Development of *OSEG*: A FOREX Expert Advisor.

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ABSTRACT

This paper describes a foreign exchange trading and forecasting model called *OSEG* that analyzes trading data and provides a trader with prompt accurate results for buying and selling recommendations that is highly cost effective and time saving. *OSEG* is user-friendly because it enables a trader to sets and run multiple trading strategies, and the model always finds the trades that fit each strategy. *OSEG* was written in MetaQuotes Language Version 4/5 and executed on MetaTrader 4 (MT4) platform.

(Keywords: trade, foreign exchange, TradeStation, FOREX, currency market)

INTRODUCTION

In 1995 it was estimated that $1,200 billion per day was been traded by dealers in the foreign exchange market, however due to globalization and the growth in international business, foreign exchange (FX) trading has increased by more than 70% in recent years (Macide, 2014). Foreign exchange is rapidly transforming the world's economy affecting inflation through imports cost and prices of commodities. That the market awareness has risen is revealed in the heavy investments of merchants in technology.

Aroskar, et al. (2004) asserted that the economies of all countries of the world are linked directly or indirectly through asset or/and goods markets and that it enables the comprehension of the economic growth direction of all countries of the world. There is scarcely any country that lives in absolute self-sufficiency. Exchange rates are clearly one of the major motivations for

policymakers in the business community (King, et al., 2011; Gallaugher and Melville, 2004).

Trading strategies are a set of rules that a trader follows in order to make his trades. Due to the dynamic nature of the foreign exchange market, any set of static strategy is only cost-effective for some time. According to Mehta, et al. (2011) even strategies that intermittently realign themselves using previous market data, have periods of time with poor results and other times profitable results because market conditions are dynamic.

Several approaches have been used to evaluate the financial markets and establish the best fit for a specific FX process, however, the growth, diversification and capricious workflows of FX processes make it very challenging to understand the growth trajectory of all countries of the world, and to decide on the choice of the price to be used when comparing the ratios of currencies (Isard, 2007).

Slany (2009) submitted a FOREX market prediction architecture that is self-adapting using genetic programming. The objective was to design an adaptive system of simple predictors that can be utilized by humans and the host system in ascertaining predictors for trading. However the system had a high ratio of incorrect projected predictor results.

Mehta, et al. (2011) using the TradeStation trading platform an automated strategy was developed which incorporated concepts from several models that successfully trades in the foreign exchange markets. The goals were to evaluate various trading methods and strategies, developed indicators and strategies in

EasyLanguage, TradeStation's proprietary programming language, and testing and evaluating which methods were successful. However, their strategy was not run over an extended period of real-time data to further evaluate actual performance.

Adamgbe (2006) proposed a model on Retail Dutch Auction System (RDAS) assuming that Efficient Market Hypothesis holds in the foreign exchange market. The aim was to analyze the short run relationship between exchange rate, inflation rate and lending rate under RDAS and other variables. Results showed that RDAS has brought about relative stability in the exchange rate in the forex market in Nigeria. However this approach was not applicable to a long term period.

Vitale (2006) formulated a market microstructure model of exchange determination. The intention was to investigate the impact of foreign exchange intervention on exchange rates and on foreign exchange market conditions. Results showed that change in extreme circumstances large scale foreign exchange intervention can have destabilizing effects for the functioning of foreign exchange markets and that the route chosen for the implementation of official intervention has important implications for its impact on exchange rates and on market conditions.

Carlson and Osler (2005) develop a model for exchange rate dynamics. The target was to link exchange rate dynamics to shift in interest rates and current account flows. Results showed that the demand for foreign currency of risk adverse speculators reflects shifts in the interest rate differential, which modify expected currency returns. The supply of non-speculative traders is price sensitive and reflects current account transactions.

Existing models on foreign exchange focuses on evaluating various trading strategies, developing indicators and investigating the impact of foreign exchange intervention on exchange rates and on foreign exchange market conditions. Also included are the designs of adaptive system of simple predictors and analyzes of short run relationship between exchange rate, inflation rate and lending rate under RDAS. This present work involves the development of an *OSEG*, an expert advisor for foreign exchange trading and forecasting that analyzes data and provides a trader with prompt accurate results for buying and selling recommendations that is highly cost effective and time saving. *OSEG* is user-friendly because it enables a trader to sets and run multiple trading strategies, and the model always finds the trades that fit each strategy. *OSEG* was written in MetaQuotes Language Version 4/5 and executed on MetaTrader 4 (MT4) platform.

BACKGROUND OF FX ANALYSIS

There are three types of FOREX markets: spot, future, and forward. According to [5], the spot market is where the currencies trade at the current price, which supply and demand dictates while the future and forward markets trade contractual claims to a certain currency type, for a certain value per unit, and on a settlement date. There are basically three types of analysis used by various kinds of traders to analyze the market, these are the fundamental analysis, technical analysis and sentiment analysis.

Fundamental analysis could be described as a way of looking at the market through economic indicators or news based event. The idea behind these types of analysis is that if a country economy is doing well their currency will also be doing well. This is because the better the country's economy the more trust other countries will have in their currency.

Economic indicators can be divided into three categories: leading indicators, lagging indicators and coincidence indicators. Leading indicators usually changes before the economy as a whole changes. They are therefore useful as short term prediction of economy. Examples include new orders of consumers' durables, net business formation and share prices.

Lagging indicators usually change after the economy as a whole does; typically they lag in a few quarters of a year. Examples include gross national product, consumers' price index and interest rate.

Coincidence indicators changes at approximately the same time as the whole economy, thus providing information about the current state of the economy. Examples include gross domestic product, employment level and retail sale.

Technical analysis involves the study of price movement using charting tools. Trends and patterns are identified in order to find a good

trading opportunity. Technical analysis could either be manual or automated. A manual system involves a trader analyzing technical indicators and interpreting whether to buy or sell. An automated trading system involves the trader teaching/programming the software on what signal to look for and how to interpret them. Automated analysis helps to eradicate human inefficiency which could be highly detrimental.

Technical indicators are divided into oscillatory/leading and lagging indicators. A leading technical indicator gives signal before a new trend or reversal occurrences. Examples includes: stochastic (AITE, 2007), parabolic stop and reversal, relative strength index, commodity channel index and rate of change.

Sentiment analysis is a very popular form of analysis that is better explained with the following example. Assuming an overwhelming amount of traders and investors are buying on a particular currency pair, having known that this traders has gone bullish on this currency pair and also that they will eventually want to close their trade. This will make the currency pair vulnerable to a sharp pull back if they all turn around and close their trades.

OVERVIEW OF *OSEG*

OSEG as an expert advisor is a software program that fit within the trader's strategy. Much like a trader, expert advisors analyzes and integrates a huge amount of present and historic data and process it very quickly for the purpose of forecasting future price movements in order to provides a trader with buy and sells recommendations that fit within the trader's strategy.

Unlike a human trader, *OSEG* is able to integrate a huge amount of data and process it very quickly for the purpose of forecasting. *OSEG* is algorithmic in nature (i.e., rule-based in how it analyzes data and comes up with recommendations).

The life cycle of *OSEG* follows the normal software development phases which include: analyses, design, coding, execution and documentation. At the analysis stage, the program analyzes the market data and determines whether it is a buy, a sell or a trendless market and also executes a trade on behalf of the trader.

At the design phase, a logical sequence of precise steps to bring about the software development is determined as an algorithm, flow chat or data flow diagram.

At the coding phase, the trading plan is converted into a program with the use of a programming language called mql4, this language compiler is packaged along with MT4 platform.

At the execution phase, the computer translate the program code into a form it can understand with the help of the compiler, during this process errors are being spotted out by the compiler and debugging takes place immediately.

At the final phase, this is the documentation and testing phase, the program is tested for accuracy and every other necessary change is made. The following Figure 1 is the *OSEG* flowchart structure.

The following is a sample of a good trading plan that is put into consideration during the development:

TIME FRAME
  5min chart (30min and 4hrs chart).
  15min chart (30min and 4hrs chart).
  1hr chart (daily and weekly chart).
  Daily chart (weekly and monthly chart).
INDICATORS
  EMA (values {5 & 10})
  MACD
  ADX (DI+ and DI-)
TRADING RULES
1. *(a)   Stop Loss =*
   (b)   Exit Target =
2. *ENTRY*
   (a)   ASK|OFFER|LONG|BUY
       (i)   5 EMA crosses above 10 EMA
       (ii) When the fast MA crosses above the slow line OR When both lines crosses
         Below the Histogram
       (iii) When the DI+ crosses up above the DI-
       (iv) When the ADX reading is above 25
   (b)   BID|SHORT|SELL
       (i)   5 EMA crosses below 10 EMA
       (ii) When the fast MA crosses below the slow line OR When both lines crosses
         Above the Histogram

(iii) When the DI- crosses up above the DI+
(iv) When the ADX reading is above 25

3. *EXIT*
(i)   When the MACD turns in the opposite direction of TRADE.
(ii)   When the ADX is below 20
(iii)   DI+ & DI- lines cross in the opposite direction of the trade.

EXPERIMENTATION AND RESULTS

OSEG was written in MetaQuotes Language Version 4/5 and executed on MetaTrader 4 (MT4) platform, an electronic trading platform is widely used by online retail foreign exchange speculative traders. The software consists of both a client and server component. The server component is run by the broker and the client software is provided to the broker's customers, who use it to see live streaming prices and charts, to place orders, and to manage their accounts. The client

is a Microsoft Windows-based application that became popular mainly due to the ability for end users to write their own trading scripts and robots that could automate trading.

To test *OSEG*, the use of strategy tester was adopted. Strategy tester is a piece of software packaged along with MT4 Platform.; the following steps are required in the process:

1. Open the MT4 Platform

2. Click on view menu and click strategy tester

3. On the window that appears at the bottom of the chart select the name of the expert advisor, symbol and period.

4. Then click start.

Figure 2 reveals the environment where *OSEG* parameters can be set for back testing.
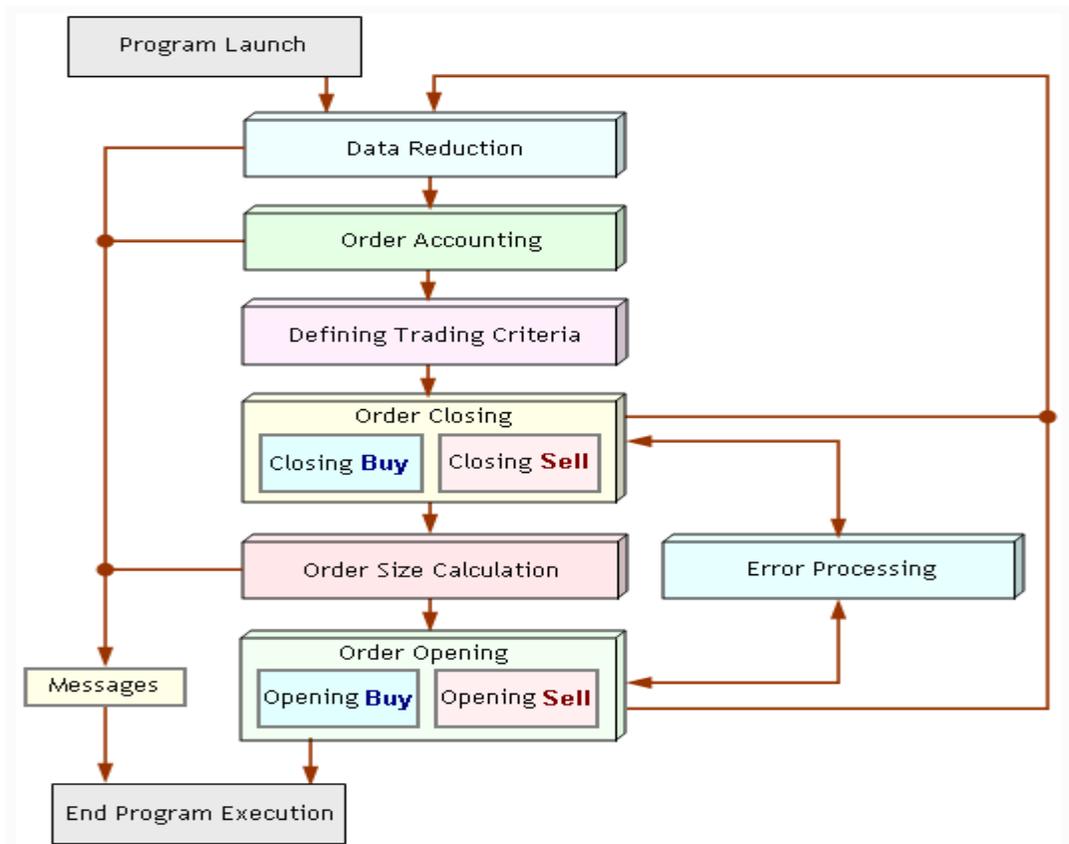
Figure 1: *OSEG* Flowchart Structure.
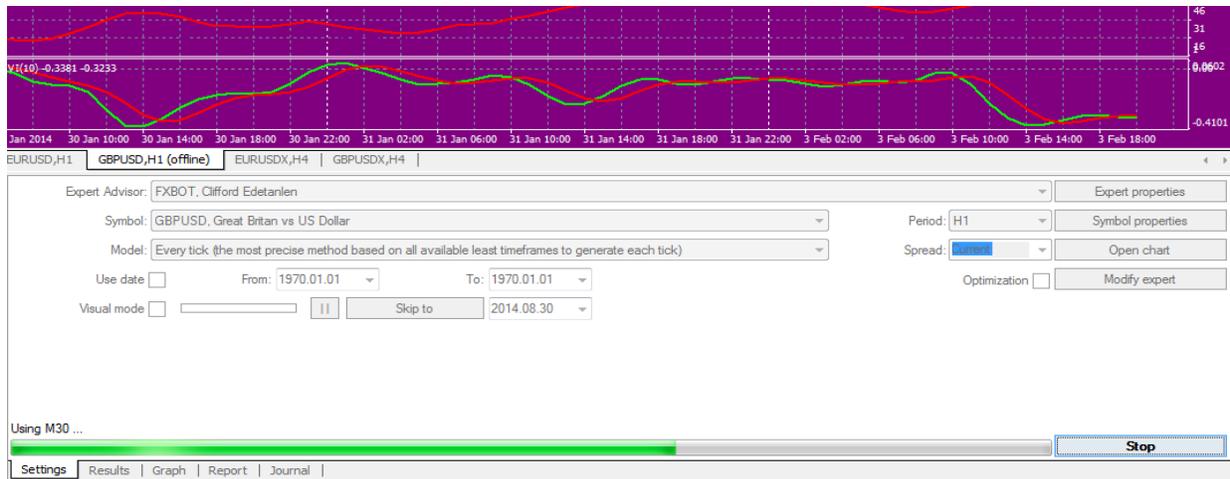
Figure 2: *OSEG* Parameters Environment for Back Testing.

Figure 3: Results of *OSEG*.

The advisor to be back tested is selected from the dropdown menu, currency from symbol drop down menu, and then a model should be selected from model dropdown menu and the appropriate date selected also. Thereafter the start button is clicked to make the strategy tester carry out the test.

Figure 3 show the performance of the *OSEG* within the time specified in the strategy tester with several columns. In this case $10000 initial capital was used with GBP/USD and the robot produced over $11,000 within August 2013 and Jan 2014 in the test with previous market date. A graphical representation of the performance of the expert advisor is shown in Figure 4 and the report of *OSEG* generated is shown in Figure 5.
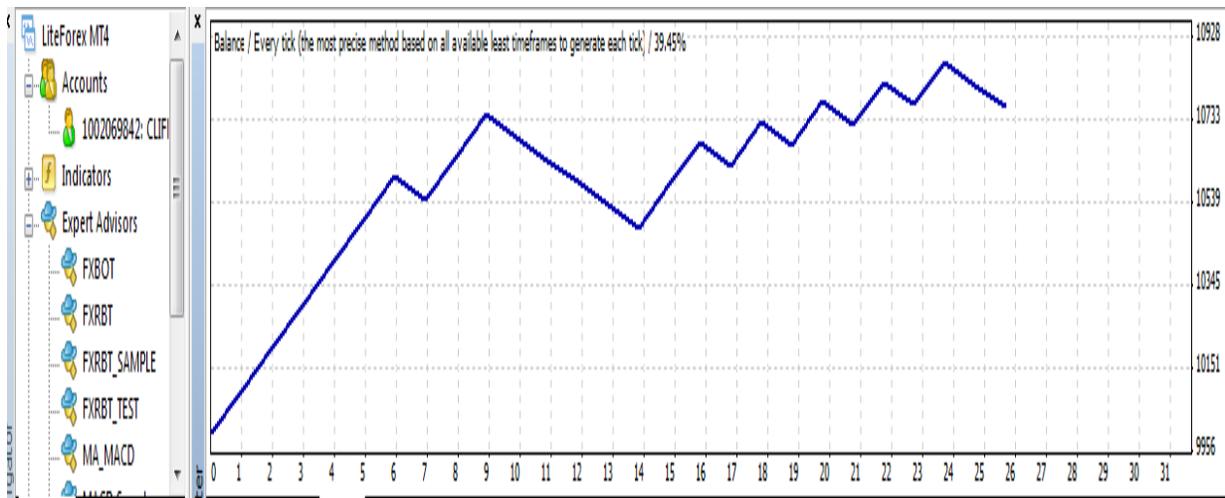
Figure 4: Graphical Representation of *OSEG* Performance.

Figure 5: Generated Report of *OSEG*.

CONCLUSION

An expert advisor *OSEG* is design for projecting and trading in the foreign exchange market. *OSEG* is very useful to financial institute and individuals, who are interested in the financial market. The traders trading plan is programmed into *OSEG* which help to analyze the market based on that plan and open a buy and sell order at different intervals.

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