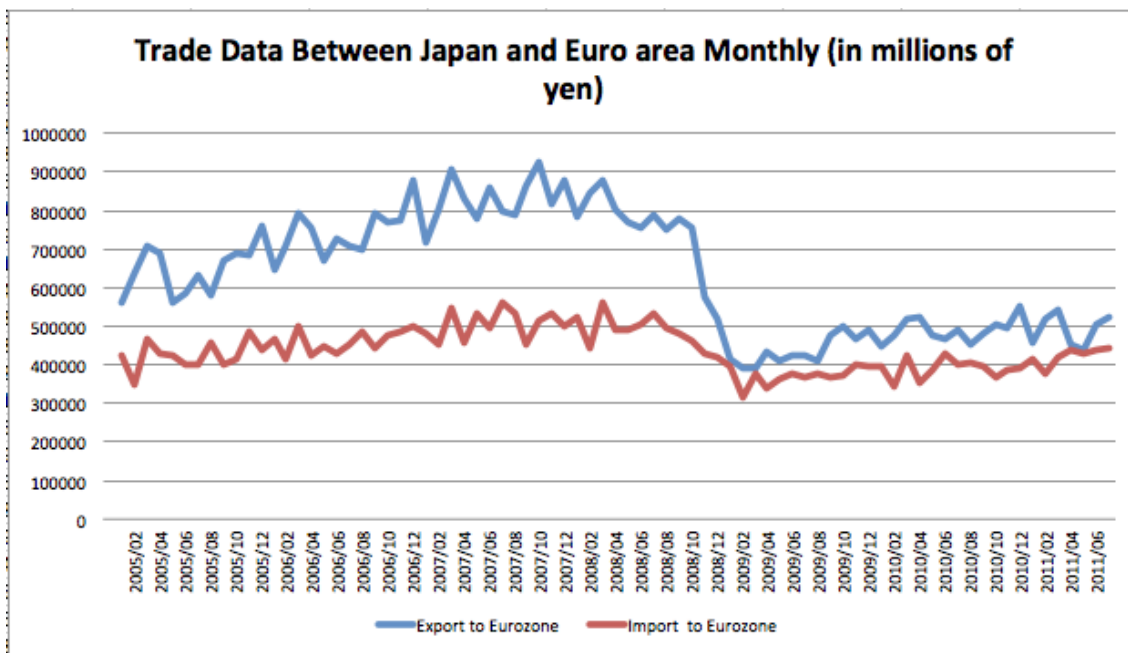

Illustration 17: Trade between Japan and Euro zone, Source: Own processing of data from Japanese Ministry of Finance

The overall trade balance of Japan is in a surplus but with a great import component which should keep the Yen stable at least from the point of trade balance view.
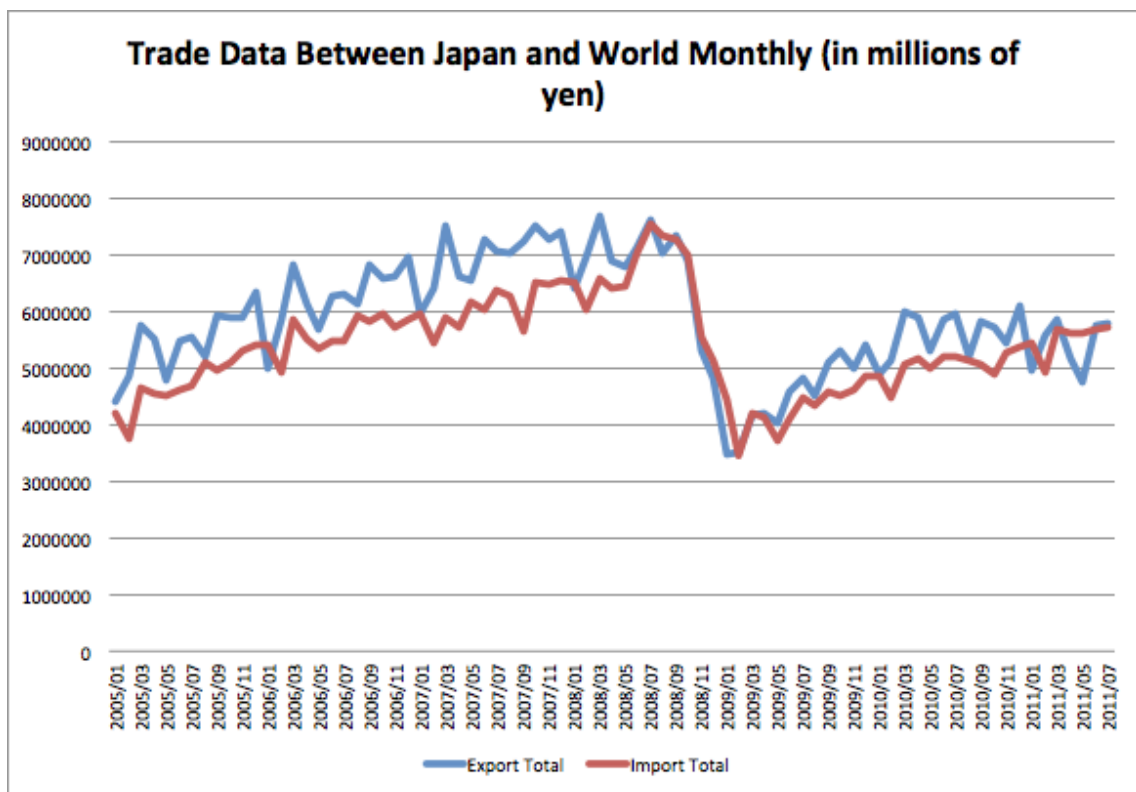

Illustration 18: Trade between Japan and World, Source: Own processing of data from Japanese Ministry of Finance

6. Summary of the results and formulation of recommendations

It is apparent that both USA, Euro zone and Japan has growing GDP which shall contribute to the currency stability or even appreciation. From the analysis of Effective exchange rates, Balance of Payment and Trade balance implies that the Japanese yen should in the upcoming months at least keep its strength or even appreciate. After the great Tohoku earthquake Yen kept appreciating with exception when the Bank of Japan in conjunction with G8 economies intervened in FOREX in order to weaken Yen which had only short-term effect. Therefore the company may hedge against the depreciation of Yen against Euro in case that its appreciation would stop or revert. For the currency pair firm should buy short-call option for cash-flow where the payment is bond by contract would suit european short-call option so that the firm know that its loss when exercising the option will be at most already paid option premium.

For cash-flows expected in Dollar the analyses shows that the Dollar should probably keep weakening. The higher debt sealing which Standard & Poors took as a signal for lowering AAA rating of United States to AA+ caused outflow of financial assets of the country and may cause further depreciation of the Dollar but on the other hand the election year of 2012 brings more uncertainty to the whole situation. European deficit problems renders development of the exchange rate between Euro and Dollar even less predictable for fundamental analysis. Therefore the future known cash flows may be hedged by the use of currency futures contracts which would suit the less certain situation.

The use of Technical analysis may be of very little use for the firm because the projects which it usually contributes to tend to be paid a few months after the point in time when the contract is signed (when the project is finished).

For securing the cash-flows in the future, the company should continue performing fundamental analyses through Effective Exchange Rate, GDP development analyses in combination with PPP. Also continue to analyse development of BOP and Trade Balance of countries where the currencies it uses to conduct business are domestic.

7. References

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Appendix A

List of Abbreviations:

$P_{D(t-n,\,t)}$ - rate of inflation in foreign country for period from *t-n* to *t*

$\quad$ $P_{D(t-n,\,t)}$ - rate of inflation in domestic country for period from *t-n* to *t*

$\quad$ $SR_{E,\,t}$ $\quad$ - balanced exchange rate in period *n*

$\sum_{i=1}^{n} P_{D,i} \cdot Q_i$ - collection of goods Q_i expressed in domestic price $P_{D,\,I,}$

$\sum_{i=1}^{n} P_{D,i} \cdot Q_i$ - collection of goods Q_i expressed in domestic price $P_{F,\,I.}$

BOC – The Bank of Canada

BOE – The Bank of England

BOJ – The Bank of Japan

BOP – Balance of Payments

ECB – European Central Bank

ERDI – Exchange Rate Deviation Index

$E_t(R_{D,\,t+n})$ – the expected earning capacity of domestic assets

$E_t(R_{F,\,t+n})$ – the expected earning capacity of foreign assets

EUR – Euro the official currency of the Eurozone

Fed – The Federal Reserves

FR – Forward exchange rate

GDP – Gross Domestic Product

IR – Interest rate

IR_D - domestic interest rate

IR_F - foreign interest rate

JPY – Japanese Yen

L(Y) – Demand for money

MOF – Japanese Ministry of Finance

M^S -The money supply

P – Price

$P_{D,\,t}$ – Domestic price in time

$P_{F,\,t}$ – Foreign price in time

PPP – Purchasing Power Parity

RIR – The real interest rate

sr – spot rate

SR – Spot Rate

SR^e – expected Spot Rate

$SR_{E, t-n}$ - balanced exchange rate in previous period *t-n*

SR_{EMA} - exponential (weighted) moving average

SR_{PPP} - exchange rate inferred from PPP

SR_{SMA} - the simple moving arithmetical average

SR_t – Spot rate in time

USD – United States of American Dollar

Y – Real GDP

e   nominal exchange rate

        (number of foreign currency units for one domestic currency unit;

        $\uparrow e$ = strengthening)

i   nominal interest rate

p   domestic versus foreign price level ($\uparrow p$ = increase in domestic prices faster than

        in foreign prices and vice versa)

v   level of economic activity

N   non-speculative capital flow - $\uparrow$ = increased outflow, $\downarrow$ = increased inflow

S   speculative capital flow   - $\uparrow$ = increased outflow, $\downarrow$ = increased inflow

T   trade balance   - $\uparrow$ = surplus, $\downarrow$ = deficit

B   government budget   - $\uparrow$ = surplus, $\downarrow$ = deficit