

Czech University of Life Sciences Prague

Faculty of Economics and Management



Department of economics

Diploma Thesis

Trading strategies for financial market

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!!!

In this place, please insert

the Diploma Thesis Assignment.

**(The original goes into one thesis
and the copy into the other)**

!!!

Declaration

I declare that I have worked on my diploma thesis titled “Trading strategies for financial market.” by myself and I have used only the sources mentioned at the end of the thesis.

In Prague on 7. 4. 2011

Veronika Drbohlavová

Acknowledgement

I would like to thank my supervisor doc. Ing. Lukáš Čechura, Ph.D. and Ondřej Hartman for their advice and support during my work on this Thesis. Last but not least I would like to express my thanksgiving to my parents who supported me a lot during my whole studies.

Obchodní strategie pro finanční trh

Trading strategies for financial market.

Souhrn

Práce pojednává o obchodování na finančních trzích – konkrétně na devizovém trhu. Tento trh je relativně nový, ale rozhodně zajímavý a s obrovským potenciálem pro obchodování. Práce dává přehled o metodách analýzy takového trhu, jakožto i využití těchto metod k následnému odvození obchodních strategií. Takovými metodami jsou technická a fundamentální analýza, díky kterým lze získat podstatné informace o trhu a jeho možném budoucím vývoji.

Klíčová slova:

FOREX, měnový trh, technická analýza, fundamentální analýza, obchodní strategie, měnový pár, trend

Summary

Thesis deals with trading on financial market – concretely forex market. This market is quit new but for sure very interesting and full of potential for trading or investments. Thesis then gives an overview of possible methods of analysis of such a market as also utilization of those methods in following determination of trading strategies. Those methods are technical and fundamental analyses which provide valuable information about market and its possible future development.

Keywords:

FOREX, foreign exchange, technical analysis, fundamental analysis, trading strategy, currency pair, technical indicators, trend

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1. Introduction

FOREX trading is very popular in recent years but it is risky and requires certain knowledge of its aspects and patterns. FOREX stands for International Interbank Foreign Exchange and simply means trading with foreign currencies. In the Czech Republic is this business at the very beginning but is very unique and can attract many people.

Advantages of FOREX trading are for example:

- Almost everyone could enter this business – even with low starting capital, only need is computer and software (for free from broker company)
- Very flexible – is open 24 hours five days in a week
- Without any fees – no fees for opening or closing position
- User friendly – variety of software available - trader can choose according to his/her preferences
- Not dependent on any quarter reports of stock companies

Trading requires some knowledge, patience and lot of self-control. At least with first point could help this thesis a bit and introduce some basic techniques how to analyse the market and also how to interpret economic information around. Without this knowledge and understanding no successful strategy can be created or better should not be created.

In this thesis are also shown three different strategies to show how can be acquired knowledge used in practice.

2. Objectives and methodology

Primary aim of the thesis is to examine short – term FOREX trading strategies for currency pair EUR/USD and based on test results derive recommendations for trading. Secondary, to verify if strategies based on technical and fundamental analysis really working in practice as hypothesis is formulated as follows: There are more forces which can influence exchange rate than just technical and fundamental analysis.

Recommendations will be made based on two main types of analysis – technical analysis and fundamental analysis. Successful approach is combination of both methods.

Analytical part has 3 main parts.

First step of analytical part is to analyse the situation of currency pair EUR/USD between years 1999 and 2010. This analysis will be based on analysis of long - term fundamentals influencing those currencies and on weekly charts for technical analysis.

Second task is to provide short – term forecast for selected currency pair (EUR/USD). By short – term forecast is meant time period between three to five months due to the fact that FOREX market is one of the most volatile markets there is no sense to do any long – term forecasts.

Last part is derivation of trading strategies for EUR/USD currency pair followed by examination of them in practice. Strategies will be tested via demo account in trading software and evaluated in terms of their profitability. Metatrader 4 was chosen as software for trading because it is one of the widest spread trading software.

Methods used for market analysis are following:

Technical and fundamental analyses could be very useful tools for understanding of all financial market. Especially application of technical analysis is same for every financial market. Those two approaches are very different from each other.

Fundamental analysis might be divided into three categories/levels: 1 – Macroeconomic level, 2 – Industrial level and 3 – Microeconomic (business) level. For FOREX market analysis is most important the first one – Macroeconomic as decisions and information on national level influence currencies and their development. From this reason are in this thesis considered only macroeconomic information of both areas (USA and Eurozone). Fundamental analysis is simply looking the value of the security, derivate or currency in this case by studying its components in different financial statements. In the thesis are used both types of fundamental analysis – qualitative and also quantitative. All the quantitative data were gained from Federal Reserve System statistics, European Central Bank statistics, Eurostat and from Bloomberg. And qualitative evaluation of both economies is from different journals, publications and news.

In contrary the technical analysis studies supply and dement on the market and its main goal is to determine future trend by analysing past prices and volumes. Technicians believe that all aspects on the market are already reflected in the price and therefore study charts. To understand the market were invented indicators which provide information regarding trend, range and also could forecast future development. All those kinds are used in this thesis and were applied to the charts via Metatrader 4 software.

Difference is also in timeframe of both analyses whereas fundamental analysis is long-term and technical analysis can study also other periods as minutes, day, weeks etc. From this fact could be derived that fundamental analysis is used for investments (buy because believe that the value will increase) and technical analysis for trading (buy to sell it later for better price).

Last step of the analysis is determination of trading strategies and their evaluation. Strategies are tested based on back-testing theory which simply means strategy testing on historical data. This system can ensure that the strategy will be successful in future but at least can give the first important clue. Goal of back testing might be not only verification of the strategy but also gaining of reliable data for money management or for optimisation of the strategy and last but not least goal is to gain more self-confidence in trading and behaving on the market.

For back-testing is important to set 3 basic parameters at the beginning:

1 – market (in this case currency pair)

2 – timeframe

3 – pattern (system and conditions under what is trade made)

As soon as those parameters are set back-test can start. Some trading programs are able to do the back-test automatically. But in this thesis is used manual approach. That means that all signals (entry and exit) with relevant prices are recorded into Microsoft Excel Sheet and later on calculated profit or loss and other indicators depending on needs of the person who do the analysis (e.g. accumulated profit, percentage share of winning/losing trades, average profit/loss, maximal profit/loss etc.).

3. Literature overview

3.1. Forex market

FOREX stands for International Interbank Foreign Exchange and simply means trading with foreign currencies. ¹

Historical context and development of currencies can also explain their relationship to commodities, from which coins were manufactured.

First mentions about coins come from Western Asia around year 700 BC and they were made from bronze. Other coins from Electrum (natural gold and silver alloy) have their origin in Lydia (today's Western Turkey) around 550-600 BC. Since 300 BC are silver Greek (drachms) and Roman (denarius, quadrans) coins in common use and from 140 BC also Jewish (leptons) ones. Between those currencies exchange rates already existed. For example: 2 Jewish leptons equal 1 Roman quadran. Colonization influenced currencies in many provinces as taxes were usually collected in the currency of colonizing country despite local currency existence.

Each mean of payment was connected to some raw material which they were made from. Most frequently used were gold, silver and bronze. Exchange rates between those commodities were given by administrator, government or by king and this rule was in practice till the end of 19th century. In that times most countries used golden coinage but till half of 20th century. ²

FOREX, as is known nowadays was established in 1973. This market is huge and different from other financial market. It is open 24 hours a day except weekends with expected day turnover around 4 trillion US dollars. FOREX is not centralized exchange so it enables trading of foreign currencies all around the world through computers and internet. It is non-delivery business, currencies are not physically traded but currency contracts. Trading on FOREX was not possible for smaller investors and traders because FOREX's basic unit is lot (1lot = 100 000 units of given currency) which requires enough financial capital. However, today's situation is different. Formation of new participants (investment

¹ HARTMAN Ondřej. Jak se stát forexovým obchodníkem - Naučte se vydělávat na měnových trzích.

² Same source

companies, brokers and others) leads to new trading techniques which enables margin way of trading and so enables dealing with lower volumes and with lower capital (mini lot = 10 000 and micro lots = 1000 units of given currency).³

Market stayed unchanged till 2002 when EURO was introduced as official currency of 12 European countries (European Monetary Union in February 2002) which decided to replace their national currencies. Those countries were: Austria (Schilling), Belgium (Franc), Finland (Markka), France (Franc), Germany (Marc), Greece (Drachma), Ireland (Punt), Italy (Lira), Luxembourg (Franc), Netherlands (Guilder), Portugal (Escudo), Spain (Peseta).⁴

FOREX spot and futures market⁵

Spot market deals with current prices of currencies and enables trading during one single day. However contract could be rolled-over to the next day. Futures markets are not that often used in FOREX compared to commodity trades where contract are due in several months.

3.1.2 Participants on the market

In general could be seen 3 main groups of participants. Each of them plays specific roles on the market:⁶

- Banks
 - Commercial
 - Central
- Brokers
- Customers

Commercial banks are referred to as market makers. They trade every day billions of dollars on the market. These huge volumes not allow them to trade directly with other

³ Forex at eye level – a Quick guide to currency trading.

⁴ ARCHER, Michael D. Getting started with currency trading – winning in today's hottest marketplace

⁵ Same source

⁶ HARTMAN Ondřej. Jak se stát forexovým obchodníkem - Naučte se vydělávat na měnových trzích and Forex at eye level – a Quick guide to currency trading

banks. They set selling and buying prices they are willing to get or pay for given transactions. This process is called creation of market. Among these banks fall for example Citigroup, HSBC, SaxoBank, Deutsche Bank, Easy Forex and others.

Central bank has important role on FOREX market. They control money supply of their countries and take care about country's stability. Other roles of central banks are more or less connected with macroeconomic environment of the country like monetary policy, commercial banks supervision, exchange rates, manage state budget account and manage exchange reserves. Central banks CB are usually owned by state but exception could be found in Switzerland and in United States of America (USA) where are in private ownership.

Brokers intermediate facilitate business between two parties. Brokers are interconnected with banks, financial institutions and also other brokers. They can also participate on market creation and very often broker can offer preferential exchange rates than banks do. On the other hand there is a lot of brokers around the world and choice of the most suitable on could be hard. The biggest brokers are EBS, Reuters, Prebon Mashall Yamane and Intercapital. Successful on-line brokers are ODL Markets, X Trade Brokers, FX Solutions, OANDA, Saxo bank and more others.

Individuals, financial institutions, investment funds, international companies but also businessmen or speculators could be seen as customers in FOREX market. Their role is not as important as role of banks but market couldn't function without them.

3.1.3 Currencies and currency pairs

Business is always carried out through currency pairs. Relationship between currencies in the pair is set by exchange rate. Liquidity of currency pair is given by its importance for global business. US dollar is most frequently traded currency nowadays.

Every pair consists of course of two currencies. The first currency in any pair is base currency and the second one is quote currency sometimes also called pip currency. Exchange rate of currency pair expresses how much the base currency is of value measure

against the quote currency. For example $USD/EUR = 0,75$. Then 0,75 euro is equal to 1 US dollar.⁷

Majors currencies:⁸

Key traded currencies are US Dollar, Euro, British Pound, Swiss Franc and Japanese Yen.

Most liquid and traded pairs are:

- EUR/USD (Euro/US Dollar)
- GBP/USD (British Pound/US Dollar)
- USD/JPY (US Dollar/ Japanese Yen)
- USD/CHF (US Dollar/Swiss Franc)
- USD/CAD (US Dollar/Canadian Dollar)
- AUD/USD (Australian Dollar/US Dollar)
- NZD/USD (New Zealand Dollar/US Dollar)

Minors currencies:⁹

Currencies which are accessible but sometimes with low liquidity are called subsidiary currencies. These are: Norwegian Crown, Danish Crown, Swedish Crown, Australian Dollar, Canadian Dollar, and New Zealand Dollar.

Exotic currencies are those which have low liquidity and are not very often traded for their low demand. Examples of exotic currencies are: New Zloty (Poland), Czech Crown (Czech Republic) or Singapore Dollar.

Cross pairs do not contain US Dollar (EUR/JPY, EUR/GBP, EUR/CHF, GBP/JPY, ...)

⁷ ARCHER, Michael D. Getting started with currency trading – winning in today’s hottest marketplace

⁸ Same source

⁹ HARTMAN Ondřej. Jak se stát forexovým obchodníkem - Naučte se vydělávat na měnových trzích

3.1.4 Leverage effect¹⁰

To be able to trade currency pairs is needed to open an account at the broker. Broker needs margin (collateral or minimal security) to be sure that investor can pay in case of loss.

Leverage effect is essential in FOREX. Leveraging enables to control higher positions with usage of low credit. In reality it means that leverage 100:1 allow trader with € 1 000 margin to operate with amount into € 100 000. Brokers offer different types of leverage from 1:1 to 400:1. But important thing to remember here is that high leverage can bring not only enormous profits but also losses.

3.1.5 Rush on the market – opening hours

FOREX market is active 24 hours a day, 5 days in a week but some differences in volumes traded could be found in different day periods. There are 3 main periods – Asian (Tokyo), European (London) and American (New York). Obviously the highest volumes are traded while particular periods overlap.

Table 1 - opening hours

<i>TIME ZONE</i>	<i>GTM</i>	<i>PRAGUE</i>
<i>Sydney – open</i>	<i>22:00</i>	<i>23:00</i>
<i>Sydney – close</i>	<i>7:00</i>	<i>8:00</i>
<i>Tokyo – open</i>	<i>00:00</i>	<i>01:00</i>
<i>Tokyo – close</i>	<i>09:00</i>	<i>10:00</i>
<i>London – open</i>	<i>08:00</i>	<i>09:00</i>
<i>London – close</i>	<i>17:00</i>	<i>18:00</i>
<i>New York – open</i>	<i>13:00</i>	<i>14:00</i>

¹⁰ BOOKER, Rob. *Advantures of a Currency Trader - A Fable about Trading, Courage, and Doing the Right Thing*

<i>New York – close</i>	22:00	23:00
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(modified based on: HARTMAN Ondřej. Jak se stát forexovým obchodníkem - Naučte se vydělávat na měnových trzích. Vyd. 2. Praha: Fxstreet spol s.r.o. 2009. ISBN 978-80-904418-0-4 (page 34))

From table above could be derived most interesting time periods for Prague time zone:

1. from 01:00 till 08:00 open both markets in Sydney and Tokyo
2. from 09:00 till 10:00 open both markets in Tokyo and London
3. from 14:00 till 18:00 open both markets in London and Ney York

These times are just giving idea about horizons when are most trades done but time of trading always depends on individuals.

3.1.6 Types of orders

Trading could be seen as auction where sellers ASK for higher price and buyers BID for lower price. Traders use three main types of orders:¹¹

- Market order
- Limit order
- Stop order

To be a successful trader is essential to understand these orders and also at least two really basic tactic procedures you will use once you enter the market. These are: ¹²

- One-Cancels-the-others (OCO)
- Cancel-and-replace

¹¹ MARTINEZ, Jared F. The 10 Keys to Succesful Trading – Technical Analysis Application for Currency Markets

¹² Same source

Table 2 - Comparison of three types of orders

	Market orders	Limit orders	Stop orders
Definition	Direct broker to sell or buy at any price is trading at the moment	Direct broker to sell or buy at a certain price or better	Direct to enter/exit market at given price
Enter/exit market	Can be both	Can be both	Can be both
Slippage (YES/NO)	Yes	No	Yes
Notes	Due to slippage can cause loss	To be filled market must trade through specified limit (number)	Usually used as protective tool (against loss)

(modified based on: MARTINEZ, Jared F. The 10 Keys to Successful Trading – Technical Analysis Application for Currency Markets)

Slippage is the difference resulting from sell/buy transaction – difference between the price trader is buying for and the price hi/she saw right prior carrying out the order.¹³

One Cancels the order (OCO)

If trader enters the market there must be some time in future when he/she exits it. He/she should keep thinking about protecting Stop order and also about his/her desired profit.

Desired profit could be expressed via Limit order. Once both orders are placed trader can leave his/her computer without extreme fear. Computer manages Limit or Stop orders and executes one of them while cancelling the opposite one.

¹³ MARTINEZ, Jared F. The 10 Keys to Successful Trading – Technical Analysis Application for Currency Markets

Procedure when exiting open order is cancelled and replaced by a new one is called Cancel/Replace order and is primarily tactics of trading and is used to secure profit and avoid loss. In practice it works like this: for example trader buys euro at 1.2622 and his/her Stop Order is 1.2590. Price goes up in expected direction so it is possible to reduce risk by cancelling Stop Order at 1.2590 and replace it to 1.2622 – the same point as open order and so trade is now without any risk. This process can be used repeatedly until trader is not stopped out.

5.2. Efficient-market hypothesis¹⁴

Theory of efficient-market presumes that prices on financial markets fully reflect all available information. Eugen Fama introduced and developed this hypothesis in 1960s in his dissertation. This theory is used by critics of technical and fundamental analysis very often.

Basic thought if this theory is fact that analysis is of no use because market price is always right and contains all past information and therefore is not possible to find undervalued securities (as an investment possibility).

There are 3 main stages of efficient-market hypothesis:

1 – Weak – prediction based on past development is not possible because there could not be observed any patterns in price moves. Future development forecast based on information have not included in price yet. Outcome from technical analysis would be irrelevant. Fundamental analysis could bring reliable results.

2- Semi-strong – prediction based on newly issued public information. Technical nor fundamental analysis is not possible to use.

3- Strong – price include not only public information but also non-public one and therefore technical analysis, fundamental analysis and also non-public information are useless.

¹⁴ Fama Eugene F. The Journal of Finance, Vol. 25, No. 2, Paper and Proceedings of the Twenty-Eight Annual Meeting of the American Finance Association New York, N.Y. 1969, 383-417

On the other hand Fama did not expect that market could be fully efficient all the time because it took some time for prices to react on information and existence of absolute efficient market is thus imposible.

3.3 Fundamental analysis¹⁵

Fundamental analysis is way how to watch the market through aspects influencing supply and demand. These aspects could be economic, social and politic. More simply could be said that the better is the economic situation of the country the more neighbouring countries believe in its currency.

Assumption of fundamental analysis is based on theory that demand and supply are affected by economic, social and political forces and those forces could be observed in practice and forecasted. Forecasts are made according to studies of relationships between exchange rates and those indicators.

In comparison with technical analysis (will be discussed in following chapter) fundamentals are typically long term. Disadvantage of fundamental analysis is that it does not help to determine exact entry or exit points.

There is enormous amount of indicators which can more or less influence currency prices but primary factors influencing supply and demand of given currency are interest rates and the overall health of an economy.

Interest rates

By interest rates are meant interest rates of central banks. Interest rates highly influence currency market. Generally is valid that country's currency strengthens when country rises its interest rates. Main reason is outflow of assets from country to gain higher profit out.

On the other hand increase in interest rates is bad news for traders on stock market.

Whereas in this scenario country's currency weaken as a result of fact that many investors withdraw money from a country's stock market. Factors affecting which scenario become reality are producer price index, the consumer price index and gross domestic product.

Changes in interest rates are published after regular meetings of central banks (U.S. Federal Reserve, European Central Bank etc.). Terms of meetings are known in advance.

¹⁵ Chapter elaborated from those sources: SMITH, Courtney. How to Make a Living Trading Foreign Exchange - A Guaranteed Income for Life.

HARTMAN Ondřej. Jak se stát forexovým obchodníkem - Naučte se vydělávat na měnových trzích.

Balance of trade

The balance of trade represents difference between country's export and import volumes over a period of time. When imports exceed exports, the trade balance faces deficit. Deficit is considered as negative in case that the deficit is greater than market expectations hence will initialize negative price moves. The opposite situation is when exports exceed imports. Exports are cause of inflow of money to the country and thus increase the value of currency.

Purchasing Power Parity (PPP)

Theory of purchasing power parity assumes that exchange rates between currencies are in equilibrium when the purchasing power in both countries is same. From that implies that exchange rate should be the ratio between countries' price level of fixed basket of goods and services. E.g. if country faces inflation, exchange rate depreciate.

Absolute PPP is based on law of one price. Law of one prices says that two identical products in two countries on competitive market should have equal price (expressed in the same currency) if transportation and other transaction cost are not does not exist. Of course there are objections against this theory:

- Transaction costs, barriers to trade, and other transaction costs can be significant
- Existence of competitive markets in both countries
- It applies only to tradable goods

Relative PPP relates to inflation rates. That implies that difference in inflation rates between foreign and home country is equal to difference in inflation rates. But this theory holds very rarely. But it could at least show the direction of moves.

Problem with PPP is comparability between countries due to different set of goods and services.

Gross Domestic Product (GDP)

GDP represents total economic output produced within one country by both foreign and domestic producers. GDP represents the broadest indicator of total market value and growth. To be comparable among countries GDP is required to be converted into:

- a) Exchange rates dominating on international currency market
- b) Purchasing power parity (PPP) of each currency in relation to selected standard

Intervention

Intervention simply means forced change in prices, exchange rates etc evoked by financial institution or an official regulatory body. Currencies are manipulated mainly by imports and exports and by re-evaluation, devaluation.

OTHER ECONOMIC INDICATORS

Those indicators are less important for FOREX market and thus are not explained into details but should be at least mentioned.

Gross National Product (GNP) – representing total output produced by one nation (e.g. Americans, French) no matter in which country.

Consumption Spending

Investment Spending

Government spending

Industrial indicators

Industrial production – monitor change in the production in factories, mines etc.

Capacity utilization – how many available resources are being used.

Durable goods orders – durable goods are those that last over three years. This indicator count new orders for immediate and future delivery of factory hard goods.

Civil engineering indicators

Newly started housing construction and accordance of building licence – issued around middle of each month. Housing is first sector reacting on changes in interest rates.

Sales of new and existing family houses

Investment into civil engineering

Fiscal policy – influence economy by changes in level and structure of public expenditures and taxes

Monetary policy – regulations made by central banks

Inflation

Inflation is one the most watched indicators.

Producer price index (PPI) – monitor average selling price change received by domestic producers (in manufacturing, mining, agricultural and electric utilities industry). Analyzed are finished, intermediate and crude goods.

Consumer price index (CPI) – observes average price change of product and serviced Purchased by households

Employment indicators

Because it is obvious that high unemployment rate is not signal of healthy economy there is not special need to explain individual reports. See bellow list of factors which might be important when observing unemployment:

Employment reports

Employment cost index (ECI) – payroll expenditures (issued quarterly)

Retail sales

Consumer confidence

Motor vehicle sales

Personal income

3.4 Technical analysis¹⁶

Technical and fundamental analysis are very different but could be very useful forecasting tools for FOREX market. Successful approach is combination of both methods.

Technical analysis is simply studying of charts. Charts represent past price moves. Technical analysis focus on what has happened rather than what should happen (this is fundamental analysis). Technical analysis do not take into consideration fundamental factors and deals only with price action. Technicians assumes that all affecting factors are already included in price. Upon technical analysis could be predicted directions, trend or buy/sell signals. In contrary with fundamental analysis is technical analysis used mainly for short-term predictions and price-specific information.

Technical analysis works upon three main principles:

1. Price reflects everything what could affect it and is known to the market.
2. Existence of trends and patterns. Pattern could be identified and some of them repeat themselves on a consistent basis. If trend or pattern is correctly recognized it is possible to make predictions.
3. History repeats itself. Patterns worked well in the past so it is expected to work in the future too. It changed a bit over the time due to changes in human psychology.

Disadvantage of technical analysis is fact, that history does not exactly repeat itself therefore it is impossible to expect repetition of patterns. This fact gives trader some space for own interpretation and judgements but also space for error in analysis outcomes simultaneously. Next problem could be huge information analysis base. Understanding and application of all accessible information, methods and indicators is not easy at all. In addition some indicators could be delayed or bring false signals which could negatively influence results of analysis.

¹⁶ Chapter elaborated from those sources: ARCHER, Michael D. and BICKFORD, James Lauren. The Forex Chartist Companion - A Visual Approach to Technical Analysis. New Jersey: John Wiley & sons, Inc. 1st ed. 2007. New Jersey: John Wiley & sons, Inc., STEVENS, Leigh. Essential technical analysis - Tools and Techniques to Spot Market Trends. New Jersey: John Wiley & sons, Inc. 2008. ISBN 0-471-15279-X

3.4.1. Trend theory

Every market has two basic trends. Market which increases is called bullish market or uptrend. Whereas decreasing market is called bearish market or downtrend. If trader goes with trend (in the same direction), he/she gains if in opposite direction, he/she loses.

Uptrend is divided into several growing sections. Each section has its high (top) and low (bottom). In order to be market moves are considered as uptrend, high (top) of each following section must be on higher level than high (top) of previous part and each low (bottom) must be higher than the previous one.

Downtrend is divided into declining sections. In order to be market moves are considered as downtrend, low (bottom) of each following section must be lower than the low in the previous part and each high (top) must be lower than the previous one.

Interest rates moves consist of three main trend components:

1. Primary trend – is the main market trend and is influencing market movements. It usually takes between one and three years.
2. Secondary trend – has lower influence than primary trend. It is fluctuation of rate in length between three months and one year.
3. Minor trend – is short-term fluctuation shorter than three months

3.4.2. Types of charts

Chart is the main tool of trader as technical analysis is based on observation of price moves in history. Each chart represents price on vertical axis and time on horizontal axis. Technical charts consider BID price.

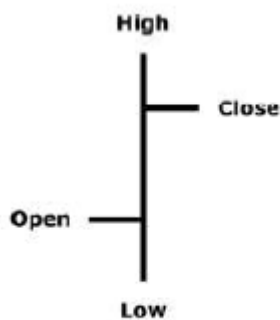
Line charts

The most simple chart joining end prices of each time moment.

Bar chart

Bar charts are one of the most often used types for their easy construction and understanding. Each bar represents intraday, daily, weekly or monthly activity. Bar consist of 4 prices: OPEN, CLOSE, HIGH and LOW.

Picture 1 – General bar



(Own creation based on: ARCHER, Michael D. and BICKFORD, James Lauren. The Forex Chartist Companion - A Visual Approach to Technical Analysis..)

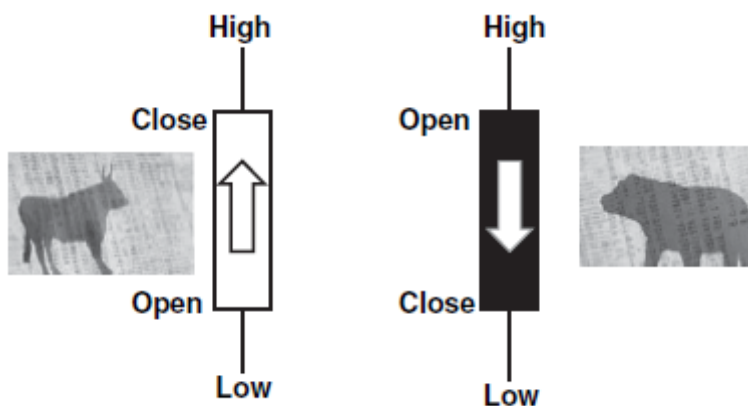
OPEN price represents opening price and is situated on the left side of the bar. CLOSE price is price where market was closed and is placed on the right side of the bar. HIGH is the highest price during set time interval. LOW is the lowest price during set time interval.

Candlestick chart

This type of chart originated from Japan in 17th century. Candlesticks provide detailed outlook in psychology of market participants. Therefore they are used mainly in short-term trading where psychology of buyers and sellers is definitely the most important influential.

Candles shows the price fluctuations and can represent any period of time. It gives to trader four important information – simply the same as do bars in bar charts but from candlestick chart is trader able to more easily determine direction of moves. Picture below shows difference between the bullish pattern candle and the bearish pattern candle.

Picture 2 - Candle stick



(Source: ARCHER, Michael D. and BICKFORD, James Lauren. The Forex Chartist Companion - A Visual Approach to Technical Analysis..)

3.4.3. Technical indicators

Technical analysis is not only about charting but there is also numerous indicators which may generate buy and sell signals and help to determine complete trading strategy and system. They use primary information of open, high, low or close prices. Indicators also could be drawn in charts but they only complement what is already visible in the chart in terms of price. There exist a lot of technical indicators but in this theses are mentioned only those recommended in literature sources and also by experts.

Types of technical indicators:

- **Trend indicators** – trend following indicators are used to identify direction of trend. They are usually based on moving averages. Disadvantage of these indicators is their delay. They should be used only for trend markets otherwise in non-trend periods they should send wrong signals.
 - Simple Moving Average (SMA), Exponential Moving Average (EMA), Moving average convergence/divergence (MACD), Bollinger Bands, Parabolic SAR (stop and reverse indicator), Average Directional Movement Index (ADX)
- **Oscillators** – this group of indicators determine strength and speed of price movements of given currency pair and its change. In comparison to trend indicators they go before price moves. Oscillators offer higher profits relatively to higher risks. They measure how “overbought” or “oversold” the price is. Basic presumption is that the price of “overbought” or “oversold” currency pair is going to drive back.
 - Relative Strength Index (RSI), Stochastic, Commodity Channel Index (CCI), Williams %R
- **Predicting indicators** – most of markets, especially FOREX and futures tend to progress in repeating intervals. From this reason exist predicting indicators.
 - Pivot Points, Fibonacci

Divergence

Divergence is concept in technical analysis which is very often used. Some indicators are delayed or inexact but thanks to divergences they could give useful and important output about development of trend.

Divergences are simply disharmony (difference in development) between price and indicator. Bullish divergence is called divergence where indicator increases but price decreases. Bearish divergence means that indicator falls but price goes up.

Bearish divergence signals early price reversion in downward direction and vice-versa for bullish divergence.

Concept of divergences is valid in all time zones and with all charts. But divergence must appear at the same time in price chart as well as in indicator chart. Tops and bottoms of indicator and price must correspond too.

Divergences do not give signals for entry or exit but primarily indicates possible changes in trend but in combination with other tools of technical analysis can increase the probability of success with relatively lower risk.

Simple moving average (SMA)

Type: trend indicator

Moving averages are based on mathematic comparison of prices and therefore subjectivity is significantly suppressed. Simple moving average construct a line from which is evident on a first view if prices are in trend or not. Moving average is simple average price value for a given period. SMA is usually calculated from close prices. For daily charts are used 10, 12, 15, 20,30 or 40 days SMA periods. For weekly chart is could be 100 or 200 days SMA period.



(Source: own illustration, created in Metatrader 4)

Calculation: $MA = (P1 + Pn) / n$

Pn – close price of n^{th} interval (days), n = number of unit in interval (days)

How to trade:

Signal to sell (short position) is if price intersect SMA in the direction down (price is below SMA line). Opposite situation is when price intersect SMA in the direction up (price is above SMA line). Then it is considered as signal to buy (long position). Important thing to remember is SMA's delay and therefore also buy and sell signals are delayed too. And also another fact that SMA is not working well in non-trend periods.

Exponential moving average (EMA)

Type: Trend indicator

Exponential moving average is used because SMA has one important disadvantage. SMA sensitively react on tops of trends. EMA gives higher importance to the latest units of given time period. EMA is also faster than SMA but on the other hand is more susceptible to providing false signals.

Picture 4 - Exponential moving average (EMA)



(Source: own illustration, created in Metatrader 4)

How to trade:

Utilization of EMA is same as of SMA. Signal to sell (short position) is if price intersect SMA in the direction down (price is below SMA line). Opposite situation is when price intersect SMA in the direction up (price is above SMA line). Then it is considered as signal to buy (long position).

Moving Average Convergence/Divergence (MACD)

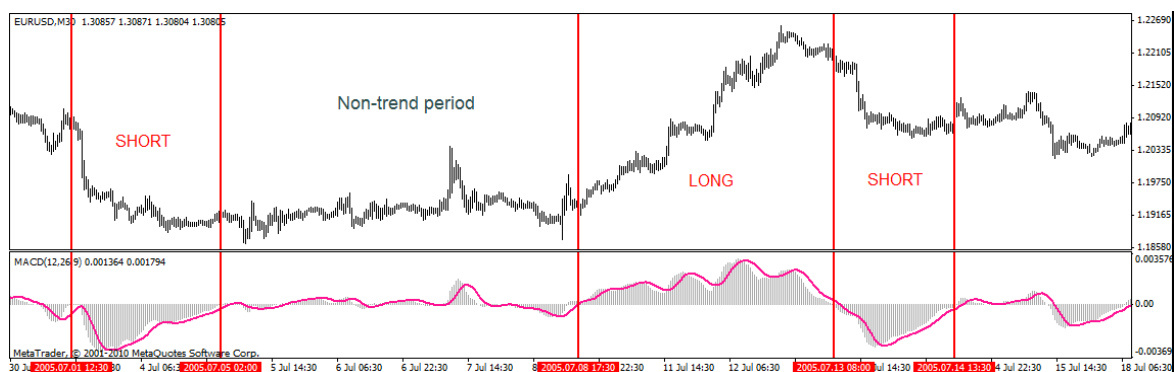
Type: Trend indicator

MACD was introduced by Gerald Apple and is one of the most popular indicators. MACD is visible as histogram representing relationship between two moving averages and prices. It is most effective on trend markets and main utilization of MACD is divergence and interception. Both moving averages have different speed. Faster moving average react faster than slower moving average (signal curve). When new trend is introduced, faster curve will soon cross signal curve. Then faster curve again turn away from slow curve and histogram increases. This is signal of strong trend. MACD is very reliable indicator but is relatively slow and delayed (based on moving averages). Price development could be considered as bullish when MACD is higher than zero and bearish when it is lower than zero. For long-term traders is MACD very useful conforming indicator.

How to trade:

Interception – basic rule is to sell when MACD is below its signal curve and buy when MACD is above it. Or other popular way is to sell when MACD is below zero (negative values) and buy above zero (positive values).

Picture 5 - Moving Average Convergence/Divergence (MACD)



(Source: own illustration, created in Metatrader 4)

Divergence – when MACD curve diverge (deviate) from moves of currency pair it is signal for nearing end of trend. Bear divergence means that MACD creates new low but price fails to reach new low. Bullish divergence means that MACD creates new high but a price fails to reach new high.

Parabolic SAR (stop and reverse indicator)

This indicator was developed by J. Welles Wilder. Whole principle of this indicator lies in observation of trend development a placing automatic trailing stops. Utilization of this indicator is permanent which in this case means as soon as indicator signals end of trade simultaneously signals opposite position and entry into reverse trend direction (in case of long position – SAR indicates stop, trader exits long position and at the same time opens short position). SAR is demonstrated by points or dots and is simple to interpret because it assumes that price either increases or decreases. SAR provides reliable results in trend markets (periods).

Picture 6 - Parabolic Stop and Reverse Indicator (PSAR)



(Source: own illustration, created in Metatrader 4)

How to trade:

Opening of new position is result of price moves going through predetermined value of Parabolic trailing stop. This value appears in chart always above (downtrend) or below (uptrend) particular points and represents stop-loss for following interval.

Relative Strength Index (RSI)

Type: oscillator

This oscillator is very popular among professional traders and is very often used. RSI defines overbought and oversold areas and has range from 0 to 100. It also helps to certify trend formation. Uptrend should give values of RSI over 50 and downtrend under 50. Value exceeding 70 indicates overbought area and values under-riding 30 oversold market. RSI is based only in close prices.

Picture 7 - Relative Strength Index (RSI)



(Source: own illustration, created in Metatrader 4)

How to trade:

In oversold areas trader enter long positions and vice-versa (overbought areas lead to short positions). Other way how to trade according RSI is divergence monitoring. Divergence indicates soon reversion on the market.

Stochastic

Type: oscillator

Indicator was invented by American George Lane and is very often used on FOREX markers. It is mainly used to find place where trend might end. Of course stochastic also allocates overbought and oversold areas. It has two curves %K and %D with different speed. %D is always the slower one (smoothed). Values are expressed in percentages so

stochastic has range 0-100%. In comparison with RSI is stochastic not using only close price but also trade range of past periods.

Picture 8 - Stochastic



(Source: own illustration, created in Metatrader 4)

How to trade:

- 1 – Buy when market is oversold (<30) and sell when market is overbought (>70).
- 2 – Buy when %K exceeds %D and vice-versa.
- 3 – Look for divergences.

Fibonacci

Type: predicting indicator

Fibonacci is well known for more than 800 years and is one of the most popular and useful tools. Its creator is mathematician Leonardo Pisano who wrote many mathematic pieces and also make discovery that many thing around us are based on golden ratio. This ratio is $1 : 1.618$. Well known is also Fibonacci progression (0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233,) where every following number is sum of two preceding numbers.

The most well known Fibonacci tools are:

- Fibonacci Retracement
- Fibonacci Expansion
- Fibonacci Arcs

- Fibonacci Fans
- Fibonacci time zones

How to trade:

In financial and exchange world has Fibonacci progression long tradition and is part of every trading software.

Principle is very simple when price advances toward level resulting from Fibonacci progression, trend change of temporary price reversal.

Table 3 Most important Fibonacci levels:

0.236	23.6%
0.382	38.2%
0.5	50.0%
0.618	61.8%
0.786	78.6%
1.27	127.0%
1.618	161.8%
2.618	261.8%

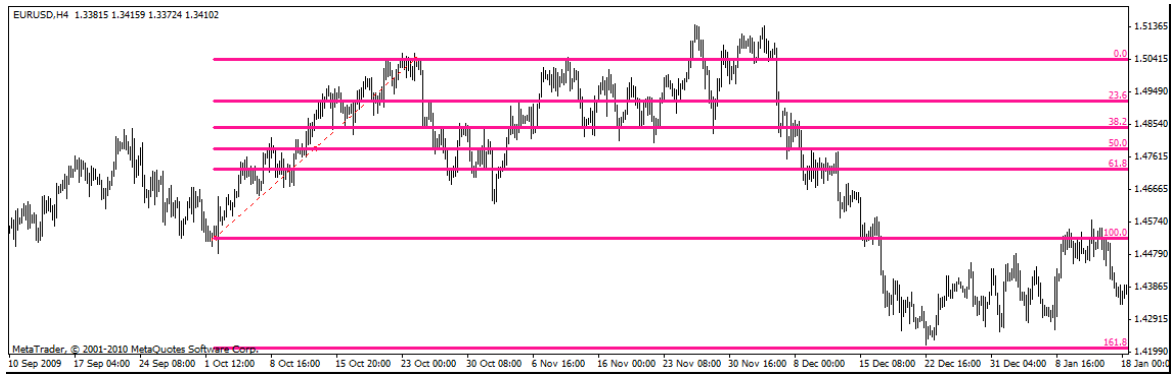
(Source: ARCHER, Michael D. and BICKFORD, James Lauren. The Forex Chartist Companion - A Visual Approach to Technical Analysis. New Jersey: John Wiley & sons, Inc. 1st ed. 2007. New Jersey: John Wiley & sons, Inc.)

Fibonacci Retracement – is the most important and the most used Fibonacci tool and shows possible level of support and resistance.

Levels 23.6%, 38.2%, 50% and 61.8% are the most important levels of retrace price moves. Fibonacci levels 100%, 161,8% and 261,8% are used by several traders as a possible target price level.

Main point is that Uptrend or Downtrend market revise in predictable corrections (go in opposite direction) and then price again rises or falls.

Picture 9 - Fibonacci retracement



(source: own illustration, created in Metatrader 4)

Application in practice:

In UPTREND is good to enter LONG position while retrace move towards Fibonacci support levels.

In DOWNTREND is good to enter SHORT position while retrace move towards Fibonacci resistance levels.

As the strongest level and also most often used retracement is considered level 50% which is also big psychological level. And traders make business with assumption that many traders put their orders on this level and therefore price will reach it. From this could be seen that other application of Fibonacci Retracement is in placing **Profit targets**.

4. Results

This part of the thesis contains own analysis.

4.1 Fundamental analysis currency pair EUR/USD between 1999 – 2010

In this part of my thesis I try to sum up all aspects which can influence development of exchange rates. In this long-term market analysis I consider fundamental factors, other relevant events and also technical analysis.

Development of currency pair EUR/USD has not long history since euro was introduced as late as in 1999 and distributed since 2002. It could be divided into 5 periods:

- 1999 – 2001: euro already traded but not in the cash form
- 2002 – 2004: consolidation
- 2005: correction period
- 2006 – 2008: period of growth and peak
- 2009 – 2010: very volatile and uncertain period without any primary trend

Period 1999 – 2001¹⁷

Right before euro's introduction analytics were afraid about its appreciation which could have negative effect on euro zone's economy. In first years of its existence euro weaken against more currencies but most significantly with US dollar.

This depreciation led to higher volumes of European exports and improvement of overall economic situation especially in year 2000. Despite first positive perception of depreciation anxiety gradually appears among euro zone due to the fear of inflation pressure and incompatibility between development of fundamental factors and development of exchange rate. In second half of year 2000 Eurozone records higher GDP growth than USA and exchange rate differential gradually cut down. Despite those facts euro kept its depreciable trend. Possible reasons could be:^{18 19 20 21}

¹⁷ [23]

¹⁸ [26]

¹⁹ [7]

- growing price of crude oil – very sensitive for demand for USD because most business with crude oil are made in this currency
- relatively high taxes in European states
- rigid European markets
- mistrust toward ECB – insufficient communication on the part of central bank

In spring 2000 ECB made intervention steps²² but without any significant improvement in terms of prosperity for euro. But in September the same year ECB announced joint intervention with United States and Japan.²³ Reason of this common strategy was fear of effects of euro's depreciation on world economy. Purchase of about 6 billion euro²⁴ cause immediate appreciation of euro and EUR/USD exchange rate reach again original level.

Change in trend development started at the end of year 2000 when euro strengthen against American dollar probably due to unfavourable results in last quarter (in spite of slower GDP growth).

Year 2001 could be sum up as a year with changeable and variable development. States faced recession in that time and that is why FED started to lower interest rates²⁵ in an effort to support local economical growth. Interest rates in USA got under the European ones.

To sum up this period could be said that euro was seen as incomplete currency till introduction of own paper money and coins.

Period 2002 – 2004

With year 2002 started distribution of euro among all states of Eurozone and euro then finally became full-valued currency. Euro then recorded continuous appreciation for

²⁰ [17]

²¹ [27]

²² [10]

²³ [14]

²⁴ [23]

²⁵ [12]

almost next three years. In that times euro was expected to struggle against dollar for dominant position in the world.

Situation in both countries was following:²⁶

- interest rates were higher in Eurozone till October 2004
- inflation rate was nearly similar (not more than 1%)
- for the whole period was GDP growth faster in USA
- current account in Eurozone was in surplus, in USA in deficit
- dollar's share in world's reserves declined while euro's increased

As could be seen here some indicators were in favour of USA and some in favour of Eurozone and that implies that trend cannot be explained just based on fundamental analysis. Let's look at some other important events that happened in this period.

In 2003 John Snow, US treasury secretary, surprised FOREX market by his statements. He enforced change from “strong-dollar policy” to more stable and reliable “sound-dollar policy”²⁷ which caused uncertainty of investors in future development of US currency. In the same period of time (2003) USA noted record housing sales as a result of significant decrease in mortgage interest rates.

In March the same year United States started invasion of Iraq. This step caused another uncertainty due to unknown duration of conflict, its capital intensity and how this would influence international political and economic relations.

European Union was preparing for the biggest single enlargement of 10 new member states²⁸, mainly from central and Eastern Europe. Since year 2004 EU had already 25 members (EU 25) but soon preceded elections to the European Parliament pointed out to growing euro-sceptic attitudes. In autumn 2004 were also accepted final changes in the European Constitution.

²⁶[8]

²⁷ [1]

²⁸ Czech republic, Slovak republic, Poland, Hungary, Estonia, Lithuania, Latvia, Cyprus, Malta and Slovenia

In USA was re-elected republican candidate George Bush in November 2004.²⁹ This evoked expectations that government was going to continue in expansive monetary policy which included also lowering of taxes in order to support economic growth.

Year 2005

During year 2005 expected turnover occurred – dollar appreciated by approximately 15%. Stronger dollar influenced also development EUR/USD exchange rate which declined by more than 10%. Reasons could be found in economic outcomes from the beginning of 2005:

- USA:
 - expected relatively high GDP growth and relatively low interest rate
 - Positive interest rate differential
 - Record-breaking inflow of foreign capital into US
- EU in opposite situation:
 - Uncertainty in Eurozone

FED gradually increased official interest rates from 2.25% to 4.25%. ECB increased too from 2.00% to 2.25% in December.³⁰

Dollar growth was result of record inflow of foreign capital which was caused by tax holidays announced by Congress.³¹

Uncertainty in the EU helped reinforce the dollar. Sceptical discussions about future of the EU started right after French and Dutch refusal of the European constitution (in referendum). In addition to that elections in Germany did not improve the situation. It was not expected that big Merkel's and Schroeder's coalition could finish needed economic reforms. This political situation had negative influence on euro's exchange rate development.

²⁹ [2]

³⁰ Bloomberg

³¹ [21]

But not only positive events happened in USA, the dollar was influenced also by those factors:

- Record trade deficit in September
- Differentiation of national reserves (in past more or less dollar reserves)
- Hurricane Katrina boost crude oil prices to the long-term maximum

Trade deficit in September (66 billion USD) was unexpected but understandable due hurricane Katrina, high prices of crude oil and also strike in Boeing company. On the other hand this deficit was compensated by enormous foreign capital inflow (110 billion USD) at the same time. Weak dollar pushed prices of domestic products down to keep them competitive with imported goods.

Hurricane Katrina had direct effects in form of lost productivity in disaster area and therefore high prices of commodities.

During year 2005 central banks of South Korea, Russia and Japan announced diversification of monetary reserves. But Japan, the biggest holder of world monetary reserves in that time, denied this information soon.³²

After many years of Alan Greenspan's presidency was appointed new chief of Federal Reserve system, Ben Bernanke. Since Bernanke's economic attitude is quite different from his predecessor one, changes were expected.³³ First of all was expected that his focus would be on ensuring economic growth rather than fight against inflation. Expectations were simple - interest rates would not rise that much as in previous years but respectively inflation rate could be high.

Period 2006 – first half of 2008

In 2006 development of currency pair EUR/USD completely changed and euro appreciated against dollar. This progress could be accredited to lower interest rate

³² [9]

³³ [4]

differential and announcements from several countries about diversification of their monetary reserves recently.

Interest rate differential declined from 2% to 1.6% but stayed positive for USA. While ECB gradually increased rates FED kept them on the same level (5.25%) due to slow economic growth.³⁴ Lower differential between European and American economy encourage and facilitate decisions of central banks of many countries to allocate their monetary reserves. For example in November 2006 president of Chinese central bank confirmed that China would continue in diversification. Although he did not specified which currencies would be in their interest, euro would profit from this step (according to IMF statistics is China the biggest holder of monetary reserves since March 2006 – in September 2010 their reserves were 2 648 billion USD).

According to GDP growth data from august could be expected that USA were probably facing recession. Due to rapidly growing prices of energy also sudden boost of inflation occurred in USA. Whereas news from EU were positive. European economy grew and higher growth of GDP and decrease of inflation and unemployment showed evidence of that. ³⁵

2007

At the beginning of 2007 International Capital Market Association publicised data regarding amount of bank-notes in circulation, for the first time amount of European bank-notes was high than American ones. ³⁶

At the same time first mentions about housing bubble in USA (real estate crisis) came up. Troubles with paying back loans were higher and higher and led to decrease in consumption. And FED was forced to dramatically lower interest rates to avoid recession.³⁷ Problems with pay back of loans influenced not just citizens but financial institutions which had to deal with risky credits and this pushed prices of estate down.

³⁴ Bloomberg

³⁵ [35]

³⁶ [25]

³⁷ Bloomberg

Panic was enhanced by information which in firm quality of portfolios connected with warranty of mortgages and news about bank and fund losses connected with investments which was covered by American mortgages. Investors immediately asked for high quality valuables e.g. governmental bonds. Boost of interest rates and risk premiums caused spiral effect of firm bankrupts mainly from sectors connected with mortgage banking system, estate development and risk capital. Crisis spread from relatively small sector to whole American economy and then in consequence of strong interconnection among financial markets also to the whole world. Dollar due to this crisis faced very bad year and several times broke its minimum not only against euro but also against other world currencies.

2008

European economy was more dynamic and more and more investors change their focus from dollar to euro and prefer riskless valuables or trade more with real assets (prices of crude oil or gold recorded long-term increasing trend). Euro broke record by record and kept very strong position.

Very strong euro had not only positive effects but on the other hand endanger competitiveness of European exporters and also overall economic growth. ECB was interested in stopping fast euro's enforcement. FED could have helped this situation but in US they had troubles with own economy at the same time. Interest rates were lowered (from 2.25% to 2%) due to last year events and to support struggling economy. But from the other perspective this step put at risk of increasing inflation. *"I do not expect the recent elevated inflation rates to persist. In my view, the adverse dynamics of the financial markets and the economy have presented the greater threat to economic welfare in the United States."*³⁸ refuted this fear Donald Kohn (vice-chairman of FED) in his speech.

Coordinated interventions could solve the problem as it did in September 2000 or another possibility was decrease of interest rates by ECB which would have led to weakening of euro. Eurozone also faced problems with inflation which recorded 3.6%³⁹ in March 2008.

³⁸ [29]

³⁹ Bloomberg

Lowering of interest rates was not probable due to strong anti-inflation ECB's policy which wanted to keep inflation up to 2% level.

As a proof of increasing importance of euro on world market could be seen the decision of Iran and Venezuela to do not trade crude oil for American dollars but only for euro of Japanese yen to limit the dependence on weak dollar. And also problems with Iran and following violations Iraq and Turkey caused prices of oil quickly went up⁴⁰ and therefore dollar went down. This inverse relationship between those two commodities is derived from their negative correlation.

In July 2008 raised first mentions about possible government bailout. But despite this expectation dollar fell more and more. 26th September finally bailout \$1 Trillion covered (\$700 Billion to buy faltering mortgages).⁴¹ The negative impact of this bailout were calmed down prices of commodities and very high inflation. FED lowered interest rates gradually during the year to avoid complete financial breakdown.

In Europe was central banks in different position and rather prevented economies against recession then fight with inflation.⁴²

At the end of year FED spent around 7 trillion USD to ease effects of crisis and inhibit recession. This enormous amount had to be repaid by newly printed money⁴³ which caused tremendous inflation.

What is important to remember from year 2008 is that dollar was considered as safe heaven and still attract many investors despite fundamentals didn't give positive view on dollar.

⁴⁰ [32]

⁴¹ [20]

⁴² [37]

⁴³ [6]

Period 2009 and 2010

Last two years were full information regarding USA credit crisis and later on European debt crisis. Those crises caused currencies (dollar and euro) to fluctuated without any certain points or within in specific trend. Due to overmuch information or events announced in this time is very difficult to find what is more or less important but I tried to pick up the most important factors to not overload reader with little things.

2009

Forex markets reacted very significantly to FED's plan to buy US government bonds in value over 1 trillion USD. ⁴⁴ Dollar fell down but euro on the other hand recorded very strong week at the beginning of year.

First quarter showed decline in industrial production by 1.4%, foreign investments in US are on its minimum since year 2007 ⁴⁵ and dollar is not suffering only from economic output of the country but also from the inflation risk. First positive news for dollar was lowering of US trade deficit which helped enforce dollar. In those times of crises also psychological factors drived the development of currency and with increasing corporate profitability (mainly in consumer goods, automotive vehicles, food and beverages) weaken the dollar due to decreasing risks are investors looking for other possibilities with higher yields.

The biggest problem of second and third quarter in US was deflation caused by still increasing government borrowing, FED's qualitative easing (printing new money) and decrease in production of many firms. ⁴⁶ Deflation is very bad for overall economy and at the same time also for the local currency. Customers do not buy a lot as they expect prices to fall down.

European economy was not doing good too but euro kept strong position in first two quarters and broke up important psychological barrier 1.40 USD. Euro is considered as risk

⁴⁴ [30]

⁴⁵ [11]

⁴⁶ [22]

bet currency. Because in that times world already perceived market less risky and more stable, euro gain from this situation.

ECB in the middle of year kept interests rates on 1% level and rather played the role of inflation and price stability guard than took care about economic growth.

Huge demand for US Treasury securities from foreigner caused extremely high capital inflows (net capital inflow 23.2 Billion USD).⁴⁷ US Treasury securities were still very popular despite their low yields. In August dollar enforced thanks to US increased housing reports (increased 3.6% in June compared to 0.8% in May)⁴⁸ which might be a good signal of recession easement.

First bad news about situation in Eurozone came already at the beginning of second half of year. Current trade deficit of Spain, Portugal, Italy, Ireland and Greece exceed 10% of GDP and resulted in high inflation and consequently in lower purchasing power parity⁴⁹ which all together weaken the currency (euro). The worst data were coming from unemployment, 9.4% (Eurostat) is the highest rate in last ten years, and influence overall economic performance of Eurozone (Eurostat reported change in GDP – quarterly, eurozone: -0.1% but Germany and France both 0.3%): *“Growth is not going to get where it needs to be to the point where companies do not have to fire their surplus workers,”* said Julian Callow, the chief European economist at Barclays Capital.⁵⁰

December brought finally proves that US economy overcame the recession and FED prepared to tightening of monetary policy. Dollar fell as a result of expectations that FED was going to higher interest rates and stable economic situation⁵¹ (negative correlation of dollar and risk).

At the end of year the biggest issue for Eurozone started, Greece debt crisis. At the end of November after change of Greek government was announced government deficit 12% of

⁴⁷ [39]

⁴⁸ [41]

⁴⁹ [36]

⁵⁰ [13]

⁵¹ [3]

GDP.⁵² ECB was not prepared for such a situation which multiplied uncertainty and fear of investors.

2010

With beginning of new year new positive expectations and believes after world financial crisis caused many countries decided to diversify (move away from US dollar) their foreign exchange reserves due to dollar's problems and to keep their reserves well-balanced (for successful risk management). And even industrialized big country as Canada for sure is, decided to denominate foreign currency bonds in euro of value around 1 billion USD.⁵³ But the key player in this game is China (with the biggest forex reserves in the world) every decision of China would significantly influence dollar.

In comparison with previous year prices in US again increased in 2010 due to couple reasons:

- Qualitative easing – almost 1 trillion USD and still in circulation
- Growing budget deficit with unfunded liabilities

January 2010 prime minister of Greece George Papandreou rejected to show their records. EU was planning bailout. Bailout of almost \$1 Trillion to support Eurozone's situation was issued in May 2010.⁵⁴

Euro kept in uncertain development due to several factors during whole year: On 6th May ECB announced refusal of quantitative easing to help overcome crisis. Many doubts about common European currency due to different fiscal policy, different productivity levels among countries and ECB's main common goal is just to maintain low inflation. In the same time Spain lost it AAA rating (got AA+)⁵⁵ and Euro went significantly down from all above mentioned reasons.

⁵² [28]

⁵³ [42]

⁵⁴ [19]

⁵⁵ [5]

In May EU finally established fund called Special Purpose Vehicle with value of 750 Billion EURO. Whole amount should be financed by individual countries of Eurozone and of course IMF and European commission will contribute in certain amount.⁵⁶ Euro gain against dollar but only for very short period and soon returned to the almost same level as was before the bailout. Not even bureaucrats and politicians could not find many positives on this bailout: *"It was crucial to stop the panic, and this package has done it, but it doesn't solve the longer-term problems which are slowly undermining the value of the euro,"*⁵⁷ kMr. Annunziata, chief economist for UniCredit. And even more could the bailout create bad example for other countries which might behave in the same way because they would expected to be saved as well. Greece debt crisis still continued and even more expanded to whole Europe and euro was losing against dollar more and more. Especially Spain's and Portugal's dept situation was the most serious but those countries were enough strong to master this situation without any financial help from European institutions. From EU and IMF Greece received 160 billion USD aid pack and Greece started with rescue steps as wage cuts, tax hikes to be able to repay its budget deficit.⁵⁸ After announcement of Greek bankruptcy investors kept to doubt against euro more than ever before.

Despite expectations of observers ECB did not intervene in order to save euro's position. Jean – Claude Trichet, president of ECB denied fears about weak euro right after euro's four-year low against US dollar on 18. 5. 2010: *"Let us be clear, it is not the euro that is in danger, but the fiscal policy of some countries that has to be, and is being, addressed."*⁵⁹

US recovery from last crisis is visible but slow. However household spending is growing, high unemployment and slowly increasing income are still problems. As positive I regard that FED reported a slowing inflation⁶⁰ which disconfirm continuous fear of deflation.

GDP growth of Eurozone and the rest of the World are very different and thus is euro considered as risk currency.⁶¹ Euro was still declining which helped development of "currency wars". Basically it means that most central banks were fighting together to

⁵⁶ [34]

⁵⁷ [18]

⁵⁸ []

⁵⁹ [33]

⁶⁰ [16]

⁶¹ [24]

devalue their currencies. Where on the opposite side was ECB which was forcing all other currencies down (pushing euro up).

Very important is that help for Greece (140 billion EUR) is due only for three years and once it expires fiscal problems of Greece might arise again. Therefore any positive development of euro could not be expected. But with the end of year came also positive news from Eurozone: ⁶²

- Dimmed inflation
- Stable economic growth
- ECB still pushed euro up

At the end of November Ireland had to accept financial aid (of 90 billion USD) from EU and IMF. ⁶³ Ireland according to Eurostat recorded public deficit of 32% of their GDP. And simultaneously first theories about possibility that Portugal would be the next country asking for bailout come up. Problems of so called PIGS (Portugal, Ireland, Greece, Spain) countries are the biggest threats for euro. Spain was working hard to lower its deficit and have not need any special assistance from the EU. ⁶⁴ Portugal and Ireland are in the most serious situation and ECS was supporting them in terms of buying their government bonds. ⁶⁵

Future of the euro development is now very dependent on current situation in Eurozone and possible bankruptcies of countries affected by deficit crisis. This situation really enforces not only ECB but also governments of all EU countries about stability and strength of common European currency. This for sure could be the reason why few countries postpone their accession to the Eurozone.

⁶² [40]

⁶³ [15]

⁶⁴ [38]

⁶⁵ [31]

4.2. Technical analysis of currency pair EUR/USD 1999 - 2011 (February)

Technical analysis studies charts. Chartists believe that all aspects that can influence price are already included in it and therefore focus rather on what happened than why it has happened.

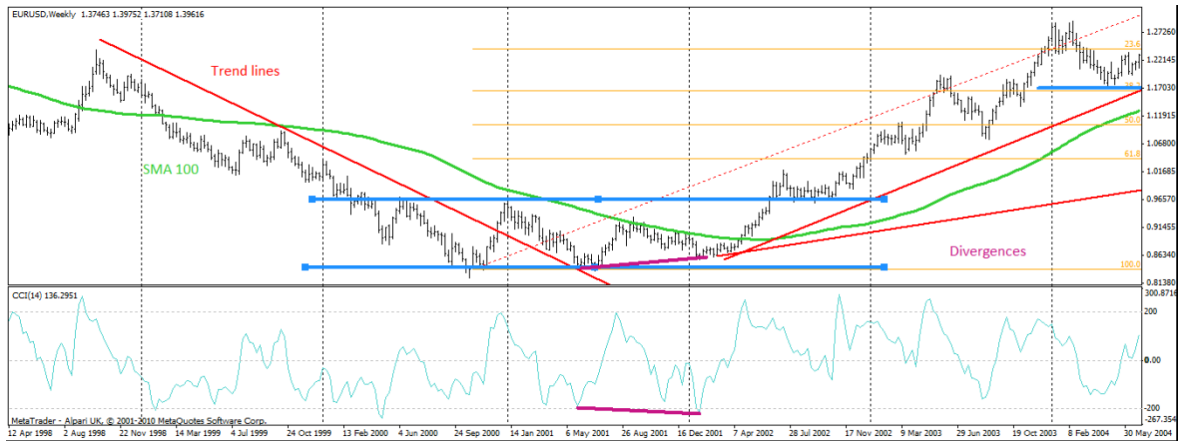
Chart 1 – EUR/USD overview from 1999 to February 2011 [weekly]



(Source: own creation, Metatrader 4)

Bar chart above represents pair EUR/USD development overview from introduction of common European currency till present time (February 2011). Each bar represents one week. As analytical tools are used the most common methods and indicators such as trend lines, simple moving average, CCI indicator and as supplementary tool principle of divergences.

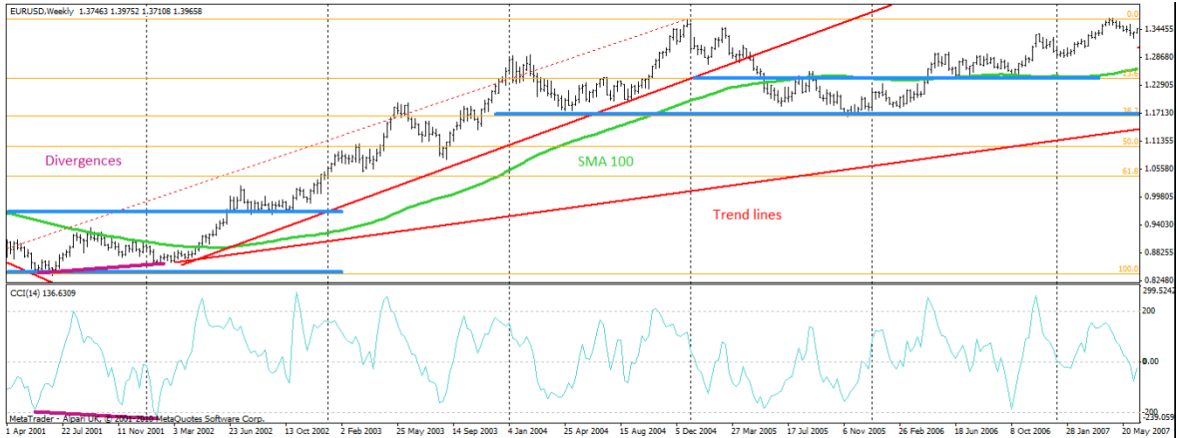
Chart 2 - EUR/USD detail 1999 – 2002 [weekly]



(Source: own creation, Metatrader 4)

Since the euro's introduction was euro in significant downtrend and dropped its historical minimum 0.83 dollar for one euro in mid-October 2000. Period between February 2000 and April 2002 is period of accumulation and exchange rate did not move in any trend and stayed in range 0.83 and 0.96, almost reached parity and formed very strong formation of triple bottom which signal absolute reverse of the trend. Earlier there was unsuccessful attempt to cross SMA line in September 2001 which was finally broken on 21. 4. 2002 and confirmed following uptrend. As a subsidiary signal could be seen strong bullish divergence generated between exchange rate and CCI indicator right before perforation of SMA line.

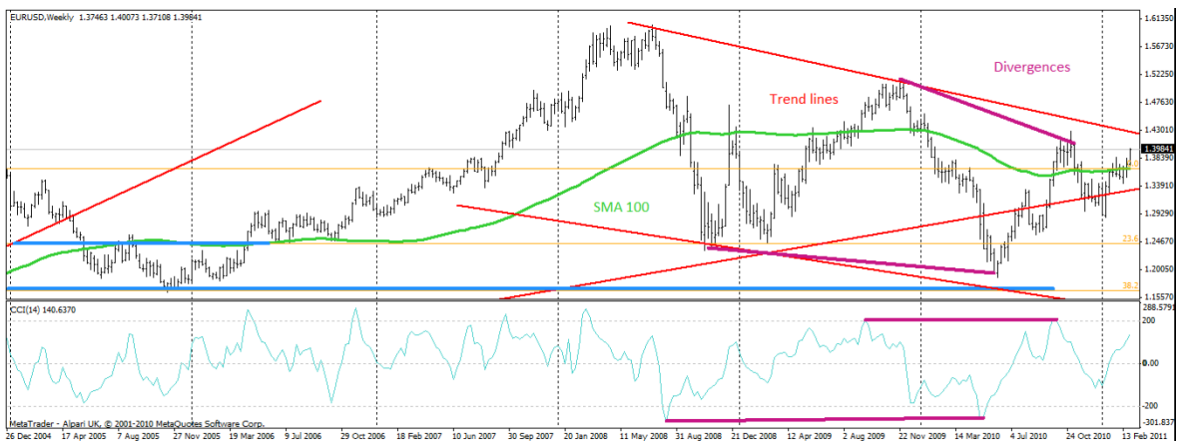
Chart 3 - EUR/USD detail 2002-2006



(Source: own creation, Metatrader 4)

In April 2002 started the longest uptrend (primary trend) in history, despite short-term correction (secondary trend) in year 2005, it lasted almost 6 years. At the beginning of May 2005 exchange rate broke-down the trend line and the end of May also SMA line. Year 2005 is year of consolidation, that means the currency is fluctuating in relatively small range. In this case the range was between 1.16 and 1.25.

Chart 4 - EUR/USD detail 2006 - 2011 (February) [weekly]



(Source: own creation, Metatrader 4)

At the end of April exchange rate again broke-up, primary trend continued and reached historical maximum 1.60 in mid-July.

After those incredible peaks in first half of 2008 came huge fall which took off times of big volatility and uncertainty. This reversal came on very interesting data 8. 8. 2008 when Olympic Games in Peking was starting. Some analytics saw this date as big physical border and also speculate about possible Chinese speculation on USD (as already mentioned China is biggest holder of dollar reserves in the world). Crude oil prices and shares dramatically fell in that time but dollar hardly kept its value thanks to investors' inflow.

Chart 5 - EUR/USD detail 2008 - 2011 (Feb) [weekly]



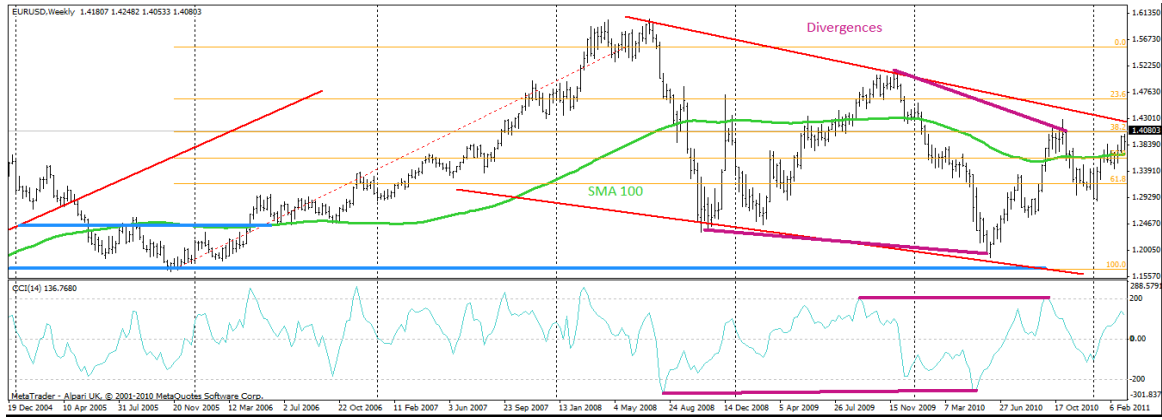
(Source: own creation, Metatrader 4)

There is no point to observe SMA line as this indicator gives correct signals on trend markets (periods). Since end of September 2008 EUR/USD dropped gradually to level around 1.24 which is its 4-year minimum.

End of 2009 brought bad news from Eurozone, specifically from Greece and euro fell again. In 2010 also Ireland announced financial problems. EUR/USD is consolidating again and moving in downward (decreasing) channel.

Possible scenarios in next 3 – 5 months

Chart 6 - Fibonacci retracement [weekly]



(Source: own creation, Metatrader 4)

According to technical analysis are 2 scenarios expected:

1 - Continuous decrease - both divergences are bearish and thus implies continual fall of EUR/USD pair.

- If psychological barrier 1.2800 broken – expected decrease as far as 1.2350

2 – Revitalization – despite not very positive news could euro also grow as it could replace dollar in term of perception as safe heaven comparing to other currencies which might be considered more (as investors have been already seeing future of common European currency pessimistically).

- If psychological barrier 1.4000 (which is also on Fibonacci level 38.2) – expected growth up to at least 1.4500

4.3. Strategy test

Following pages are addressed to strategy test of concrete trading strategies based on specific technical indicators. All three strategies are very different from each other to show more possibilities how those indicators might be used in favour of investor.

4.3.1 Strategy based on moving average and parabolic SAR

Basic principle of trading according to moving average is to buy when price is above indicator and sell when price is below indicator. For successful trading is recommended to filter also according some other indicator. As main indicator is set EMA 50 which react faster than SMA. I decided to add PSAR as the supporting indicator to get better exit signals due to the fact that MA give signals with a certain time delay. And in case of strategy based on only 2 moving averages is necessary to wait until the MA cross each other to exit the position. PSAR might help to solve this problem because creates S/R levels which are instrumental for leaving the position.

Conditions:

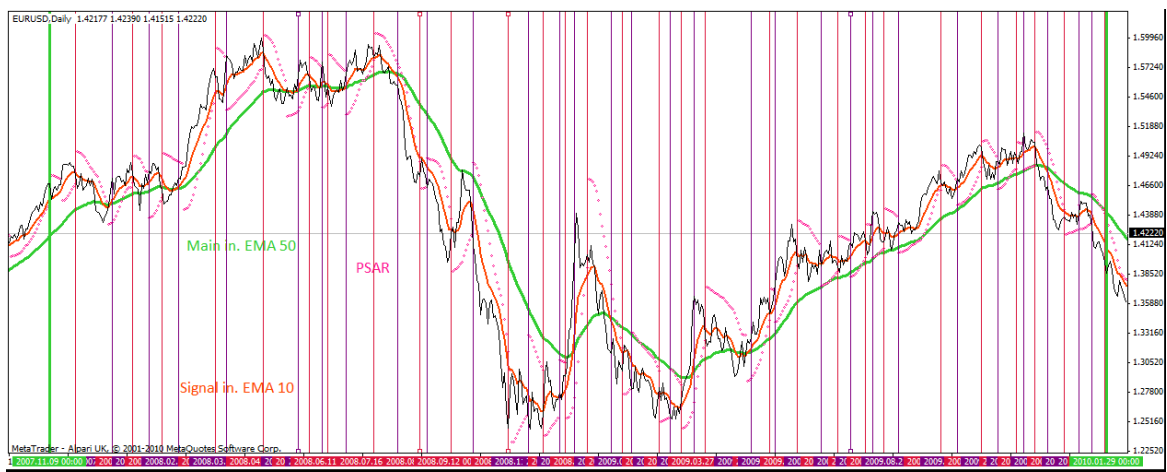
- System is based on two indicators EMA and PSAR
- Buying signal is when EMA (10) exceeds EMA (50)
- Leaving the long position signal is when PSAR breaks the price upward
- Re-enter long position is possible when PSAR is again bellow price line
- Selling signal is when EMA (10) is bellow EMA (50)
- Leaving short position signal is when PSAR breaks the price downward
- Re-enter long position is possible when PSAR is again above price line

Input parameters:

- EMA, period - 50, applied price – Close

- EMA, period – 10, applied price - Close
- PSAR, step – 0.02, maximum 0.2
- Currency pair: EUR/USD, daily chart
- Tested time period: 9.11.2007 – 29.1.2010

Chart 7 - Application of MA and PSAR

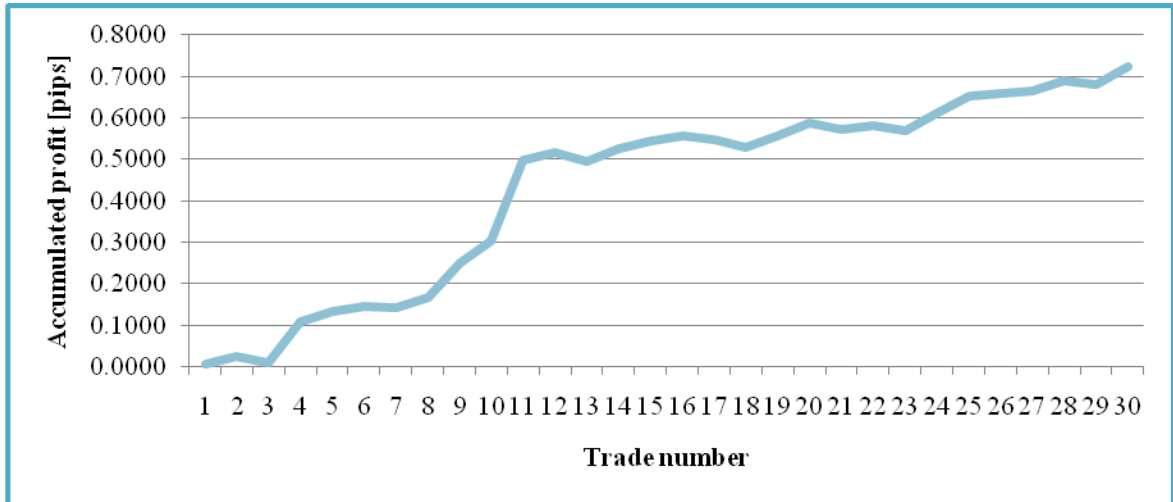


(Source: own creation via Metatrader 4 software)

Picture above represents application of two EMAs and PSAR indicators and places of entry to position (purple vertical lines) and places of exit from position (red vertical lines).

Results:

Chart 8 - Development of MA and PSAR trading



(Source: own creation, own application)

Table 4 - EMA and PSAR trading results

Total trades	30	Total accumulated profit	<u>0.7229 pips</u>
Winning trades	73.3%	Losing trades	26.7%
Gross profit	0.8283 pips	Gross loss	-0.0982 pips
Average profit	0.0377 pips	Average loss	-0.0123 pips
Max profit	0.1957 pips	Max loss	-0.0212 pips

(Source: own creation – EMA and PSAR trading results)

Despite this is the first tested strategy and even without any optimisation (with just basically of parameters results are very good. With 73.3% fruitfulness it might be labelled as successful strategy with also very interesting profit which is 7229 pips. Parameters average profit is 3 times higher compared to average loss why simply means that profit grew faster than loss decreased.

4.3.2 Strategy based on MACD

MACD is very popular indicator among traders. There two ways how to trade. First, determining oversold and overbought areas and second to look for divergences. For the purposes of this thesis is considered only first way.

Conditions:

- System is based on indicator MACD
- Buying signal is when MACD is above its signal curve
- Selling signal is when MACD is bellow its signal curve
- Close of short position means opening of long position and vice-versa

Input parameters:

- MACD, applied price – Close; fast EMA -12; slow EMA – 26; MACD SMA – 9
- Currency pair: EUR/USD, daily chart
- Tested time period: 11.9.2007 – 29.1.2010

Chart 9- Application of MACD

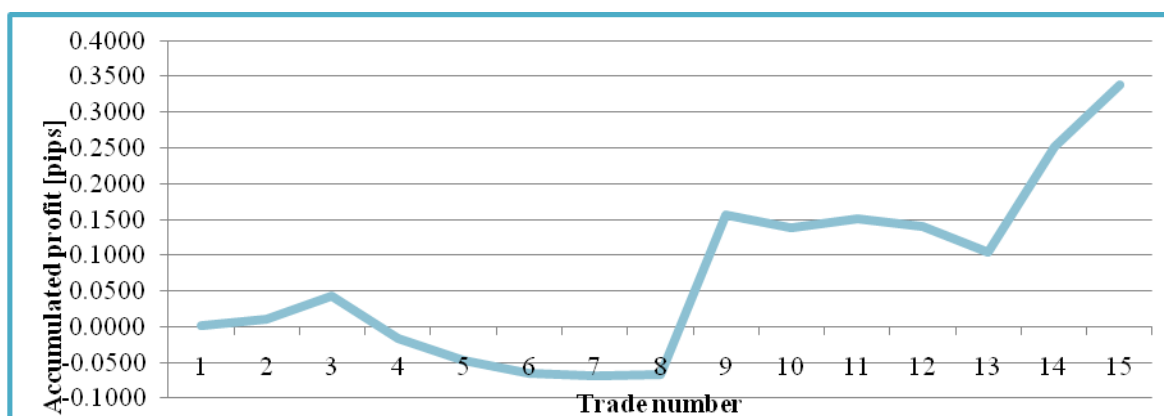


(Source: own creation via Metatrader 4 software)

Picture above represents application of MACD indicator and places of entry to the short position (with red arrow) and entry to the long position (with blue arrow).

Results:

Chart 10 - Development of MACD trading



(Source: own creation, own application)

Table 5 - MACD trading results

Total accumulated profit	<u>0.3389 pips</u>	Total trades	15
Winning trades	53.3 %	Losing trades	46.7 %
Average profit	0.0643 pips	Average loss	-0.0251 pips
Gross profit	0.5144 pips	Gross loss	-0.1756 pips
Max profit	0.2239 pips	Max loss	-0.0595 pips

(Source: own creation – MACD trading results)

MACD did not give a lot of signals in tested period. Only 15 signals were generated within the period longer than 2 years.

Despite accumulated profit is not very high (see table above) is result considered as successful because even without any optimisation is in positive numbers. This result is not

very often expected in case of such a basic strategy. Share of winning and losing trades is not very big and the probability of gain/loss invested money is around 50%. Average profit is 2,5 times higher than average loss and maximum profit was almost 4 times higher than maximal lost.

The best results were gain in periods with strong trend. Within the non-trend period MACD gave some not very successful signals. And last but not least important thing is to remember that MACD is based on two moving averages and that those indicators are always a bit delayed.

4.3.3 Strategy based on RSI and Stochastic

This oscillator is one of the most used for FOREX market. There are again more ways how to trade according to this indicator like graphical formations, divergences, S/R levels or the most basic one allocation of overbought and oversold areas. For the testing purposes was considered only last possible way. Stochastic is also very often used by professional traders, again identifies overbought and oversold area or periods and is determined by 2 curves (%K is more active one and %D is the slow one). Stochastic is used only for exit position signals.

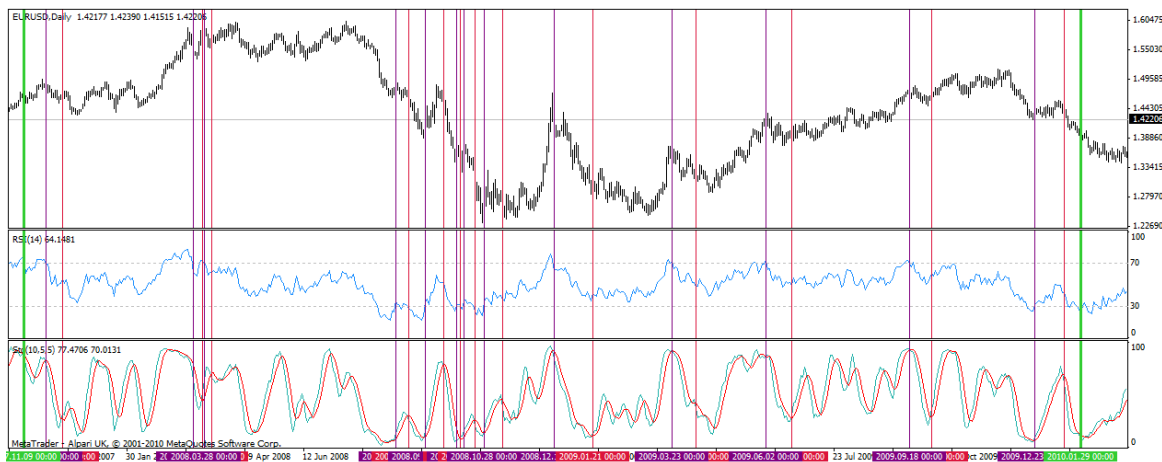
Conditions:

- System is based on two indicators: main RSI; supporting STO
- Buying signal is when RSI is below level 30 and again increase above this level
- Selling signal is when RSI is above level 70 and again decrease bellow this level
- Leaving the selling and buying position is crossing of the 2 stochastic curves

Input parameters:

- RSI, applied price – Close; period 14
- STO, applied price – Close; period K – 10; period S – 5; Slowing - 5
- Oversold area: above level 70
- Overbought area: below level 30
- Currency pair: EUR/USD, daily chart
- Tested time period: 11.9.2007 – 29.1.2010

Chart 11 - Application of RSI and STO



(Source: own creation via Metatrader 4 software)

Picture above represents application of indicators – RSI and supporting Stochastic. Purple vertical lines indicate places of entry to the position and red vertical lines places of exit from position.

Results:

Chart 12 - development of RSI and STO trading



(Source: own creation, own application)

Table 6 - RSI and STO trading results

Total accumulated profit	0.2196 pips	Total trades	13
Winning trades	23.1%	Losing trades	76.9%
Gross profit	0.3183 pips	Gross loss	-0.0844 pips
Average profit	0.0318 pips	Average loss	-0.0281 pips
Max profit	0.0143 pips	Max loss	-0.0519 pips

(Source: own creation – RSI and STO trading results)

Also last strategy made profit of 2196 pips. Which is again satisfactory result for strategy without any optimisation. On the other had I changed a bit the setting of periods in this case due the fact that after visual check of chart and signals I decided to prolong the K period to avoid too soon ejection from positions.

Anxious is low share of winning trades which less than one quarter of all trades. But this might be effect of low number of signals and therefore trades within the tested period. And also the fact that almost all profit was made by 3 trades (trades 8 – 10).

2.3.3 Comparison of results

Comparison of results is based on two variables – accumulated profit and share of winning trades. Results from previous test are transferred into money system with presumption that investor traded with **micro lot**. When standard lot means 100 000 units of any currency is obvious that standard lots are able to trade only big investors.

Relate to the following equations:

1 Standard Lot = 10 Mini Lots = 100 Micro Lots

1 pip = 0.0001 for currency pair EUR/USD

Is pip value for pair EUR/USD equals to 0.1 USD (for micro lot).

Table 7- Profitability overview of tested strategies

Tested strategy	Accumulated profit [USD]	Share of winning trades [%]
EMA and PSAR	722.9	73.3
MACD	338.9	53.3
RSI and STO	216.6	23.1

(Source: own creation –trading strategies overview)

From the table above is obvious the most successful strategy in term of profit was combination of 2 EMAs and PSAR which not only gain the highest profit but also provided almost three quarters of all trades were gaining.

Other two strategies ended with profit but the share of winning trades were significantly lower. Or course this might be caused by lower number of signals and in long-term this variable could improve.

If input capital was 1000 USD (standard micro-lot) then we can say the first strategy (EMA + PSAR) was very successful because after 28 months brought profit around 72% which consider as more than satisfactory result. Other two strategies had satisfactory results but I would recommend slight changes in strategies which can be:

- Optimisation of parameters which should improve those still even positive outcomes
- Implementation of other supporting indicator

RSI + STO indicator might be very successful strategy but period of stochastic were too short and there were situations when stochastic unnecessarily closed the position too early. So this is the example where optimisation can help.

In case of MACD strategy I would probably advice to add some other indicator or at least change the strategy in terms of volumes. Trader calculates the volumes based on actual balance and stop loss range. Stop loss is for trader the maximal acceptable price for loss of decrease in profit. Then is usually set the percentage of the actual balance which is trader willing to risk for the given trade. This could ensure better outcomes or at least not worse outcomes. Everything depends just on the set percentage.

5. Conclusions

Primary objective was fulfilled and trading strategies derived and set. All strategies were set based on the previous technical and fundamental analysis and then tested and evaluated based on their profitability. All strategies were profitable at the end but I tried to make some recommendations which might lead to better outcomes and higher profits from trade.

Although testing on historical data is very often criticized and considered as useless, my opinion is that this approach can very easily discover fatal mistakes in the strategy before it could cause huge damages on investors' capital. Then helps the trader to feel more confident and familiar with the trading system and it might also help to learn some important attributes of successful traders.

Results of strategy tests showed that trading according to technical analysis can work and even make some profit. On the other hand it also showed that no strategy is 100% working and every strategy based on technical indicator can give some fake signals. This can be also seen as proof of the expectations that there are more forces influencing currency price development and those aspects cannot be explained through fundamental or technical analysis.

Those forces might be psychology of the market. Especially during the crisis in US or also in Eurozone was fear one of the factors that played the most significant role. Fear influenced decisions of millions of traders who were looking for some safe haven for their investments. While mortgage crisis in US was USD considered as that kind of safe haven.

I would like to end up this thesis with one quote that I consider also as very valuable advice for traders. In *Elements of Successful Trading*, Robert Rottella talks about trading:

“Trading is a business of making and losing money. Any trade, no matter how well thought out, has a chance of becoming loser. Many people think the best traders do not lose any money and have only winning trades. This is absolutely not true. The best traders lose a lot of money, but they eventually make even more over time.” From this quote is obvious one message – trading can hurts sometimes and you should be psychically ready for that.

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7. Supplements

Supplement 1 - EMA and PSAR trading

Nu.	Date	Price	P	Profit	Loss	Accumulated profit
1	9.11.2007	1,4675	L			
	29.11.2007	1,4747	*	0,0072		0,0072
2	28.12.2007	1,4611	L			
	15.1.2008	1,4776	*	0,0165		0,0237
3	28.1.2008	1,4689	L			
	6.2.2008	1,4621	*		-0,0068	0,0097
4	19.2.2008	1,4652	L			
	18.3.2008	1,5638	*	0,0986		0,1083
5	26.3.2008	1,5629	L			
	23.4.2009	1,5882	*	0,0253		0,1336
6	20.5.2008	1,5519	L			
	28.5.2008	1,5646	*	0,0127		0,1463
7	6.6.2008	1,5582	L			
	11.6.2008	1,5550	*		-0,0032	0,1431
8	25.6.2008	1,5570	L			
	16.7.2008	1,5819	*	0,0249		0,1680
9	4.8.2008	1,5574	S			
	20.8.2008	1,4743	*	0,0831		0,2511
10	26.8.2008	1,4752	S			
	12.9.2008	1,4231	*	0,0521		0,3032
11	30.9.2008	1,4418	S			
	27.10.2008	1,2461	*	0,1957		0,4989
12	11.11.2008	1,2749	S			
	21.11.2008	1,2587	*	0,0162		0,5151
13	4.12.2008	1,2712	S			
	9.12.2008	1,2924	*		-0,0212	0,4939
14	16.12.2008	1,3701	L			
	26.11.2008	1,4029	*	0,0328		0,5267
15	15.1.2009	1,3160	S			
	23.1.2009	1,2973	*	0,0187		0,5454
16	30.1.2009	1,2937	S			
	20.2.3009	1,2813	*	0,0124		0,5578
17	2.3.2009	1,2616	S			
	10.3.2009	1,2704	*		-0,0088	0,5490
18	19.3.2009	1,3490	L			
	27.3.2009	1,3287	*		-0,0203	0,5287

19	1.5.2009	1,3222	L			
	15.5.2009	1,3495	*	0,0273		0,5560
20	20.5.2009	1,3627	L			
	5.6.2009	1,3957	*	0,0330		0,5890
21	24.6.2009	1,4073	L			
	7.7.2009	1,3918	*		-0,0155	0,5735
22	16.7.2009	1,4101	L			
	28.7.2009	1,4171	*	0,0070		0,5805
23	3.8.2009	1,4266	L			
	11.8.2009	1,4147	*		-0,0119	0,5686
24	21.8.2009	1,4244	L			
	23.9.2009	1,4689	*	0,0445		0,6131
25	6.10.2009	1,4647	L			
	23.10.2009	1,5053	*	0,0406		0,6537
26	5.11.2009	1,4876	L			
	19.11.2009	1,4915	*	0,0039		0,6576
27	25.11.2009	1,4963	L			
	3.12.2009	1,5053	*	0,0090		0,6666
28	14.12.2009	1,4614	S			
	28.12.2009	1,4372	*	0,0242		0,6908
29	8.1.2010	1,4304	S			
	8.1.2010	1,4409	*		-0,0105	0,6803
30	19.1.2010	1,4387	S			
	28.1.2010	1,3961	*	0,0426		<u>0,7229</u>

(Source: own calculations)

Supplement 2 - MACD trading

Nu.	Date	Price	P	Profit	Loss	Accumulated profit
	13.12.2007	1,46104				
1	31.12.2007	1,45871	L	0,00233		0,0023
2	8.2.2008	1,45050	S	0,00821		0,0105
3	21.2.2008	1,48280	L	0,03230		0,0428
4	2.5.2008	1,54230	S		-0,05950	-0,0167
5	22.5.2008	1,57230	L		-0,03000	-0,0467
6	30.5.2008	1,55390	S		-0,01840	-0,0651
7	24.6.2008	1,55710	L		-0,00320	-0,0683
8	29.7.2008	1,55830	S	0,00120		-0,0671
9	11.12.2009	1,33440	L	0,22390		0,1568
10	14.1.2009	1,31590	S		-0,01850	0,1383
11	17.3.2009	1,30354	L	0,01236		0,1507
12	20.4.2009	1,29249	S		-0,01105	0,1397
13	1.5.2009	1,32743	L		-0,03494	0,1047
14	9.11.2009	1,47387	S	0,14644		0,2512
15	29.1.2010	1,38617	L	0,08770		0,3389

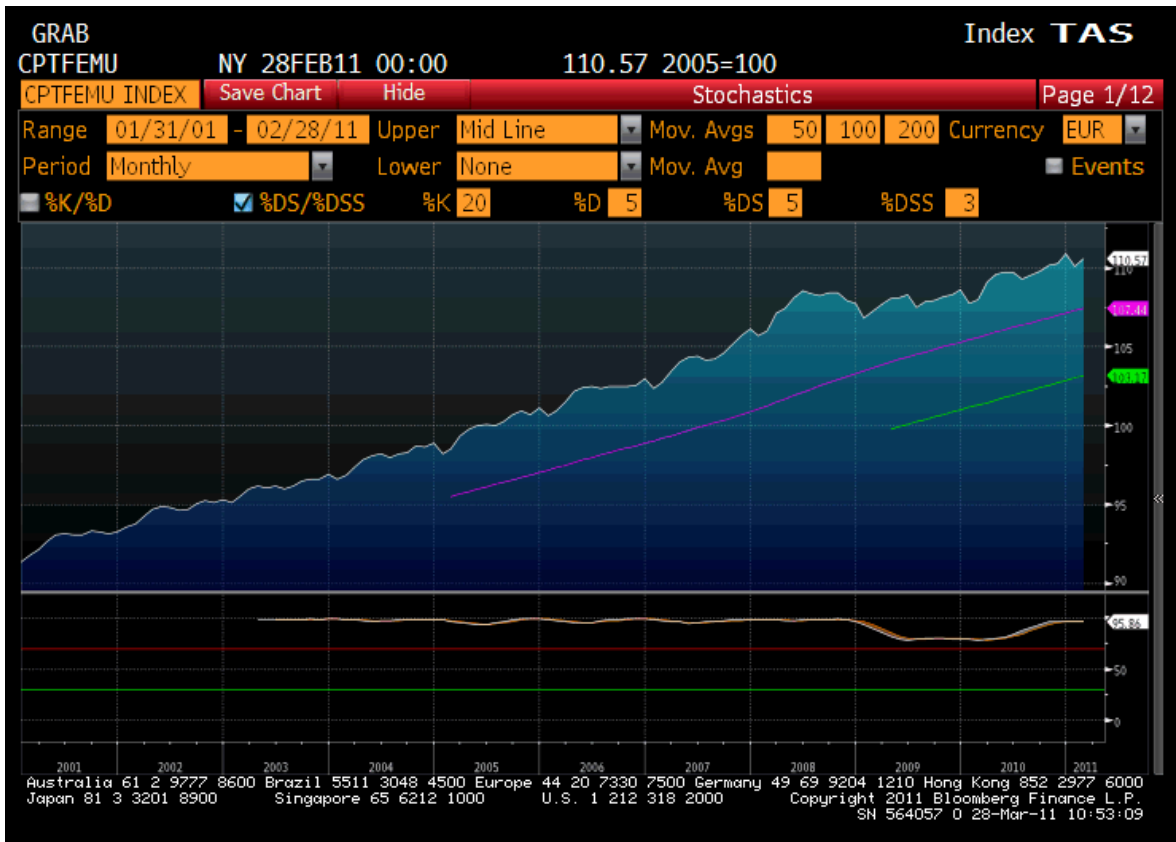
(Source: own calculations)

Supplement 3 - RSI and STO strading

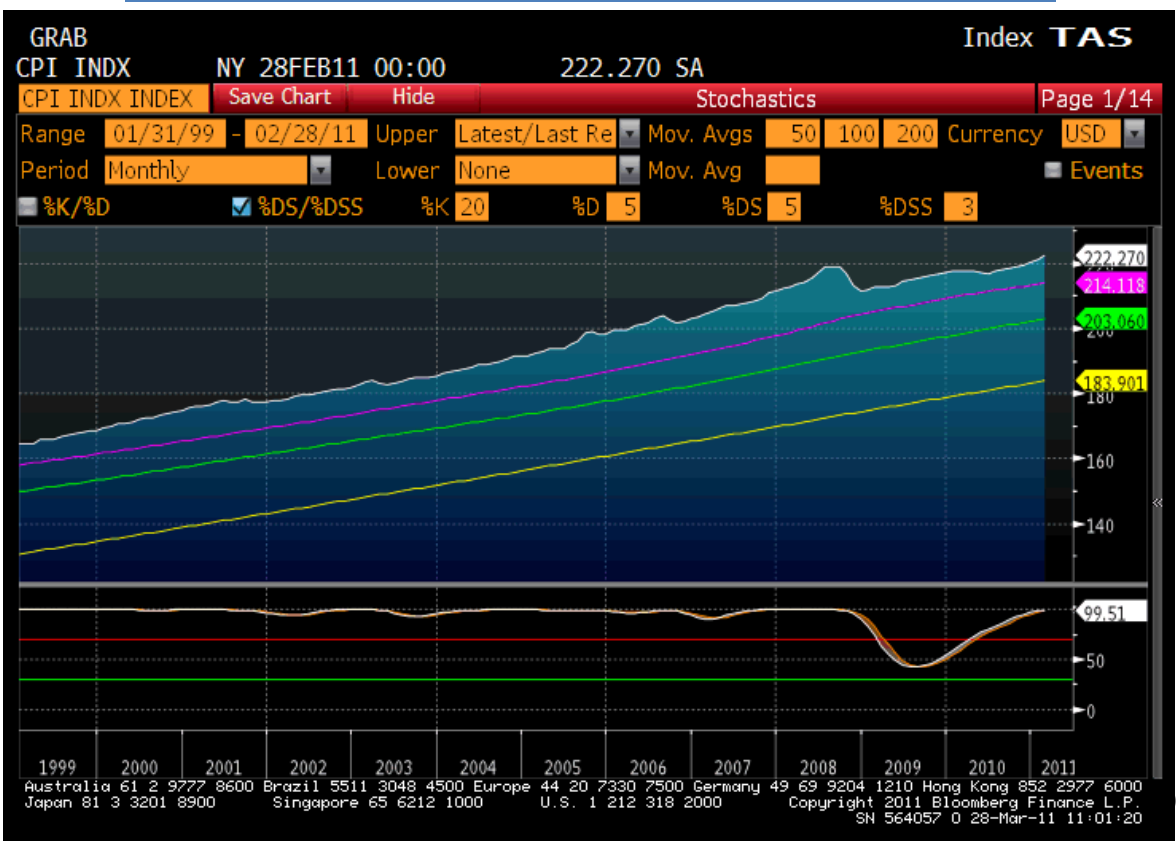
Nu.	Date	OPEN Price	P	Profit	Loss	Accumulated profit
1	27.11.2007	1,48640	S			
	10.12.2007	1,47210	*	0,01430		0,01430
2	20.3.2008	1,56430	S			
	27.3.2008	1,58120	*		- 0,01690	-0,00260
3	28.3.2008	1,58110	S			
	3.4.2008	1,56810	*	0,01300		-0,00390
4	21.8.2008	1,47420	L			
	1.9.2008	1,45860	*		- 0,01560	-0,01950
5	12.9.2008	1,40140	L			
	26.9.2008	1,46130	*	0,05990		0,04040
6	7.10.2008	1,34860	L			
	9.10.2008	1,35980	*	0,01120		0,05160
7	13.10.2008	1,35700	L			
	21.10.2008	1,30510	*		- 0,05190	-0,00030
8	28.10.2008	1,24630	L			
	11.11.2008	1,25110	*	0,00480		0,00450
9	19.12.2008	1,42650	S			
	21.1.2009	1,30650	*	0,12000		0,12450
10	23.3.2009	1,36560	S			
	9.4.2009	1,31560	*	0,05000		0,17450
11	2.6.2009	1,41500	S			
	22.6.2009	1,38550	*	0,02950		0,20400
12	18.9.2009	1,47430	S			
	6.10.2009	1,47210	*	0,00220		0,20620
13	23.12.2009	1,42530	L			
	18.1.2009	1,43870	*	0,01340		0,21960

(Source: own calculations)

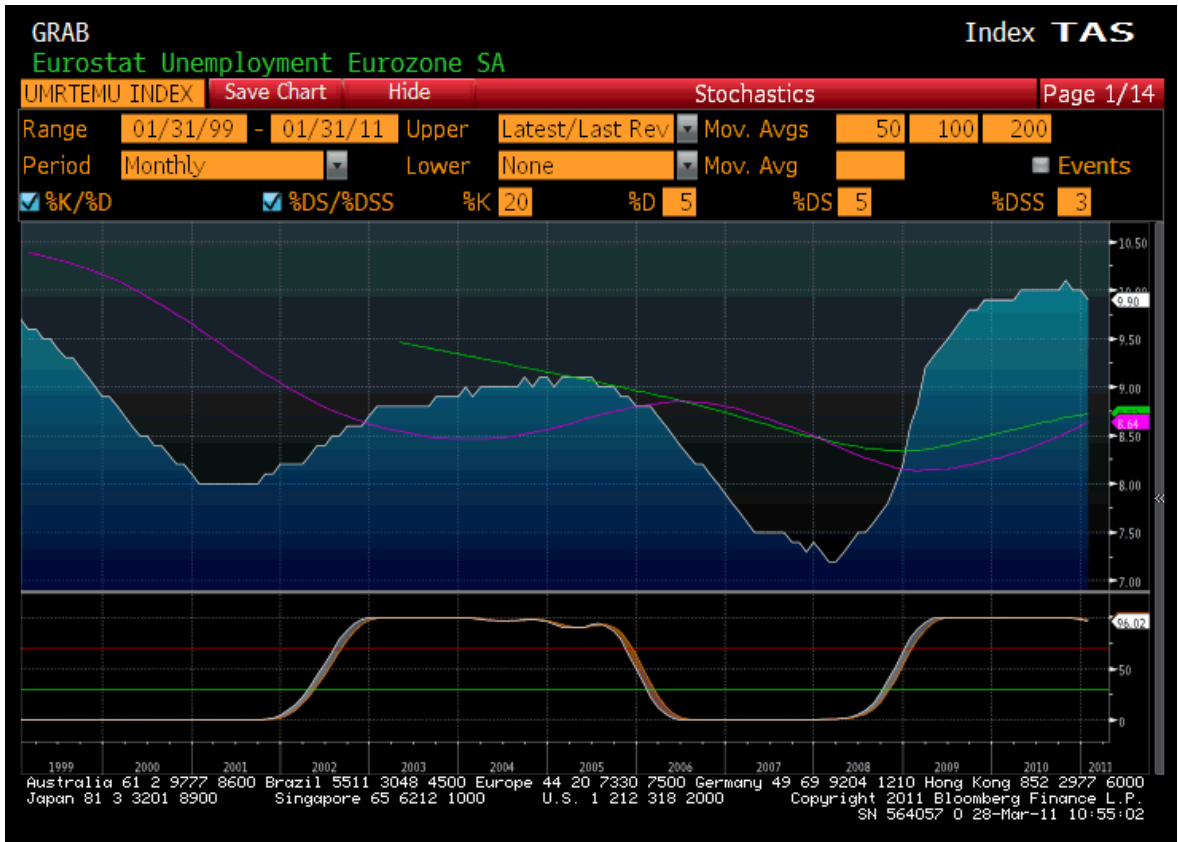
Supplement 4 – CPI index - EUROZONE



Supplement 5 – CPI index - USA



Supplement 6 – Unemployment EUROZONE



Supplement 7 – Unemployment - USA



