

Analyzing the Effects of Value of Dollar Against the Euro on Prices Index in Tehran Stock Exchange

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Abstract

Here in, the effect of changing the rate of dollar against euro which led to an imbalance in the oil market, changes in demand for crude oil, and consequently led to changes in oil prices and oil revenues had been studied. When the value of dollar falls against euro, it leads to increase in the European countries demand for oil and consequently leads to increase in oil prices and the revenues of oil producing countries in long term.

Greater supply of dollars in the domestic market leads to increases in domestic value of the currency. Increase the value of domestic currency reduces the price of imports relative to domestic goods and leads to in the volume of imports and hence a domestic manufacturer are having difficulty selling their products and reduce the volume of the production and ultimately leads to the reduction in the profit of domestic manufacturers and stock price index. On the other hand, due to the fact that there is no risk in long term deposits in the bank, this is a competitor for capital investment in the stock market. The aim of this paper is the Analyzing the effects of long-term banking profit and value of the dollar against the euro on prices Index in Tehran Stock Exchange using Seasonal time series data between 2001-1 2009-4. The result indicates that, reduction in the value of dollar against euro has negative and significant impact on stock price index. The long-term bank deposit interest rate has significant and negative impact on price index.

Keywords: Tehran Stock Exchange, Price Index, Long term Interest, Against the Euro, Co-Integration

Introduction

Financial market is one of the main and effective markets in a country. Stock market as a center for collecting savings and liquidity of the private sector is one of the major components of financial markets. Currently, analyzing the effect of macroeconomic variables on stock markets is vital for investors. It is generally believed that stock prices will be affected by some macroeconomic variables such as bank deposit interest rates, currency rate, interest rates and money supply and oil prices. In recent years, the mutual influence of the oil market and financial markets has attracted the interests of economists and analysts.

A brief investigation revealed that the price of oil has risen almost continuously from 2000 to 2007. The price of oil per barrel has reached from \$ 20 per barrel to \$ 90 per barrel (Zhang, 2008). This changes a lot of factors including market demand for oil, supply conditions, political factors, institutions such as OPEC and the dynamics of financial markets.

Changes in currency rate against USD rate are among the financial variables affecting oil prices. Given that oil sales is being done in dollars, so any changes in the dollar against another currency like the euro, mark, yen leads to changes in the purchasing power of the countries, euro, mark, yen, etc. reduction in the value of dollar against above mentioned currencies, leads to reduction of oil for these countries in terms of domestic currency and thus leads to increases in oil demand.

Existing research and statistics show that from 2002 to 2007 American dollar has depreciated 41% against against (Zang, 2008). This means that the purchasing power of euro area countries with dollar in international markets for purchasing goods like oil will increase and leads to increase in oil prices and oil demand and hence changes in the revenues of oil producing countries. Reduction in the value of dollar against euro leads to increase in oil prices Europe with euro and this leads to increase in oil prices with dollar. So in equilibrium, reduction in the value of dollar against euro leads to increase in oil prices and hence leads to reduction of oil demand in America.

On the other hand, rising crude oil prices leads to increase in foreign exchange revenues and greater supply of dollars to domestic market leads to increases in the value of domestic currency.

Increase in the value of local currency leads to reduction in the value of imported goods and leads to increase in the volume of imports and hence leads to reduction in the production of domestic manufacturers and consequently leads to reduction in the profit of domestic manufacturers and stock prices.

Long term bank deposit interest is one of the influential factors on the stock price index. Due to the fact that there is no risk in long term deposits in the bank, this is a competitor for capital investment in the stock market.

With these facts that changes in the value of dollar and profits on long term deposits leads to changes in stock index, these hypotheses can be raised:

What is the relationship between changes in the dollar against the euro and stock index?

What is the relationship between changes in the interest of long-term bank deposits and stock market indicators?

The answer to questions and testing the hypothesis is most important achievement of this present paper.

The second part of this paper regards literature. The third section, examines the factors affecting stock index. In the fourth section, using the co-integration analysis, the relationship between the dollar and stock index being investigated. The conclusion of this paper is presented in fifth section.

Literature Review

Lantz and Simon (2000) after analyzing the relationship between Frank and the dollar rate using VECM showed that changes in exchange rates has immediate effect on oil prices and income of the Petroleum Exporting Countries.

Sadersky (2000) by investigating the accumulation between future energy prices (crude oil and gasoline) and the weighted index of the exchange rate concluded that there is short-term and long-term relationship between these two variables and the causality from exchange rates to future prices of energy and for every 1% increase in long-term exchange rate, futures prices of energy will be reduced 373/0 percent. (Yousefi and Vyrjantv, 2004) using GMM regression showed that exchange rate fluctuations cause fluctuations in oil prices and Exporting Countries revenues.

(Melham and Traza ,2007) analyzing long-term relationship between the real price of oil and value of dollar against euro over the period 2006-2000 concluded that for every 1% decrease in the dollar against the euro, oil prices increases, 1.95 per cent in the long run and the causality is from exchange rates to oil price.

(Zhanq and colleagues, 2008) analyzing the relationship between the value of dollar against euro and oil prices using the market nominal prices (Wti2) showed that there is Long-term relationship between the dollar and oil prices. Also they examined the risks and the effects of exchange rate fluctuations on oil prices. The results showed that purchasing power of the Petroleum Exporting Countries increases with increases in oil prices and the stock index decreases in long-term.

(Hossein Sajjadi and colleagues, 2009) examined the relationship between inflation and stock returns and oil prices on the Tehran Stock Exchange. Results showed that the oil revenues and the rate of inflation and liquidity explain the stock index. Liquidity growth rate and inflation rate Coefficients has a negative relationship with price index in 90% confidence level.

Saeidi and Abdullah Amiri (2010) studied the relationship between macroeconomic variables with the total stock index. The basic problem of this research is that is there a relationship between macroeconomic variables, free market exchange rate index, oil price and Tehran Stock Exchange index? White linear regression model was used to test assumptions. Results indicate no significant relationship between consumer index and exchange rate of free market with total stock index, but there is inverse relation between crude oil prices and total stock market index.

Karim Zadeh Mustafa (2006) examined the long-term relationship between stock of Tehran Stock exchange index and monetary variables and has used monthly data for the

years 1990 to 2002 for stock price, liquidity, exchange rate and real interest rates and oil prices variables.

Using vector auto regressive method, he has reached to this conclusion that there is a co-integration vector between price stock index and macro monetary variables. The long-term relationship declares the positive and significant impact of liquidity and significant negative impact of exchange rate and real interest rates and the negative impact of oil prices on bank stock price index.

Theoretical research

It is believed that the stock prices defined by some macroeconomic variables such as real interest rates, banking and oil revenues. Real interest rate of bank Investors looking for efficient portfolio investment. Hence they fill their asset portfolio of various compounds such as cash, stocks, bank deposits, gold and bonds and etc. according to the experiences obtained from the results of the returns of Iranian stock market and risk also it is risky, capital investors believe that returns from investing in the stock market is not enough against its risk. On the other hand, due to the fact that there is no risk in long term deposits in the bank, this is a competitor for capital investment in the stock market. For the realization of interest rate of bank deposits, the rate of inflation has been deducted from the nominal rate of interest. Hence, it is expected that the increase in the real rate of bank had negative relationship with the stock price index (Sajjadi, 2009).

Since Europe and America are the major oil consuming countries, Theoretical Foundations of the effects of euro against the dollar on oil prices is explained. For this work, the simple model of Molhem (2007), along with changes in order to achieve the goal of paper is used. First, we introduce the following symbols:

q_E : The European demand for oil (which is a function of oil prices)

q_D : The American demand for oil (which is a function of oil prices)

V_E : Exchange rate (price per dollar against the euro)

P_D : Oil prices for the United States in dollar

P_e : Oil prices for the Europe in euro

The demand function of those countries will be as follows:

$$q_E = f(P_e), f' < 0 \quad (1)$$

$$q_D = f(P_d), g' < 0 \quad (2)$$

If oil prices are in dollars, in this case, its price using euro, will be as follows:

$$p_e = V_E * p_D \quad (3)$$

So if oil prices are fixed in dollars, with the changes in V_E (the value of dollar to euro) oil prices in Europe will be changed. So, the devaluation of the dollar, leads to reduction of p_e . We assume that there are two countries, America and Europe, and total production purchased by these two countries.

$$Q = q_E + q_D \quad (4)$$

The equations of this system has 4 equation and 6 variables: $Q, V_E, q_E, q_D, p_D, p_e$ considered exogenous. So, changes in this system depend on the exchange rate. Changes in exchange rate has results which are described below using 1 and 2 models.

First, we will measure the effects of changes in exchange rate on the system with a differentiating:

$$dq_E = f' * dp_E$$

$$dq_D = g' * dp_D$$

$$dp_E = V_E * dq_D + dV_E * p_D$$

$$dq_E + dq_D = 0$$

First model: decrease in the value of dollar:

$$\langle 0 dp_E < 0, dv_E > 0 dp_D$$

With simple algebraic operations and replacing we have:

$$\frac{dq_E}{(-dV_E)} = \frac{f' * g' * p_D}{f' + g' * V_E} > 0$$

$$\frac{dp_D}{(-dV_E)} = \frac{f' * p_D}{f' + g' * V_E} > 0$$

$$\frac{dq_D}{(-dV_E)} = -\frac{dq_E}{(-dV_E)} = \frac{f' * g' * p_D}{f' + g' * V_E} < 0$$

The value of dollar falls against euro, it leads to increase in the price of oil in Europe with euro and this leads to increase in the European countries demand for oil and consequently leads to increase in oil prices in dollar. So in equilibrium, the reduction of the value of dollar against euro leads to increase in oil prices and increase in American for oil demand. So, the reduction in the value of dollar leads to reduction of oil demand in USA. The reduction in the value of dollar can be shown as figure 1.

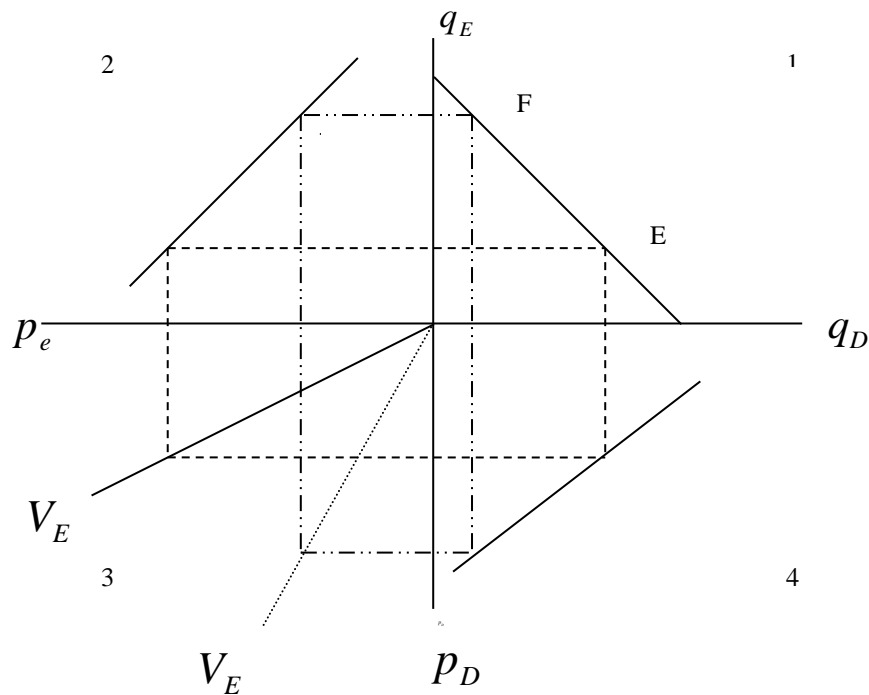


Figure 1. Effect of exchange rate changes on oil prices

First quarter shows the distribution between of oil supply among two country: Europe and America, second quarter reflects the demand for oil in Europe, the third quarter represents change in the exchange rate V_E (i:1,2) and the fourth quarter show the oil demand by America.

We consider Initial equilibrium at point E. Oil supply is divided into two parts which is shown in the first quarter. Reduction in the value of dollar against euro, leads to turns in relative prices from 1 to 2 and a new equilibrium will be at point F.

Equilibrium results are summarized as follows in **model 1**:

- Reduction in the value of dollar leads to increased oil prices in terms of dollar.

- Reduction in oil prices with euro
- Increase in European oil demand
- Reduction in American oil demand

Model 2: increase-in-the-value-of-dollar:

Increases in the value of dollar leads to increase in oil prices with euro for Europe and this leads to reduction in oil demand in Europe. Reduction in the demand of Europe leads to reduction of oil prices in terms of dollar and this leads to increase in demand of USA for oil. On the other hand, a weakening dollar, has led investors and speculators into oil and gold market, and this led to strong growth of oil and gold prices. With reduction in the value of dollar, a lot of money flooded to the oil market which leads to increases in oil prices. Also, Demand of oil importing countries, except

America, reduces which leads to reduction of oil prices in long term.

With increase in crude oil prices (given that there is no significant changes in oil supply), the currency revenue of oil exporting countries, including Iran, increases, and leads to the increase in currency supply to the domestic market.

Increased supply of dollars in market has a negative impact on stock index in different ways:

1-Greater supply of dollars to the domestic market leads to increases in the value of domestic currency. Increase in the value of domestic currency leads to reduction of prices of imported goods rather than domestic goods, and this led to an increased volume of imports and consequently manufacturers face with problems and reduce their production. Hence the profit of domestic manufacturers reduces and the price index of stock market will be reduced.

2-A change in exchange rate is one of the important factors affecting the treatment of debts. Increasing debts leads to the liquidity shortage, and lack of liquidity of economic enterprises has negative effect on profits distribution, stock returns and the price index. Also, increase in the prices of products, reduces the company's profit margins, prices and stock returns, and consequently stock index (sajjadi2009).

3-Increase in oil revenues, leads to increase in money supply and according to the monetary theory of inflation, increasing the money supply more than the multiplication of real income and income elasticity of demand for money, is necessary and sufficient condition for sustained inflation.

In average, in inflationary conditions, nominal interest of companies increases without real increase in profitability. Thus, rising inflation, lower the quality of real earnings of the firms and decreases the intrinsic value of each share. On the other hand, with rising inflation, expected interest rates increases and hence discount rate of cash flow and the opportunity cost of money will increase. Reduction in the value of dollar has led to the players to oil and gold markets and has led to strong growth in oil and gold prices. Generally, it is expected that the reduction in the value of dollar against euro, increases in global oil prices and this has negative impact on the stock index.

Data, Models, estimating the model and analyzing results

In this paper, the seasonal time series of nominal exchange rate in terms of value of dollar against euro has been used. The total index of Tehran Stock Exchange and interest of long term deposits interest is used over the period 2001:1 to 2009:4 seasonally.

According to theory and research background, research model presented as:

$$TEPIEX = \beta_1 + \beta_2 EX_t + \beta_3 RR_t + \varepsilon_t$$

TEPIEX: Stock price index EX: value of dollar to euro RR: The long term bank deposit interest rate after subtracting the inflation rate.

Now, we can analyze the hypothesis, but before deciding the relationship between variables, it is necessary to examine the

statistical properties of variables used in the model in terms of reliability and the possibility the unit root. If the unit root in the variables be confirmed, OLS regression leads to spurious results and Based on the estimated parameters, it is not possible to be used to judge about the relationship between variables. But accumulative model enables us to extract results in spite of the unstable variables and relationships between variables.

Unit Root Test

The important point is that when one the time series are non-stationary, estimating a regression equation that matches the actual process is important. Also remove fixed component or process from the model, can lead to decrease in the power of model to zero. In the following, the more steps to detect the existing of trend and intercept in actual process of the series, has stated:

First step: To investigate the origin and the width of a series, we start with the most non-binding and reasonable model that included fixed and process component. We estimate the following equation initially

$$\Delta y = a + \gamma y_{t-1} + a_2 t + \sum \beta_i \Delta y_{t-i} + \varepsilon_t$$

And examine zero hypotheses. If the zero hypotheses rejected, it is not necessary to proceed and we conclude that the series has no unit root.

Second step: If zero hypothesis is not rejected, there is a possibility that additional components in the model has been entered in first stage. These additional components can reduce the power of the test. So at this stage, we evaluate the significance of trend through zero test ($\gamma = a_2 = 0$).

If the trend is not significant, we follow continuing the work from the third stage. Otherwise, if the trend is significant, again using the standard normal distribution test the existence of the unit root. If the existence of unit root is rejected, the work will end and we conclude that the series has no unit root. Otherwise the result will be that the series contains unit root.

Third stage: we estimate a regression equation without the trend, and then we can test the existence of unit root in the model. If the existence of unit root is rejected, we conclude that time series has no unit root. If zero hypothesis is not rejected, we examine the existence of significant fixed component, through zero hypothesis. If the existence of unit root was rejected, we conclude that the series has no unit root. Otherwise the result will be the existence of unit root in the series.

Fourth stage: we estimate a regression equation without constant and trend component and examine the unit root tests. If the existence of unit root was rejected, we conclude that the series has no unit root. Otherwise, the existence of unit root in the series will confirm (Sadeghi, p446).

Operations for all existing series in the model show that all series in level are without intercept and trend and have unit root. Difference in all series in the most non-binding situation (existence of intercept and trend) is stationary. The results are summarized in Table 1:

TABLE I. RESULTS

Variable	lag	C	T	ADF	Critical value	result
TEPIEX	1			-0.67	-1.96	Non-stationary at 95%
RR	2			-1.174	-1.96	Non-stationary at 95%
EX	1			-1.46	-1.96	Non-stationary at 95%
Δ TEPIEX	1			-7.23	-3.42	stationary at 95%
Δ RR	2	*		-11.16	-3.42	stationary at 95%
Δ EX	1	*	*	-6.92	-3.42	stationary at 95%

Optimal number of intervals is determined using Akaike criteria. For the unit root test, the generalized Dicke - Fuller (ADF) method was used. According to the results of generalized Dicke - Fuller unit root test, variables in the level are non-stationary and their first order difference is stationary.

Long-run relationship Test:

The accumulation test

In order to review and determine the long-term relationship (relationships) balance between time series of economic variables, the Johansen test is used. To estimate long-run relationship, it is necessary to determine the best degree of the model using criteria of defining lags and then using the parameters of effect matrix and the maximum especial values, the number of convergence vectors between the variables of the model should be defined. To check the speed of adjustment towards the balance of short-term and long-run equilibrium we used VECM model.

Step (1): Determining the optimal order of VAR model using the criteria for defining lags.

In this step, it is necessary in order to determine the optimal order of auto regressive model using criteria for defining lags. To determine the optimal lag, the Schwarz - Bayesian criterion is used. Results to determine the optimal lags for variables of the model are presented in the table 2:

TABLE II. DETERMINE THE OPTIMAL NUMBER OF LAGS VAR

Schwarz – Bayesian Criteria	Number of lag
-12.43	0
-15.65	1
-18.23	2
-18.10	3

According to the Table (2), the lowest Schwarz - Bayesian statistic, is obtained in the second lag, it can be stated that the optimal lag of the VAR model, is equal to 2. After defining interruption, we should identify the existence of trend and intercept in long term. To identify the pattern and number of co-integration vectors, Johansson method according to trace test and the maximum non special value could be used. Accordingly, there are five different modes for the model including the most binding model (first model) to most non-binding model (pattern V) is expected. These patterns are as follows (nofresti, pp. 142-143):

- 1- There is no intercept and time trend in any of the long-term and short term relationships.
- 2- Only long-term relationships are bound to have an intercept.
- 3- In the short term there is not trend pattern and there is only intercept. This intercept leads to existence of trend in long term relationships.
- 4- There is a trend in short term pattern, but long-term relationships have trends.
- 5- There is trend in short term pattern and hence long-term relationships have second-degree trend.

The test results showed that the model has a second pattern. These results of two tests for the second pattern is presented in the following tables:

TABLE III. TRACE MATRIX TEST (λ_{trace})

Zero hypothesis	H1 hypothesis	test statistic	Critical value at 95%	Probability value at 95%
$r=0^*$	$r \geq 1$	97.36	63.42	0.002
$r \leq 1$	$r \geq 2$	49.62	52.31	0.08
$r \leq 2$	$r \geq 3$	23.84	34.72	0.54

*Represents a rejection of the null hypothesis at significance level 0/05

TABLE IV. MAXIMUM AMOUNT OF SPECIAL VALUE TEST:

Zero hypothesis	H1 hypothesis	test statistic	Critical value at 95%	Probability value at 95%
$r=0^*$	$r=1$	47.57	34.34	0.01
$r \leq 1^*$	$r=2$	29.24	28.14	0.043
$r \leq 2$	$r=3$	18.48	22.54	0.29

(λ_{max})

*Represents a rejection of the null hypothesis at significance level 0/05

According to the results of tables (3) and (4), the number of the vectors which are obtained by the trace matrix's parameter is one and the number of the vectors which are obtained by the maximum non special tests is two. Considering the fact that trace matrix's parameter represent lower vectors, for determining the number of convergent vectors, this test parameter will be used. (Andarz, 2009).

Step (2): Estimating long-run relationship between model's variables and estimated VECM model.

At this stage, the long-run relationship between variables in the model is estimated. Selected Optimal vector and results of the VECM model in this study are in Table 5:

TABLE V. RESULTS OF LONG-RUN RELATIONSHIP BETWEEN THE VARIABLES

Variable	Coefficient	t-student
EX	-589.86	-4.56
RR	-332.56	-2.02
C	23	

According to the results of long-term relationships, it can be stated that the dollar's value against the Euro has negative and significant impact on the stock price index. Also, long-term interest rates, has a negative effect on stock price index. Per unit increase in the value of dollar against the euro, the total stock index, per unit is reduced 589.86 in the long run. Also, for every one unit increase in long-term interest rates, the decrease in price index of stock is 332.56 units which is significant.

The results indicate that the coefficient of error correction sentence (ECM (-1) is and is significant 5%. It declares that 26 percent of the imbalance in one period adjusted in the next period. Thus, adjustment process tends to equilibrium with relatively low-speed.

Conclusion

People have different combinations of cash, shares, bank deposits, bonds, gold and currencies in their basket of financial assets. Increase in the value of dollar leads to decrease in the demand of oil importing countries, except America, which results in the reduction of long-term oil prices. increase in crude oil prices (given that there is no significant changes in oil supply) leads to the increase in the revenue of oil exporting countries, including Iran's, and leads to increased supply of dollars in domestic market. Greater supply of dollars to the domestic market leads to the increase in the value domestic currency. Increase the value of domestic currency leads to the reduction in the price of imported goods against domestic goods and leads to the increase in imports and consequently endangers internal manufacturers. Their profit will be reduces and the stock index will be reduced.

Change in exchange rate is one of the important factors affecting the treatment of debts. Increasing debts leads to the liquidity shortage, and lack of liquidity of economic enterprises has negative effect on profits distribution, stock returns and the price index. Also, increase in the prices of products, reduces the company's profit margins, prices and stock returns, and consequently stock index. On the other hand, due to the fact that there is no risk in long term deposits in the bank, this is a competitor for capital investment in the stock market.

Generally it could be said that the reduction of dollar against euro leads to increase in global oil prices and rising oil prices has a negative impact on the stock index and per unit increase in the dollar against the euro, the total stock market index will reduce about 589.86 units in the long run. Also, for every one unit increase in long-term interest rates, stock price index reduces about 332.56 which are significant.

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